

ETHNIC DIFFERENCES IN OBESITY

What are the potential underlying mechanisms of ethnic differences and their implications for weight control in the South African population?



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Obesity can be described as an imbalance between energy intake and expenditure such that excess energy is stored as adipose tissue. However, obesity is also a complex medical condition, affected by a host of contributing factors, including genetic, physiological, socio-cultural and behavioural characteristics. This will be discussed in the context of South Africa, looking at the implications for weight management strategies.

EPIDEMIOLOGY OF OBESITY IN SOUTH AFRICA

The 1998 South African Demographic and Health Survey (SADHS) examined the anthropometric pattern of a representative sample of over 13 000 South Africans between the ages of 15 and 95 years.¹ The main finding of the study was that the pattern of malnutrition in South Africa was predominately overnutrition rather than undernutrition (Table I).

The study found that the overall prevalence of overweight (body mass index (BMI) > 25) and obesity (BMI > 30) in South Africa was high, with more than 29% of men and 56% of women classified as overweight or obese. Those most at risk are urbanised black women (58.5% overweight or obese) and white men (54.5% overweight or obese). Age, level of education, population group (Table I) and urbanisation explained 19% and 34% of the variance in BMI in men and women, respectively. In women, a higher BMI was found in those who were black, older and living in urban areas. Interestingly, those with the lowest (no education) and highest (more than 12 years) levels of education had a lower BMI compared with those who had between 1 and 12 years of education. Significantly higher levels of BMI were found in men who were white, older, living in the city and had more than 8 years of education.

Obesity in South Africa is not limited to the adult population and appears to start at a young age, especially in women. In the SADHS, 10% of women between the ages of 15 and 24 years of age were classified as obese.¹ Overweight and obesity are also becoming increasingly evident in South African children. The National Household Food Consumption Survey reported that 17.1% of South African children between the ages of 1 and 9 years living in urban areas are overweight.² In contrast, Monyeki *et al.*³ found that the prevalence of obesity and overweight in rural children aged 3 - 10 years from the Northern Province was low (0 - 2.5% and 0 - 4.3% in boys and girls respectively), thus highlighting the role of the rural-urban transition.

Table 1. The anthropometric pattern of adults (>15 years old) from the South African National Demographic and Health Survey¹

| | Men (%) | | | | | Women (%) | | | | |
|----------------------|--------------------|------------------|-------------------|------------------|--------------------|--------------------|------------------|-------------------|------------------|--------------------|
| | Black N = 4 006 | Mixed N = 740 | Indian N = 174 | White N = 470 | Total N = 5 390 | Black N = 5 897 | Mixed N = 986 | Indian N = 262 | White N = 572 | Total N = 7 717 |
| BMI | | | | | | | | | | |
| Underweight (<18.5) | 12.9 | 12.1 | 16.9 | 5.0 | 12.2 | 4.8 | 10.5 | 14.9 | 3.1 | 5.6 |
| Normal (18.5 - 24.9) | 61.7 | 57.1 | 50.3 | 40.4 | 58.6 | 36.7 | 37.3 | 36.1 | 47.8 | 37.8 |
| Overweight (25 - 30) | 19.4 | 23.1 | 24.0 | 36.3 | 21.7 | 26.7 | 25.9 | 27.8 | 26.5 | 26.6 |
| Obese (> 30) | 6.0 | 7.7 | 8.7 | 18.2 | 7.5 | 31.8 | 26.3 | 21.1 | 22.7 | 30.0 |

POTENTIAL UNDERLYING MECHANISMS

There are few studies that have specifically addressed the underlying mechanisms associated with the problem of overweight in South African communities. A questionnaire study of a sample of economically active South Africans (N = 554) identified black ethnicity, lower levels of education (\leq Grade 7), inactivity, and family history (at least one overweight parent) as risk factors for overweight and/or obesity.⁴ Similarly, a study in a disadvantaged community in the Western Cape attributed the rise in BMI to factors associated with rural-urban transition, including electrification, reduced physical activity, and increasing availability of energy-dense foods.⁵

Indeed, high-fat diets promote fat accumulation significantly more than high-carbohydrate diets due to the high energy density, metabolic efficiency, palatability, poor regulation and the weak satiating effect of fat. A review of the 'nutrition transition' in the black population in South Africa found that although diets met prudent dietary guidelines, there was a general trend for an increase in fat intake and a decrease in carbohydrate intake in both rural and urban areas.⁶ A 10.9% reduction in carbohydrate intake (69.3 - 61.7%) and a 59.7% increase in fat intake (16.4 - 26.2%) from 1940 to 1990 were reported in urban areas. In rural areas the change was less marked, with an increase in fat intake from ~20% to 28% and a decrease in carbohydrate intake from ~70% to 60% reported between 1970 and 1990.

A high dietary energy and fat intake is therefore a likely factor contributing to the high prevalence of obesity in South African populations, particularly those living in urban areas. Indeed, the

high prevalence of obesity in a group of urban black community health workers (CHWs) was attributed, in part, to the intake of cheap fatty meats and large portion sizes.⁷ However, a high dietary fat intake alone cannot account for the extent of the problem. Weight gain associated with a high fat intake may also be caused, in part, by an inability to increase fat oxidation when fed a high-fat diet. Studies undertaken in America found that African American women had lower levels of fat oxidation at rest and during exercise than their white counterparts.⁸ Moreover, numerous studies have shown that African American women have lower resting and total energy expenditure rates than white women, even after adjusting for age and fat-free mass.⁹ The lower total energy expenditure in the African American compared with the white women was attributed, in part, to lower physical activity energy expenditure.⁹

Although there are few South African studies in which physical activity has been studied in relation to obesity, there is support for the well-established observation that physical inactivity is an important determinant of obesity. For example, in the THUSA study, which included over 1 000 black women from the North West Province, physical inactivity showed the strongest association with measures of obesity when compared with other socio-demographic and dietary factors.¹⁰ Subjects in the highest tertile of physical activity (most active) had an odds ratio of 0.38 (95% CI: 0.22 - 0.66) for being obese.

The protective effect of physical activity against obesity is not limited to adults. In a regional, cross-sectional survey of children's health and fitness status conducted in 14 schools in the Western Cape in children aged 12 - 18 years

(boys, $N = 2\,026$, girls, $N = 2\,792$) current levels of obesity were associated with inactivity as measured by time spent watching television, lower fitness levels, and a low reported daily intake of fruit and vegetables. Moreover, television viewing time was greater, and opportunities for school-based or after-school sports and physical activity were fewer, in persons of lower socio-economic status.

The rural to urban transition contributes significantly to the progression of the obesity epidemic in South Africa, by its impact on dietary intake, physical activity, education, social support and stress levels. Black South Africans who have spent larger proportions of their lives in urban areas tend to have unhealthier lifestyles and a higher risk for chronic diseases of lifestyle when compared with those who are less urbanised.¹¹ It has been estimated that culture and lifestyle contributes 75% towards the variation in body fatness, whereas only 25% can be attributed to genetic factors.¹² Although we cannot discount the contribution of pure genetic influences, it is the interplay between genetic and environmental factors that is most important in the manifestation of the obesity phenotype. This is currently an active area of research in South Africa.

MORBIDITY ASSOCIATED WITH OBESITY

Obesity is associated with a large number of clinical problems, categorised into those associated with excess adipose tissue and those associated with the metabolic effects of the increased adiposity. Those diseases associated with increased fat mass include osteoarthritis, sleep apnoea and psychological problems, whereas the diseases associated with the metabolic effects of adiposity include coronary heart disease (CHD), hypertension, type 2 diabetes mellitus and certain types of cancer.¹³ However, the distribution of the adipose tissue, independent of its magnitude, profoundly influences its metabolism, and hence its associated risk. Accumulation of fat

in the abdominal area, particularly in the visceral fat compartment, is associated with increased risk of insulin resistance, diabetes, hypertension, dyslipidaemias and atherosclerosis and is the cornerstone of the metabolic syndrome.¹⁴

Results from the SADHS found that 42.2% of women and 9.2% of men had central obesity, and that this was most common in white men and urban African and mixed-ancestry women.¹ Interestingly, more than twice as many black women had a waist circumference greater than 0.85 than did white women (35.3% v. 17.4%, respectively). This is in direct contrast to studies undertaken in small samples ($N = 8 - 15$) of South African women in which black women had significantly less visceral adipose tissue (assessed using computed tomography) than white women when matched for BMI.¹⁵ Despite having less visceral fat, the obese black women in these studies were more insulin resistant, but had lower total and LDL-cholesterol and triglyceride levels than the white women.^{15,16} However, further studies including a larger, more representative sample are required to confirm these findings.

A clear understanding of the nature of the association between body fat distribution and morbidity is essential, as there are distinct ethnic differences in the morbidity pattern associated with obesity in South Africa. For example, the prevalence of type 2 diabetes mellitus is twice as high in black and Indian populations compared with the white population, whereas coronary heart disease is more common in the white population group. Irrespective of these differences, it is evident that obesity and its co-morbidities have a negative impact on the lives of many South Africans and the consequent burden of disease contributes to the increasing cost of health care. Therefore, effective prevention and management strategies to combat obesity and its co-morbidities are imperative.

OBESITY MANAGEMENT

One of the major challenges facing obesity management in South Africa are the socio-cultural perceptions regarding obesity. In the SADHS, actual overweight and obesity were completely underestimated by those individuals who presented with these conditions.¹ Only 9.7% of men and 22.1% of women perceived themselves as overweight, whereas 29.2% of men and 56.6% of women were actually overweight or obese. These perceptions varied according to ethnicity and gender. Only white women were able to approximate their actual level of obesity accurately. In contrast, only 16% of black women saw themselves as overweight. Similar results were found in a recent study on urban black CHWs, who are trained in health matters and play a role in educating the community.⁷ Less than half of the CHWs perceived themselves as overweight, yet 42 of the 44 women studied were overweight or obese, with an average BMI of 40 (23 - 64).

Although the CHWs were aware of the negative factors associated with obesity, they preferred to be slightly overweight, regarding a BMI of 27 as ideal, owing to the association between thinness and HIV/AIDS. Moreover, the CHWs associated overweight with happiness, dignity, respect, health, wealth and strength, as well as being treated well by one's husband, which is supported by other studies on South African women.¹⁷ These ethnic differences in body image perception appear to stem from childhood and adolescence, as both Caradas *et al.*¹⁸ and Mciza *et al.*¹⁹ found that the ideal body size desired by white girls was significantly smaller than that of mixed race or black girls. Furthermore, dissatisfaction with present body size was significantly higher in white, compared with black or mixed race girls.¹⁸

An acceptance of overweight and obesity can hinder the effectiveness of weight control programmes. A recent

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study that examined attitudes toward weight control in black women ($N = 187$) aged 25 - 55 years in a rural village in South Africa found that most of these rural women were unconcerned about their weight and most overweight and obese women did not want to lose weight.²⁰ Moreover, Mvo *et al.*¹⁷ found that in a disadvantaged community in which food was highly valued owing to low food security, the concept of an individual voluntarily regulating the intake of nutrients when food did become available was unacceptable.

However, it does appear that Western norms are influencing South Africans' perceptions of body weight and weight control. A recent study found that the media, particularly the radio and TV, was the most common source of information on nutrition in urban black South African women.²¹ Although studies have shown that white girls exhibit greater body image dissatisfaction than black or mixed race girls, the prevalence of abnormal eating attitudes is equally common in South African schoolgirls from different ethnic backgrounds.¹⁸ Black women therefore find themselves in a dilemma; on the one hand, their culture and traditions demand a bigger body size, and on the other, increasing pressure from Western norms, largely driven by media influences, promotes the attainment of a thin figure.

To our knowledge, there is only one study in South Africa that has examined ethnic differences in the effectiveness of a weight loss programme, and used dexfenfluramine, an appetite suppressant that has subsequently been removed from the market.¹⁵ Nonetheless, 12 weeks of dexfenfluramine treatment resulted in a greater weight loss in obese black women compared with white women (-9 v. -4 kg), which was largely from the subcutaneous gluteo-femoral depot, whereas white women lost more visceral fat than black women. Unfortunately metabolic outcomes were not measured following weight loss, so the potential health benefits of the weight loss could not be assessed. Future research should focus on intervention strategies that are culturally specific, and should include dietary and behavioural aspects, as well as interactions with pharmacotherapy.

CONCLUSION

It is apparent that obesity in South Africa is a burgeoning problem in all sectors of the community, but is a particular challenge in urbanised black women. Cultural perceptions of obesity are a particular challenge when implementing strategies for the prevention and management of obesity in South Africa. Education and cultural acceptability are key to the success of such interventions and can be effectively implemented by nutrition messages delivered from health professionals via the media or via suitably educated CHWs. When addressing the problem of obesity and its associated health risks, the importance of increasing physical activity, as well as dietary manipulation should be emphasised. Future research should investigate the effectiveness of intervention programmes aimed at reducing obesity and its associated morbidity, which should be culturally specific, and include dietary and behavioural aspects, as well as pharmacotherapy.

References available on request.

IN A NUTSHELL

The prevalence of overweight (BMI > 25 kg) and obesity (BMI > 30) in South Africa is high, with more than 29% of men and 56% of women being classified as overweight or obese.

The groups most at risk are urbanised black women (58.5% overweight or obese) and white men (54.5% overweight or obese).

The major determinants of obesity in South Africa include ethnicity, rural-urban transition, education level, inactivity, and increasing availability of energy-dense and fatty foods.

Obesity in children is associated with inactivity, as measured by television viewing time.

Ethnic differences in body fat distribution (central obesity) may influence the morbidity pattern and health risks associated with obesity in South Africa.

Overweight and obesity are completely underestimated in South Africa. Perceptions regarding obesity are largely driven by socio-cultural norms, with the black population having a greater tolerance for a larger body size.

In disadvantaged communities where food security is low, the concept of voluntarily regulating food intake for weight control may not be acceptable, and may therefore hinder the effectiveness of weight loss interventions.

Education is key to weight management, and nutrition and lifestyle messages delivered by health professionals, the media, and suitably educated community health workers may provide an effective vehicle for intervention.

Future research should focus on weight loss intervention strategies that are culturally specific, and should include dietary and behavioural aspects, as well as interactions with pharmacotherapy.