The Nutritional Vulnerability of Older Guyanese in Residential Homes

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ABSTRACT

Objective: *To assess the nutritional status, functional ability and food intake of older Guyanese in residential care.*

Methods: *Eighty-four residents of one public and two private homes underwent an anthropometric and functional ability assessment including height, weight, armspan, arm and calf circumferences and handgrip strength. Food intake in two private homes was measured over seven days by direct weighing and the use of consumption units.*

Results: *The overall prevalence of underweight was 26.2% and of overweight was 17.8% but the prevalence of underweight was higher in the public home (29.3% underweight and 17.2% overweight in the public home, and 19.2% underweight and 19.2% overweight in the private home). Mean handgrip strength was 26 kg in males and 17.7 kg in females. The nutritional adequacy of the diet provided by one of the homes was poor with the food providing less than 50% of the required amount of zinc and vitamins A, D and C. Neither home met the requirement for energy.*

Conclusion: *A high prevalence of malnutrition exists in a public home for the elderly and, to a lesser degree, in two private homes. In the context of a rapidly ageing population and tight financial constraints, the challenge of providing an adequate diet must be given priority.*

Vulnerabilidad Nutricional de los Ancianos Guyaneses en los Hogares de Ancianos

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RESUMEN

Objetivo: *Evaluar el estatus nutricional, la capacidad funcional, y la ingestión de alimentos de ancianos guyaneses en el cuidado residencial.*

Métodos: *Ochenta y cuatro residentes de dos hogares privados y uno público fueron sometidos a una evaluación antropométrica y de su capacidad funcional, que incluyó altura, peso, medida de la distancia de los brazos abiertos, brazos, circunferencias de la pantorrilla, y fuerza del puño. La ingestión de alimentos en dos hogares privados fue medida durante siete días mediante el peso directo y el uso de unidades de consumo.*

Resultados: *La prevalencia general del bajo peso corporal fue de 26.2% y la del peso corporal excesivo de 17.8%, pero la prevalencia del bajo peso fue más alta en el hogar público (29.3% de bajo peso frente a 17.2% de peso excesivo en el hogar público, y 19.2% de bajo peso frente a 19.2% de peso excesivo en el hogar público). La fuerza media del puño fue 26 kg en los hombres y 17.7 kg en las mujeres. La adecuación nutricional de la dieta suministrada por uno de los hogares fue pobre, formada por alimentos que proveían menos del 50% de las cantidades requeridas de zinc y vitaminas A, D, y C. Ninguno de los hogares satisfacía los requerimientos energéticos. .*

Conclusion: *En el hogar público para los ancianos, la prevalencia de la malnutrición es alta en grado alarmante, y lo mismo ocurre, en menor grado, en los dos hogares privados. En el contexto de una población que se avejenta rápidamente y que experimenta serias limitaciones financieras, hay que dar prioridad al reto de suministrar una dieta adecuada.*

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INTRODUCTION

The most striking demographic trend in the 21st century will be the increasing number and proportion of elderly people in all regions of the world, both developed and developing. This is a feature of the 'demographic transition' which sees fertility and mortality rates fall with improvements in sanitation, medical care and birth control. Guyana is no exception to this but the situation is further intensified by the high levels of out-migration. The United Nations median prospect for Guyana is that by 2050 the total population will fall but the proportion of the population aged over 65 years will increase from 5% in 2000 to 27.3% in 2050, an increase in absolute numbers of 100 000 people. The increase in those aged over 80 years is even more dramatic, rising from 6000 (0.9% of total population) in 2000 to 35 000 (7%) in 2050 (1).

Nutritional vulnerability is defined as the presence of risk factors for malnutrition. Whilst the physiological changes that accompany ageing are important risk factors, there are many other social, economic, physical and psychological factors that also determine what and how much an elderly person eats. Examples include bereavement, social isolation, poverty, dementia, and physical disorders that limit mobility and food acquisition.

The consequences of the risk factors outlined above are woven into the overall web of nutritional vulnerability: many of them not only cause nutritional vulnerability but are, in turn, enhanced by it. Inadequate nutritional status in the elderly has important consequences for health and functional ability: their decline in a person leads to a loss of independence and an increased need for care. Such dependence is a critical issue in Guyana where so many younger adults have left the country.

The objective of this study was to conduct a cross-sectional survey of nutritional status and functional ability in three homes for the elderly, one a public institution and two private ones. Food intake was also assessed in the two private homes. The studies were part of a broader project to improve the nutrition and quality of life of the residents of the two private homes.

SUBJECTS AND METHODS

The anthropometric study was conducted between November 2002 and February 2003 in an urban area of Guyana. Three homes were included: a large (over 300 beds) public residential institution for the elderly, a private home with 16 beds and another private home with 38 beds.

All residents aged over 60 years were invited to take an adapted version of the Abbreviated Mental Test (AMT) to assess their ability to give informed consent to be measured (2). The consent of all those scoring seven or above in the test was sought. All measurements were taken by the researcher and two local fieldworkers who underwent training and practice sessions. Height was measured against a wall or door frame using a microtoise type stadiometer. If the person could not stand upright with heels, buttocks, shoulders and head against the support, the measurement was not taken. Weight was measured without shoes using portable scales to the nearest 0.5kg. If the person could not stand on the scales unsupported, the measurement was not taken. Armspan was measured using a tape measure between the person's outstretched arms. The arms were held parallel to the floor and in line with the body with the palms facing forward. The measurement was taken from the middle fingertips. Mid-upper arm circumference (MUAC) was measured using a tape measure positioned midway between the acromion and the olecranon processes. Calf circumference was measured with the person lying down with their left leg bent at a 90º angle at the knee. The tape measure was positioned at the widest point of the calf. All length and circumference measurements were taken to the nearest millimetre and followed the methods of Lohman *et al* (3). Handgrip strength was measured using a grip strength dynamometer (Takei Scientific Instruments Co, Ltd, Japan). The person was given two attempts with each hand with at least two minutes between each attempt. Measurements were taken to the nearest one kilogram and their greatest attempt was used subsequently.

Body mass index (BMI) was calculated using the formula weight(kg)/height(m)^2 for all those residents for whom both measurements were available. For those in whom height could not be measured directly, it was estimated using the armspan measurement and the regression equations of Manandhar *et al* for those of Indian descent and of Chilima *et al* for those of African descent (4, 5).

African males: height, cm = 51.5 + (0.64 x armspan)
African females: height, cm = 45.9 + (0.66 x armspan)
Indian males: height, cm = 40.3 + (0.71 x armspan)
Indian females: height, cm = 43.8 + (0.67 x armspan)

For the one Caucasian (of six) in the sample for whom height could not be measured, measured armspan was used to calculate BMI as Caucasian armspans are almost exactly equal to their heights (6). For those residents with an actual or estimated BMI, malnutrition was defined using the standard cut-offs of: malnourished (< 18.5 kg/m^2), normal (18.5 – 24.9 kg/m^2) and overweight or obese ($ 25 kg/m^2) (7). If BMI could not be calculated for a resident then MUAC was used with a cut-off of 24 cm in all persons of African descent, of 23 cm in men of Indian descent, and of 22cm in women of Indian descent (8). These values are obtained by regressing MUAC and BMI and calculating MUAC values equivalent to BMI cut-offs (8). If neither BMI nor MUAC could be used then calf circumference was used with a definition of malnutrition of < 30.5 cm (9).

Food intake was assessed over seven days in the two private homes in April 2003. All food served by the kitchen was weighed raw during preparation and all left-overs were weighed. Records were also made of the number of participants in the meal (residents and staff), their gender and age. The total amount of each food consumed was calculated and the nutritional composition of those foods was calculated by

hand using the food tables of McCance and Widdowson (10), the Caribbean Food Composition Tables (11), and manufacturer's data. Using an elderly man (> 60 years) as a base (one consumption unit), consumption units of all other individuals were obtained by calculating their nutrient requirements as a proportion of the requirement of the elderly man. Total consumption units for each meal were obtained by summing the consumption units of all individuals consuming that meal. The total nutrient consumed at the meal was then divided by the total consumption units for that meal, and values for the three meals each day were summed to give the nutrient intake per consumption unit per day This procedure was followed for each nutrient. A weighted average requirement using the Recommended Dietary Allowances for the Caribbean (12) was calculated to give a combined nutrient requirement for men and women and the nutrient per consumption unit per day as a proportion of the requirement was calculated, to assess adequacy. No attempt was made to measure the food that the residents ate from sources other than the kitchen. Nutrients analyzed were energy, protein, calcium, vitamin D, vitamin C, iron, zinc, retinol equivalents, vitamin B_{12} and folate.

Formal approval for this study was given by the homes studied, the Guyana Association of Professional Social Workers and the Ethics Committee of the University of Westminster.

RESULTS

There were 215 residents aged over 60 years at the public home and 187 (87%) undertook the AMT. Forty-two men and eighteen women passed the test (42% and 21% of those tested respectively). Forty-one men and seventeen women consented to be measured giving a total sample of 58 (27% of all those over 60 years).

There were 46 residents aged over 60 years in the two private homes. Only one home had male residents and they were in the minority so the genders are not presented separately. In addition, one home had a sample of only four after testing so the two private homes are considered together. Forty residents (67%) undertook the AMT. Twenty-seven residents passed the test (68% of those tested) and 26 consented to be measured (57% of all those over 60 years); six (23%) of these were men.

The average age of men at the public institution who participated in the anthropometry was 73.3 years and of the women was 75.8 years. The average age of the participating residents in the private homes was 82.9 years. The nutritional status of the residents are presented in Table 1. Handgrip measurements were obtained for 56 residents of the public home and all residents of the private homes. The results are presented in Table 2. The results of the seven day food intake survey are shown in Table 3.

Table 1: Nutritional status of the residents of the three homes

Nutritional status*	Public home			Private homes	All homes combined
	Men	Women	Total	Total	
Underweight	13 (31.7%)	4 (23.5%)	17 (29.3%)	5 (19.2%)	26.2%
Normal	22 (53.7%)	9 (52.9%)	31 (53.4%)	16 (61.5%)	56%
Overweight/Obese	6 (14.6%)	4 (23.5%)	10 (17.2%)	5 (19.2%)	17.8%
Totals (N)	**41**	**17**	**58**	**26**	**84**

* See Methods section for definitions

Table 2: Handgrip strength of the residents of the three homes

Handgrip strength kg	Public home		Private homes
	Men (n = 40)	Women (n = 16)	(n = 26)
Mean	25.5	18.7	19.7
Standard deviation	8.4	4.5	7.4
Minimum	7	6	9
Maximum	48	26	43

Table 3: Seven day averages of the proportion of nutrient requirements met by food provided by two private homes

Nutrient	Percentage of requirement met (7-day average)	
	Home 1	Home 2
Energy	71%	89%
Protein	99%	118%
Calcium	91%	81%
Iron	77%	89%
Zinc	43%	53%
Vitamin A	50%	100%
Vitamin D	30%	91%
Vitamin B_{12}	85%	152%
Folate	91%	116%
Vitamin C	47%	462%*

* Value is high owing to use of West Indian cherries

DISCUSSION

This study presents the results of a baseline survey of nutritional vulnerability, assessed by anthropometry and dietary intake, in three homes for the elderly in Guyana. Unfortunately, it was beyond the scope of this study to undertake a more extensive assessment of the residents which could have included physical activity levels and disease burden, food intakes at the public home, and further, biochemical assessments of nutritional status to compensate for the limitations of anthropometric techniques in the elderly.

The nutritional status of the cognisant residents was worse in the public home despite a younger average age of approximately eight years. In the public home, 29.3% of the residents were malnourished compared to 19.2% of the residents in the private homes. There was also a degree of overweight in both settings with 17.2% and 19.2% being classified as overweight or obese in the public and private homes respectively.

It is clear that age does not explain the difference in prevalence of undernutrition in the two settings (Table 1). One can speculate that, apart from differences in care (diet, medical care, social and other facilities) between public and private homes, it is very likely that the nutritional status at entry of those in public homes was substantially poorer than the nutritional status at entry of those in private homes. Indeed, the lower mean age of residents in the public home suggests a substantially lower survival period. It should also be noted that the mean age of the cognisant residents at the public home (73.3 years in men and 75.8 years in women) was similar to the mean age of all elderly residents at the public home (75.9 years) which suggests the AMT was not merely screening out older residents.

These results must be interpreted with caution for a number of reasons. Firstly, many of the residents of the homes were excluded from the survey as they failed the AMT, or refused or were unable to take it. This was particularly evident in the public home where nearly three-quarters were not measured and it is unlikely, therefore, that this was a representative sample. Seventeen malnourished residents accounted for the 29.3% of those measured, but equate to only 7.9% of the 215 residents aged over 60 years. A thorough knowledge of the private homes and observational studies in other aged populations (13, 14), however, suggest that those residents that failed the test are likely to have a poor nutritional status. The results may therefore underestimate the extent of malnutrition in the three homes.

Secondly, substantial problems were encountered using the anthropometric methods with this elderly population. Many of the residents were very frail and could not stand alone to have their weight and height measured. Stiffness in the shoulders also meant that armspan could not always be taken as an alternative to height and there were a number of residents at the public institution with missing limbs (usually as a consequence of diabetes mellitus). Fewer problems were encountered with the MUAC and calf circumference measurements but their interpretation is complicated by the lack of published data on validated cut-offs for malnutrition.

Thirdly, BMI was always used to designate nutritional status when possible and the second choice was to use BMI calculated with an estimated height. The equations used to estimate height were derived from data collected in India and Malawi. No local or regional regression equations of height and armspan exist so the use of those from other regions was unavoidable but may not be wholly appropriate. For example, different equations have been published from different populations in Africa (15), and the population of Guyana also has a significant number of people of mixed race which further complicates the choice of which equations to use.

Recent surveys examined the nutritional status of community-living older people in Guyana and Barbados. Table 4 compares the nutritional status of older Guyanese in residential care with that of community-living older people in Guyana (16) and Barbados (17). The prevalence of underweight among older people in public and private homes is substantially higher than its prevalence in community-living elderly in both Guyana and Barbados. This comparison should be made cautiously as the residential sample is approximately five years older than the community living samples and may not be satisfactorily representative, as discussed previously. Given that the true prevalence of underweight in the homes is likely to be greater than estimated, however, the striking difference between the homes and those in the community is a concern. On the positive side, the residents in homes demonstrate a far lower prevalence of overweight and obesity.

Table 4: A comparison of nutritional status of community-living older people (Guyana and Barbados) and in residential care (Guyana)

	In residential care*			**Community-living (ref 16)**			**Community -living (ref 17)**
	Men	**Women**	**Total**	**Men**	**Women**	**Total**	**Total**
Sample size	47	37	84	147	228	375	462
Mean age (yrs)	74.4	80.0	76.8	–	–	70.6	71.4
Age range (yrs)	60 – 96	66 – 91	60 – 96	60 – 97	60 – 97	60 – 97	60 – 99
Nutritional status**							
Underweight	27.7	24.3	26.2	10.9	5.7	7.7	6.5
Normal weight	57.5	54.1	56.0	48.3	37.3	41.6	34.2
Overweight /obese	14.9	21.6	17.8	40.8	57.0	50.7	59.3

* Present study

** See Methods section for definitions; values are percentages

The differences between those in homes and the community-living can be partially explained by the five-year difference in mean ages of the survey samples, but further factors may be influencing the disparity. It is quite possible that a substantial proportion of older people move into homes, be it public or private, because they have health and care needs that their families cannot meet. This automatically creates a situation where those with the worst health and functional ability problems are more likely to be in a home, creating a higher prevalence of underweight and lower prevalence of overweight in homes.

Finally, the higher prevalence of overweight and obesity among community-living older Guyanese is of serious concern, and is clearly linked also to Guyana's high prevalence of non-communicable chronic diseases.

Handgrip strength is a means of assessing functional ability and has been found to be related to nutritional status (18, 19). As expected, handgrip strength was greater in men than in women in the public institution. It was similar between the women of the public institution and the residents of the private homes (a predominantly female group).

The mean handgrip strength of elderly Guyanese in residential care is compared in Table 5 with means from studies from developing countries (4,18–20) and the United Kingdom (UK) (21). With the exception of the Rwandan refugee study and one of the UK studies, all non-Guyanese samples consisted of community-living individuals. Mean handgrip strengths of the Guyanese men and women are substantially lower than those of their counterparts from all countries except India and the UK institutionalized elderly. The Indian study, conducted in urban slums where malnutrition levels were very high (35% with BMI < 18.5 kg/m^2), showed lower mean handgrip strength values than those from any other country. The UK institutionalized elderly sample comprised a large proportion (51% as compared to the present study's 19%) of very old (> 85 years) people and also included residents of nursing homes (30% of sample).

Table 5: A comparison of handgrip strength of older people from various countries

Country (reference)	Sample	Sex	Age (yrs)	Handgrip strength (kg)
Guyana (*)	In residential care	M	≥ 60	26.0
		F	≥ 60	17.7
Rwanda (18)	Rural, in refugee camp	M	≥ 60	27.6
		F	≥ 60	20.3
Malawi (19)	Rural, community-living	M	≥ 60	27.5
		F	≥ 60	20.7
Thailand (20)	Rural, community-living	M	≥ 60	28.2
		F	≥ 60	21.2
India (4)	Urban, community-living	M	≥ 65	20.8
		F	≥ 65	11.1
UK (21)	Community-living	M	≥ 65	34.8
		F	≥ 65	20.0
UK (21)	Institutionalized	M	≥ 65	19.1
		F	≥ 65	11.7

* Present study

The survey of the food in the two private homes revealed notable differences in the quality and the quantity of the diet. Both homes provide three meals a day but home 2 was achieving 90% or more of the requirement for six of the nutrients compared to only three at home 1. The percentage of the requirement met also fell at or below 50% for four of the nutrients at home 1. The low percentage for vitamin C and retinol equivalents at home 1 indicates a lack of fresh fruits and vegetables and this was indeed the case. Fruit was served on four of the seven days and vegetables, other than root vegetables, were used on three days. The results indicate that micronutrient deficiencies may be prevalent among those residents at home 1 who do not use a supplement. The energy intake also fell below 100% in both homes. The interpretation of these percentages, however, rests on the assumption that the requirement is accurate and this has been challenged (22). Certainly, the physical activity levels of many of the residents are extremely low with some being wheelchair bound and some never leaving their rooms. The use of consumption units also hinders interpretation as this method assumes that food is shared on the basis of individual nutrient requirements, and observations at the home show very clearly that this is not the case. The food intake at mealtimes of some residents is very low indeed and their nutrient intakes will therefore be substantially worse than the results imply.

Two further limitations of the dietary assessment method should be noted. Firstly, the use of consumption units meant that the residents' and staffs' intake could not be distinguished. Whilst the method does assume that food is divided on the basis of nutrient and energy requirement and thus apportions more nutrients and energy to younger adults where their requirements are greater, it was not ideal to rely on this assumption. It is possible that the staff systematically took a greater share of the food served than their requirement would allow and this would consequently bias the results, making it appear that the residents ate more food than they actually did.

Secondly, it should be emphasized that only the food provided by the homes was included in this analysis and no attempt was made to objectively measure the residents' own snacks or use of supplements as this could only have been done with those residents that passed the AMT. Long-term observations in the homes revealed that some residents had snacks such as biscuits and vitamin fortified drinks, and occasionally fruit. This was, however, by no means universal. Whilst the methodology prevents any definitive conclusion on the overall nutrient intake of the residents, it is

reasonable to state that the food provided, by home 1 in particular, was insufficient to meet the nutrient requirements of at least some of the residents, particularly those with limited access to other food sources.

This survey of nutritional vulnerability found malnutrition among cognisant residents of a public home for the elderly that is suggestive of a larger problem, and a smaller but not insignificant problem in two private homes. The adequacy of the food provided in one of the homes was also poor in terms of quality and quantity. All the homes in the survey face severe financial constraints which make providing an adequate diet challenging. The ageing situation in Guyana, however, means that this challenge must be met sooner rather than later.

The results of this study represent the baseline for an intervention study to improve the quality of life of the residents of the private homes. Based on observation and on discussions with residents and staff, a number of diet and non-diet interventions were identified. These are in progress, with support from the private sector, non-governmental organizations and charitable foundations. Qualitative and quantitative assessments of the impact of the interventions are planned.

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REFERENCES

1. United Nations Population Division. World Population Prospects: The 2002 Revision Population Database. *http://esa.un.org/unpp/*
2. Hodkinson H. Evaluation of a mental test score for assessment of mental impairment in the elderly. Age Ageing 1972; **1:** 233–8.
3. Lohman TG, Roche AF, Martorell R. Anthropometric Standardization Reference Manual. Champaigne, IL: Human Kinetics Books; 1988.
4. Manandhar MC. Undernutrition and impaired functional ability amongst elderly slum dwellers in Mumbai, India. PhD thesis. London School of Hygiene and Tropical Medicine; 1999.
5. Chilima DM, Ismail SJ. Anthropometric characteristics of older people in rural Malawi. Eur J Clin Nutr 1998; **52:** 643–9.
6. Kwok T, Whitelaw MN. The use of armspan in nutritional assessment of the elderly. J Am Geriatr Soc 1991; **39:** 492–6.
7. Shetty P, James WPT. Body Mass Index as a Measure of Chronic Energy Deficiency in Adults. Rome: FAO; 1994.
8. Ismail S, Manandhar M. Better Nutrition for Older People: Assessment and Action. London: Helpage International; 1999.
9. Bonnefoy M, Jauffret M, Kostka T, Jusot JF. Usefulness of calf circumference measurement in assessing the nutritional status of hospitalized elderly people. Gerontol 2002; **48:** 162–9.
10. McCance RA, Widdowson EM. The Composition of Foods. London: Royal Society of Chemistry; 1992.
11. Caribbean Food and Nutrition Institute. Food Composition Tables for use in the English-speaking Caribbean. Jamaica: CFNI; 1998.
12. Caribbean Food and Nutrition Institute. Recommended Dietary Allowances for the Caribbean. Jamaica: CFNI; 1994.
13. Ödlund Olin A, Koochek A, Ljungqvist O, Cederholm T. Nutritional status, well-being and functional ability in frail elderly service flat residents. Eur J Clin Nutr 2005; **59:** 263–70.
14. Pearson JM, Schlettwein-Gsell D, Brzozowska A, van Staveren WA, Bjornsbo K. Life style characteristics associated with nutritional risk in elderly subjects aged 80-85 years. J Nutr Health Aging 2001; **5:** 278–83
15. Pieterse S, Manandhar M, Ismail S. The nutritional status of older Rwandan refugees. Pub Health Nutr 1998; **1:** 259–64.
16. Trotter P, Archibald J. Unpublished data; 2001.
17. National Nutrition Council. The Barbados Food Consumption and Anthropometric Survey. Barbados: Ministry of Health; 2003
18. Pieterse S, Manandhar M, Ismail S. The association between nutritional status and handgrip strength in older Rwandan refugees. Eur J Clin Nutr 2002; **56:** 933–9.
19. Chilima DM, Ismail SJ. Nutrition and handgrip strength of older adults in rural Malawi. Pub Health Nutr 2001; **4:** 11–7.
20. Varakamin C, Henry J, Golden M, Tontisirin K. Body composition and muscular strength in an elderly Thai population. Proc Nutr Soc 1998; **57:** 64A.
21. Finch S, Doyle W, Lowe C, Bates CE, Prentice A, Smithers G et al. National Diet and Nutrition Survey: people aged 65 years and over. London: HMSO; 1998.
22. Roberts SB, Dallal GE. Effects of age on energy balance. Am J Clin Nutr 1998; **68:** 975S–9S.