Determinants of obesity and perception of weight in hypertensive patients in rural South Africa

Duncan PR, BMedSci, BMBS, Academic Clinical Fellow and General Practice Trainee
School of Social and Community Medicine, University of Bristol, Bristol
Howe LD, BSc, MSc, PhD, Research Fellow
MRC Integrative Epidemiology Unit University of Bristol, School of Social and Community Medicine, University of Bristol, Bristol
Manukusa Z, BMBS, Medical Officer, Manguzi Hospital, KwaZulu-Natal, Durban
Purdy S, BMBS, MD, MPH, FRCGP, Reader in Primary Health Care, School of Social and Community Medicine, University of Bristol, Bristol
Correspondence to: Polly Duncan, e-mail: pollyduncan@doctors.org.uk
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Abstract

Objective: The objective of the study was to identify factors associated with being overweight or obese, and perceptions of weight by hypertensive patients living in rural South Africa.

Design: This was a nested cross-sectional study.

Setting: The setting was primary healthcare clinics close to Manguzi Hospital, KwaZulu-Natal.

Subjects: Subjects were 109 males and 391 females, prescribed at least one antihypertensive medication aged ≥ 18 years.

Outcome measures: The primary outcome measure was body mass index (BMI) ≥ 25 kg/m^2. The secondary outcome measure was recognition of being overweight by those with a BMI ≥ 25 kg/m^2.

Results: The mean age was 58 years. Three hundred and ninety-one (78%) participants were female, and the majority had never been to school or had attended primary school only. Three hundred and eleven (62%) participants were overweight or obese, with a BMI ≥ 25 kg/m^2. Factors associated with being overweight or obese included having high cholesterol [adjusted odds ratio (OR) 10.62, 95% confidence interval (CI): 1.22-92.4, p-value 0.032], and having never smoked (adjusted OR 3.22, 95% CI: 1.38-7.52, p-value 0.007. Human immunodeficiency virus (HIV) was associated with a lower risk of being overweight or obese (adjusted OR 0.52 for BMI ≥ 25, 95% CI: 0.31-0.89, p-value < 0.0001). Only 12% of participants who were overweight or obese perceived that they were overweight. Participants with a BMI ≥ 25 kg/m^2 were most likely to recognise they were overweight if they had high cholesterol, diabetes or HIV.

Conclusion: Almost two thirds of participants were overweight or obese, and of these, only 12% perceived that they were overweight. Educating patients about obesity, particularly when they have other cardiovascular risk factors such as hypertension, is of public health importance.

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Introduction

Obesity is emerging as a significant health problem in developing countries, such as South Africa.[1] In 1998, the South African Demographic and Health Survey estimated that 29% of men and 57% of women were overweight or obese with a body mass index (BMI) greater than 25 kg/m^2.[2] It is estimated that excess body weight caused 7% of all deaths in South Africa in 2000.[3]

There is evidence that people in South Africa do not want to lose weight for fear of being stigmatised as having human immunodeficiency virus (HIV), acquired immune deficiency syndrome (AIDS) or tuberculosis.[4,5] To date, the emphasis of public health campaigns in South Africa has been on reducing and preventing malnutrition. Campaigns to increase testing and treatment of HIV and tuberculosis have highlighted weight loss as a symptom of these conditions.

Being overweight is perceived by many South Africans as a sign of being able to provide for your family, and as such, a sign of wealth and well-being. In contrast, being thin and losing weight is associated with being stressed or worried.[6] A qualitative study of black female community health workers found that when asked about their ideal body shape, the majority of women pointed to a participant with a moderately overweight body shape (BMI 27 kg/m^2). The women discussed how they associated being overweight with having a sense of dignity, respect, beauty, confidence and wealth. They also discussed some of the negative aspects of obesity, including body aches, lethargy and an increased risk of health problems, such as hypertension, diabetes, heart disease and arthritis.[7] Faber and Kruger's study on women living in a village in KwaZulu-Natal found that most women were not concerned about their weight, and that

over a third reported that their husbands would not like it if they lost weight.[8]

A study of adolescent South African schoolgirls found that the perception of ideal body size varied between different ethnic groups, with white girls desiring a significantly smaller body shape than girls of black or mixed-race ethnicity. Despite black schoolgirls having a significantly higher mean BMI than the white girls, dissatisfaction with present body size was more common in white adolescents.[9]

Several studies in South Africa have found a discrepancy between actual body weight, calculated using BMI, and the perception of body weight. Overweight and obese individuals perceived that they were a normal weight or underweight.[2,8,10]

Obesity is a risk factor for cardiovascular disease, a prevalent condition that is estimated to have caused 17% of deaths in South Africa in 2000.[11] Weight loss can improve blood pressure (BP) control and lower overall cardiovascular risk in hypertensive individuals. In recognition of this, the South African hypertension guidelines advise that patients should be encouraged to make lifestyle modifications to achieve and maintain an ideal weight (BMI 18.5-24.9 kg/m^2).[12] However, little is known about what proportion of hypertensive patients is overweight, and of those who are, what proportion recognise this.

The purpose of this study was to investigate what proportion of hypertensive patients living in a rural area of KwaZulu-Natal was overweight or obese, and to identify sociodemographic factors associated with having a BMI $\geq$ 25 kg/m^2. A secondary purpose was to describe participants' perceptions of their weight and to identify factors associated with recognition of being overweight or obese.

Method

Setting

This study was part of a larger study to investigate the determinants of BP control in patients prescribed antihypertensive treatment. Patients attending five of the 11 primary healthcare clinics near Manguzi Hospital, KwaZulu-Natal, were recruited (Mahlungulu, Maputa, Mshudu, Thengane and Zama Zama). The clinics were purposively selected to include those closest to, and those furthest away from the hospital. The most commonly spoken local language in the Manguzi district is Zulu.

Height, weight and blood pressure measurements

The primary healthcare nurses took weight, height and BP measurements from all of the participants. Weight was measured to the nearest 1 kg, using a calibrated bathroom scale, Seca® 762. Height was measured using a metre stick while subjects stood with their backs, buttocks and heels as close to the wall as possible. Height was measured to the nearest 1 cm. BMI was calculated in Excel® using the equation height (kg) divided by the height (m) squared. Three BP measurements were taken using an automated machine, Rossmax® AW150F. The mean of the three measurements was calculated. Data were collected over a three-week period in May and June 2012.

Questionnaire design

A questionnaire was developed in English to obtain sociodemographic information, self-reported medical history, including a history of raised cholesterol, and perceptions of health and weight. The questionnaire was translated into Zulu, and independently back-translated into English to check the translation.

Participants were asked: "Do you personally think that you are underweight, normal weight or overweight?" There were four categorical responses of "underweight", of "normal weight", "overweight" or "I don't know". They were also asked: "Would you say that your health is poor, average, good, or very good?"

Recruitment, consent and questionnaire administration

Data collection took place over three weeks in May and June 2012. Participants were eligible to take part if they were 18 years or older, and had been prescribed at least one antihypertensive medication.

The sample size was calculated to investigate the primary aim of the larger study, which was whether or not there was a difference in compliance with hypertensive treatment between those with controlled BP (< 140/90) and those with uncontrolled BP.[13] Based on an estimate that 50% of patients would comply with treatment, a sample size of 366 patients would allow detection of a difference of 15% in the proportion of patients with BP control between the compliant group and the non-compliant group, with 80% power at the 5% significance level. To allow for a response rate of 72%, 500 individuals were approached to take part in the study.

A trained field worker was placed in each of the five clinics for a period of three weeks. With assistance from the clinic nurses, participants were opportunistically identified and recruited into the study. Individual written consent was obtained using a thumb print if the participant was unable to write. Verbal and written community consent was obtained from members of the tribal council for the Manguzi district, including representatives from each of the clinic areas.

The field workers were trained face to face. Questions and possible responses were read aloud to participants in Zulu and answers were marked down. The field workers were supervised on a one-to-one basis during the piloting phase of the study to ensure that they read out every question and possible answer to participants. After the questionnaire had been administered, an information sheet on hypertension was given to participants. If they were unable to read, this was read aloud to them. Participants were given 10 Rand (approximately 1 US dollar) to take part, and the field workers were paid a small amount to cover transport costs.

Data entry and analysis

The data were entered into an Excel® computer spreadsheet. Data from one clinic were entered in duplicate by independent field workers to check for the accuracy of data input. BMI was calculated from the height and weight measurements in Excel®. The data were imported into the Stata® statistical software programme for analysis.[14]

Descriptive statistics were used to describe the sociodemographic variables presented as means and standard deviations for continuous variables, and percentages for categorical variables.

BMI was used to categorise participants as underweight (BMI < 18.5 kg/m^2), of normal weight (BMI 18.5-24.9 kg/m^2), overweight (BMI 25-29.9 kg/m^2) and obese (BMI > 30 kg/m^2), in line with the World Health Organization guidelines.[1] Overweight and obese participants were grouped together, and underweight and normal weight participants were grouped together, owing to the small number of participants in the underweight group. A mean of three BP measurements was calculated, and participants with mean systolic BP < 140 mmHg and mean diastolic BP < 90mmHg were categorised as having controlled BP, in line with the South African hypertension guidelines.[12,15]

Logistic regression analysis was performed to identify differences in sociodemographic factors, self-reported medical history, and perceptions of health and BP control between overweight and obese participants, and underweight and normal weight participants. The odds ratio (OR) for age was adjusted for gender, and the OR for gender was adjusted for age. The remaining ORs were adjusted for age, gender, marital status, level of schooling, employment status, reported use of alcohol, smoking, past medical history and family history.

Participants who were overweight or obese with a BMI ≥ 25 kg/m^2 were categorised as recognising that they were overweight if they answered "overweight" to the question: "Do you personally think that you are underweight, of normal weight or overweight?" Overweight and obese participants who answered either "underweight", of "normal weight" or "I don't know" to the same question were categorised as not recognising that they were overweight. Logistic regression analysis was performed to identify differences in sociodemographic factors, self-reported medical history, and perceptions of health and BP control between the two groups. ORs were adjusted for the same listed variables.

Ethical approval

Ethical approval was granted by the Biomedical Research and Ethics Council, University of KwaZulu-Natal. The study was approved by the KwaZulu-Natal Health Research and Knowledge Management Group, KwaZulu-Natal Department of Health.

Results

Five hundred participants entered the study with a response rate of 100%. Every patient who had been invited to take part in the study was willing to participate. The error rate was 5% for the data that were entered in duplicate.

Participants were aged 23-98 years, with a mean age of 58 years (Table I). Three-hundred and ninety-one (78%) participants were female, 109 (22%) were male, and the majority had either never been to school or had only attended primary school. The majority of patients had never smoked, and only 12% reported drinking alcohol.

One hundred and forty (28%) participants were overweight, and 171 (34%) were obese (Figure 1). Of the remaining participants, 168 (34%) were of normal weight and 21 (4%) underweight.

Table I: Participant characteristics

Characteristics	n (%)
Mean age (standard deviation)	58 (13.8)
Age	
20-39	46 (9)
40-49	95 (19)
50-59	130 (26)
60-69	127 (25)
70-79	70 (14)
≥ 80	32 (6)
Gender	
Male	109 (22)
Female	391 (78)
Marital status	
Married	130 (26)
Never married	296 (59)
Separated, divorced or widowed	74 (15)
Level of schooling	
Never went to school	264 (53)
Grade 1-7	194 (39)
Grade 8-12	37 (7)
Tertiary education	1 (0.2)
Employment status	
Employed	19 (4)
Unemployed	82 (16)
Full-time homemaker	163 (33)
Pensioner	202 (40)
Receiving disability grant	33 (7)
Drinks alcohol	
Yes	59 (12)
Smoker	
Current smoker	41 (8)
Ex-smoker	37 (8)
Never smoked	415 (85)
Self-reported past medical history	
Hypertension	468 (94)
Myocardial infarction	61 (12)
Strokes	22 (4)
High cholesterol	15 (3)
Diabetes	49 (10)
Asthma	31 (6)
Epilepsy	12 (2)
HIV	64 (13)
Mental health illness	44 (9)
Self-reported family history	
Hypertension	155 (31)
Myocardial infarction	22 (4)
Strokes	22 (4)
Diabetes	34 (7)
Patient perception of own health	
Poor	339 (64)
Average	150 (33)
Good	8 (3)
Very good	3 (1)
BP control (BP < 140/90 mmHg)	
Yes	157 (31)
No	343 (69)

BP: blood pressure, HIV: human immunodeficiency virus

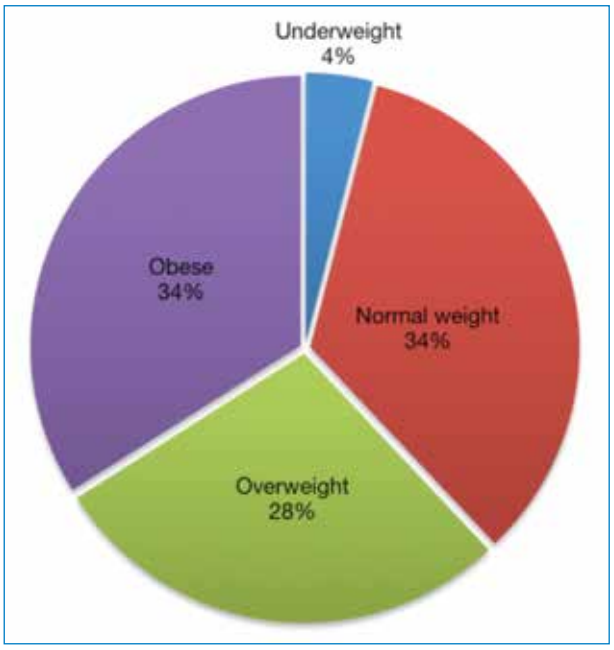

Figure 1: Distribution of body mass index

Table II: Odds ratios for overweight or obese (body mass index ≥ 25 kg/m^2) versus underweight or normal weight (body mass index < 25 kg/m^2) by sociodemographic factors, perception of health and blood pressure control

Variable	Unadjusted OR			Adjusted OR*		
	OR	95% CI	p-value	OR	95% CI	p-value
Age**						
20-39	1			1		
40-49	1.39	0.67-2.90	0.376	1.38	0.66-2.88	0.390
50-59	1.30	0.65-2.61	0.459	1.30	0.65-2.61	0.465
60-69	0.90	0.45-1.79	0.759	0.92	0.46-1.84	0.820
70-79	1.02	0.48-2.20	0.952	1.04	0.49-2.24	0.914
≥ 80	0.50	0.20-1.25	0.138	0.51	0.21-1.29	0.156
Gender***						
Male	1			1		
Female	0.65	0.42-1.00	0.050	0.68	0.44-1.05	0.084
Marital status						
Married	1			1		
Never married	0.75	0.48-1.15	0.184	0.80	0.48-1.33	0.382
Separated, divorced or widowed	0.81	0.45-1.47	0.493	1.01	0.50-2.01	0.983
Level of schooling						
Never went to school	1			1		
Grade 1-7	1.30	0.88-1.90	0.187	1.17	0.75-1.81	0.490
Grade 8-12	2.59	1.14-5.88	0.023	2.81	0.96-8.17	0.058
Employment status						
Employed	1			1		
Unemployed	0.26	0.07-0.98	0.047	0.43	0.10-1.77	0.241
Full-time homemaker	0.44	0.12-1.56	0.203	0.72	0.18-2.89	0.642
Pensioner	0.25	0.07-0.88	0.031	0.47	0.11-2.07	0.321
Receiving a disability grant	0.20	0.05-0.81	0.025	0.26	0.05-1.21	0.085
No	1			1		
Yes	0.58	0.33-1.00	0.049	1.03	0.52-2.01	0.937
Smoker						
Current	1			1		
Ex-smoker	1.82	0.72-4.59	0.204	1.71	0.57-5.12	0.96
Never smoked	3.79	1.92-7.45	< 0.001	3.22	1.38-7.52	0.007
Self-reported past medical history						
Hypertension	0.55	0.23-1.34	0.190	0.43	0.15-1.26	0.124
Myocardial infarction	0.93	0.54-1.61	0.791	0.96	0.49-1.90	0.911
Strokes	1.32	0.53-3.29	0.555	1.21	0.39-3.72	0.740
High cholesterol	8.86	1.15-68.0	0.036	10.62	1.22-92.4	0.032
Diabetes	1.77	0.91-3.43	0.090	1.47	0.69-3.19	0.318
Asthma	1.00	0.54-2.02	0.914	0.90	0.37-2.17	0.808
Epilepsy	0.84	0.26-2.69	0.773	1.09	0.22-5.49	0.914
HIV	0.52	0.31-0.89	0.016	0.32	0.17-0.61	< 0.0001
Mental health illness	0.97	0.51-1.82	0.913	1.12	0.48-2.61	0.793
Self-reported family history						
Hypertension	0.82	0.56-1.21	0.314	0.82	0.52-1.30	0.399
Myocardial infarction	0.72	0.31-1.70	0.455	0.52	0.17-1.54	0.236
Strokes	0.71	0.30-1.69	0.443	0.57	0.21-1.55	0.272
Diabetes	1.50	0.70-3.22	0.295	1.74	0.72-4.23	0.221
Patient perception of own health						
Poor	1			1		
Average	1.32	0.88-1.98	0.173	1.19	0.74-1.92	0.461
Good	1.10	0.26-4.70	0.894	1.55	0.32-7.56	0.587
BP control						
Yes	1			1		
No	1.10	0.74-1.62	0.641	0.98	0.62-1.54	0.929

Logistic regression analysis (n = 464)
BP: blood pressure, CI: confidence interval, HIV: human immunodeficiency virus, OR: odds ratio
*: All variables, except age and gender, have been adjusted for age, gender, marital status, level of education, employment status, alcohol use, smoking, past medical history and family history
**: Adjusted for gender
***: Adjusted for age
Note: significant associations are highlighted in bold

Factors associated with being overweight or obese (Table II) included self-reported high cholesterol (adjusted OR 10.62, 95% CI: 1.22-92.4, p-value 0.032), having never smoked as opposed to being a current smoker (adjusted OR 3.22, 95% CI: 1.38-7.52, p-value 0.007), and completion of grades 8-12 at school as opposed to having never been to school, although this was no longer significant after adjusting for other variables (adjusted OR 2.81, 95% CI: 0.96-8.17, p-value 0.058). Self-reported HIV was associated with a lower risk of being overweight or obese (adjusted OR 0.32, 95% CI: 0.17-0.61, p-value < 0.0001). No other significant differences were seen between the overweight and obese participants and the underweight and normal weight participants.

There were marked differences between perceived body image and weight category calculated by BMI (Table III). Of the obese

Table III: Comparison of perceived body weight with participants' calculated body mass index (%)

Perceived body image	Calculated body mass index categories			
	Underweight (BMI < 18.5 kg/m²)	Normal weight (BMI 18.5-24.9 kg/m²)	Overweight (BMI 25-29.9 kg/m²)	Obese (BMI ≥ 30 kg/m²)
Underweight	9 (43)	43 (26)	31 (23)	26 (16)
Normal weight	9 (43)	112 (67)	89 (65)	106 (63)
Over weight	0 (0)	3 (2)	5 (4)	33 (20)
Don't know	3 (14)	10 (6)	11 (8)	2 (1)

Table IV: Adjusted odds ratio for recognition of being overweight by participants with a BMI ≥ 25 kg/m²

Variable	Unadjusted OR			Adjusted OR*		
	OR	95% CI	p-value	OR	95% CI	p-value
Age**						
20-39	1			1		
40-49	0.56	0.12-2.66	0.463	0.56	0.12-2.68	0.466
50-59	1.11	0.28-4.36	0.880	1.13	0.29-4.46	0.857
60-69	1.23	0.31-4.92	0.770	1.20	0.30-4.81	0.802
70-79	2.52	0.63-10.2	0.192	2.48	0.62-10.0	0.201
≥ 80	1.51	0.22-10.4	0.672	1.49	0.22-10.3	0.681
Gender***						
Male	1			1		
Female	1.36	0.61-3.07	0.448	1.25	0.54-2.89	0.600
Marital status						
Married	1			1		
Never married	0.46	0.22-0.97	0.041	0.57	0.23-1.44	0.234
Separated, divorced or widowed	0.52	0.18-1.52	0.231	0.28	0.07-1.05	0.058
Level of schooling						
Never went to school	1			1		
Grade 1-7	1.65	0.80-3.40	0.176	1.59	0.67-3.79	0.296
Grade 8-12	1.43	0.44-4.66	0.554	2.20	0.48-10.0	0.310
Employment status						
Employed	1			1		
Unemployed	0.65	0.11-3.94	0.641	0.45	0.05-3.98	0.472
Full-time homemaker	1.00	0.21-4.87	1.00	1.33	0.20-8.92	0.768
Pensioner	1.11	0.23-5.36	0.901	0.15	0.02-1.28	0.083
Receiving a disability grant	1.50	0.22-10.4	0.682	1.06	0.11-10.7	0.960
Drinks alcohol						
No	1			1		
Yes	1.49	0.53-4.17	0.448	**4.34**	**1.06-17.8**	**0.041**
Smoker						
Current	1			1		
Ex-smoker	0.81	0.46-14.3	0.887	6.51	0.22-197	0.281
Never smoked	2.03	0.26-16.0	0.503	**14.24**	**1.02-197**	**0.048**
Myocardial infarction	1.91	0.77-4.74	0.162	1.04	0.32-3.39	0.974
Strokes	1.81	0.49-6.72	0.377	1.40	0.25-7.88	0.704
High cholesterol	4.31	1.36-13.6	0.013	5.16	1.11-24.2	0.037
Diabetes	2.56	1.06-6.18	0.037	3.46	1.05-11.4	0.041
Asthma	2.11	0.66-6.78	0.210	1.71	0.42-6.97	0.452
HIV	1.80	0.69-4.72	0.232	**3.75**	**1.03-13.6**	**0.045**
Mental health illness	0.90	0.26-3.15	0.876	2.37	0.44-12.7	0.313
Self-reported family history****						
Hypertension	1.27	0.62-2.62	0.512	1.43	0.56-3.63	0.452
Myocardial infarction	0.62	0.78-4.96	0.654	0.93	0.06-15.2	0.958
Diabetes	0.31	0.04-3.34	0.255	0.21	0.02-2.85	0.243
Patient perception of own health						
Poor	1			1		
Average	0.43	0.18-1.02	0.055	0.37	0.12-1.10	0.074
Good	1.40	0.15-13.0	0.767	2.57	0.16-42.1	0.509
BP control						
Yes	1			1		
No	0.81	0.38-170	0.570	0.64	0.24-1.70	0.370

Logistic regression analysis (n = 249)
*: All variables, except age and gender, have been adjusted for age, gender, marital status, level of education, employment status, alcohol use, smoking, past medical history and family history
**: Adjusted for gender
***: Adjusted for age
****: Hypertension, epilepsy and a family history of strokes omitted owing to empty cells
Note: significant associations are highlighted in bold

participants, only 20% reported that they were overweight, 63% reported that they were of normal weight and 16% reported that they were underweight. Similarly, of the overweight patients, only 4% perceived that they were overweight, and 65% perceived they were of normal weight. Of the normal weight participants, 26% reported that they were underweight, and of the underweight participants, 43% reported that were of normal weight.

Participants who were overweight or obese were more likely to recognise that they were overweight if they had high cholesterol (adjusted OR 5.16, 95% CI: 1.11-24.2, p-value 0.037), diabetes (adjusted OR 3.46, 95% CI: 1.05-11.4, p-value 0.41), or HIV (adjusted OR 3.75, 95% CI: 1.03-13.6, p-value 0.45). Recognition of being

overweight was also associated with drinking alcohol (adjusted OR 4.34, 95% CI: 1.06-17.8, p-value 0.041), and having never smoked (adjusted OR 14.24, 95% CI: 1.02-197, p-value 0.048) (Table IV).

Discussion

In this study on hypertensive patients in rural KwaZulu-Natal, almost two thirds of participants were overweight or obese, and of these, only 12% perceived that they were overweight. Poor recognition of weight status was particularly concerning since these patients regularly attend primary healthcare clinics for hypertension reviews, and according the South African hypertension guidelines, should be receiving education on lifestyle, including weight loss.[12]

The high response rate was similar to that in other studies,[16] and the sample is seen as representative. The predominance of females (78%) was similar to the results of the study by Thorogood, Connor, Hundt and Tollman,[17] and is likely to reflect male labour migration.

Twenty-eight per cent of participants were overweight and 34% were obese. A study on adults in an urban township in Cape Town by Matoti-Mvalo and Puoane[4] reported a slightly higher prevalence. Forty per cent of participants were overweight and 34% obese. Moreover, in another study performed in Bloemfontein, the prevalence of obesity in adults aged 18-50 years (a younger population than that in the present study) was also higher. Thirty-two per cent were overweight and 44% obese.[12] The present study took place in a rural setting, and this may account for the lower prevalence of obesity compared to that in more urban populations.

Poor recognition of weight status has been reported by several other studies in South Africa. Matoti-Mvalo and Puoane found that only a third of overweight participants perceived that they were overweight, and only 8% of obese participants perceived that they were obese.[4] Similarly, a study in a village in KwaZulu-Natal found that only 2% of overweight women and 30% of obese women reported that they were "too fat".[8] A study on women in Bloemfontein found that over half of the obese women did not perceive that they were so.[10]

Factors associated with being overweight or obese included self-reported high cholesterol, having never smoked and completion of grades 8-12, as opposed to having never been to school. The association between obesity and high cholesterol was expected. Overweight people are more likely to eat a high-fat diet, and to have high cholesterol as a consequence. A study in Soweto found that obesity was associated with a threefold increase in hypercholesterolaemia.[18]

The association between smoking and low BMI has been reported elsewhere,[19,20] and smoking cessation has been shown to be associated with an increase in weight gain.[21-25] Available evidence overwhelmingly and consistently indicates that smoking is a significant cardiovascular risk factor. Furthermore, studies in Japan[26] and the USA[27] have found that any potential benefit of weight loss caused by smoking is outweighed by the increased cardiovascular risk. A systematic review reported on a 36% reduction in crude relative risk of mortality in patients with coronary heart disease who had stopped smoking, compared to that in ongoing smokers.[28] In keeping with the present study, analysis of the South African Demographic and Health Survey found that obesity in men was associated with completing a higher level of education. Obesity in women was associated with having never been to school or having completed more than 12 years of education, as opposed to 1-12 years of education.[2] Perhaps those who complete higher education are of higher socio-economic status, and are more likely to adopt a high-fat Western diet.

Several studies have reported a higher prevalence of obesity in women, compared to that in men, and an increasing prevalence of obesity with age.[2,29] However, this study did not find a significant gender or age difference. Malhotra et al's study on adults living in a black township in Cape Town found that those who were married were more likely to be overweight or obese than those who had never been married.[30] Interestingly, in a different study, a third of women reported that their husbands would not want them to lose weight.[8] The prevalence of obesity did not vary with marital status in this study.

The present study found that having HIV was associated with a lower risk of being overweight or obese. HIV and conditions associated with it are known to cause weight loss. Previous studies have found that people in South Africa do not want to lose weight for fear of being stigmatised as having HIV, AIDS or tuberculosis.[4,5] This is a significant barrier which public health initiatives will need to overcome.

Participants were more likely to recognise that they were overweight if they had high cholesterol, diabetes or HIV. It is likely that patients with raised cholesterol and/or diabetes receive more education on weight loss than those with hypertension alone, and hence are more likely to recognise that they are overweight. Perhaps those with HIV are aware of the stigma attached to being underweight and having HIV, and so were inclined to report that they were overweight.

There are many barriers to weight loss in South Africa, including the association of being thin with having HIV, tuberculosis or AIDS,[4,5] the perception that "big is beautiful", and that being overweight is a sign of well-being and wealth.[7] Also, many women held the view that their husbands would not like them to lose weight.[8] The first hurdle to overcome would be to increase the recognition of weight status, particularly in those who are overweight or obese. In an attempt to improve this, the principal investigator in the study returned to Manguzi eight months after the study to run a series of one-day workshops during which primary healthcare nurses were taught how to calculate adult BMI using colour-coded height and weight charts. The nurses reported that the charts were easier to use than the BMI wheels that they had previously used, and that the colour coding would help them to inform patients about their weight status.

A strength of this study was that the field workers underwent rigorous training and close supervision to ensure good validity of the data. The 100% completion rate meant that selection bias was reduced. However, this must be considered against the increased risk of selection bias owing to convenience sampling. Random sampling would have reduced this bias, but this was not possible because of time constraints. A limitation of the study was that it was powered to detect a difference in BP control between participants who complied with their medication and those who did not (described elsewhere),

rather than to investigate differences between overweight and obese individuals, and normal weight and underweight individuals. A further limitation was that only clinic-attending adults who were prescribed antihypertensive treatment were invited to participate in the study. Hence, caution needs to be exercised with regard to generalising the results to the wider community.

Conclusion

The majority of participants were overweight or obese in this study, and of those with a BMI ≥ 25 kg/m^2, few participants perceived that they were overweight. Educating patients about obesity is of public health importance, particularly when patients have other cardiovascular risk factors, such as hypertension. A first step could be to routinely calculate BMI for patients with hypertension, high cholesterol or diabetes, and to inform patients when they are overweight or obese. The teaching workshops for nurses that used colour-coded charts to calculate BMI were well received. Further research is needed to evaluate interventions aimed at changing perceptions of weight in South Africa.

Declarations

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