Original Article

Poor nutritional status in older black South Africans

Karen E Charlton[1] MSc, MPhil, Lesley T Bourne[2] MSc, PhD, Krisela Steyn[3] MD and Jacoba A Laubscher[2] BCom

[1]*Nutrition and Dietetics Unit, Department of Medicine, University of Cape Town, South Africa*
[2]*Urbanization and Health Programme, Medical Research Council, Parowvallei, South Africa*
[3]*Chronic Diseases of Lifestyle Programme, Medical Research Council, Parowvallei, South Africa*

A cross-sectional analytical study was undertaken to describe the nutritional status and dietary intake of the elderly black population of Cape Town. A stratified proportional sample of 148 men and women aged 60 years and older (mean = 68.9 ± 5.7) was selected from informal and formal peri-urban settlements. The study population was predominantly urbanized, although most subjects had migrated from non-urban areas. Trained fieldworkers conducted a 24-h recall dietary assessment and performed anthropometrical measurements. Mean energy intakes fell below the recommended dietary allowance (RDA) for both men and women; 27% and 36% of men and women, respectively, had energy intakes <67% RDA. Total fat intake was low and contributed 24–26% total energy. Mean dietary fibre intake was low at 11–16 g/day. Mean intakes fell below the RDA for vitamin D, calcium, zinc and vitamin B6. Less than two and a half servings per day were consumed from the vegetable and fruit group and less than one serving per day from the calcium-rich food group. Over half (51.3%) of the women and 18% of the male were obese (body mass index ≥30). We concluded that older black subjects in Cape Town have energy profiles in line with prudent dietary guidelines and more favorable than other elderly groups in the country, with regard to atherogenic risk. However, micronutrient and dietary fiber intake is inadequate, largely due to low reported energy intakes, particularly in women.

Key words: anthropometry, Cape Town, elderly, nutritional status, South African.

Introduction

It is estimated that 2.9 million South Africans are aged 60 years and older, which constitutes 6.2% of the total population.[1] The total population growth rate in South Africa is falling as a result of declining fertility rates. As more people reach old age, the growth rate of the 60+ age group has come to exceed that of the total population and this gap will widen considerably in the future.[1] In terms of life expectancy at birth, differences are seen between the racial groups in South Africa. Life expectancy for white South Africans is currently about 8–10 years higher than that for the black and coloured population and about 5 years higher than that for the Asian group (W Mostert, unpubl. data, 1997). As well as demographic differences between the groups, older black South Africans are particularly marginalized with regard to educational and socioeconomic attainment, provision for old age, indicators of health status and perceived quality of life.[2]

Older people are at nutritional risk, not only because of impaired digestion, absorption or utilization of nutrients associated with chronic disease or drug–nutrient interactions, but also due to an interaction between physiological, psychological and socioeconomic factors. Information on the nutritional status of community-dwelling South Africans is sparse and is largely limited to findings from four studies: a sample of older rural blacks in Hekpoort (*n* = 141);[3] a sample of urbanized blacks in the Free State (*n* = 400);[4] a study of older coloured subjects in Cape Town (*n* = 200);[5] and a sample of white elderly in Potchefstroom (*n* = 100).[6] A study of a rural black elderly sample in Pankop did not include a dietary assessment but measured biochemical parameters and anthropometrical assessments (*n* = 100).[7] The purpose of the present paper is to describe, for the first time, the dietary pattern of an urban elderly black community of the Cape Peninsula (the Black Coronary Risk Factor Study (BRISK study)) and to compare this with information on studies of other older South Africans.

Methods

Study population and sampling procedures

As part of a larger sample (that is, the BRISK study), a stratified proportional subsample of older subjects (*n* = 148; 74 males and 74 females) aged 60 years and older was drawn from the black residential areas in Cape Town, including squatter and formal housing areas, during the first quarter of 1990. The sample design was based on the census conducted in 1988 for the Cape Provinical Administration by the Human Sciences Research Council (HSRC).[8] A household was the sampling unit and was described as a group of people who cook and eat together. Only one subject was selected from each household sampled. A detailed description of the methodology of the survey is reported elsewhere.[9]

Correspondence address: Professor KE Charlton, Nutrition and Dietetics Unit, Department of Medicine, Medical School, University of Cape Town, Observatory 7925, South Africa.
Tel: 27 21 406 6534; Fax: 27 21 4486815
Email: kc@uctgsh1.uct.ac.za
Accepted 3 August 2000

Data collection and methods

Dietary assessment

Trained fieldworkers conducted a 24-h recall procedure and administered questions on habitual food intake. Real foods were used during the training to demonstrate appropriate ways of measuring portion sizes, using a dietary kit which had specially been developed. Interviews were conducted in the subjects' homes where the volumes of mugs, glasses, bowls and spoons could be determined and where the labelling of commercial food products could be checked.

The recorded quantities of food consumed were converted to gram weights using the Medical Research Council (MRC) Food Quantities Manual.[10] Average daily nutrient intake was calculated using the 1991 MRC Food Composition Tables.[11] The mean number of exchanges consumed from the five basic food groups – the calcium-rich food group, the protein-rich food group, the fruit and vegetable food group, the cereal food group and the fat food group, as well as of the confectionery, sugar and alcohol groups ('other') – was calculated.[12]

Macronutrient intakes were evaluated according to the dietary recommendations of the South African Diet Consensus Panel, which are in line with the American Heart Association (AHA) dietary guidelines.[13,14] Micronutrient intakes were compared with the US Recommended Dietary Allowance values for adults aged 51+ years.[15]

As a measure of the validity of the dietary assessment method, reported energy intakes were compared with estimated minimal energy requirements. Resting metabolic rate (RMR) was estimated using the sex- and age-specific equations of Schofield.[16] The RMR was multiplied by a factor of 1.3, which is considered by the FAO/WHO as being the lower range of energy requirements in free-living people.[17]

Anthropometry

Height was measured to the nearest 0.5 cm using a metal measuring tape against a wall and a flat headboard at right angles to the wall to ensure correct reading. Mass was determined on a good-quality standardized bathroom scale with the subject in light clothing and without shoes. Body mass index (BMI) was calculated as weight (kg) divided by height squared $(m)^2$. Mid-upper arm circumference was measured to the nearest 0.5 cm.

Results

Characteristics of the sample

The mean age of the subjects was 68.9 years (SD = 5.7; range 60–89 years). Most subjects (78%) lived in formal housing; however, 14% lived in informal housing (shack or tent) and the remainder lived in a hostel (8%). All of the females in the sample were above the age of eligibility for a state old age pension (that is, 60 years); however, 9% ($n = 7$) were still employed. Seventy-one per cent of males who were age-qualified for the state pension (that is, 65+ years) were receiving a pension, whereas 28% of males in this age group ($n = 14$) were employed. Overall, one-quarter of the sample were currently 'working for pay' (males = 38%; females = 12%). Eighteen per cent of the sample had no formal schooling. An additional 16.5% had received some years of primary school education, which is not necessarily indicative of 'functional literacy'.[18] Only 29% of males and females had attended secondary school (that is, 8–10 years of schooling) and of these only one subject had matriculated. The majority of the males (75%) and females (67%) had spent most of their childhood years in rural villages (that is, up to 10 years), thus reflecting a rural orientation in early life. Later migration to urban areas is demonstrated by the finding that 91% of males and 80% of females reported having spent more than 40% of their lives in a city. About half of the sample (47.3%) used paraffin for cooking, whereas 74% used electricity and/or gas (multiple responses possible).

Macronutrient intake

Mean energy, macronutrient and cholesterol intakes of the sample are compared with data from the four other studies in Table 1. Mean energy intakes fell below the RDA for both men and women in the present sample (Table 1); 27% of males and 36% of females had energy intakes below 67% of the RDA.[15] In males, mean energy intake was similar to older coloured men in Cape Town and rural black men in Hekpoort.[3,5] Females in the present study had the lowest mean energy intakes, compared to studies of other groups of older South Africans. In both males and females, fat intake was less than half that of older white South Africans and was most comparable to the rural black elderly sample in Hekpoort.[3,6]

Estimated energy requirements were significantly higher than the reported energy intake for both males (7867 compared to 7210 kj; $P = 0.016$) and females (7461 compared to 5116 kj; $P < 0.001$; Wilcoxon signed rank test). Mean differences between estimated and reported energy intakes were relatively small for men (660 (SD = 2959) kj), but large for women (2182 (SD = 2462) kj).

A comparison of the percentage contribution to total energy from macronutrients, and the dietary polyunsaturated-to-saturated fat (P:S) ratio and cholesterol and fiber intakes is shown in Table 2. Total fat intake was low and contributed about 24–26% total energy (E) for females and males, respectively, which was similar to the findings of a sample of urban black elderly in the Free State and a sample of rural black elderly in Hekpoort.[3,4] In contrast, the percentage of energy supplied by fat was high for a sample of older white South Africans (37–39%E),[6] and was intermediate for a sample of coloured elderly (about 32%E).[5] The P:S ratio was relatively low (0.68) in the present sample and was notably lower than that reported for elderly coloured subjects (0.83), which is related to a liberal use of plant oils in food preparation in the coloured cuisine.[5] Percentage energy from protein comprised between 14.2 and 15.7%E for females and males, respectively. Animal protein intake was slightly higher than plant protein intake, whereas in a sample of older coloured subjects in Cape Town animal protein comprised almost two-thirds of total protein intake (Table 2).[5] Percentage energy intake provided from carbohydrate sources was high for men and women (58–65%E), as it was for the other black samples cited.[3,4] Overall, older white South Africans had the lowest carbohydrate intake (<46%E),[6] while a sample of rural blacks had the greatest intake (> 65%E),[3] which is characteristic of a western versus cereal-based traditional diet, respectively. Mean dietary fiber intake did not meet the prudent dietary recommendation of 30 g/day for the present sample, nor for the elderly groups in any of the other studies

Table 1. Comparison of the energy, macronutrient and cholesterol intake of elderly South Africans

	RDA[15]	Present study (Cape Town)	Black rural elderly (Hekpoort)[3]	Black urban elderly (Free State)[4]	Coloured urban elderly (Cape Town)[5]	White urban elderly (Potchefstroom)[6]
n		148	100	400	200	100
Males		74	50	182	104	48
Females		74	50	218	96	52
Age group (years)		60–89		65–116	65–92	65–84
Energy (kj)						
Males	9600	7245 (2906)	6804 (1663)	11 852 (11 138)	8022 (3259)	9920 (2188)
Females	7980	5140 (2092)	7224 (1264)	10 622 (6111)	7014 (2230)	8198 (1873)
Protein (g)						
Males		67 (47)	52 (14)	80 (73)	69 (30)	89 (21)
Females		47 (23)	51 (13)	75 (55)	60 (22)	74 (21)
Animal protein (g)						
Males		42 (29)		80 (73)	45 (24)	65 (18)
Females		27 (19)		75 (55)	39 (18)	53 (18)
Plant protein (g)						
Males		25 (15)		48 (65)	23 (9)	23 (8)
Females		18 (9)		42 (29)	21 (7)	21 (7)
Fat (g)						
Males		50 (33)	42 (18)	78 (67)	69 (36)	100 (27)
Females		35 (24)	45 (16)	77 (57)	62 (27)	79 (22)
Saturated fat (g)						
Males		18 (13)		27 (26)	22 (12)	37 (12)
Females		12 (9)		29 (29)	20 (9)	28 (10)
Total Carbohydrate (g)						
Males		229 (104)	283 (92)	413 (495)	246 (87)	252 (73)
Females		180 (73)	279 (80)	364 (217)	215 (70)	220 (60)
Sugar (g)						
Males		48 (37)			89 (48)	73 (43)
Females		44 (28)			69 (45)	52 (39)

Data entries given as mean ± SD. RDA, recommended dietary allowance.

cited, except for urban black males in the Free State.[4] Subjects in the present study had fiber intakes which were about half that of the Free State sample. Alcohol intake was reported only in the present study (19% of males and 3% of females) reported having consumed alcohol during the previous day; mean = 61 (± 73) g/day and 65 (± 50) g/day, respectively). In the study of older coloured South Africans (30% of males and 9% of females) reported alcohol consumption during the previous month (mean = 10 (± 11) g/day and 4 (± 3) g/day, respectively).[5] Both mean values are only for those men and women who reported consuming alcohol and is not the mean for the total sample.

Micronutrient intake

The mean intakes of minerals and vitamins of subjects are compared with data from the other South African studies in Table 3. In both males and females in the present study, as well as in the other studies cited, mean intake did not meet the RDA for the following micronutrients: vitamin D, calcium, zinc and vitamin B6 (men only).[15] Subjects in the present study generally had the lowest mean micronutrient intakes, as compared to the other samples, which is in line with their lower energy intakes (Table 1). Micronutrient data are not available for the rural sample of older subjects in Hekpoort, except for mean calcium intakes of 463 (± 310) and 430 (± 277) mg/day for men and women, respectively.[3]

Contribution of food intake from the five basic food groups

The contribution of each of the five basic food groups to total daily intake is shown in Table 4. The mean intake from the vegetable and fruit group (that is, less than two and a half servings a day) was lower than the dietary recommendations of the South African Department of Health (1991).[19] The contribution of foods from the cereal group was mainly refined (that is, maize meal), which is reflected in the low fiber intake of the sample. The mean number of servings from the protein-rich group (which includes meat, fish, chicken, eggs and legumes) consumed daily was higher than the recommended four portions per day for males. Most of the total fat intake was supplied from brick margarine, which is comprised of fat sources with a P:S ratio of 0.05–1.9. The low calcium intake of the sample is explained by the low mean number of servings from the calcium-rich food group (less than one serving of 250 mL milk or equivalent, per day).

Table 2. Comparison of the mean (SD) energy distribution, P:S ratio, cholesterol and fiber intakes of older South Africans

	Recommended[13]	Present study (Cape Town)	Black urban elderly (Free State)[4]	Black rural elderly (Hekpoort)[3]	Coloured urban elderly (Cape Town)[5]	White urban elderly (Potchefstroom)[6]
n		148	400	100	200	100
Males		74	182	50	104	48
Females		74	218	50	96	52
Age group (years)		60–89	65–116		65–92	65–84
% E protein	13%					
Males		15.7 (5.2)	11.5	12.9 (1.5)	14.3 (2.5)	15.4 (1.9)
Females		14.2 (4.5)	12.1	11.8 (1.7)	14.7 (3.3)	15.5 (2.5)
% Animal/Total protein						
Males		58 (22)			64 (10)	
Females		52 (23)			63 (10)	
% E Fat	< 30%					
Males		25.9 (10.4)	25.1	23.3 (5.8)	31.8 (5.1)	38.6 (5.2)
Females		24.1 (10.8)	27.7	23.5 (6.1)	33.1 (5.6)	36.8 (5.7)
P:S Ratio	≥ 1					
Males		0.69 (0.47)	0.67	0.83 (0.24)	0.5 (0.3)	
Females		0.68 (0.48)	0.59	0.84 (0.24)	0.6 (0.3)	
% E Carbohydrate	> 57%					
Males		57.9 (15.8)	59.9	69.0 (6.8)	56.3 (7.2)	43.2 (7.3)
Females		64.8 (14.4)	58.5	64.7 (7.3)	55.9 (7.3)	45.9 (6.2)
% E Sugar	< 10%					
Males		12.1 (9.4)			18.9 (8.0)	12.2 (5.7)
Females		15.9 (10.5)			16.2 (9.2)	10.7 (6.9)
Dietary fiber	30 g					
Males		16 (11)	31 (38)	12.5 (6.2)	17 (8)	22 (8)
Females		11 (7)	28 (19)	12.0 (7.7)	16 (8)	23 (7)
Cholesterol	≤ 300 mg					
Males		300 (344)	356 (348)		285 (168)	412 (193)
Females		175 (162)	334 (318)		225 (114)	308 (108)

Table 3. Daily micronutrient intake of older South Africans in urban areas

Nutrient	RDA[15] Men, Women	Present study (Cape Town)	Males, Females Black (Free State)[4]	Coloured (Cape Town)[5]	White (Potchefstroom)[6]
Vitamins					
Vitamin A (RE)	1000, 800	1214 (4456), 379 (425)	3458 (5523), 2866 (3197)	1185 (971), 987 (759)	2142 (632), 1922 (761)
Thiamin (mg)	1.2, 1.0	0.90 (0.63), 0.65 (0.42)	1.70 (1.55), 1.48 (0.93)	0.95 (0.47), 0.86 (0.36)	1.4 (0.4), 1.2 (0.3)
Riboflavin (mg)	1.4, 1.2	1.29 (2.52), 0.69 (0.44)	1.66 (1.32), 1.56 (1.58)	1.4 (0.9), 1.3 (0.7)	1.8 (0.7), 1.7 (0.5)
Niacin (mg)	15, 13	14.8 (10.6), 9.1 (6.0)	15.5 (11.0), 14.4 (9.5)	16.3 (8.5), 14.4 (6.2)	20.7 (4.9), 18.6 (3.7)
Vitamin B_6 (mg)	2, 1.6	1.11 (0.73), 0.76 (0.50)	1.06 (0.86), 1.1 (1.0)	1.3 (0.7), 1.3 (0.6)	1.6 (0.3), 1.6 (0.3)
Folate (µg)	200, 180	210 (250), 125 (90)	171 (124), 159 (122)	236 (129), 210 (92)	212 (84), 209 (69)
Vitamin B_{12} (µg)	2.0	9.2 (47.6), 2.2 (3.2)	6.92 (14.0), 6.3 (1.4)	8.9 (8.3), 6.8 (6.2)	5.9 (3.1), 4.9 (2.1)
Vitamin C (mg)	60	49 (108), 23.5 (32.5)	57.4 (60.7), 64.9 (154)	61 (62), 65 (84)	58.7 (23.6), 75.7 (49.5)
Vitamin D (µg)	5	2.0 (3.2), 1.6 (3.2)	1.47 (1.47), 1.45 (1.95)	3.6 (2.7), 2.8 (1.7)	2.8 (2.3), 2.3 (1.9)
Vitamin E (mg)	10, 8	6.2 (6.6), 2.6 (3.7)	9.91 (8.91), 8.2 (6.5)	14.7 (7.3), 13.2 (6.6)	18.6 (7.1), 13.2 (4.7)
Minerals					
Calcium (mg)	800	424 (234), 319 (237)	513 (412), 631 (1401)	499 (263), 482 (216)	819 (357), 734 (357)
Iron (mg)	10	8.7 (6.8), 5.4 (3.0)	14.8 (12.6), 12.8 (7.2)	9.5 (4.8), 8.6 (3.8)	13.3 (3.5), 11.4 (2.4)
Magnesium (mg)	350, 280	253 (122), 181 (75)	423 (314), 376 (234)	260 (109), 235 (85)	341 (108), 290 (69)
Phosphorus (mg)	800	917 (401), 629 (288)	1207 (798), 1185 (1271)	1030 (458), 915 (327)	1367 (477), 1201 (285)
Zinc (mg)	15, 12	9.2 (6.6), 6.5 (4.4)	10.6 (7.4), 9.8 (6.8)	9.3 (4.4), 8.0 (3.1)	12.2 (3.1), 10.1 (2.5)
Copper (mg)	–	1.8 (5.4), 0.7 (0.4)	1.47 (1.67), 1.28 (1.07)	1.5 (0.9), 1.5 (0.9)	1.5 (0.5), 1.3 (0.3)

All data entries are given as mean (SD). RDA, recommended dietary allowance.

Table 4. Mean number of portions consumed from the five basic food groups

Food group	Recommended[19] number of servings/day	Males $n = 74$	Females $n = 74$	Percentage consumers overall $n = 148$
Calcium-rich group*	1.6 (400 mL)	0.69 ± 0.67	0.54 ± 0.59	75.5
Milk		0.68 ± 0.67	0.53 ± 0.57	75.0
Cheese		0.01 ± 0.07	0.01 ± 0.10	0.5
Protein-rich group†	4	5.73 ± 4.19	3.46 ± 2.92	83.8
Red meat		1.52 ± 3.39	1.28 ± 2.24	29.7
White meat		2.27 ± 2.92	1.19 ± 1.99	41.9
Eggs		0.35 ± 0.75	0.25 ± 0.64	15.5
Legumes		0.41 ± 0.98	0.21 ± 0.58	18.9
Organ, processed Meat, combined dishes		1.18 ± 3.07	0.52 ± 1.40	16.9
Vegetable and fruit group‡	5	2.31 ± 2.34	1.70 ± 1.48	75.0
Vitamin C-rich		0.20 ± 0.57	0.08 ± 0.24	20.3
Carotene-rich		0.24 ± 0.50	0.25 ± 0.45	25.7
Potato, sweet potato		1.29 ± 1.72	0.98 ± 1.09	25.7
Other veg/fruit		0.95 ± 1.83	0.25 ± 0.89	54.7
Cereal group§	4 +	8.01 ± 4.93	6.46 ± 3.74	97.2
Unrefined		1.76 ± 2.69	1.02 ± 1.89	39.2
Refined		6.25 ± 4.76	5.44 ± 3.65	91.9
Fat group¶	3–5	2.38 ± 3.14	2.03 ± 2.53	64.2
Dripping, saturated fat		0.51 ± 1.36	0.64 ± 1.77	23.6
Brick margarine		1.00 ± 1.93	1.01 ± 1.57	44.6
Oil, tub margarine		0.51 ± 1.36	0.39 ± 0.96	22.2

*One calcium-rich food group exchange = 250 mL milk. †One protein-rich food group exchange = 30 g cooked meat, fish or chicken; 1 egg; or 125 mL of cooked legumes. ‡One fruit/vegetable food group exchange = one portion of fruit (15 g carbohydrate) or 125 mL vegetables (5 g carbohydrate). §One cereal food group exchange = 30 g bread; 125 mL rice or pasta, etc. ¶One fat food group exchange = 5 mL oil, margarine, butter.

Anthropmetrical assessment

Mean anthropometrical measures are compared with findings from other studies of older South Africans in Table 5. The findings of the present study, as well as those of three other cited studies of older black and coloured elderly, demonstrate that both men and women appear to be shorter in stature than older white South Africans. Women in the present study had a very high prevalence of obesity; over half of the sample had a BMI ≥ 30. Almost one-fifth of the males were classified as obese. In contrast, the prevalence of obesity in rural black women was reported by Johnson and van der Westhuizen (1992)[7] to be markedly lower, and no cases of obesity were reported for rural men. Mid-arm circumference, another indicator of obesity, was highest for subjects in the present Cape Town sample and was similar to that reported for the older white sample.[6]

Discussion

The sample of older black subjects in Cape Town was found to have a low energy intake; over one-quarter (27%) of males and over one-third (36%) of females had energy intakes below 67% of the RDA, which is the cut-off generally considered to indicate dietary inadequacy. In terms of diet composition, the proportion of energy supplied by fat was low (24–26%E) and is comparable to data reported for a sample of older black adults in both the urban Free State and rural Hekpoort.[3,4] The ratio of protein, fat and carbohydrate to total energy intake provides an indication of the atherogenicity of the diet and identifies a population's position in the 'nutrition transition'. As socioeconomic status and urbanization in a population increases, diets high in complex carbohydrates and fiber are replaced by diets containing a higher proportion of fats, saturated fats and sugars.[24] In this regard, the available data for older South Africans suggest that elderly white South Africans have a high fat intake (> 35%E), while coloured elderly have an intermediate fat intake (32%E), as compared to the data from black South Africans reported here and elsewhere.

The mean intake of subjects in the present study was low for most micronutrients. It has been argued that it is difficult to meet the requirements for vitamin and minerals when energy intake falls below about 6.3 MJ/day.[25] In this regard, the particularly low micronutrient values of the females is probably a function of their reported inadequate energy intake. For example, the low mean iron intake of 5.4 mg/day (43.3% had intakes < 67% RDA) is less than half of that reported for a sample of urban older blacks in the Free State, whose mean energy intakes were twice as high.[4] It has previously been suggested that micronutrient density (that is, nutrient intake per 4.18 MJ) provides a more valid indicator of adequacy of dietary intake than absolute intakes in older adults and allows comparison between groups with different energy intakes. However, in samples where overall energy intake is low, the use of density values may provide a misleadingly favourable picture.

Male and female subjects in the present study, as in all of the other studies cited, had particularly low mean intakes of vitamin D, calcium and zinc, which is consistent with data

Table 5. Comparison of the nutritional status by means of anthropometrical data in samples of older South Africans: means (SD)

Measurement	Reference value	Present study (Cape Town)	Coloured urban (Cape Town)	Black rural (Hekpoort)[4]	Black rural (Pankop)[8]	Black urban (Free State)[20]	White urban (Potchefstroom)[11]
n		148	200	100	100	400	100
Males		74	104	50	33	182	48
Females		74	96	50	67	218	52
Age group (years)		60–89	65–92	60–105	60–96	65–116	65–84
Height (cm)							
Males	173.0†	165.9 (6.7)	163.9 (7.8)	163.2 (5.3)	164.4 (5.0)	163.8 (7.3)	175 (10)
Females	160.0†	154.9 (6.3)*	151.3 (6.7)	150.5 (6.1)	152.7 (5.9)	151.2 (6.4)	160 (7)
Weight (kg)							
Males	77.0†	70.6 (14.3)	65.0 (14.4)	54.7 (10.7)	61.1 (13.4)	59.6 (12.5)	78.7 (12.2)
Females	65.0†	72.5 (16.2)	65.7 (13.3)	58.7 (15.5)	58.8 (14.4)	62.4 (18.1)	72.0 (11.8)
Body mass index (BMI)							
Males	18.5	25.7 (5.1)	24.2 (5.1)	20.5 (3.8)	22.6 (4.6)	22.2 (4.1)	25.7 (3.3)
Females	29.9[21] ‡	30.3 (6.9)*	28.9 (5.7)	25.7 (6.0)	25.0 (5.2)	27.1 (7.3)	27.6 (4.5)
Obesity (%) (BMI ≥ 30)							
Males		17.6	14.0	4.0	0	5.0	2.3
Females		51.3	38.0	12.0	13.4	19.9	23.1
Triceps skinfold thickness (mm)							
Males	12.9§			8.2 (5.1)	10.1 (6.8)	7.8 (3.8)	13.2 (6.0)
Females	20.6§			17.9 (18.6)	19.1 (8.3)	16.5 (7.8)	22.5 (8.7)
Mid-upper arm circumference (MAC) (cm)							
Males	26.8**	29.9 (3.9)	26.3 (3.4)		25.4 (4.4)	26.4 (3.4)	30.3 (3.2)
Females	22.5**	31.3 (5.0)	29.0 (4.3)		27.5 (4.3)	28.4 (5.1)	31.8 (3.9)

*$P \leq 0.05$; difference between males and females. †Persons aged 51+ years.[15] ‡World Health Organization (1997).[21] §Persons aged 7 years on the 50th percentile.[22] **Persons aged 65–74 years.

on older populations in other countries.[26,27] With respect to the adequacy of vitamin D intake in the South African studies, the US Food and Nutrition Board of the Institute of Medicine have recently recommended an even higher adequate daily intake of vitamin D for adults aged 71 years or older than the present RDA, namely 15 µg (600 IU) per day.[28] It is often assumed that people living in equatorial countries at latitudes of below 40°N or 40°S receive sufficient sunlight for adequate vitamin D production from 7-dehydrocholesterol in the skin. However, a recent in vitro study in Cape Town (latitude 35°S) has demonstrated a significant seasonal variation in the production of vitamin D from its precursor through sunlight exposure; minimal vitamin D was formed during the winter months May through September.[29] This finding raises the question of whether oral vitamin D supplementation is indicated for older South Africans. The implications of the low calcium intake of subjects in the present study, particularly for females, in terms of bone health is unclear. A study conducted over 20 years ago reported that the prevalence of hip fractures in black South African women was more than 10-fold lower than that seen in their black American counterparts, or in white American women.[30] The apparent anomaly which exists between low dietary calcium intakes and a low observed prevalence of osteoporosis in older blacks in Africa warrants further investigation. Biochemical and hematological indicators of nutritional status were not assessed in the present study, thus further interpretation of the reported dietary data is limited.

The use of different dietary methodologies in the studies cited limits the interpretation of the comparative data. The present study of black elderly in Cape Town and rural black elderly in Hekpoort[3] employed a 24-h recall method, whereas a semiquantified food frequency questionnaire (FFQ) was used in the study of coloured South Africans.[5] The remaining two surveys cited included both a 24-h recall and FFQ method.[4,6] The low energy intakes reported in the present study, particularly for females, questions the validity of the 24-h recall method, of which underreporting of intake is a potentially inherent methodological problem.[31] Further, a method based on one day's food intake is likely to yield a higher percentage of individuals below a fixed cut-off point such as the RDA, than a method including several days' consumption per individual.[32] Comparison of estimated minimal energy requirements with reported energy intakes suggests underreporting of food intake, more so in females than in males. However, a subsequent verification study on 50 adult black males and females from the same population (albeit younger than 60 years), which involved in-depth probes on snacking and nibbling habits, showed only a 7.4% increase in energy intake over that recorded in the original study.[33] In addition, the ratios of protein, fat and carbohydrate to total energy reported in the present study compare well with the only other published study of older urban black South Africans (in the Free State).[4] This finding suggests that any underreporter error is likely to be consistent across the food groups. However, a combination of both a FFQ method and a 24-h recall may have resulted in overreporting of food intake in the Free State and Potchefstroom studies.[4,6]

Information on intake of food types is important to inform the development of food-based dietary guidelines and nutrition education activities. The poor micronutrient intake of the subjects is explained by the small number of portions of foods from the calcium-rich food group. It is also explained by the small proportion of subjects who reported that they had consumed foods from the vitamin C- or carotene-rich vegetable group. Brick (hydrogenated) margarine was the spread most frequently used by subjects. The atherogenic properties of a high hydrogenated fat (that is, trans-fatty acids) intake is controversial; however, available evidence suggests that this isomer increases low-density lipoprotein (LDL) cholesterol.[34]

In the multicountry SENECA–Euronut study of elderly in European countries, an enormous variability in micronutrient intake was seen both between and within centers; this was explained by studying intake of food from the various food groups.[35] Notably, vitamin A intake was higher in northern European centers, as a result of a higher consumption of milk and dairy products, while the intake of β-carotene and vitamin C was lower in northern towns because of a lower intake of fruit and vegetables.

Regarding anthropometrical status, subjects in the present study were of shorter stature and had lower body weights and BMI values than white South Africans, whose anthropometric profiles are similar to older Americans.[36] Observational studies have shown an association between impaired intrauterine and childhood growth and subsequent later increased risk of coronary heart disease.[37,38] It has been suggested that adult lifestyles add to the effects of intrauterine insult, particularly in the case of development of adult obesity in people who were small at birth and who were undernourished as young children.[39] In this regard, older previously disadvantaged South African populations who may have been exposed to early chronic malnutrition may be at risk of these additive effects, at least in the case of women.

Older white and coloured South African women tend towards obesity; however, the more than twofold difference in the prevalence of obesity identified between urban black women in the present study, in Cape Town (51%) and those in the urban Free State sample (20%) is puzzling, particularly with respect to the lower energy intakes of the former. Older black and coloured males tend towards undernutrition, particularly in rural areas. In the rural Pankop study, almost one-third of males (30%) and one-tenth (13.4%) of females had BMI values below 20 and 19 kg/m^2, respectively.[7] Although the BMI provides a quick and relatively easy indicator of obesity or underweight in adults,w its interpretation is limited in the elderly due to a reduction in the proportion of lean body mass to fat mass with age, which results in an empirical underestimation of fatness.[40] In addition, since the index incorporates height as a denominator, its usefulness to compare adiposity across populations who have different height distributions, as a result of differing exposure to varying socioeconomic circumstances in early life, may be inappropriate.

Conclusion

The black elderly population of peri-urban settlements of low socioeconomic status in Cape Town currently consume a diet which is line with prudent dietary recommendations, in terms of energy profiles, and which is more favourable with regard to atherogenic risk than other groups of the same age in the country. The low micronutrient intake, particularly in females, is probably a function of their low reported energy intakes and strategies to improve micronutrient density are required. The prevalence of obesity (51%) identified in women in this sample is higher than that reported in other studies of older South Africans and the causes for its manifestation remain unexplained by the dietary data. The coexistence of undernutrition and overnutrition in this age group presents a challenge to health-care workers in the country. Future generations of black South Africans are expected to undergo the nutrition transition associated with increasing urbanization trends. The country's revised health and welfare policies, which aim to redirect subsidies from institutionalized and tertiary care to community-based care for the elderly need to incorporate nutrition services aimed at this growing sector of the population, in order to maximize physical functioning and independence.

Acknowledgement. The work was carried out, in part, while the first author (KC) was based at the Human Sciences Research Council/ University of Cape Town Centre for Gerontology, University of Cape Town.

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