C. N. M. Nyaruhucha, BSc, MSc., PhD, Senior Lecturer, J. M. Msuya, BSc, MSc, PhD, Senior Lecturer, and E. Matrida, BSc., Sokoine University of Agriculture, Department of Food Science and Technology, P. O. Box 3006, Morogoro, Tanzania

Request for reprints to: Dr. C. N. M. Nyaruhucha, Sokoine University of Agriculture, Department of Food Science and Technology, P. O. Box 3006, Morogoro, Tanzania

NUTRITIONAL STATUS, FUNCTIONAL ABILITY AND FOOD HABITS OF INSTITUTIONALISED AND NON-INSTITUTIONALISED ELDERLY PEOPLE IN MOROGORO REGION, TANZANIA

C. N. M. NYARUHUCHA, J. M. MSUYA and E. MATRIDA

ABSTRACT

Objective: **To determine nutritional status, food habits and functional abilities of the institutionalised and non-institutionalised elderly.**

Design: **A cross-sectional population survey.**

Setting: **Free living and institutionalised elderly of Morogoro municipality, Tanzania.**

Subjects: **A total of 100 elderly people, fifty institutionalised and fifty non-institutionalised were included. Gender distribution was of equal numbers.**

Measurements: **Anthropometric measurements of weights and heights were taken to enable calculation of Body Mass Index (BMI) of each subject. Questionnaires were used to collect information on types of foods, amount and frequency of consumption and functional abilities of the elderly. Amount of food consumed was expressed in grams per person per day.**

Results: **There were significant differences (p=0.001) in nutritional status between the institutionalised and the non- institutionalised males, but this relationship did not exist among the females. Similarly, 30% and 26% of the institutionalised males and females, respectively, and none of the non- institutionalised males was observed to be overweight. On the other hand, 39% and 23% of the non-institutionalised males and females, respectively, were underweight or malnourished. Consumption of sardines was higher (p=0.05) among the institutionalised subjects, but the situation was opposite for the case of fruits. Alcohol consumption was higher (p<0.05) among non- institutionalised subjects in both sexes. No difference was noted in consumption of beans, vegetables, cereals and meat. The most common functional disability was urinary incontinence (36%) while feeding (5%) was the least common. The most affected by urinary incontinence were institutionalised male subjects.**

Conclusion: **There was a great variation between elderly people who are cared for in institutional centres and those who are cared for by their relatives in terms of nutritional status, reflected by their BMI levels. The institutionalised ones appear to be better off than their counterparts. However, this condition is not equally reflected in their eating habits. Generally, most of the elderly have poor or no source of income, which make them to have poor living conditions. They are also faced with problems of functional disabilities of which urinary incontinence was more common among males.**

INTRODUCTION

The demographic profile of the world is changing. At the heart of transition is the growth in the number and proportion of older people. This is due to the fact that there have been advances in medical and immunization, sanitation and nutrition, which have increased life expectancy[1].

Traditionally, high birth rates and high proportion of the population under the age of fifteen years characterize the demographic structure of developing countries[2]. This was certainly appropriate until recently where the situation has changed rapidly; the ageing of the population is now a worldwide phenomenon. Already by 1960, more than half of the elderly population in the world lived in third world countries. Demographic projection between 1980 and 2000 years indicated that three quarters of the increase in the world's population would take place in the developing word[3].

This sizeable increase in elderly people is a social phenomenon with enormous economic and social repercussions, which have led to increased interest in the study of this population segment especially with respect to their care. In some cases, families, which historically have taken care of the elderly, have now changed to institutionalisation through the state or

religious organisations in such a way that some elderly people today receive care in public institutions other than from their families(1).

Elderly people make invariable socio-economic contribution to the society. For example, they do help with special family work such as caring for young children, food preparation and looking after animals. This helps in freeing younger people for other productive activities. However, an individual's functional ability determines, to a greater extent, his/her contribution(4).

The ability to get around in one' s environment is a basic human function necessary for independence and activities of daily life. Loss of mobility is a principal cause of a limited quality of life and increased dependency among elderly people.

Disability can affect nutritional status by impending participation in production, acquisition and preparation of food as well as in eating. Therefore, elderly people present different characteristics, which make them an especially vulnerable group with a higher risk of nutritional deficiency. The early detection of under-nutrition by means of non-invasive anthropometrical techniques can easily be applied to these persons(5). To the authors' knowledge, no study has been done in relation to food habits and socioeconomic conditions of elderly in Tanzania. Furthermore, no study has analysed the differences in food habits between institutionalised and independently living elderly people in Tanzania.

This study was conducted to assess the nutritional status, food habits and functional disability of institutionalised and non-institutionalised elderly people living in Morogoro area of Tanzania.

MATERIALS AND METHODS

Area of study: The study was conducted in Morogoro municipality in Eastern Tanzania. Two institutional centres were included namely, Funga Funga and Mgolole. On the other hand, non-institutionalised elderly individuals were included from the Chamwino area. Funga Funga camp, as it is commonly known, is located in northeastern part of the Morogoro town and the government manages it, while Mgolole centre is in the eastern part and is managed by the Catholic Church. Chamwino on the other hand, which is one of the suburbs of the Morogoro town, is located on the southern part.

Study design and data collection: The study adopted a cross-sectional approach whereby observations and interviews of elderly people in the three sites were conducted. Interviews were held by means of a structured questionnaire.

Anthropometric measurements: A total of 100 elderly people, fifty institutionalised and fifty non-institutionalised were used as subjects. All subjects were aged more than 60 years old. The anthropometric measurements (weights and heights) were determined by using bathroom weighing scale and tape measure respectively. Body weight was measured to the nearest 0.25 kg while height was measured to the nearest 0.01 cm. The weights and heights were then used to compute the Body Mass Index (BMI) using the formula: BMI = weight (in kg) divided by the square of height

(in m^2). The BMI of 25 (and above) was regarded as obese or overweight while below 18 indicated underweight, and values between 18 and 25 were regarded as normal body weights(4).

Determination of food intakes: Food habits were determined by means of 24-hour food recall method, whereby all foods consumed at each meal and between meals were recorded on interviews. The quantities of respective foods eaten were also stated and whenever possible actual measurements were conducted using standard measures such as glass tumblers, teacups and slices of bread, or other household utensils with known volumes.

Functional disability: To find out information on functional disabilities, respondents were asked and assessed whether they were able by themselves, or with assistance, to perform six basic activities in their daily living(5). The basic activities included urinary continence, toileting, dressing, bathing, feeding and transferring.

Analysis of data: The collected data on all variables under investigation were analysed using descriptive statistics under which results were expressed in means and standard deviations. In cases where variables were categorized, percentages were employed to reveal the categories or classes. Chi-square tests and student t-tests (paired and unpaired) of statistics) software package were used in categorical/qualitative and quantitative variables respectively. Pearson correlation based on statistical package for social science (SPSS) was used to examine adjusted relationship between variables(6).

RESULTS

Anthropometric measurements and nutritional status: The heights and weights of each respondent were measured for which the BMI was computed. The study showed that the body weights of elderly people increased with increase in heights (r = 0.19), for both institutionalised and non-institutionalised. There was a significant difference (p<0.05) in heights of males between institutionalised and non-institutionalised whereby the non-institutionalised were slightly taller than their counterparts. Institutionalised females weighed significantly higher (p<0.05) than the non-institutionalised. It was also noted that the heights of elderly people decreased with an increase in age.

The BMIs ranged from 21.63 to 36.23 and from 17.60 to 24.16 in institutionalised and non-institutionalised elderly, respectively (Table 1). There was no significant difference in BMI of the elderly of same sex between the institutionalised and non-institutionalised. Using the cut off points mentioned above, 30% and 26% of the institutionalised male and female, respectively, were observed to be overweight (Table 2). However, none of the non-institutionalised males was overweight or obese. Using chi-square statistics to test for relationships, the results showed that there were significant differences (p=0.001) in nutritional status between the institutionalised and non-institutionalised only in males. It is interesting to note that 39% and 23% of the non-institutionalised males and females, respectively, were underweight, which indicated that they were malnourished.

Table 1

Anthropometric measurements of elderly categorised by sex
and place of residence

	Males		Females	
	Institutionalised (n=23)	Non-institutionalised (n=28	Institutionalised (n=27)	Non-institutionalised (n=22)
Height (cm)	153.3 ±11.5a	156.8 ± 7.1*	156.3 ± 7.3	150.2 ± 8.0
Range	136- 185	141 - 169	134 - 167	139 - 164
Weight (Kg)	52.6 ± 7.4	47.5 ± 8.9	52.6 ± 7.4	47.5 ± 5.8*
Range	41 - 124	34 - 66	40 - 82	39 - 69
BMI (Kg/m^2)	22.7 ± 4.2	19.5 ± 2.9	23.1 ± 3.7	21.1 ± 11.7
Range	17.6 - 23.1	21.6 - 31.7	20.1 - 24.2	22 - 36.2

a = Represents the mean value ± standard deviation, *Institutionalised versus non-institutionalised ($p<0.05$)

Table 2

Cross tabulation of nutrition status of respondents categorised by sex and place of residence

Nutritional Status*	Males		Females	
	Institutionalised (n=23)	Non-institutionalised (n=28)	Institutionalised (n=27)	Non-institutionalised (n=22)
Underweight	2 (8.7%)	11 (39.3%)	4 (14.8)	5 (22.7%)
Normal	14 (60.9%)	17 (60.7%)	16 (59.3%)	14 (63.6%)
Overweight or obese	7 (30.4%)	0	7 (25.9%)	3 (13.6%)
	Chi-square value = 13.157; df= 2; P = 0.001		Chi-square value = 1.348; df= 2; P= 0.510	

*Underweight (BMI < 18); Normal (BMI   18 and BMI < 25); Overweight or obese (BMI ≥ 25)

Table 3

Mean (±SD) values of types of foodstuff consumed showing results of t-tests for differences
between institutionalised and non-institutionalised elderly

Type of food	Institutionalised (n=23) g/person/day	Non-institutionalised (n=28) g/person/day	Institutionalised (n=27) g/person/day	Non-institutionalised (n=27) g/person/day
Cereals	200±8	200±9a	200±9	199±19
Beans	50 ±2	52 ±2	50 ±2	51 ±3
Sardines	50 ±10*	30 ±10	50 ±10*	42 ±5
Fruits	45 ± 5*	163 ± 6	45 ±5*	150 ±4
Vegetables	12 ±2	20 ± 2	12 ±2	17 ±6
Meat	82 ±7	100 ± 6	82 ±6	100 ±3
Alcohol	185 ±32*	245 ± 34	143 ±31*	190 ±31

a = represents the mean values ± standard deviations, *Significant difference at $p<0.05$ between
the institutionalised and non-institutionalised elderly

Table 4

The most common source of income for institutionalised and non-institutionalised respondents

Source of income	Institutionalised (n = 50)		Non- institutionalised (n = 50)	
	No.	%	No.	%
Grants (Government and/or NGOs)	19	38	0	0
Agriculture	0	0	6	12
Begging	3	6	17	34
Assistance from relatives	2	4	3	6
Weaving	1	2	6	12
Assistance from other home members	0	0	4	8
Those unable to work	25	50	14	28

Table 5

The frequency of occurrence of functional disabilities among the institutionalised and non-institutionalised elderly categorised by sex

Functional disability	Males		Females		Total (%) of all
	Institutionalised	Non-institutionalised	Institutionalised	Non-institutionalised	
	(n =23)	(n=28)	(n=27)	(n=22)	(n=100)
	No. (%)	No. (%)	No. (%)	No. (%)	
Urinary incontinence	14 (60.9)	11 (39.3)	3 (11.1)	8 (36.4)	36
Toileting	2 (8.7)	8 (28.6)	5 (18.5)	2 (9.1)	17
Bathing	1 (4.35)	2 (7.1)	7 (25.9)	2 (9.1)	12
Dressing	2 (8.7)	2 (7.1)	5 (18.5)	5 (22.7)	14
Feeding	0	1 (3.6)	1 (3.7)	3 (13.6)	5
Transferring	4 (17.4)	4 (14.3)	6 (22.2)	2 (9.1)	16
Total of category	23 (100)	28 (100)	27(100)	22 (100)	100

Table 6

Occurrence of functional disabilities among the respondents categorised by age

Functional disability	Age groups of elderly (years)			Total (%)
	61-70	71-80	>80	
Urinary incontinence	30 (85.7)	0	6 (35.3)	36
Toileting	5 (14.3)	11 (22.9)	1(5.9)	17
Bathing	0	10 (20.8)	2 (11.8)	12
Dressing	0	14 (29.2)	0	14
Feeding	0	5 (10.4)	0	5
Transferring	0	8 (16.7)	8 (47)	16
Total	35(100)	48(100)	17(100)	100

Food habits: The food types given or eaten by the elderly included cereals, beans, sardines, fruits, vegetables and meat. Alcohol consumption was significantly higher (p<0.05) among the non-institutionalised respondents in both sexes. Only 38% of elderly were drinking alcohol, and of these, 72% were institutionalised and most of them were males (86%) compared to only 14% females. The mean values for different foodstuffs consumed by institutionalised and non-institutionalised elderly are shown in Table 3.

Consumption of sardines was significantly higher (p<0.05) among the institutionalised, while that of fruits was significantly higher in the non-institutionalised elderly in both sexes. No significant difference was observed in consumption of beans, vegetables, cereals and meat.

Sources of income for elderly people: The study showed that most of the institutionalised elderly people (Table 4) were either unable to work (50%) or were only getting grants from the government or non governmental organisations (38%). The non-institutionalised ones reported to have some sources of earning income, though very limited. The observed sources of income were mostly informal ones, which included begging, weaving, farming and assistance from relatives and /or other members of their households.

Functional disability: The common functional disabilities observed among the elderly are shown in Table 5. The most common disability was urinary incontinence (36%) while feeding (5%) was the least common. It appears that, urinary incontinence affected greater proportion of males that were institutionalised (60.9%) than the non-institutionalised (39.3%) ones. Among the institutionalised, comparison between sexes reveals that urinary incontinence was more common among male members (60.9%) than female members (11.1%). However, the trend was not so obvious for the non-institutionalised.

Table 6 summarises the occurrence of functional disabilities of all the respondents according to their varying age categories. Although it appears difficult to trace a general trend, one can say that impaired mobility (i.e. transferring functional disability) increases with increasing age among the elderly.

Other problems noticed among elderly people in institutionalised areas were availability of only a single meal per day and absence of recreational facilities. The study further reveals that only 33% of both institutionalised and non-institutionalised attained primary level of education while the rest had no formal education. Other common problems noted for both institutionalised and non-institutionalised respondents were lack of immediate assistance when required, and little or absence of health services.

DISCUSSION

From results in Table 1, the higher BMI in females than males institutionalised could be ascribed to absence of activities that required heavy physical exercises among the females, and therefore leading to deposition of excess fat hence increasing body weights. Similarly, the presence of well-developed pelvic girdle and breasts in mature females leads to relatively higher body weights and BMIs in females[7]. A review of nine surveys by James *et al.*[8] in third world communities that involved a variety of structured samples from China, India, Ethiopia, Zimbabwe, Mali, Somalia and Papua New Guinea has shown that men had weights in the normal range (BMI 18.5 - 25.0) that do not differ much from results of this study.

The positive correlation between heights and body weights observed in this study is similar to the findings of Chilima and Ismail[9]. Body weight is the sum of all mass of muscles, water and bones of a person. It is therefore expected that as the height increases, the bone content increases also resulting in increased body weight.

Generally, the BMIs of institutionalised males and females were slightly higher than those of non-institutionalised. This was probably due to the fact that elderly people in institutional centres were assured of having food, at least one meal that was complete per day, as opposed to those living freely who depended much on begging. On the other hand, little physical exercise among the institutionalised respondents could also explain their relatively higher BMIs. It is therefore not surprising that the majority of those who were found to be overweight, or obese, came from the institutionalised group. Moreover, one can argue that contrary to the observed lower levels of BMIs among the non-institutionalised group, this group had a higher intake of different food items, except for sardines. While the level of food intake is an important determinant of BMI status, it is not the only factor. To a certain extent, disease status and the type of health care that an individual gets also determines his/her BMI level[10]. This factor was not fully investigated in this study. However, with the introduction of user fees in health services[11], and given the low incomes that the elderly people are having, it is unlikely that those who are not living in institutional centres could afford to get sufficient health care.

In this study, the heights of older people decreased with the increase in age. This might be because of many chronic diseases such as spinal column problems coupled with poor nutritional status. The spinal column could have caused bending of their backs resulting into underestimation of their heights. This has also been reported in other studies[12-14].

The higher rate of alcohol consumption among the non-institutionalised elderly than the institutionalised ones could be ascribed to the fact that the elderly people in institutional centres are, to some extent, restricted from going out from their centres. Individuals are required by the authority to spend most of their time within the centres. Also, the requirement to be around during meal times could restrict members from going out, including drinking. Lack of sources of money among the institutionalised elderly may also explain their relatively limited intake of alcohol. It is obvious that to get the drink one needed to have money, something that was more difficult for the institutionalised elderly than their counterparts. Lasher *et al.*[15] reported a higher frequency of alcohol intake among the institutionalised elderly in Spain whereby unlike the situation in Tanzania, the management of the centres provided the alcohol.

The higher consumption of sardines among the institutionalised respondents ($p < 0.05$) than the non-institutionalised could be attributed to the fact that it is more convenient for the management in the centres

to purchase them in bulk and store, as compared to other foodstuffs. The situation is totally different with the elderly in free living who are found in different households with different eating habits and life styles.

Begging was the major source of income in non-institutionalised (34%) compared to only 6% of those who were institutionalised. This difference was likely to be due to lack of government assistance to elderly people who are not institutionalised. The fact that large proportions of non-institutionalised elderly (39% and 23% of males and females, respectively) were underweight, implying that they were malnourished, is something to be concerned about. It is likely that the non-institutionalised, or the elderly who are living together with their families, do not get the necessary care, particularly sufficient food. Currently, the government assistance to the elderly people is provided directly to the centres or through other agencies. This study also found that most elderly people have not obtained formal education and therefore they could not get good paying casual jobs, something that made their incomes extremely limited and unreliable.

The higher frequency of urinary incontinence among males could be related to the anatomical features of their male reproductive organs. The penile muscles become weak and fail to mediate urination through the normal way during the old age. This can lead to continuous dribbling of urine(16).

CONCLUSION

This study has shown that there is great variation between elderly people who are cared for in institutional centres and those who are cared by their relatives in terms of nutritional status as reflected by their BMI levels. The institutionalised elderly appear to be better off than their counterparts. However, this condition is apparently not a reflection of their eating habits. Generally, most of the elderly have poor or no source of income, which make them to have poor living conditions. They are also faced with problems of functional disabilities of which urinary incontinence was more common among the males.

It is recommended that the government develops a mechanism to assist the elderly people who are not living in institutional centres unlike the current system, which is only considering the institutionalised one.

It is perhaps time now for the government to consider formulating a policy to assist the elderly people who are not living in institutions, and who were not engaged in the formal sector and therefore not covered by the common pension scheme.

REFERENCES

1. Kibuga, F.K. The situation of older people in an ageing world. Help Age International, London, 1999.
2. Kalache, A. Ageing in Developing countries. In: Principles and Practices of Geriatric Medicine, ed. MSJ Pathy PP , Chichester, UK, 1991. (517 -1528)
3. Harris, A. Handicapped and Impaired in Great Britain. H.M. Stanley Stationery Office, London, 1971.
4. James, W. P. T., Ferro-Luzzi A. and Waterlow J. C. Definition of chronic energy deficiency in adults. *Eur. J. Clin. Nutr.* 1988; **42:**969-981.
5. Manandhar, M. C., Aklesaria, P. S., Myalt, M. and Ismail, S. J. Undernutrition and functional ability amongst poor people in urban India. J. *Nutr. Health and Ageing.* 1997; **1:**75-76.
6. Norusis, J. M. Guide to data analysis. SPSS® 8.0 Prentice-Hall, Upper saddle River, New Jersey, 1998.
7. Durnin, J. V. G. A., Mckay, F. C. and Webster, C. I. A new method of assessing fatness and desirable weight for use in the Armed services. Unrestricted report to Army Department, Ministry of Defence. West Publishing Company, St Paul, 1984.
8. James, W. P. T., Mascie-Taylor, C. G. N., Norgan, N. G., *et al.* The value of arm circumference measurements in assessing chronic energy deficiency in third world adults. *Eur. J. Clin. Nutr.* 1994; **42:** 969-981.
9. Chilima, D. M. and Ismail, S.I. Anthropometric characteristics of older people in Rural Malawi. *Eur. J. Clin. Nutr.* 1998; **52:**643-649.
10. Keys, A. Overweight, obesity, coronary heart disease and mortality. *Nutr. Rev.* 1980; **38:**297-307.
11. United Republic of Tanzania. National Health Policy. Ministry of Health. Dar es Salaam, Tanzania. 1990.
12. Fidanza, F. and Losito, G. Nutritional status of the elderly. *Eur. J. Clin. Nutr.* 1981; **12:**34-39.
13. Wolfson, L. J. Gait and Mobility. Textbook of Geriatric Medicine. Oxford University press, Oxford. 1992; 585-593.
14. Frisancho, A. R. Anthropometric standards for the assessment of growth and nutritional status. U.S.A; University of Michigan Press, Michigan, 1991.
15. Lasher, C., Gonz'alez, C., Patterson, A. M. and Ferna'ndez,S. Food habits and anthropometric measurements in a group of independent and institutionalised. Elderly people in Spain. *J. Nutr. Sci. Vitaminol.* 1998; **44:**757-768.
16. Peachey, K. Ageism: a factor in nutritional vulnerability of older people?, Oxford University Press, Oxford. 1999.