

# Epidemiology of adult obesity

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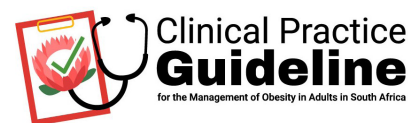
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SOUTH AFRICAN METABOLIC MEDICINE AND SURGERY SOCIETY

## KEY MESSAGES FOR POLICYMAKERS AND HEALTHCARE PROVIDERS IN SOUTH AFRICA

- Obesity is a complex chronic disease in which abnormal or excess body fat (adiposity) impairs health, increases the risk of long-term medical complications, and reduces lifespan.
- In epidemiological research, obesity is determined using the body mass index (BMI), calculated as weight in kilograms divided by height in metres squared ( $\text{kg}/\text{m}^2$ ). Overweight is defined as a BMI between 25 and 29.9  $\text{kg}/\text{m}^2$ , obesity as a BMI  $\geq 30 \text{ kg}/\text{m}^2$ , and severe obesity as a BMI  $\geq 35 \text{ kg}/\text{m}^2$ .
- Health professionals should not rely solely on the BMI to predict an individual's health risk, but use it in conjunction with other screening and assessment tools.
- Obesity increases the risk of serious chronic illnesses such as heart disease, cancer, stroke, diabetes and metabolic dysfunction-associated steatotic liver disease, among others.
- In South Africa (SA), the prevalence of obesity in adults over the 20-year period 1998 - 2017 rose by 38%, with the rate of increase being double in women compared with men.
- Obesity affected 28%, or 10.89 million, of SA adults in 2017, with women more affected than men (42.6% v. 12.1%).
- Severe obesity, the fastest-growing obesity subgroup, increased disproportionately over this same period, with as many as 3.34 million women and 770 000 men living with severe obesity in 2017.
- Overweight affected an additional 24% of adults in SA.
- Measures of abdominal obesity (excess fat in the abdominal region, estimated using sex-specific waist circumference cut-points), associated with significant increases in health risk, increased by 20% and 23% in women and men, respectively, between 1998 and 2017.
- The causes of and contributors to obesity are complex and extend well beyond an individual's choice over calories in and out. Established contributors to obesity in the SA context include socioeconomic status, sex, ethnicity, urbanisation, and environmental and lifestyle factors.
- The pervasive weight bias, stigma and discrimination must be addressed in the healthcare system and in society to ensure fair, respectful and equitable treatment for people living with obesity (PLWO).
- Obesity affects individuals, families and society. The economic burden is significant. In 2019, the global economic impact of obesity was estimated to be 2.19% of the global gross domestic product (GDP), ranging from USD20 in Africa to USD1 110 in high-income countries.
- In SA, the total cost of overweight and obesity was estimated to be ZAR33.194 billion in 2020, equivalent to 0.67% of the GDP and 15.4% of total government health expenditure. Cardiovascular diseases and diabetes were the main obesity-related conditions that contributed to these costs.
- Management (i.e. prevention and treatment) of obesity requires a collective co-ordinated effort across policy, healthcare systems and communities, and at an individual level.
- There is a need for continued and focused investment in research funding to support the scientific understanding of PLWO. This includes non-experimental research on the biopsychosocial and environmental causes of and contributors to obesity. In addition, experimental research to develop and test interventions to prevent obesity and manage and treat PLWO is required. Research on how best to implement evidence-based practice and policy is a priority.

## RECOMMENDATIONS

1. Healthcare providers should recognise and treat obesity as a chronic disease, caused by abnormal or excess body fat accumulation (adiposity) that impairs health, with increased risk of premature morbidity and mortality (Level 2b, Grade B).<sup>[1-8]</sup>
2. The development of evidence-informed strategies at the health system and policy level should be directed at managing obesity in adults (Level 2b, Grade B).<sup>[4-8]</sup>
3. Continued longitudinal national and regional surveillance of obesity that includes self-reported and measured data (i.e. heights, weights, waist circumferences) should be conducted on a regular basis (Level 2b, Grade B).<sup>[2-6]</sup>

## Introduction

Obesity is a complex chronic disease in which abnormal or excess body fat (adiposity) impairs health, increases the risk of long-term medical complications, and reduces lifespan. Obesity is a complex disease in both its aetiology and its pathophysiology.<sup>[9]</sup> In 2020, overweight and obesity were estimated to affect 42% of all adults globally, with 0.81 billion adults living with obesity.<sup>[10]</sup> Obesity is associated with many diseases, such as diabetes, cardiovascular disease and certain types of cancers. Obesity affects the health and psychosocial wellbeing of individuals. Health-related quality of life is significantly lower for people living with obesity (PLWO) compared with the general population owing to impaired mental health, increased depression and anxiety, greater pain and discomfort, and reduced mobility.<sup>[11]</sup> PLWO experience pervasive weight bias, stigma and discrimination that further impacts on their wellbeing and leads to health and social inequalities.<sup>[11,12]</sup>

The annual costs attributed to overweight and obesity in 2019 across 161 countries were estimated to be equivalent to 2.19% of the global gross domestic product (GDP), with the total economic loss per capita being USD20 in Africa.<sup>[13]</sup> In South Africa (SA), the healthcare cost of treating overweight- and obesity-related conditions using healthcare services in the public sector in 2020 was estimated to be ZAR33.194 billion, representing 0.67% of the GDP.<sup>[14]</sup> Most of these costs (81%) were attributed to the treatment of cardiovascular diseases (especially hypertension) and diabetes. Notably, these costs only included those related to treating the conditions (e.g. medication, outpatient visits, hospitalisation, imaging, laboratory) and did not include indirect costs (e.g. absenteeism, presenteeism [being at work but not functioning at full capacity] and premature death), and therefore highly underestimate the total costs of overweight and obesity in SA. In the private sector, the Discovery Health Vitality ObeCity Index 2023 analysed data from Vitality members living in six cities across SA and estimated that the additional cost of overweight and obesity to medical schemes in 2022 was ZAR21.8 billion.<sup>[15]</sup>

In epidemiological research, obesity is determined using the body mass index (BMI), calculated as weight in kilograms divided by height in metres squared ( $\text{kg/m}^2$ ). Obesity is defined as a BMI  $\geq 30 \text{ kg/m}^2$  and further divided into subgroups: Class 1: BMI 30 - 34.9  $\text{kg/m}^2$ , Class 2: BMI 35 - 39.9  $\text{kg/m}^2$ , and Class 3: BMI  $\geq 40 \text{ kg/m}^2$ . The term severe obesity is used for individuals with a BMI  $\geq 35 \text{ kg/m}^2$ .

Owing to its ease of measurement, the BMI is often used at a population level to estimate the health risks associated with excess body weight. However, at an individual level it has many limitations; it does not quantify body composition or fat distribution, and does not account for age or sex (see the chapter '[Assessment of people living with obesity](#)'). Other anthropometric measures such as waist circumference, waist-to-hip ratio, waist-to-height ratio and skinfold measurements are used as proxies of abdominal and regional adiposity. These measures also have limitations related to validity and reliability, and like the BMI do not directly measure total or regional body fat.<sup>[16-18]</sup> Of these anthropometric measures, waist circumference is frequently used to assess excess body weight around the abdominal area. Increasing waist

circumference is associated, independently of BMI, with increased health risks for diabetes, hypertension and coronary heart disease. The cut-points for waist circumference should be ethnic-specific, such as those established for Asian populations.<sup>[19]</sup> Waist circumference cut-points, including the need for African-specific cut-points, are discussed in 'Assessment of people living with obesity'.

## Prevalence of obesity in South Africa

In SA, the overall prevalence of obesity in adults ( $\geq 18$  years) increased by 38% over the 20-year period 1998 - 2017, from 20.3% in 1998 to 28.0% in 2017 (Fig. 1). In 2017, more than 10.89 million people were living with obesity in SA. These data are based on direct measurements of participants' height and weight, from which BMI was determined, in nationally representative population surveys and estimated as described by Cois *et al.* (in preparation). Available SA surveys include the Demographic and Health Surveys in 1998, 2003 and 2016,<sup>[20-22]</sup> the South African National Health and Nutrition Examination Survey in 2012,<sup>[23]</sup> and the five waves of the National Income Dynamics Study in 2008, 2010 - 2011, 2012, 2014 - 2015 and 2017.<sup>[24]</sup> The high and increasing prevalence of obesity in SA is largely driven by obesity in women, among whom the prevalence increased from 29.5% in 1998 to 42.6% in 2017 (44% increase). This increase in prevalence far exceeds that for men, among whom the prevalence increased from 10.1% in 1998 to 12.1% in 2017 (20% increase). More recent data from the SA National Food and Nutrition Security Survey conducted in 2021 indicated that the overall obesity prevalence was 32.1%, with a higher prevalence in women than men (41.3% v. 15.3%).<sup>[25]</sup> Unfortunately, at the time of publication, the microdata were not available and could not be included in the trends reported here.

Notably, among women, the prevalence of overweight decreased by 7% over the 20-year period 1998 - 2017, while Class 1 obesity increased by 30%, Class 2 by 46% and Class 3 by 95% (Fig. 2), with as many as 3.34 million women living with severe obesity (BMI  $\geq 35 \text{ kg/m}^2$ ) in 2017. Among men, the prevalence of overweight over the same 20-year period remained stable at 22%, while the prevalence of Class 1 obesity increased by 9.6%, Class 2 by 45% and Class 3 by 50% (Fig. 2), with 770 000 men living with severe obesity in 2017. Although the majority of South Africans living with obesity in 2017 were classified as living with Class 1 obesity (21% of women and 8.0% of men), with fewer living with Class 2 (12.3% of women and 2.9% of men) and Class 3 (9.0% of women and 1.2% of men) obesity, the higher rate of increase in extreme obesity (Fig. 2) is a major concern, as it is associated with a much higher risk of ill health and premature mortality than Class 1 obesity.<sup>[5,26]</sup>

Among women in 1998, the prevalence of obesity was highest in black African women (30.6%), followed by coloured (27.1%), white (26.2%) and Asian (21.4%) women (Fig. 3). However, between 1998 and 2017, the rate of increase in obesity prevalence was highest in Asian women (76.7%), followed by white (66%), coloured (53%) and black African (40%) women. Accordingly, the prevalence of obesity in 2017 did not differ markedly by ethnicity, with 42.8% of black African, 41.5% of coloured, 43.5% of white and 37.6% of Asian women living with obesity.

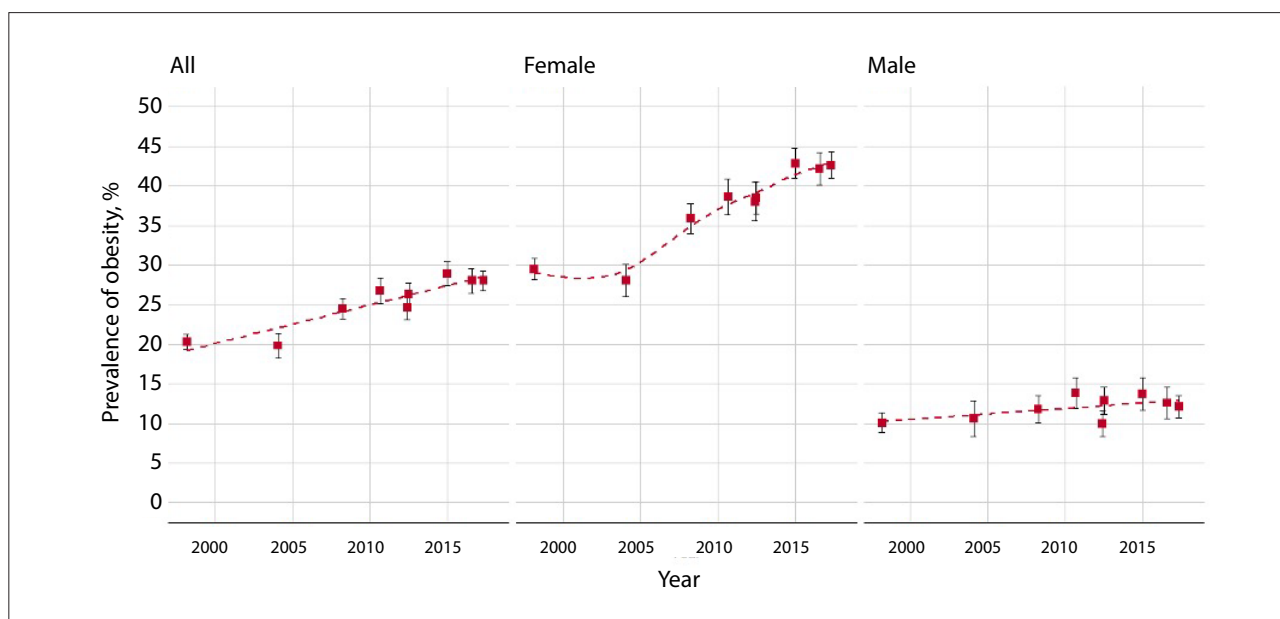


Fig. 1. Prevalence of obesity in the South African adult population (18+), 1998 - 2017, by sex (%). Estimates from nationally representative population surveys including direct measurement of participants' height and weight. Dashed lines are smoothed trends recovered by weighted generalised additive models (thin-plate splines, 8 degrees of freedom). Vertical bars represent 95% confidence intervals.

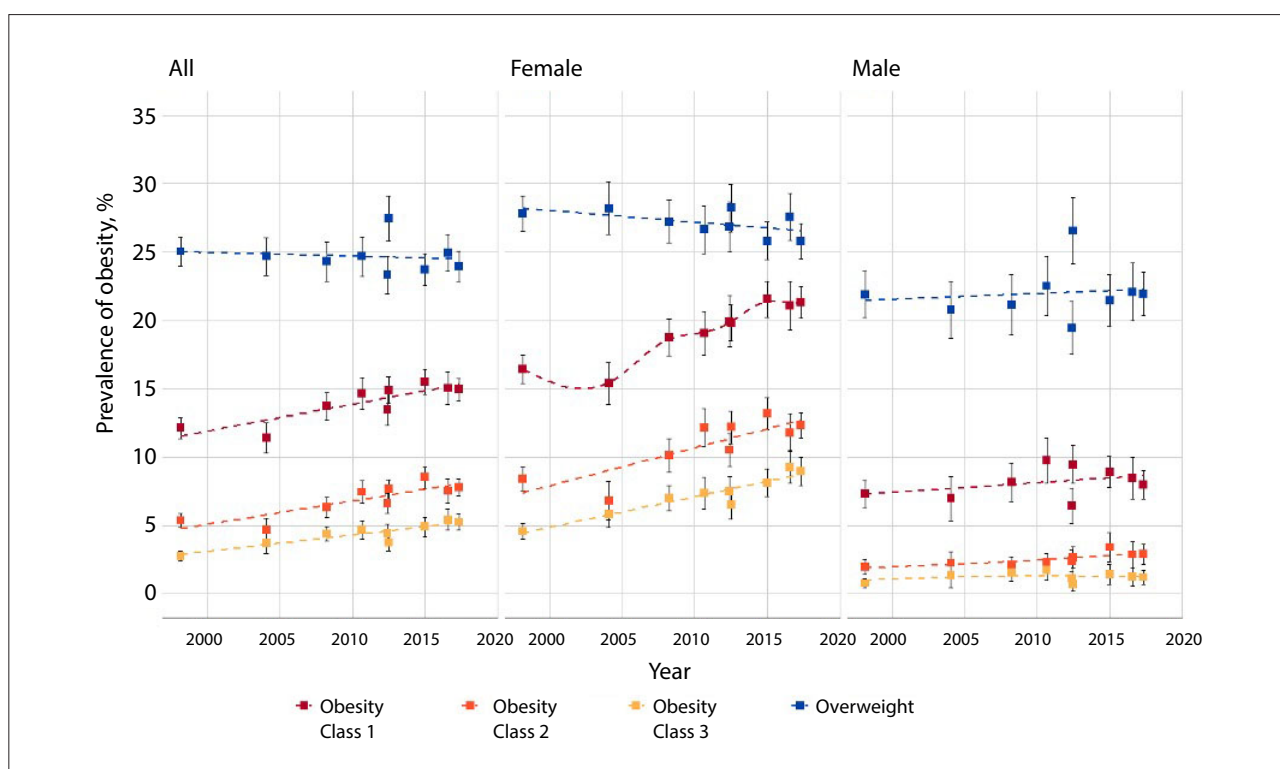


Fig. 2. Prevalence of obesity in the South African adult population (18+), 1998 - 2017, by sex and obesity class (%). Estimates from nationally representative population surveys including direct measurement of participants' height and weight. Dashed lines are smoothed trends recovered by weighted generalised additive models (thin-plate splines, 8 degrees of freedom). Vertical bars represent 95% confidence intervals.

Among men in 1998, the prevalence of obesity was similar between Asian (9.5%), black African (9.8%) and coloured (9.7%) men, with white men having a significantly higher prevalence of obesity of 21.5%. Notably, between 1998 and 2017, the prevalence of obesity in coloured men doubled (109%), whereas the change in obesity prevalence in white (25%), black African (20%) and Asian (3%) men was more moderate. In 2017, 9.8% of black African and Asian men,

17.9% of coloured men and 26.8% of white men were living with obesity.

A note of caution must be applied in interpreting the estimates for the Asian subpopulation, as it is generally accepted that Asian populations experience heightened mortality risk at lower BMI compared with other ethnic groups.<sup>[27-30]</sup> Accordingly, Asian-specific cut-points for obesity (BMI  $\geq 25$  kg/m<sup>2</sup>) have been proposed.<sup>[31-33]</sup>

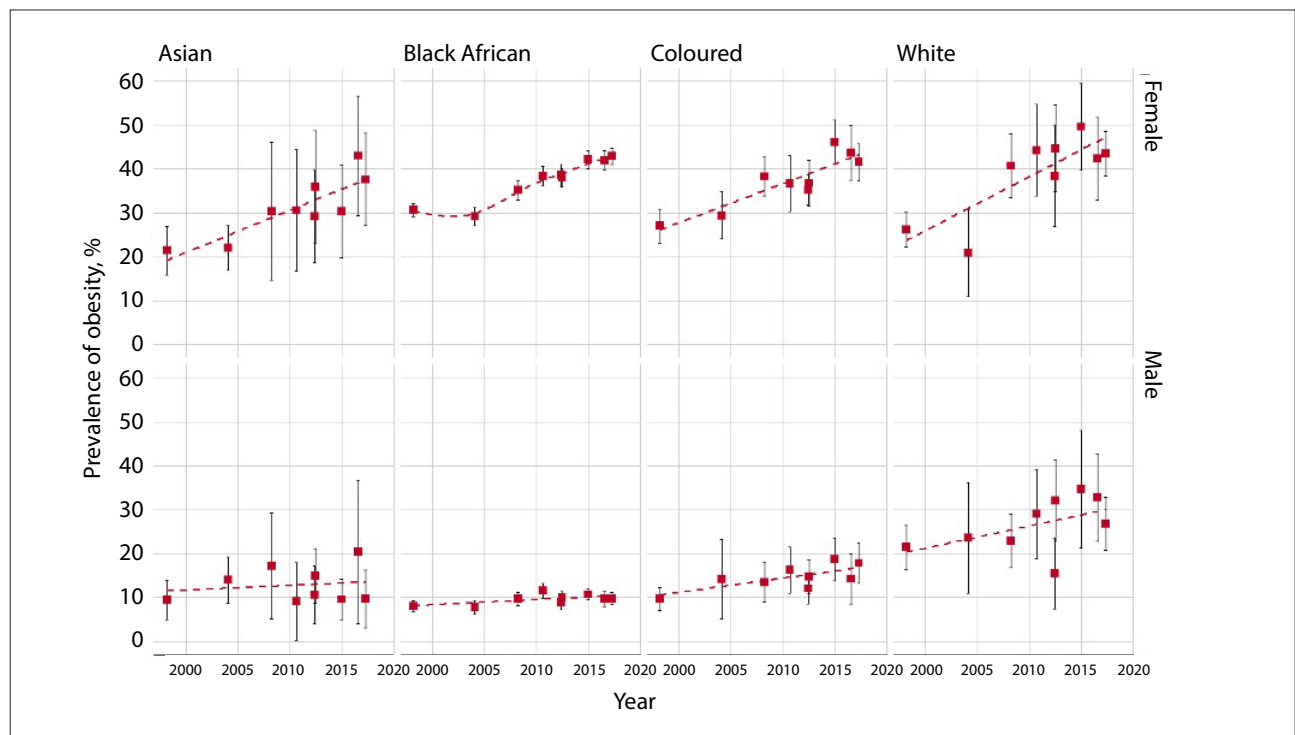


Fig. 3. Prevalence of obesity in the South African adult population (18+), 1998 - 2017, by sex and population group (%). Estimates from nationally representative population surveys including direct measurement of participants' height and weight. Dashed lines are smoothed trends recovered by weighted generalised additive models (thin-plate splines, 8 degrees of freedom). Vertical bars represent 95% confidence intervals.

Using the adapted cut-off for Asians of 25 kg/m<sup>2</sup>, the prevalence of obesity among the Asian subpopulation was estimated at 68.4% among women and 34% among men in 2017.

In SA, the prevalence and trajectories of obesity vary by geographical region (Fig. 4). Among women in 2017, those living in the more urbanised provinces (Free State, KwaZulu-Natal, Western Cape, Eastern Cape, Gauteng and North West) had the highest rates of obesity of over 40%, compared with 33 - 38% in Limpopo, Mpumalanga and Northern Cape. Among men in 2017, the pattern was similar, with the highest prevalence in Western Cape (16.5%), followed by Free State (15.1%), and the lowest in Limpopo (9.4%). The discrepancy in obesity prevalence between provinces is reflected by the differences between urban and non-urban areas (Fig. 5). However, these differences are more pronounced in men compared with women. In 2017, the prevalence of obesity was 13.8% in urban men compared with 8.2% in non-urban men, representing a 68% difference. Among women, there was only a 12% difference between urban (44.4%) and non-urban (39.5%) women. It is important to note that these differences may be partly explained by the differences in the age structures of the different provinces.

Notably, the rates of increase in obesity between 1998 and 2017 differed markedly by province (Fig. 4). For both men and women, the largest increase in the prevalence of obesity was in North West (131% and 142%, respectively), followed by Free State (74% and 71%, respectively). Among men, the next-greatest increases in obesity prevalence were seen in the more rural provinces, including Northern Cape (52%), Mpumalanga (49%) and Limpopo (40%), with Western Cape and Eastern Cape showing 20% and 18% increases, respectively. Interestingly, the prevalence of obesity in men only increased by 4% in Gauteng and decreased by 13% in KwaZulu-Natal. Among women, there was less variation, with the increase in obesity prevalence being 70% in Limpopo, 58% in Western Cape, 53% in Northern Cape, 46%

in Eastern Cape and 39% in Mpumalanga, with Gauteng (27%) and KwaZulu-Natal (24%) having the lowest rates of increase between 1998 and 2017.

Centralisation of body fat, estimated using waist circumference, is a better predictor of disease risk than BMI.<sup>[34-36]</sup> Over the 20-year period 1998 - 2017, mean waist circumference increased significantly by 3.9 (95% confidence interval [CI] 3.5 - 15.6) cm/decade among women, with a more modest non-significant increase of 1.1 (95% CI -1.1 - 3.2) cm/decade among men. Accordingly, the proportion of South Africans classified with central obesity, defined by waist circumference  $\geq 80/94$  cm (women/men), increased from 60% to 77.2% in women and from 21.6% to 26.3% in men between 1998 and 2017 (Fig. 6).

When exploring the changes in the prevalence of central obesity by ethnicity over the 20 years 1998 - 2017 (Fig. 7), we see that the prevalence doubled in Asian women (127%), whereas in the other ethnic groups, the prevalence increased by approximately 50%. Among men, the prevalence of central obesity increased by 145% in coloured men and 106% in black African men, whereas a 28% increase was observed in Asian men and only 1% in white men.

As for the BMI, substantial evidence suggests that in Asian populations the relationship between waist circumference and mortality and morbidity risk is shifted towards lower values of waist circumference compared with other ethnicities.<sup>[19]</sup> Accordingly, Asian-specific cut-points for waist circumference have been proposed (80 cm in women and 90 cm in men) to identify individuals at heightened risk.<sup>[32,37]</sup> Using the adapted male cut-off of 90 cm, the prevalence of central obesity in the Asian male subpopulation in SA is estimated at 33.1% in 2017.

## Health risks of obesity

Obesity increases the risk of developing a number of complications.<sup>[38]</sup> Most concerning, it increases the risk of developing cardiovascular disease<sup>[5]</sup> and cancer,<sup>[39-41]</sup> two primary causes of premature mortality in

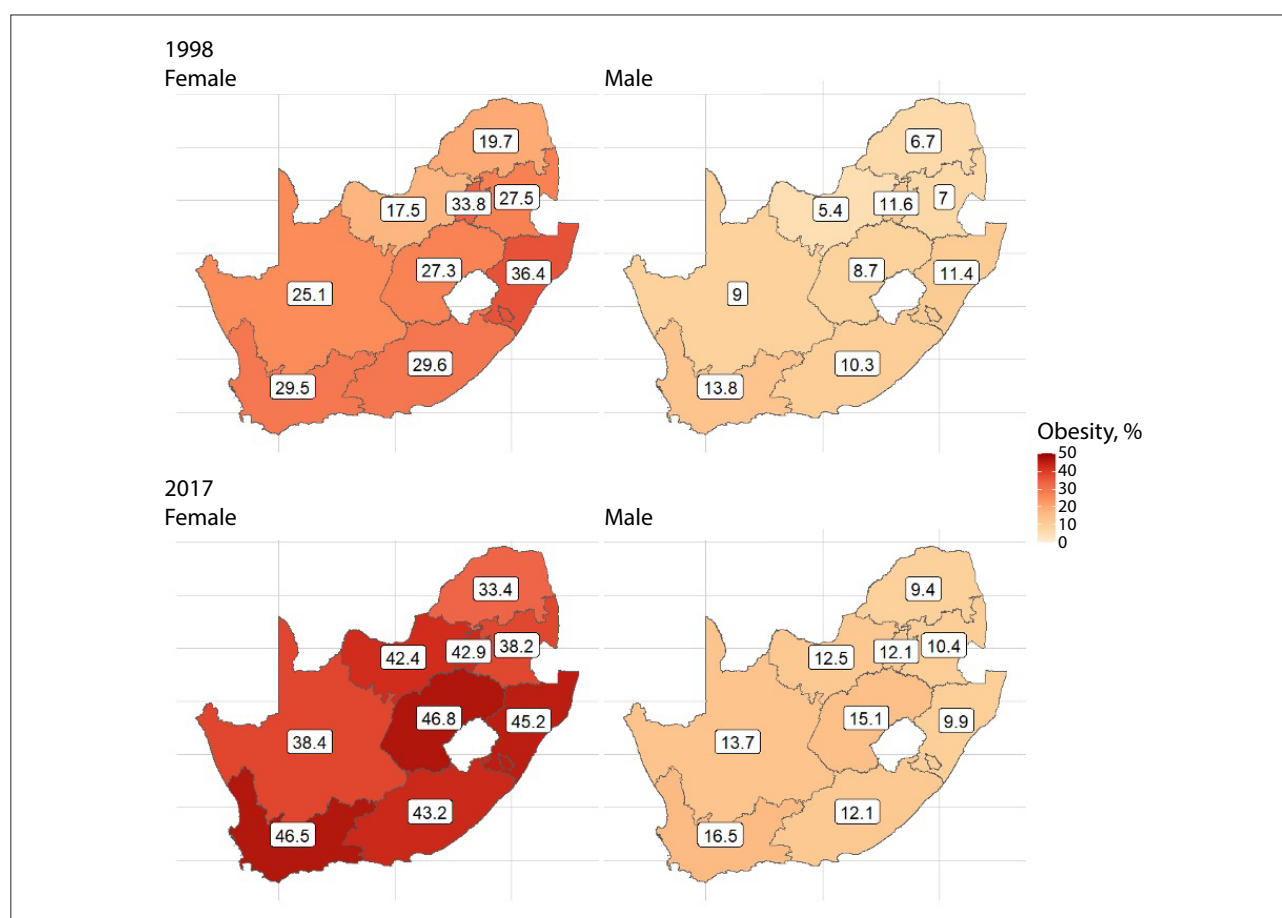


Fig. 4. Prevalence of obesity in the South African adult population (18+), 1998 and 2017, by sex and province (%). Estimates from nationally representative population surveys including direct measurement of participants' height and weight.

SA,<sup>[42,43]</sup> resulting in a reduction of life expectancy of 6 - 14 years.<sup>[5,44]</sup> It is estimated that 20% of all cancers can be attributed to obesity, independent of diet.<sup>[45]</sup> Obesity increases the risk of colon, kidney, oesophageal and pancreatic cancers in both sexes and of endometrial and postmenopausal breast cancers in women.<sup>[45]</sup> Obesity also increases the risk of developing type 2 diabetes,<sup>[46]</sup> gallbladder disease<sup>[47]</sup> and gout.<sup>[48]</sup> In addition to the aforementioned health problems, obesity is associated with functional limitations and psychological symptoms that impair quality of life. It is associated with a nearly three-fold increased risk of osteoarthritis and changes in gait that negatively affect mobility.<sup>[49]</sup> Pain associated with osteoarthritis leads to avoidance of physical activity, thus further contributing to functional limitations, and increasing the risk of depression and anxiety and reducing quality of life.<sup>[50]</sup> Obesity is also associated with an increased risk of many mental health conditions. For example, individuals living with obesity are twice as likely to be diagnosed with a mood disorder compared with individuals without obesity.<sup>[51]</sup>

The second South African Comparative Risk Assessment Study estimated that in 2012, more than 58 000 deaths (or 11.1% of the total number of deaths among people aged 20 years and older) and 1 400 000 disability-adjusted life years (6.9% of the total burden) were attributable to a raised BMI.<sup>[8]</sup> The analysis revealed that 68% of deaths due to type 2 diabetes, 65% of deaths due to hypertensive heart disease, 43% of deaths due to haemorrhagic stroke and 26% of deaths due to ischaemic stroke, 30% of deaths due to ischaemic heart disease, 63% of deaths due to endometrial cancer, 25% of deaths due to kidney cancer, 32% of deaths due to oesophageal cancer and 10% of deaths due to breast cancer were attributable to a raised BMI.<sup>[8]</sup>

Weight-related stigma is highly prevalent and occurs at home, places of employment, healthcare facilities and educational institutions and in the media. Negative societal attitudes, stigma and prejudice towards individuals living with obesity contribute to the large mental health burden observed. This bias negatively affects the health of individuals through increased anxiety and depression, employment inequities, avoidance of healthcare professionals, and inequitable treatment received in the healthcare system. It is likely that bias also contributes to the increased risk of mortality observed in individuals with obesity.<sup>[6]</sup>

Evidence from high-income countries shows that excess body weight, defined using the BMI, increases the risk of mortality. This relationship has been clearly demonstrated in several large-scale studies, independent of sex and ethnicity. A meta-analysis of 239 studies of more than 10 million individuals across four continents (excluding Africa) demonstrated that all classes of overweight and obesity were associated with an increased risk of all-cause mortality in every studied region, with the exception of South Asia.<sup>[4]</sup> The relationship between BMI and mortality risk in Asian populations has been demonstrated in other studies.<sup>[52]</sup> In another meta-analysis of 57 prospective cohort studies, including close to one million individuals living in Western Europe and North America, mortality risk in both men and women was lowest in the BMI range between 22.5 and 25 kg/m<sup>2</sup>,<sup>[5]</sup> and each 5 kg/m<sup>2</sup> increase in BMI above a BMI of 25 kg/m<sup>2</sup> was associated with a 30% increased risk of all-cause mortality. A dose-response relationship has been shown to exist between increasing BMI classes and an increased risk of mortality in prospective studies including predominantly US cohorts.<sup>[53]</sup> In contrast, a 7-year prospective study in

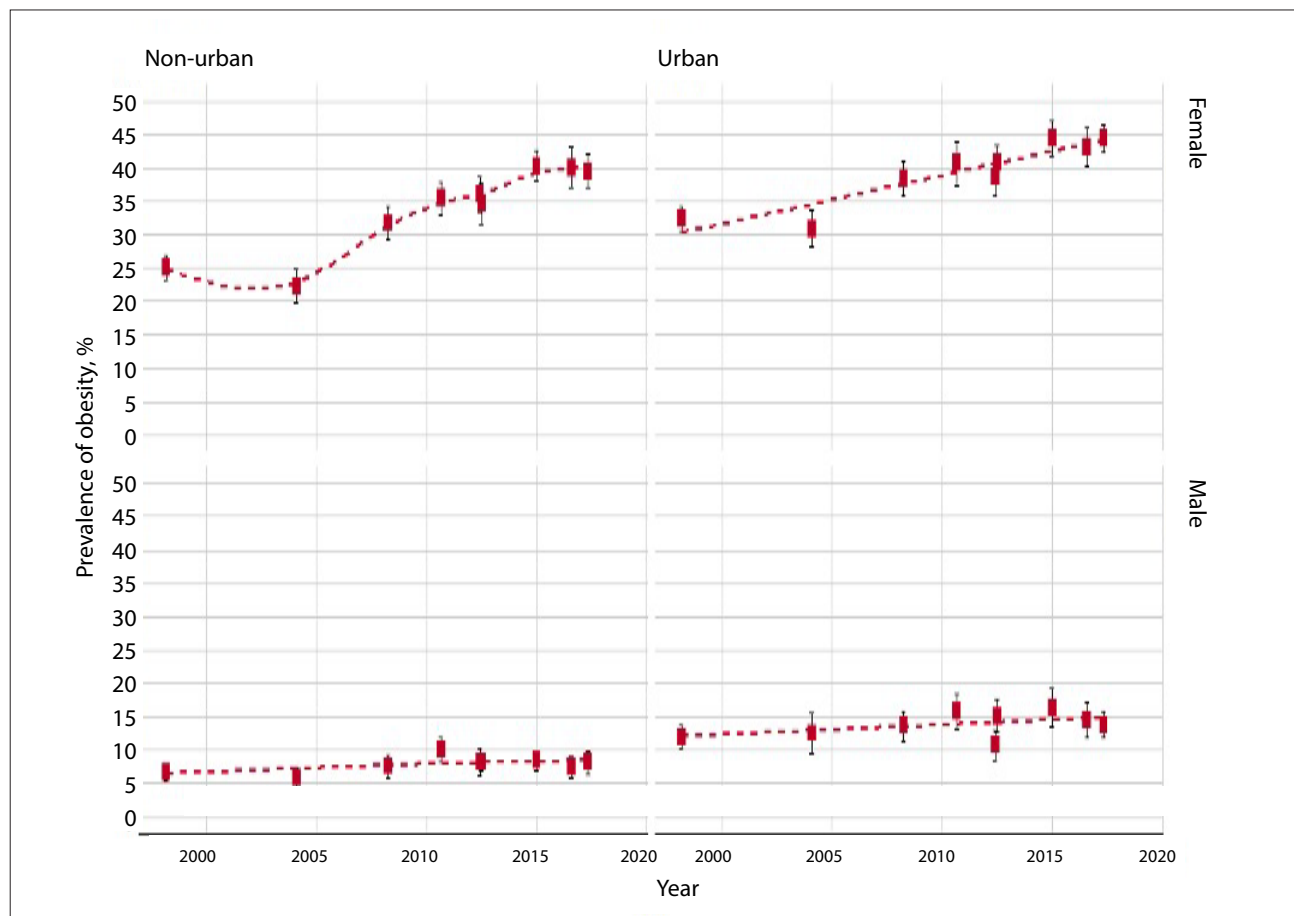


Fig. 5. Prevalence of obesity in the South African adult population (18+), 1998 - 2017, by sex and geotype (%). Estimates from nationally representative population surveys including direct measurement of participants' height and weight. Dashed lines are smoothed trends recovered by weighted generalised additive models (thin-plate splines, 8 degrees of freedom). Vertical bars represent 95% confidence intervals.

rural SA (Agincourt) demonstrated that compared with individuals of normal weight (BMI 18.5 - 24.9 kg/m<sup>2</sup>), those with overweight (BMI 25 - 29.9 kg/m<sup>2</sup>) or obesity (BMI 30 - 34.9 kg/m<sup>2</sup>) had a lower risk of all-cause mortality.<sup>[54]</sup> These findings were stronger in women and for those with infectious causes of death, whereas there was no difference in mortality from non-communicable diseases between those with a normal BMI and those with overweight or obesity.<sup>[54]</sup> The authors hypothesised that these findings may relate to sociodemographic factors such as access to healthcare and dietary quality, among others. However, further studies are required to validate these findings and understand the underlying mechanisms for these associations.

### Perspective on the contributors to obesity in South Africa

SA has undergone a significant epidemiological transition<sup>[55]</sup> and now finds itself with the highest prevalence of obesity in sub-Saharan Africa. Although a genetic predisposition to the disease cannot be negated, sociocultural, economic, environmental and behavioural factors are also powerful determinants of obesity in SA.<sup>[55-57]</sup>

In SA, the prevalence and the rate of increase in obesity are significantly greater in women compared with men (Fig. 1). In the early surveys (1998, 2003), black African women had the highest prevalence of obesity in SA (Fig. 3), which may in part be linked to cultural perceptions and acceptance of a larger body size.<sup>[58,59]</sup> However, over the following years the prevalence of obesity increased more in Asian, white and coloured women, reaching similar rates to those for black African women (Fig. 3). In contrast, among men the prevalence

of obesity is highest in white men and lowest in black African men (Fig. 3). Sartorius *et al.*<sup>[57]</sup> characterised the determinants of obesity and their population attributable fraction estimates from national survey data. The study showed that the determinants of obesity in women included black African ethnicity, formal or informal urban residence, being married, having middle-to-high socioeconomic status (SES), lack of exercise, high total household food expenditure and expenditure on unhealthy food options, and crime.<sup>[57]</sup> Similar but subtle differences in the determinants of obesity in SA men were reported, and included white ethnicity, formal urban residence, being married, having high or very high SES, and lack of exercise.<sup>[57]</sup>

These data clearly show a positive association between higher SES and obesity, which is supported by previous studies in SA.<sup>[60-62]</sup> This is in direct contrast to studies in high-income countries, where an inverse correlation between SES and obesity is reported.<sup>[63,64]</sup> Obesity in SA has been associated with SES factors such as access to electricity and clean water, lower housing density, greater expenditure on food, increased energy consumption, reliance on taxis or private vehicles for commuting, and reduced physical activity or higher levels of sedentary behaviour,<sup>[60-62,65]</sup> all of which signify a shift toward a westernised lifestyle. Furthermore, in numerous black African communities, living with overweight or obesity is often regarded as a symbol of health, beauty and affluence,<sup>[59,66]</sup> which further reinforces the link between SES and obesity.

The association between obesity and the shift to a westernised lifestyle is reflected by the difference in obesity rates between urban and rural areas in SA, which are more pronounced among

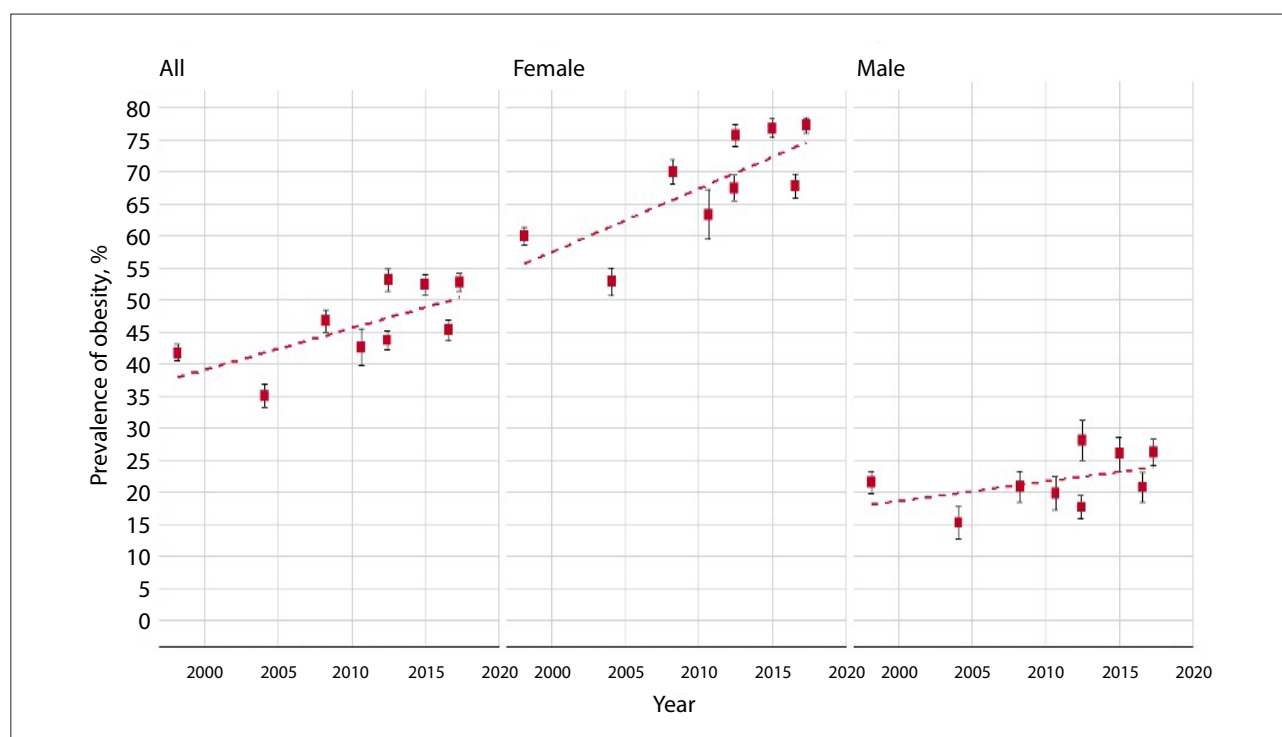


Fig. 6. Prevalence of central obesity in the South African adult population (18+), 1998 - 2017, by sex (%). Estimates from nationally representative population surveys including direct measurement of participants' waist circumference. Dashed lines are smoothed trends recovered by weighted generalised additive models (thin-plate splines, 8 degrees of freedom). Vertical bars represent 95% confidence intervals.

men than women (Fig. 5). Urbanisation is linked to the obesogenic environment and the adoption of westernised lifestyle habits. Differences in dietary habits are considered one of the main reasons for obesity discrepancies between urban and rural populations,<sup>[67]</sup> leading to the term 'nutrition transition' to describe dietary shifts accompanying urbanisation. The nutrition transition is associated with the intake of diets high in energy, fats and sugars but low in fibre, fruits and vegetables, which contribute to obesity. The nutrition transition is also occurring in rural areas, which may explain the rising obesity rates in these regions.<sup>[68,69]</sup> Notably, urbanisation also affects food accessibility. Many urban black South Africans reside in informal settlements far from large supermarkets that provide a wider range of food choices. Instead, they rely on informal vendors selling cheap, low-quality food. Socioeconomic status also influences dietary choices, with higher income linked to increased consumption of meat, larger portions, and more frequent fast-food intake.<sup>[70]</sup> Conversely, food insecurity leads to poor diet quality and limited food variety.<sup>[71]</sup> Importantly, the intake of sugar-sweetened beverages (SSBs) has also been associated with weight gain in South Africans from low-income settings.<sup>[72]</sup> In 2021 the SA government successfully implemented taxes on SSBs, which has been shown to be partly effective in reducing consumption.<sup>[73]</sup>

Another significant driver of obesity in both urban and rural SA communities is the decline in physical activity and the adoption of more sedentary lifestyles.<sup>[57,65,74]</sup> Indeed, meeting physical activity guidelines of at least 150 minutes per week was associated with lower BMIs in both men and women.<sup>[75]</sup> In contrast, physical inactivity is defined as engaging in little to no movement across work, home, transportation or leisure contexts.<sup>[76]</sup> Results from the Healthy Aging Adult South Africa report card showed that the prevalence of meeting physical activity guidelines (at least 150 minutes of moderate- to vigorous-intensity physical activity [MVPA] per week) in adults ranged from 34% to 75%, depending on the age and demographics of

the study population.<sup>[56]</sup> The prevalence of physical inactivity in SA, based on data from a population-based survey of HIV prevalence and making use of a multistage stratified cross-sectional design, is estimated to be as high as 57%, with women having higher levels than men (67.1% v. 46.9%, respectively).<sup>[77]</sup> Compared with their normal-weight counterparts, SA men living with overweight or obesity spent less time in MVPA, and SA women with obesity spent more time sitting or lying down.<sup>[78]</sup> Notably, reallocating sedentary time to MVPA is associated with a lower fat mass in both SA men and women.<sup>[79]</sup> Barriers to physical activity in SA include crime, traffic, lack of infrastructure, and cultural norms.<sup>[80]</sup> Education also influences activity, with higher education linked to lower work-related physical activity but higher leisure-time activity.<sup>[81,82]</sup> Most concerning for SA are the results from the country's 2018 report card on physical activity for children and youth, which found that only 48 - 51.7% of children are meeting the recommended 1 hour of MVPA per day. In addition, 9 - 11-year-old SA children are spending an average of 3.3 hours using screens per day, with only 34% of children meeting the screen-time guideline of <2 hours per day.<sup>[83]</sup> As physical behaviours track into adulthood, this is cause for concern.

Although education is closely related to SES, it has also been independently associated with obesity in SA.<sup>[57]</sup> SA studies suggest a non-linear relationship between education and obesity, with both uneducated women and those with tertiary education having lower BMIs compared with women with some schooling.<sup>[55,57]</sup>

Although direct evidence for SA is scarce, other contributors in our modern environment increase the risk of developing obesity, such as medication use, chronic stress, insufficient sleep, and modern energy-saving conveniences such as cars, remote controls, washing machines, etc. Many of these factors are associated with small changes in appetite or energy expenditure and demonstrate secular trends that mirror the rise in obesity.<sup>[84,85]</sup> In the case of medications, several pharmaceuticals used for treating comorbidities commonly

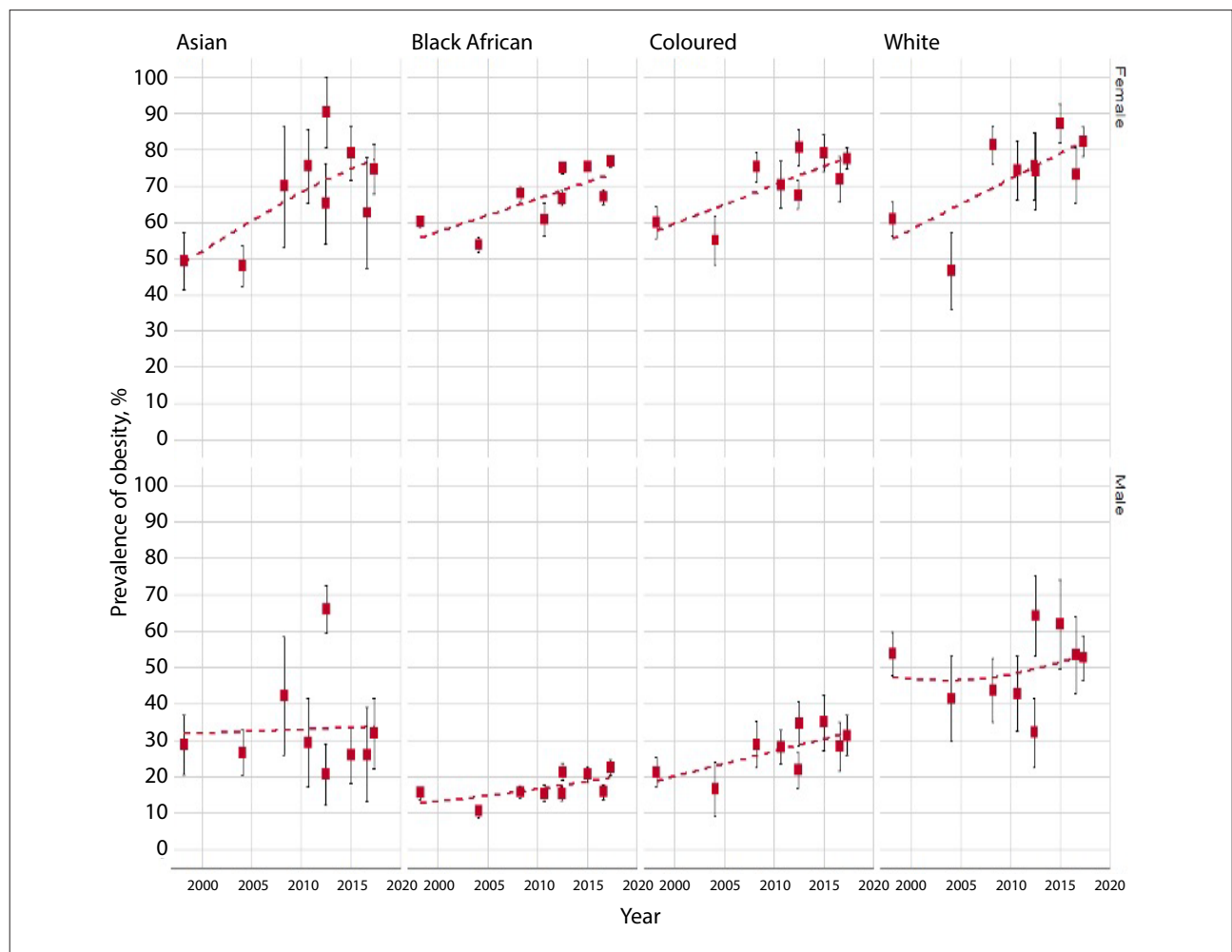


Fig. 7. Prevalence of central obesity in the South African adult population (18+), 1998 - 2017, by sex and population group (%). Estimates from nationally representative population surveys including direct measurement of participants' waist circumference.

associated with obesity, such as depression, hypertension and diabetes, are known to promote weight gain.<sup>[86]</sup> Patients can therefore find themselves in a paradoxical situation in that treatment for their obesity-related conditions also exacerbates their obesity.

While a significant amount of research has focused on individual-level behaviours that are associated with obesity, such as food intake and levels of physical activity, the relationship is not always well defined. Rather, the high prevalence of obesity in SA points to multi-system and multi-level factors, including government policy, the provision of and access to healthcare services, and regional food and built environments that influence how people live and work.<sup>[87]</sup>

## Conclusion

In SA, the prevalence of obesity increased by 38% between 1998 and 2017, affecting one in four adults in 2017. The prevalence of obesity is higher in women than in men, and while the rate of increase in men has been relatively flat, the rates of obesity and central obesity have continued to increase in women. Obesity and related complications negatively affect health and quality of life, taking years off life expectancy. In SA, the increasing humanistic, health system and societal burden of obesity is significant and does not discriminate, affecting individuals across age, sex and ethnic groups, geographical regions and SES strata. The complex aetiology of obesity has contributed to pervasive bias and stigma in the healthcare system and in society as a whole and has hindered progress in managing obesity

as a chronic disease. It is essential to examine obesity trends beyond 2017, incorporating the most recent data available from 2021, as well as considering projections for the near future. An urgent mobilisation of knowledge and resources and a collective effort are required to characterise the trends in obesity to inform interventions to reduce the far-reaching and significant impact of obesity, a life-threatening disease, on the SA population.

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