

# THE WEIGHT OF THE NATION

AN IN-DEPTH ANALYSIS OF SCOTLAND'S WEIGHT BETWEEN 1995 AND 2018



**Obesity Action  
Scotland**  
Healthy weight for all

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# FOREWORD

**Obesity Action Scotland was established in 2015 to provide clinical leadership and independent advocacy on preventing and reducing overweight and obesity in Scotland. One of our aims is to raise awareness of obesity and health problems associated with it. We regularly use Scottish Health Survey data to make sure our calls and actions are evidence-based.**

Obesity rates reported in the survey illustrate changes in the weight of the nation. This information helps health professionals and policy makers decide what needs to be done to increase healthy weight and improve the health of people in Scotland.

The published survey reports include information on obesity rates among adults and children. They also show differences between men and women, between different ages and sometimes between areas of deprivation. However,

due to limited space, they do not go into details.

This report explores weight of the Scottish nation in detail. We used publicly available data collected for the Scottish Health Survey and re-analysed them.

We looked at all years the survey was completed and reported how obesity rates have been changing in Scotland since 1995. We also looked in detail at what was happening for different groups of the population.

We created this report for anyone interested in how the weight of people

in Scotland has been changing over the years. We also hope it will support policy makers and health professionals in making Scotland a healthier nation.

We would like to thank Diffley Partnership and the University of Aberdeen for providing support on the data analysis and presentation in this report.

## ABOUT THIS ANALYSIS

The analysis for this report was conducted by the Medical Statistics team from the University of Aberdeen with follow up interpretation work provided by Diffley Partnership.

Data for analysis were sourced from the UK Data Service.

Analysis which includes 1995 data is restricted to under 65s as the earlier surveys did not include all ages. Analysis which only uses 2008-2018 data includes all adults (16 years or older).

Data are weighted to ensure the sample in the Scottish Health Survey represents the population of Scotland as a whole.

***Please note: Throughout the report we use the terminology morbid obesity/morbidly obese as that is the terminology used within the Scottish Healthy survey and we wished to be in line with the original data. That is not our preferred terminology.***

***The term significant has been used only when findings are statistically significant, i.e. when the p-value falls below the significance level (0.05). When results are statistically significant it is unlikely the differences can be explained by chance or random factors.***

## EXECUTIVE SUMMARY

This report reviews surveys of weights of children and adults in Scotland over the ten year period 2008-2018 for all ages and longer term for adults (1995-2018) for some measures. The time series ends before the start of the COVID-19 pandemic.

Average weight has risen steadily and significantly over the 23 year period analysed. The average adult in Scotland is now classified as overweight, and this high proportion is unchanged over the past 10 years. We know that since 2018 the weight of the nation has not been falling and has likely been continuing to rise.

Only a third (33%) of adults report a healthy weight; almost two-thirds of adults are within overweight or obese classifications. The proportion of adults in the morbidly obese category has been increasing.

For children, the picture is of little change over the time period 2008-2018, but a persistent challenge of overweight that worsens over childhood, and a worryingly high proportion of those in the overweight categories who are classified as severely obese.

The many social and economic influences and life experiences that bear on multiple deprivation have effects on the likelihood that men and women of all ages develop overweight and obesity. Levels of overweight and obesity are progressively higher among both adults and children living in deprived areas of Scotland.

It is clear that this issue has deteriorated over the past two decades, and the effects of the COVID-19 pandemic are likely to have made the situation worse. Existing policy has not been strong enough to turn the tide. New evidence-based strategies which span multiple sectors are necessary to address the rising weight of the nation effectively.

# KEY FINDINGS

## ADULTS

- » Average BMI has risen steadily and significantly over the 23 year period.
- » The average BMI for the adult population has been in the overweight range since records began but is now heading towards the obese category.
- » The proportion of adults in the BMI category of morbid obesity has been increasing.
- » By 2018 almost two-thirds of adults were within overweight or obese classifications.
- » The average BMI of young adults (16-24) has increased the most out of all age groups since 1995.
- » Average BMI is patterned by level of deprivation with those from the most deprived areas consistently showing higher BMIs compared to the least deprived.
- » Between 1995 and 2018 there was a significant increase in average waist circumference for both men and women.
- » Over time there has been a significant rise in the proportion of women in the raised waist <sup>1</sup> category. Whilst men have seen an increase in the proportion in the raised waist category it is not as stark as the pattern for women.

## CHILDREN

- » There have been fluctuations in rates of childhood obesity over the years and no clear pattern is emerging.
- » Over half (58%) of the children with obesity are children with morbid obesity.
- » As with adults, children from the most deprived areas are more likely to be overweight and obese than children from the least deprived areas.

<sup>1</sup>A raised waist circumference is a waist of more than 102cm in men and more than 88cm in women

## 1

# ADULT BODY MASS INDEX

## ADULT (16-64 YEARS OLD) AVERAGE BMI OVER TIME 1995-2018

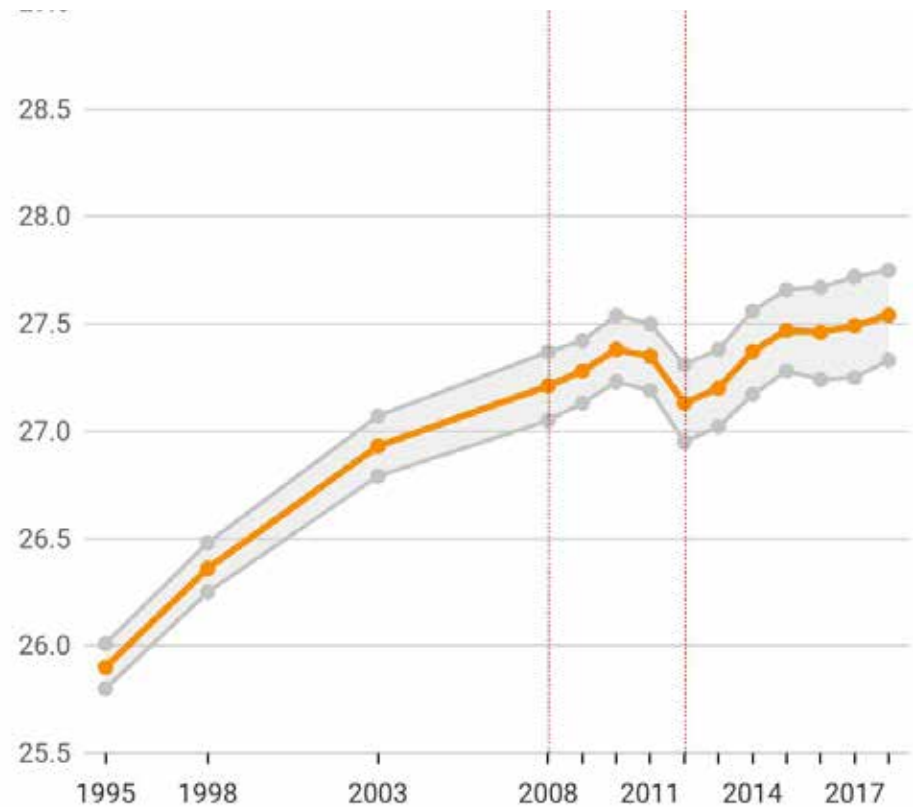
Body Mass Index (BMI) is a proportion of a person's weight to their height squared ( $\text{kg}/\text{m}^2$ ). Table 1.1 below outlines the five BMI categories, or groups. The healthy weight BMI range for adults is between 18.5 and 24.9  $\text{kg}/\text{m}^2$ .

*Table 1.1: BMI group classifications*

BMI Group	BMI Range
<b>Underweight</b>	Below 18.5 $\text{kg}/\text{m}^2$
<b>Healthy weight</b>	Between 18.5 and 24.9 $\text{kg}/\text{m}^2$
<b>Overweight</b>	Between 25 and 29.9 $\text{kg}/\text{m}^2$
<b>Obese</b>	Between 30 and 39.9 $\text{kg}/\text{m}^2$
<b>Morbidly obese</b>	40 $\text{kg}/\text{m}^2$ and above

The average BMI for adults (16-65 years old) has been significantly increasing over time, as shown in **Figure 1.1**.

**Figure 1.1**  
Average BMI (kg/m<sup>2</sup>) for adults aged 16 – 65 years, 1995-2018



Greyed area marks 95% confidence intervals; vertical lines are placed at 2008 and 2012 which were the years with marked changes in methodology.

When records began in 1995 the average BMI for all adults was 25.9 kg/m<sup>2</sup> and this has risen to 27.7 kg/m<sup>2</sup> in 2018. This is a steady increase over time and, while we cannot make any assumptions what may happen in the future from this information, it is important to tackle a rising average BMI. The average BMI for people in Scotland has been in the overweight range since records began in 1995. As the average BMI for the adult population increases it slowly moves towards the obese category.

In 2018 the average BMI was 27.7 kg/m<sup>2</sup> which is in the overweight range. However, 28% of the adult population are obese (obese or morbidly obese) which, as a proportion, has been somewhat constant between 2008 to 2018, fluctuating between 27% of the adult population to 29% of the adult population as shown in **Figure 1.2**.



**Figure 1.2**

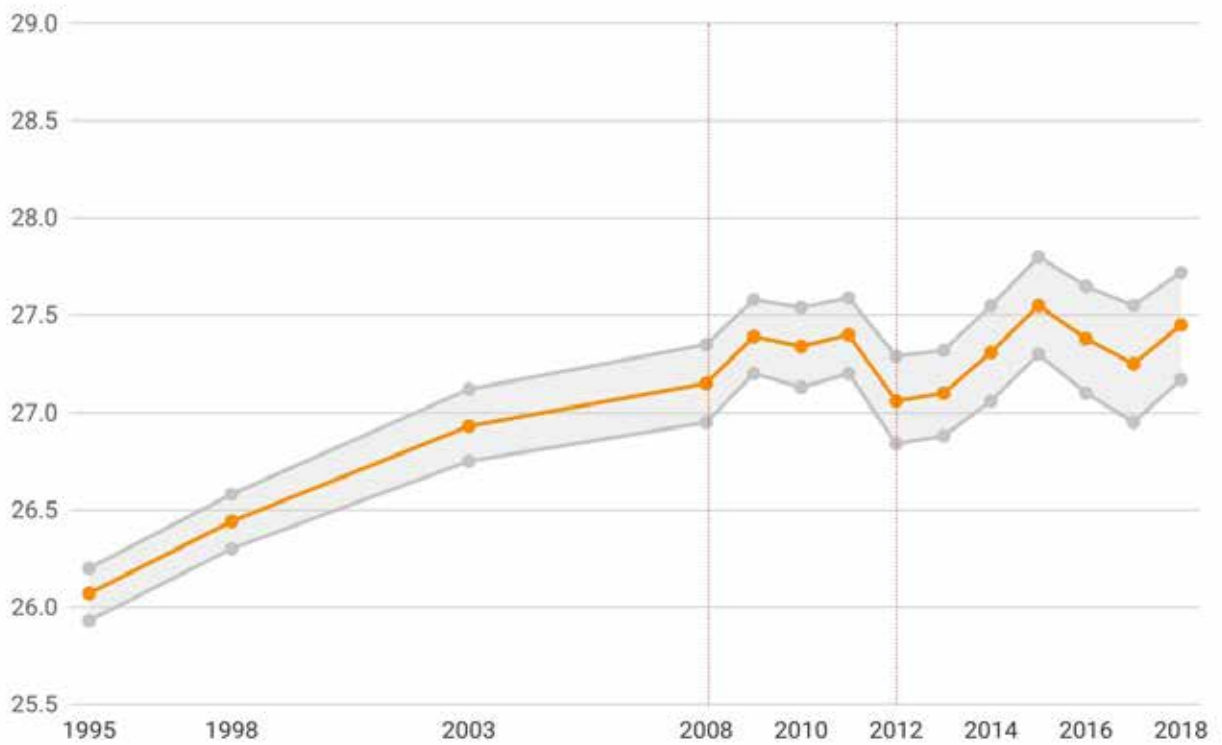
*Percentage of adults with obesity in Scotland, by year*



**Figure 1.3** shows the increasing BMI within adult men. While the increase in BMI has stalled since 2015, the average BMI for men has increased significantly since records began to 27.45 kg/m<sup>2</sup> in 2018 from 26.07 kg/m<sup>2</sup> in 1995.

**Figure 1.3**

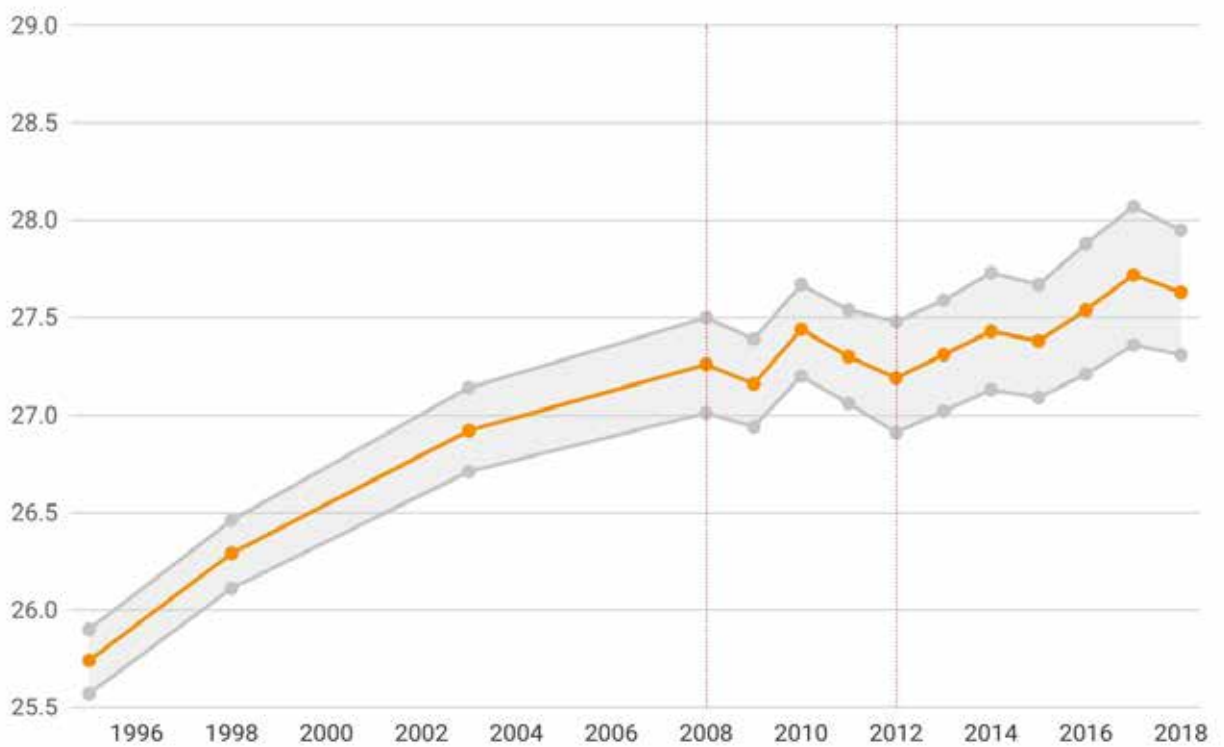
Average BMI ( $\text{kg}/\text{m}^2$ ) for men aged 16 – 65 years, 1995-2018



Greyed area marks 95% confidence intervals; vertical lines are placed at 2008 and 2012 which were the years with marked changes in methodology.

Similarly, the average BMI for women has also increased substantially over time, from 25.74  $\text{kg}/\text{m}^2$  in 1995 to 27.63  $\text{kg}/\text{m}^2$  in 2018, as shown in Figure 1.4. It is worth noting that women have a slightly higher increase per year on average (0.037) compared with men (0.022).

**Figure 1.4**  
Average BMI (kg/m<sup>2</sup>) for women aged 16 – 65 years, 1995-2018



Greyed area marks 95% confidence intervals; vertical lines are placed at 2008 and 2012 which were the years with marked changes in methodology.

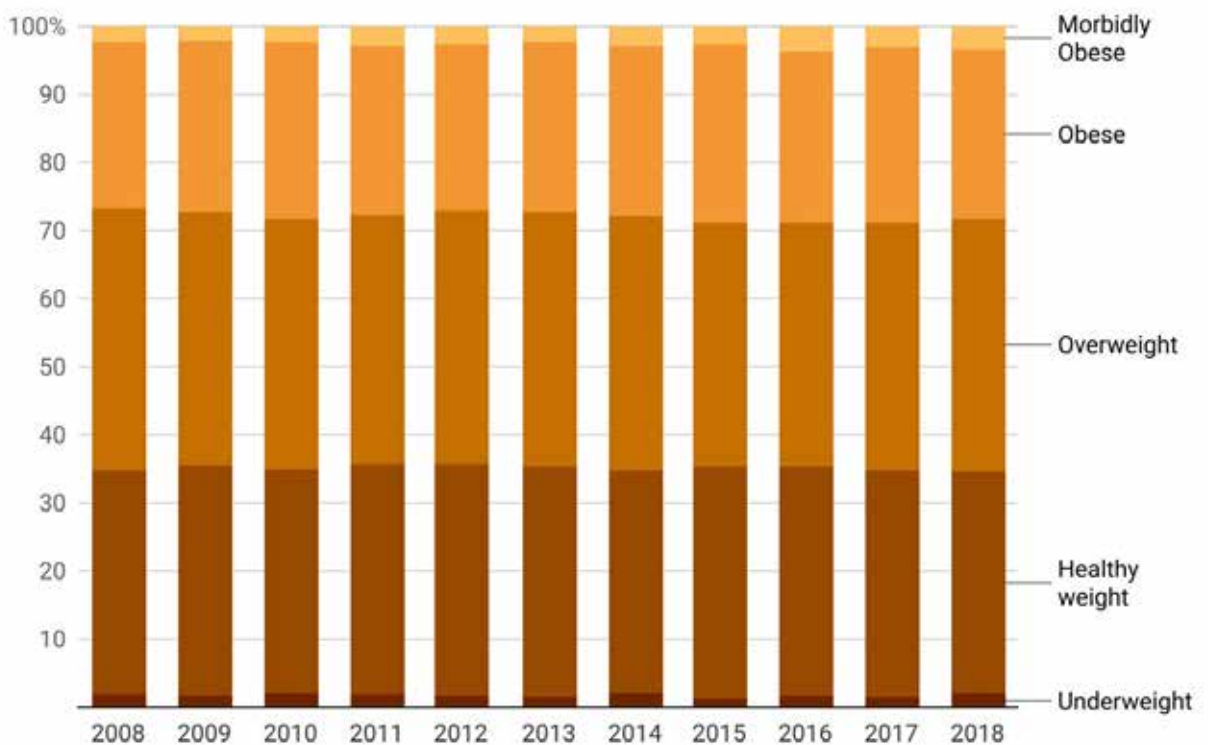
As we know for most adults a healthy BMI is in the 18.5 to 24.9 range meaning that regardless of gender, the average BMI in Scotland for both sexes is in the overweight range and has been since the survey began in 1995.

2

# PROPORTION OF ADULTS IN EACH BMI GROUP IN EACH BMI GROUP 2008 – 2018

While the average BMI for Scotland is increasing and remains in the overweight group, there has been a subsequent effect within the proportion of adults in each BMI group. **Figure 2.1** outlines the changes observed within each BMI group in the ten years from 2008 to 2018.

**Figure 2.1**  
Proportion (%) of adults in each BMI (kg/m<sup>2</sup>) grouping from 2008 to 2018 <sup>2</sup>

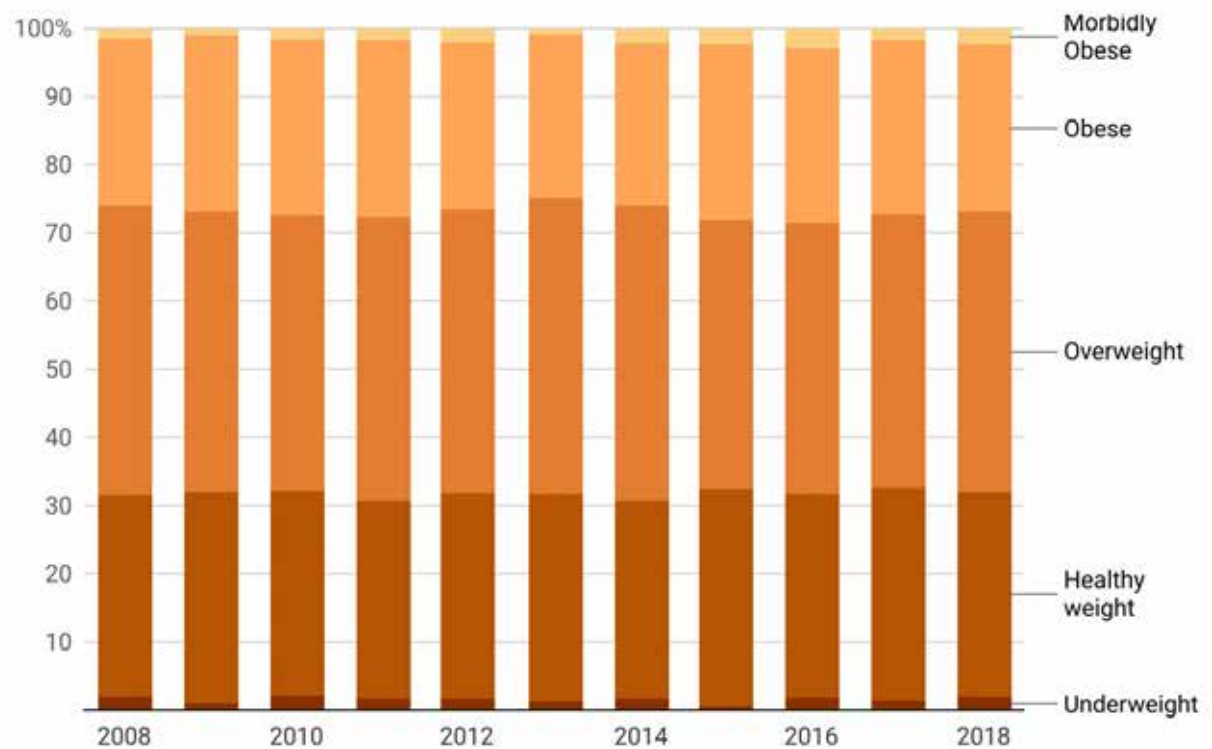


When looking at how the proportion of adults in each BMI group has changed over time there was a small, but significant, change within the groups. This is due to the proportion of people in the morbidly obese group (those with a BMI of over 40) increasing over time. In 2008 the proportion of people in the morbidly obese group was 2.4% of the adult population and this has risen to 3.4% in 2018, confirming that those within the obese ranges are getting heavier.

Differences in the BMI groups are also observed by gender and **Figure 2.2** shows how the proportion in each BMI group changes in men.

<sup>2</sup> Reminder: BMI classifications are as follows: morbidly obese – BMI over 40 kg/m<sup>2</sup> obese – BMI of over 30 – 40 kg/m<sup>2</sup>, overweight – BMI of over 25 – 30 kg/m<sup>2</sup>, healthy weight – BMI of over 18.5 – 25 kg/m<sup>2</sup>, underweight – BMI of 18.5 kg/m<sup>2</sup> or under

**Figure 2.2**  
*Proportion of adult men in each BMI grouping from 2008 to 2018*

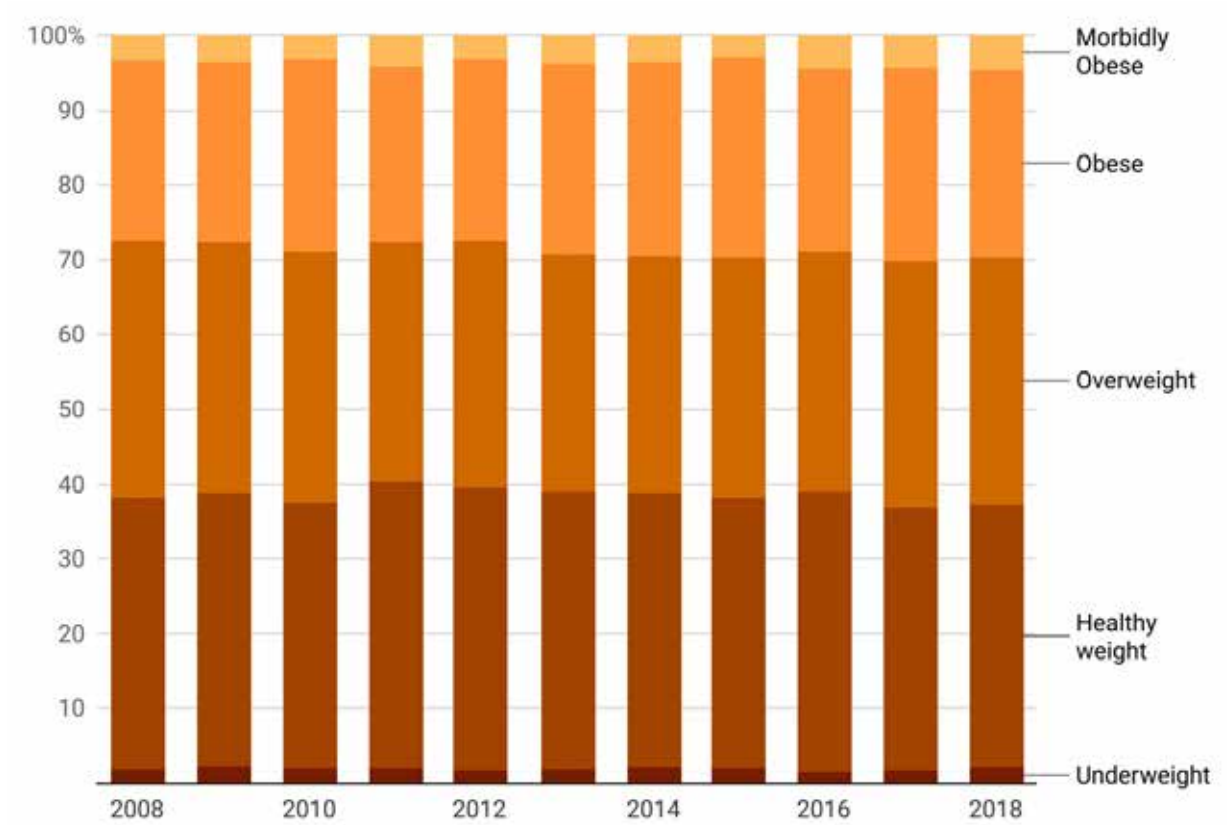


The proportion of men in each BMI group fluctuates more than the observed trends for the overall adult population, and there are more changes observed on a year-to-year basis which reflects the relatively small numbers in the sample. Despite no significant changes, the proportion within the morbidly obese group has seen an increase from 1.4% in 2008 to 2.4% in 2018.

By contrast for females there has been a significant shift into both the obese and morbidly obese groups over time as shown in **Figure 2.3**. Since 2008, those in the obese group have increased from 24.1% to 25.1% and the morbidly obese group have increased from 3.4% to 4.5% in 2018.

**Figure 2.3**

*Proportion of adult women in each BMI grouping from 2008 to 2018.<sup>3</sup>*



<sup>3</sup>Reminder: BMI classifications are as follows: morbidly obese – BMI over 40 kg/m<sup>2</sup>, obese – BMI of over 30 – 40 kg/m<sup>2</sup>, overweight – BMI of over 25 – 30 kg/m<sup>2</sup>, healthy weight – BMI of over 18.5 – 25 kg/m<sup>2</sup>, underweight – BMI of 18.5 kg/m<sup>2</sup> or under

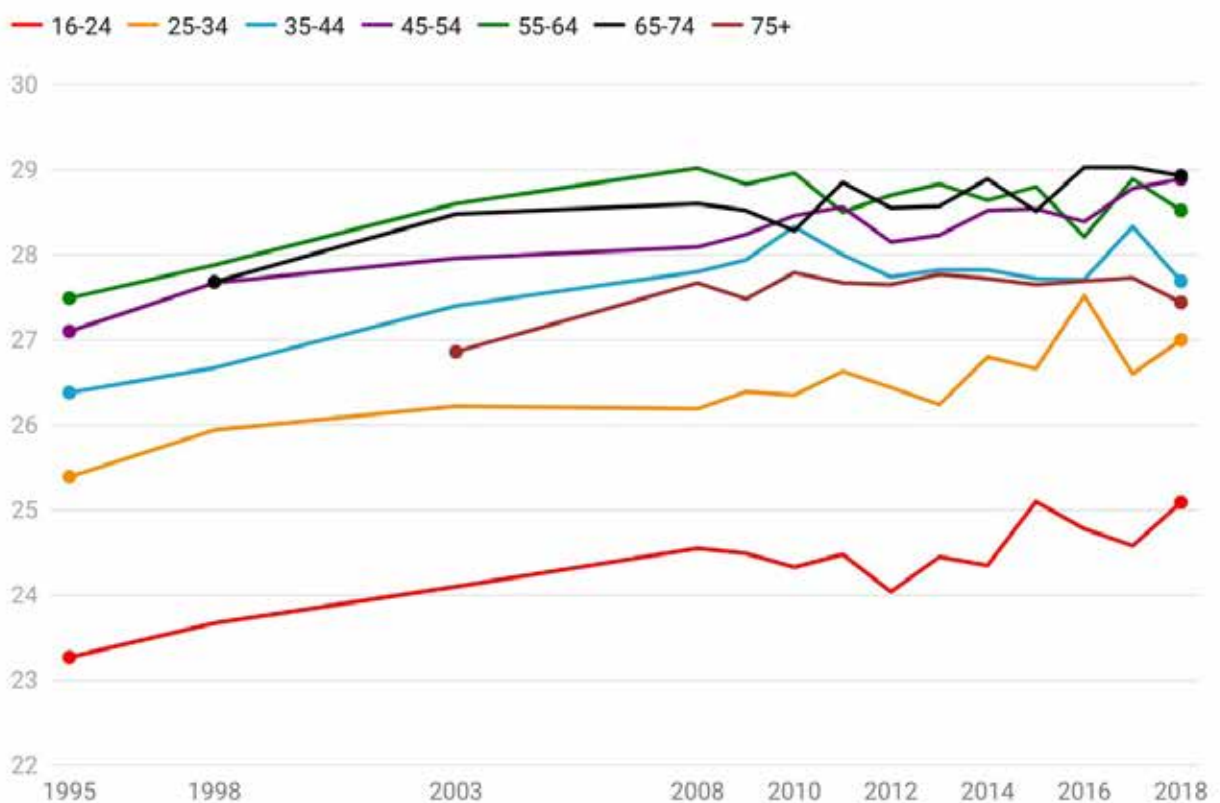
## 3

## AVERAGE ADULT BMI BY AGE GROUP, 1995-2018

Average adult BMI varies greatly within different age groups. Broadly speaking the BMIs for all age groups have significantly increased since data collection began in 1995 and this is shown in **Figure 3.1** below.

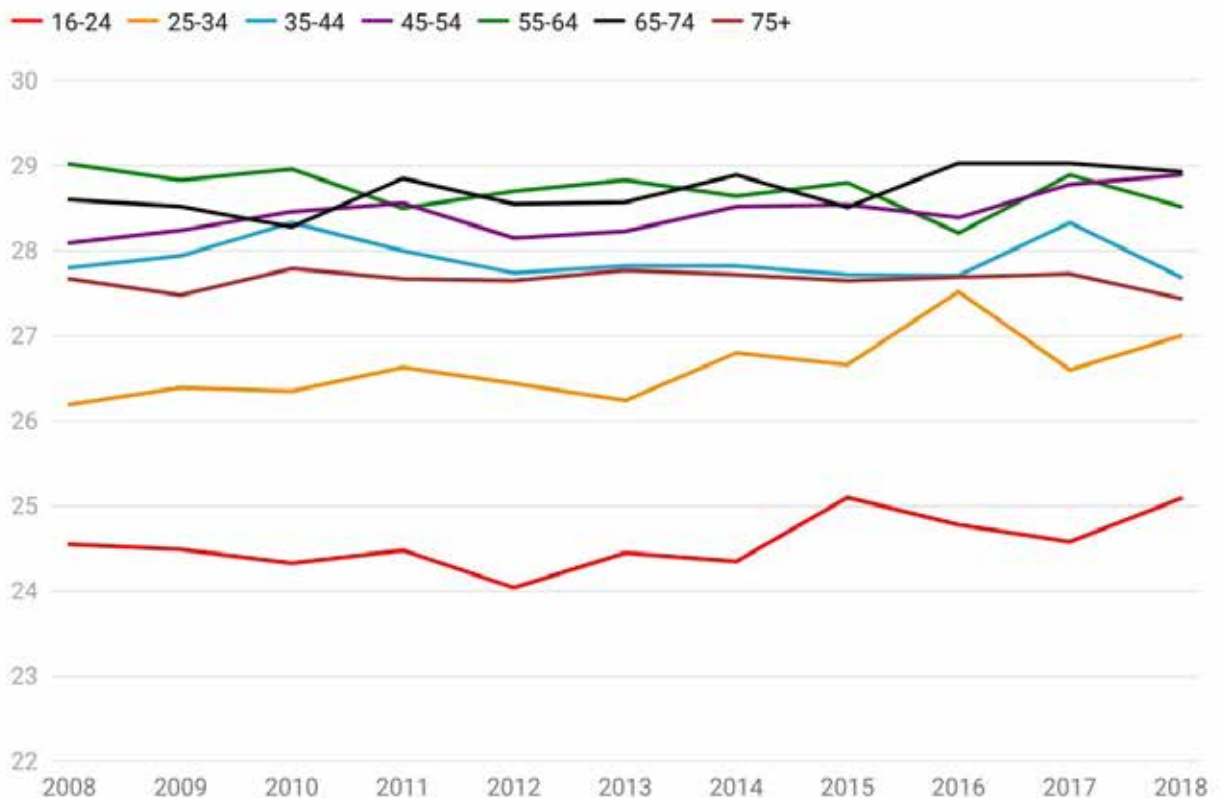
**Figure 3.1**

*Average adult BMI (kg/m<sup>2</sup>) by age group from 1995-2018*



NB: 1995 and 1998 do not include all age groups.

Narrowing down the time period to the last ten years (2008-2018) there is a significant increase in average BMI over time for younger adults, as shown in **Figure 3.2**. Those aged 16-24 have increased from an average BMI of 24.55 kg/m<sup>2</sup> in 2008 to an average BMI of 25.1 kg/m<sup>2</sup> in 2018, while those aged 25-34 have an average BMI of 27.0 kg/m<sup>2</sup> in 2018, an increase from 26.19 kg/m<sup>2</sup> in 2008.

**Figure 3.2***Average adult BMI (kg/m<sup>2</sup>) by age group from 2008-2018*

In 2018 the average BMI for those aged 16 to 24 years old was in the overweight range and therefore all age groups at that time had an average BMI within the overweight classification. While this is not a longitudinal study, and we cannot make any assumptions about how our BMI may change as we grow older, we can see the average BMI increases within age groups, with the exception of those aged over 75.

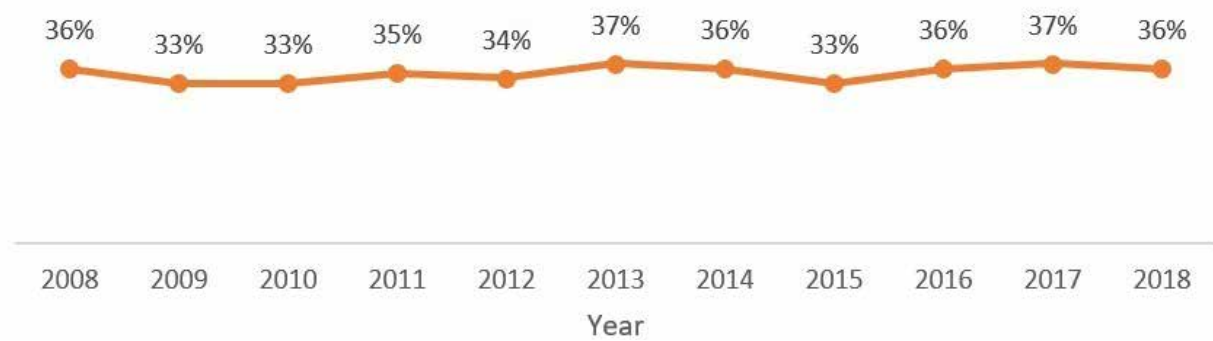
For those aged 65 to 74 years old the average BMI was 28.9 kg/m<sup>2</sup> in 2018. While the average BMI for those in this age range is in the overweight range, **Figure 3.3** shows the percentage of those aged 65 to 74 years old who are obese. Given 36% of those in the age group were obese in 2018 there is a worry about the related health consequences of obesity within older adults, particularly type 2 diabetes. This tends to be diagnosed in older adults and obesity is the most significant risk factor associated with type 2 diabetes <sup>4</sup>.

<sup>4</sup> <https://www.gov.scot/publications/diet-healthy-weight-monitoring-report-2020/documents>



**Figure 3.3**

*Percentage of adults aged 65 to 74 classified as obese (obese or morbidly obese), from 2008 to 2018*



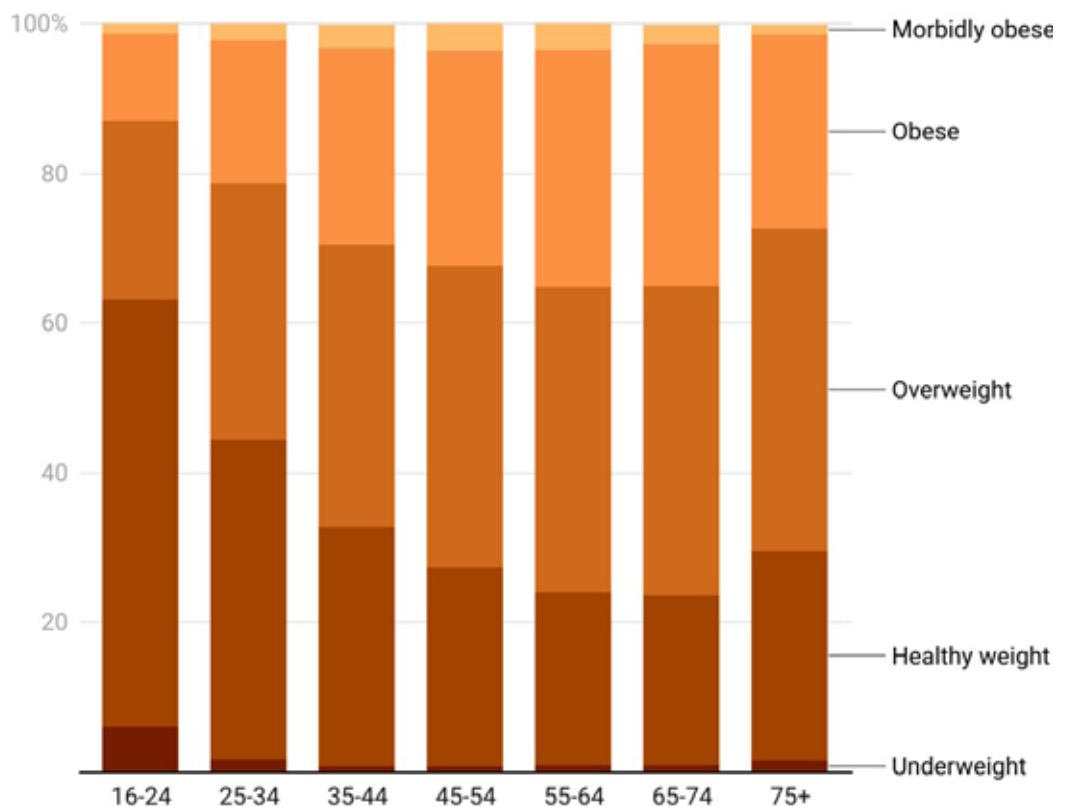
## 4

# PROPORTION OF ADULTS IN BMI GROUPS 2008-2018

The proportions of adults within BMI groups were significantly different between age groups when combining the data from 2008 to 2018, as shown in **Figure 4.1**.

**Figure 4.1**

*Proportion of adults in BMI classifications by age group (pooled data 2008-2018)*



Adults with overweight or obesity are most likely to be aged 55-64 years old and 65-74 years old with only 23% of people in both these age groups reporting a healthy weight compared to 57% of 16-24-year-olds recording a healthy weight.

While we cannot say for certain from this analysis that an adult's BMI will increase as they get older, there is evidence that the average BMI for older age groups is greater than younger adults, and the proportion of adults within the obese categories is higher in older adults, with the exception of over 75-year-olds. This exception is potentially due to a survival bias whereby the adults who had obesity at a younger age are not as likely to survive into older age.<sup>5</sup>

<sup>5</sup> Di Angelantonio, E., Bhupathiraju, S.N., Wormser, D., Gao, P., Kaptoge, S., de Gonzalez, A.B., Cairns, B.J., Huxley, R., Jackson, C.L., Joshy, G. and Lewington, S., 2016. Body-mass index and all-cause mortality: individual-participant-data meta-analysis of 239 prospective studies in four continents. *The Lancet*, 388(10046), pp.776-786.

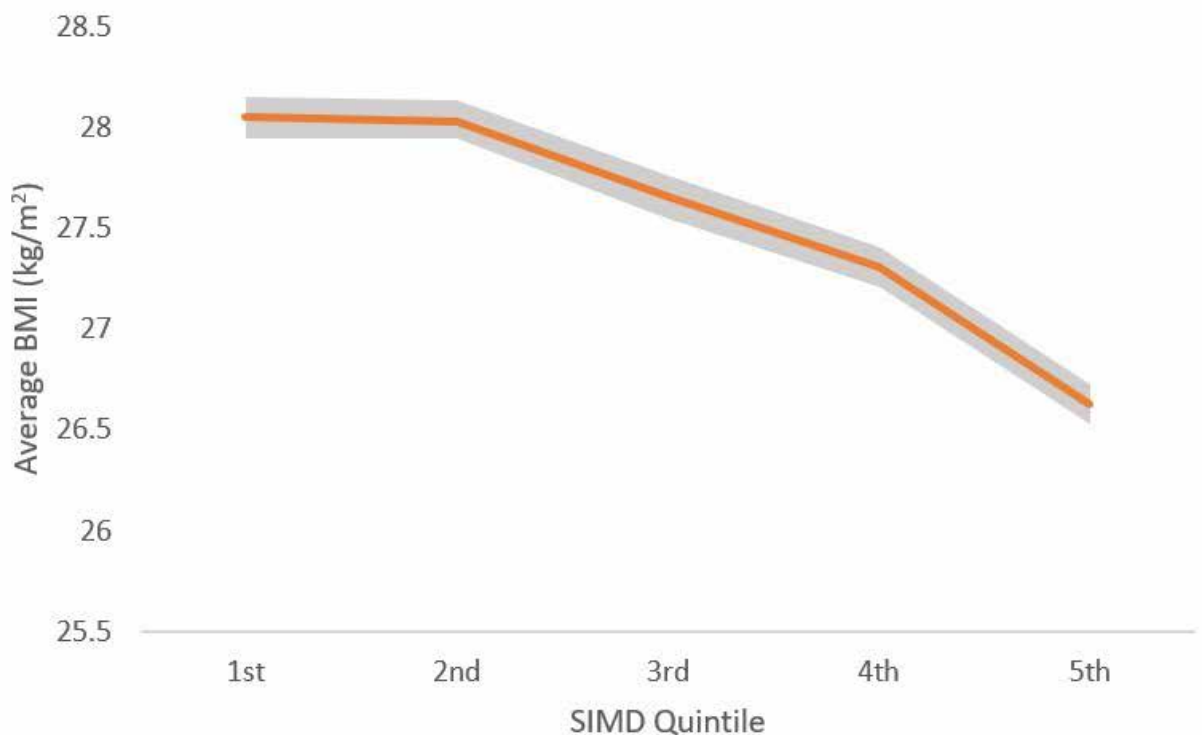
## 5

## AVERAGE ADULT BMI BY SIMD CATEGORY 2008-2018

As with gender and age, deprivation is also linked to differences in BMI across Scotland. The Scottish Government monitors deprivation using the Scottish Index of Multiple Deprivation (SIMD) classifications. The SIMD measures relative deprivation in an area using seven inputs: income, employment, education, health, access to services, crime, and housing<sup>6</sup>. The SIMD does this by ranking small areas, known as data zones, from most deprived to least deprived into five quintiles. Each quintile represents 20% of the total number of data zones, ranging from SIMD1 containing the 20% most deprived areas to SIMD5 with contains the 20% least deprived areas.

The level of deprivation in an area is strongly linked to the average BMI of the residents in these areas. As shown in **Figure 5.1** below, those who live in the most deprived areas have a higher BMI than those who live in the least deprived areas, and this is consistent across all age groups (**Figure 5.2**). However, when considering BMI and SIMD together there are no favourable categories as the average for each quintile is within the overweight category.

**Figure 5.1**  
Average BMI for each SIMD quintile (pooled data 2008-2018)

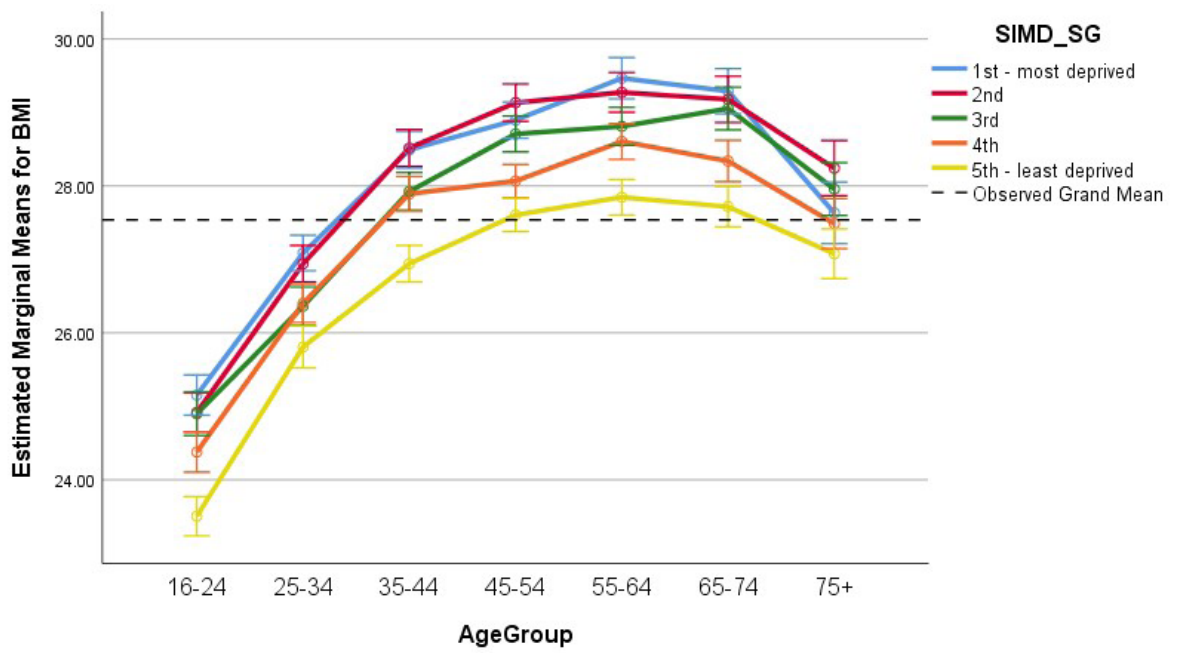


<sup>6</sup> <https://www.gov.scot/collections/scottish-index-of-multiple-deprivation-2020/>

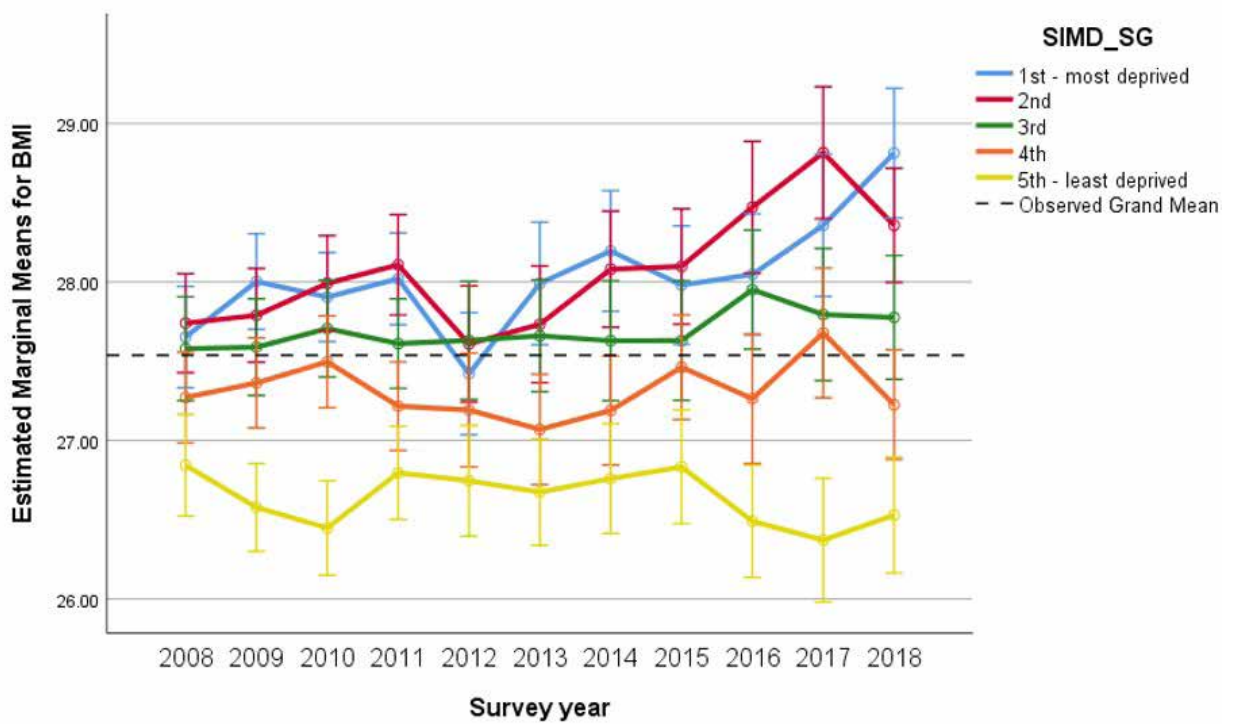
**Figure 5.2**

Average adult BMI by age group and SIMD classification (pooled data 2008-2018)

\*Error bars: 95% CI

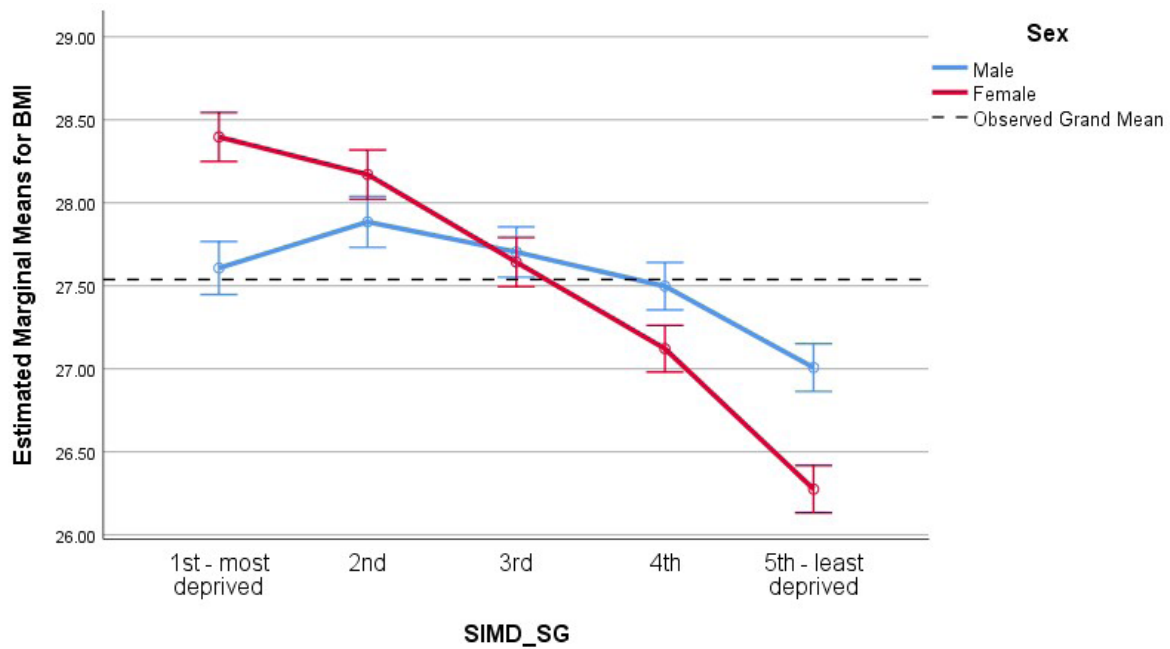


**Figure 5.3**  
 Average adult BMI by SIMD classification (2008-2018)  
 \*Error bars: 95% C



There is evidence of growing inequalities in BMI across SIMD quintiles, as shown in **Figure 5.3**. The two most deprived groups (SIMD 1 and 2) show a significant upward trend in BMI while the other SIMD groups do not. This suggests that there is a growing gap in average BMI between the most and least deprived areas of Scotland.

**Figure 5.4**  
 Average adult BMI by gender and SIMD classification (pooled data 2008-2018) \*Error bars: 95%CI



Similar to those patterns observed within age groups, the average BMI in different SIMD areas changes when looking at males and females. As shown in **Figure 5.4**, the average BMI in males does not change as drastically as females however both do increase as the deprivation in the area in which they live also increases. Females in the most deprived areas in Scotland have the highest average BMI values overall at 28 kg/m<sup>2</sup>.

# ADULT WAIST CIRCUMFERENCE

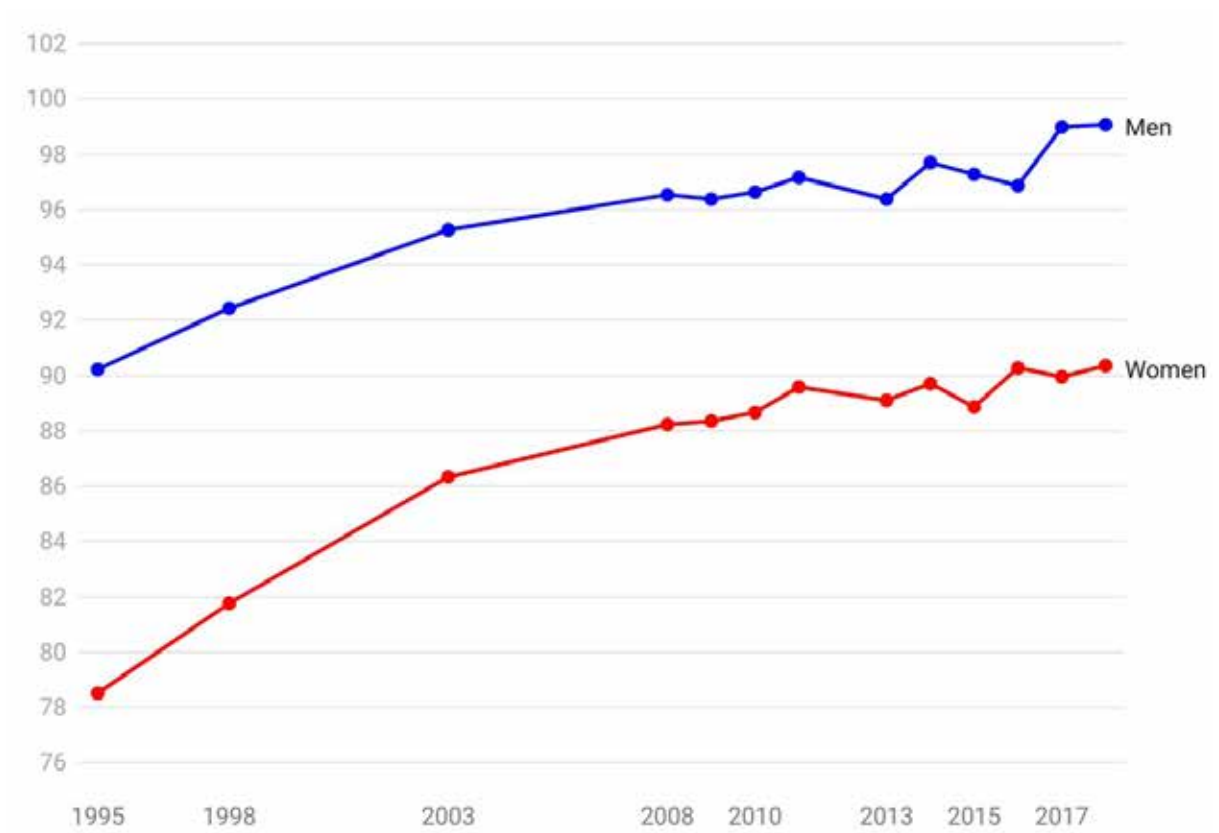
## 6

## AVERAGE WAIST CIRCUMFERENCE 1995-2018

Another health marker used to track change over time is average waist circumference. Between 1995 and 2018 there was a significant change in average waist circumference which is shown in **Figure 6.1**.

**Figure 6.1**

*Average waist circumference (cm) between 1995-2018, under 65s only*



Regardless of sex, the average waist circumference has been increasing from 1995. For men there has been an increase from 90.22cm in 1995 to 99.07cm in 2018. However, there has been a larger increase observed in the waist circumference of women with a rise from 78.51cm in 1995 to 90.35cm in 2018.

## 7

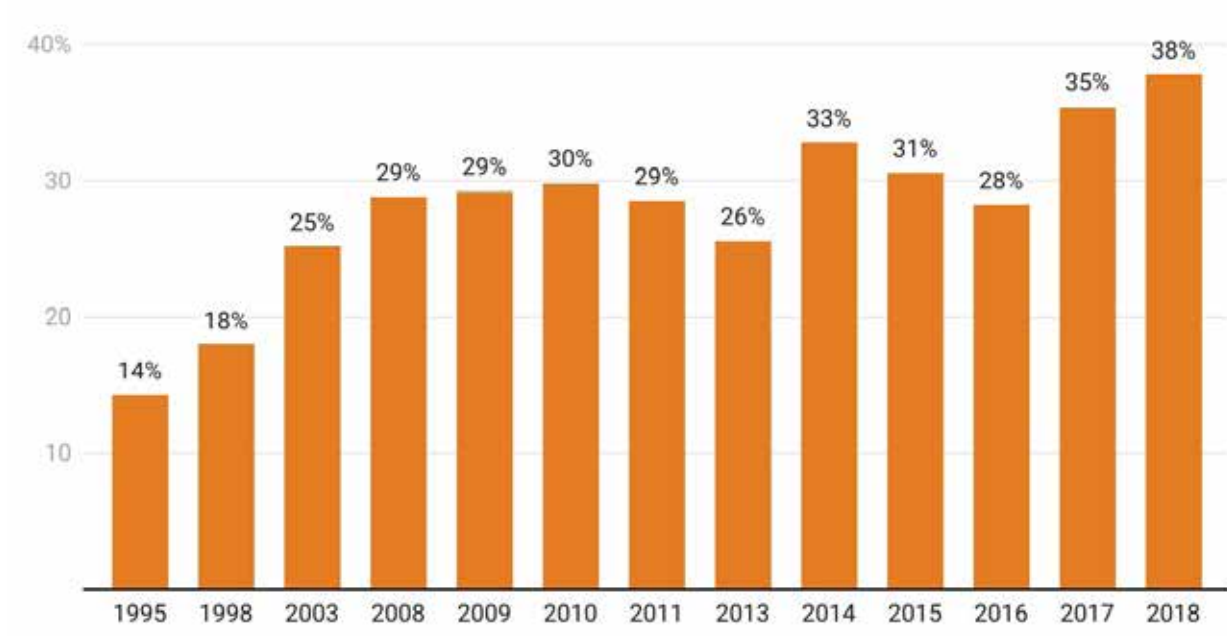
## RAISED WAIST CATEGORY

As a result of the increase in average waist circumference over time, the proportions of men and women falling into the high waist category were also increasing between 1995 and 2018. A raised waist circumference is a waist of more than 102cm in men and more than 88cm in women. Waist circumference is only examined in those people under 65 years old.

**Figure 7.1** shows the change in the proportion of men in the raised waist category over time. In 1995 only 14.3% of men were within the raised waist category however this has risen to 37.8% in 2018.

**Figure 7.1**

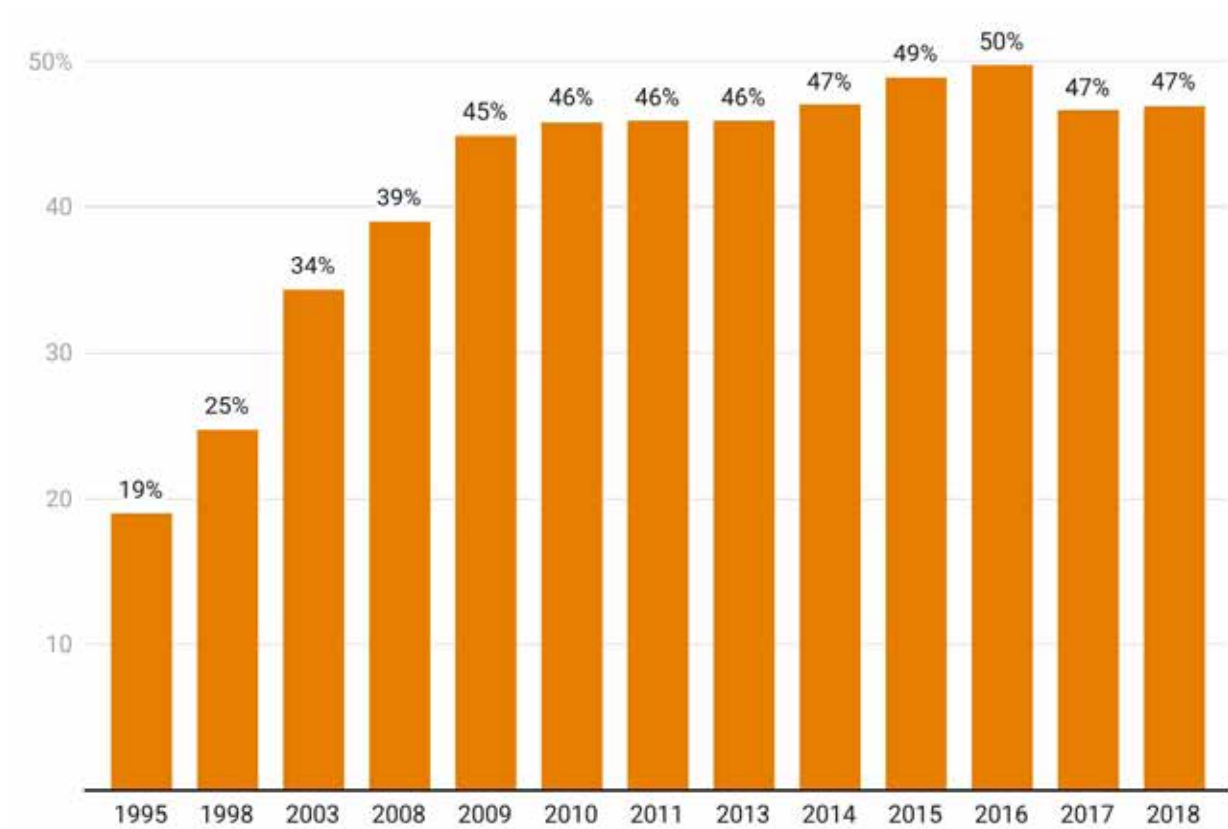
*Proportion of men in the raised waist category, 1995-2018*



Similarly, there has been a significant increase in the proportion of women in the raised waist category. Only 19% of women had a high waist circumference in 1995 however this had doubled by 2008, when 39% of women had a high waist circumference. By 2018 almost half (47%) of women were in the high waist category as shown in **Figure 7.2**.



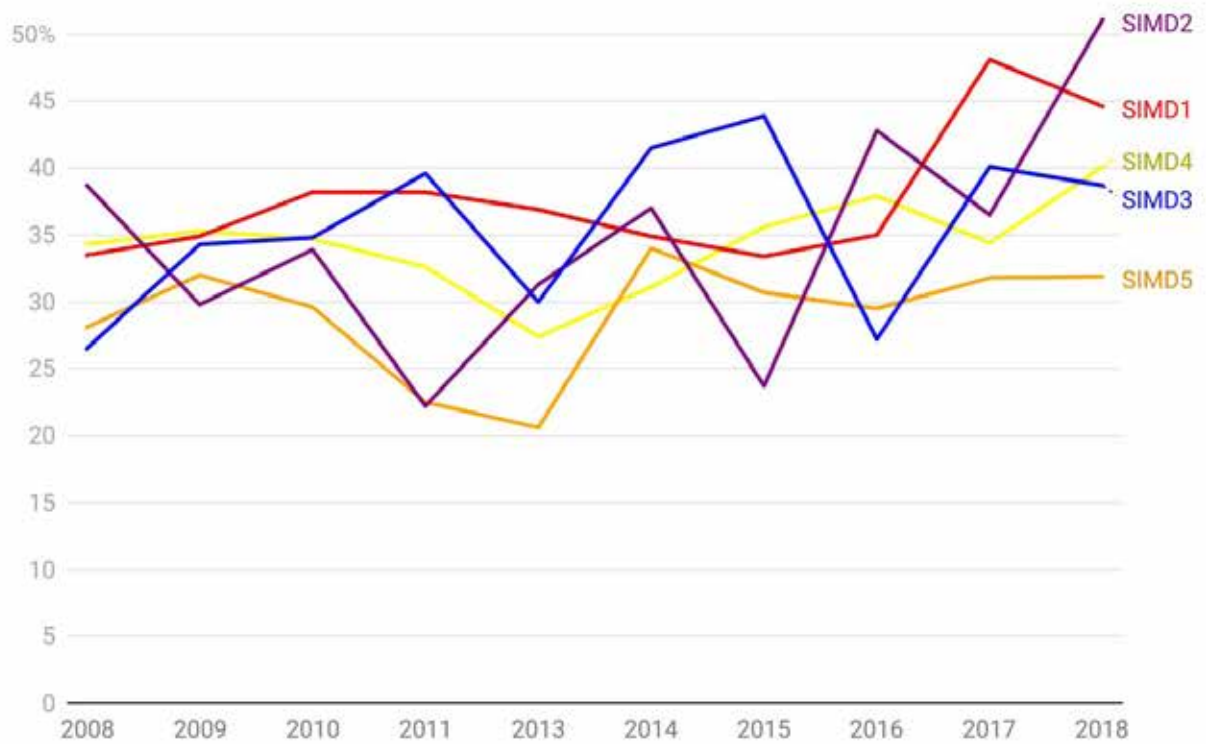
**Figure 7.2**  
Proportion of women in the raised waist category, 1995-2018



The proportion of people in the raised waist category also differs by SIMD quintile.

**Figure 7.3** shows the change in raised waist category between 2008 and 2018. The greatest increase in proportion of those with a high waist circumference is observed in SIMD 1, 2 and 3 whereas the proportion of people with a high waist circumference in SIMD 5 has only increased by 4 percentage points over the ten-year period.

**Figure 7.3**  
*Proportion of people in the raised waist category by SIMD, 2008-2018*



While the proportion of people with a high waist circumference in SIMD 2 areas has increased from 38.7% in 2008 to 51.1% in 2018, there was a lot of variation observed between these years. The lowest proportion of people in SIMD 2 areas with a high waist circumference was 22.2%, observed in 2011, resulting in a range of 28.9 percentage points between the minimum and maximum proportions of people within this category. In comparison, SIMD 3 has the second highest amount of variation with 17.4 percentage points between the minimum and maximum proportions of people within the high waist category.

## 8

## CHILDREN BODY MASS INDEX

### CHILDREN AVERAGE BMI OVER TIME

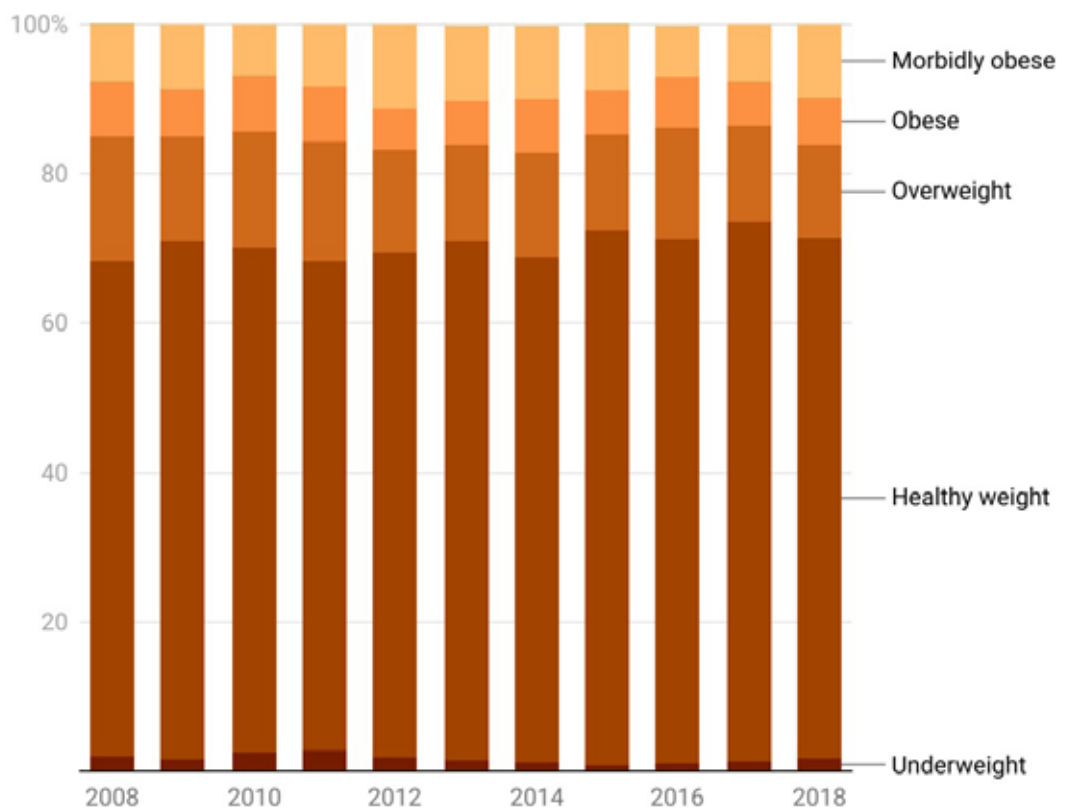
While the unit of BMI measurement is the same in adults and children ( $\text{kg}/\text{m}^2$ ), there are differences in the way healthy weight is classified. Child BMI is based on percentiles shown in **Table 8.1**.

*Table 8.1: Children's BMI classifications*

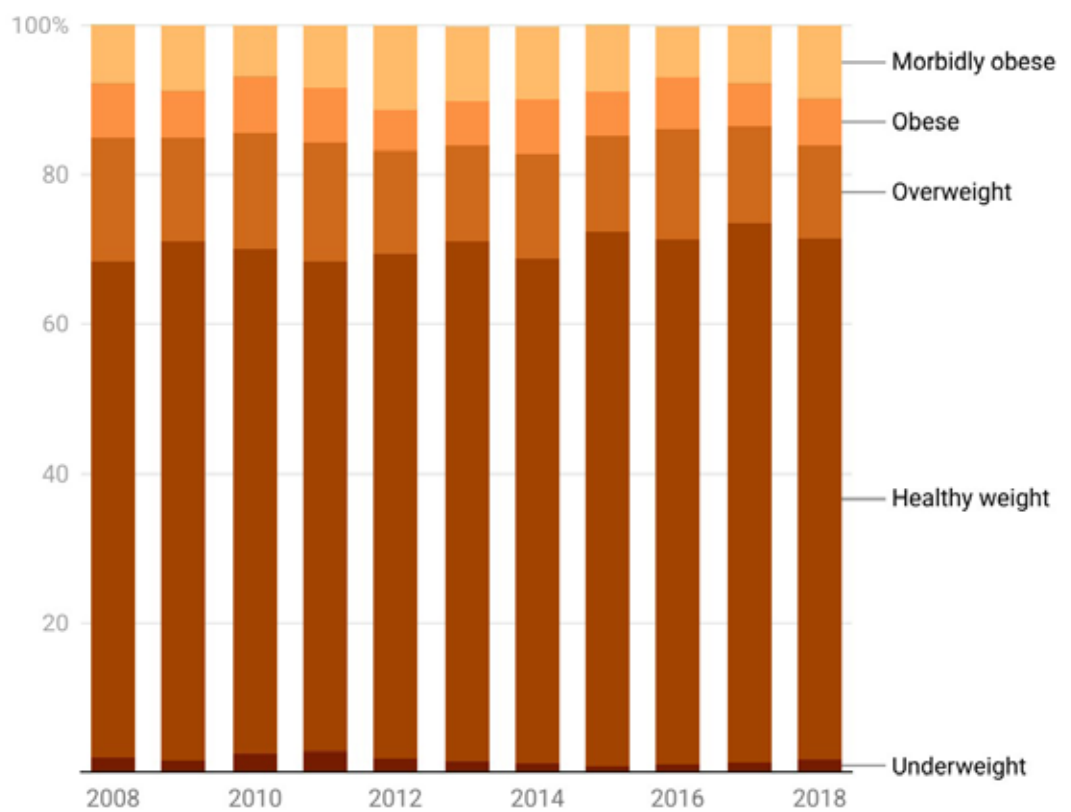
Percentile cut-off	Description
Less than or equal to 5th percentile	Underweight
Between 5th and 85th percentile	Healthy weight
From 85th Percentile to 95th percentile	Overweight
From 95th to 98th percentile	Obese
At or above 98th percentile	Morbidly obese

The overall proportions of children in these groups are shown in **Figure 8.1** for 2008 to 2018. There are fluctuations causing some movement within the groups, for instance the proportion of children within the morbidly obese classification varies between 7% to 11% and does not remain constant over time. These fluctuations are not heading in the same direction, and the variation means we don't see any particular trends in how BMI changes in children from year to year in the way we do for the adult population.

**Figure 8.1**  
*Proportion of all children in each BMI group, by year*

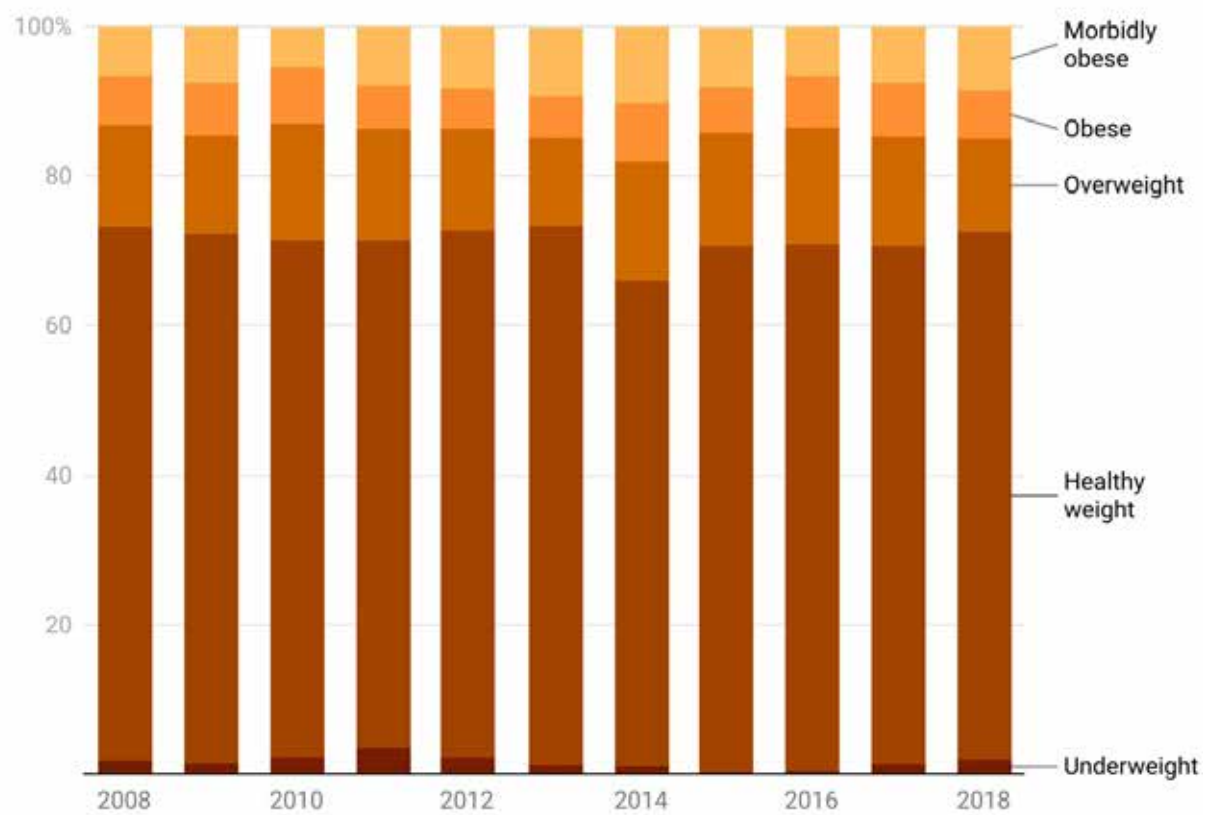


In the subsection of all children who are either obese or morbidly obese, significantly more are in the morbidly obese category when data for this period are combined (58% morbidly obese vs 42% obese). However, there is no evidence that this has changed over time.

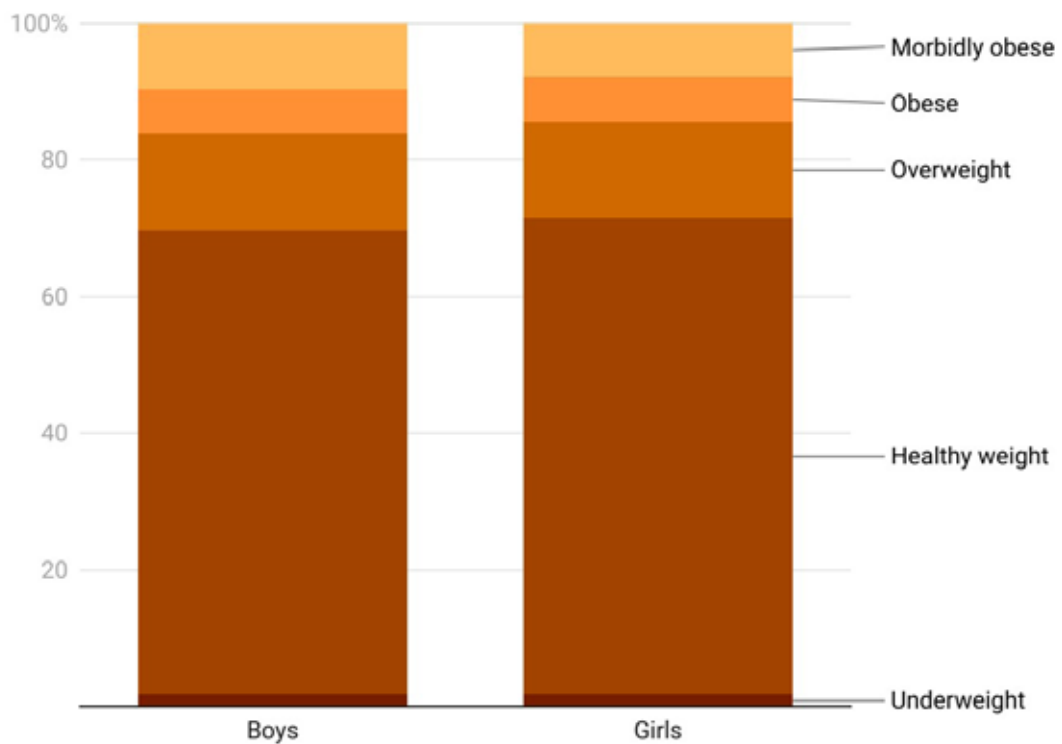
**Figure 8.2***Proportion of all boys in each BMI group, by year*

As with adults, there are slight differences in how the BMI of boys changed compared to girls' BMI. There is a small increase amongst boys in the healthy weight category over time, with this group increasing to include 69% of all boys in 2018, as shown in **Figure 8.2**.

**Figure 8.3**  
*Proportion of all girls in each BMI group, by year*



There are no particular differences over time when looking at girls' BMI, as shown in **Figure 8.3**. The proportion of those in the healthy weight group remains fairly consistent, other than for 2014, and there are some minor fluctuations within the overweight, obese, and morbidly obese categories.

**Figure 8.4***Percentage of girls and boys in each BMI group (pooled data 2008-2018)*

With children it's much more difficult to track any important changes over time due to constant changes in body composition. While the difference in BMI classifications should address this there is no perfect model to account for the constant growth in children.

As discussed previously, there are more boys in the morbidly obese group (9.7%) than there are in the obese group (6.5%). This is a significant difference to the proportion of girls within the morbidly obese group (7.8%), as shown in **Figure 8.4**. Around a third of both boys and girls are outside of the healthy weight range (32.2% and 30.2%, respectively); however we can see that the morbidly obese group in boys is larger than for girls.

## 9

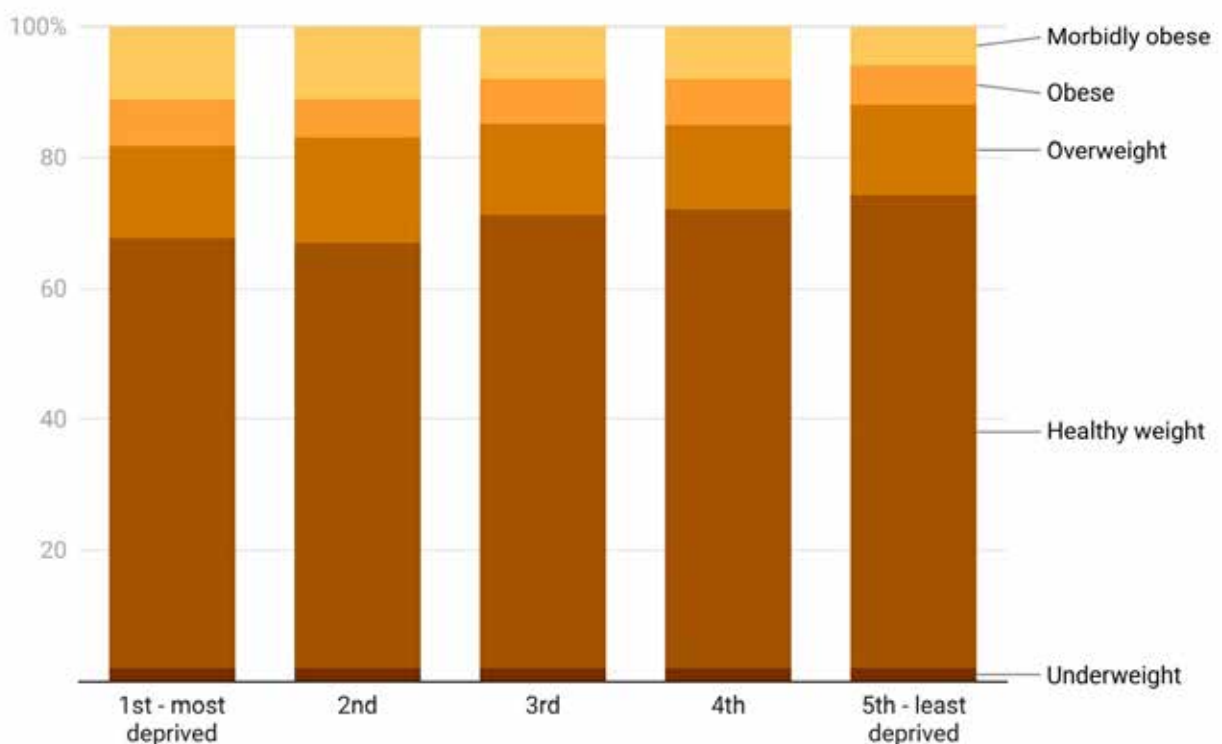
## PROPORTION OF OBESITY IN CHILDREN OF DIFFERENT AGES (2-6, 7-11, 12-16 YEARS)

There has been no significant increase or decrease in BMI over the time period for children of any age group. However, there are increasing numbers of overweight and obese children with increasing age despite there being more underweight children in the 12-16 years age group than in the younger groups.

It's not possible to tell from survey data if there is an 'optimal' point for an intervention aimed at reducing overweight and obesity, as this is not a longitudinal survey and does not track the same people from 2008 to 2018. The broader academic evidence suggests, however, that there may be factors contributing to overweight and obesity which start early, are gradual and cumulative.<sup>7,8</sup> It is also possible that significant periods of growth may affect the factors contributing to overweight and obesity, and how obesity generally impacts a child at that age.

As with adults, children are likely to have a higher BMI if they live in a more deprived area, as shown in **Figure 9.1**. Children in the most deprived SIMD quintiles have higher proportions of overweight and obesity and this has not changed over time.

**Figure 9.1**  
Proportion of all children in each BMI group, by SIMD classification



<sup>7</sup> Reilly, J.J., Armstrong, J., Dorosty, A.R., Emmett, P.M., Ness, A., Rogers, I., Steer, C. and Sherriff, A., 2005. Early life risk factors for obesity in childhood: cohort study. *Bmj*, 330(7504), p.1357.

<sup>8</sup> Umberson, D., Crosnoe, R. and Reczek, C., 2010. Social relationships and health behavior across the life course. *Annual review of sociology*, 36, pp.139-157.



# SUMMARY

## ADULTS

- » Average BMI has risen steadily and significantly over the 23 year period.
- » The average BMI for the adult population has been in the overweight range since records began but is now heading towards the obese category.
- » The proportion of adults in the heaviest BMI category has been increasing.
- » By 2018 almost two-thirds of adults were within overweight or obese classifications.
- » The average BMI of young adults (16-24) has increased the most out of all age groups since 1995.
- » Average BMI is patterned by level of deprivation with those from the most deprived areas consistently showing higher BMIs compared to the least deprived.
- » Between 1995 and 2018 there was a significant increase in average waist circumference for both men and women.
- » Over time there has been a significant rise in the proportion of women in the raised waist<sup>9</sup> category. Whilst men have seen an increase in the proportion in the raised waist category it is not as stark as the pattern for women.

## CHILDREN

- » There have been fluctuations in rates of childhood obesity over the years and no clear pattern is emerging.
- » Over half (58%) of the children with obesity are children with morbid obesity.
- » As with adults, children from the most deprived areas are more overweight and obese than children from the least deprived areas.

<sup>9</sup>A raised waist circumference is a waist of more than 102cm in men and more than 88cm in women"

# IMPLICATIONS

**This report clearly indicates that there is much work to be done to achieve a healthy weight population in children and adults in Scotland. Pre-pandemic headline messages about obesity from the Scottish Health Survey tended to indicate that things were remaining fairly steady. However, this deeper analysis of the data up to 2018 indicates that trends were getting worse over time and that most measures were heading in the wrong direction.**

Here we have provided evidence of a worsening position of the weight of the adult nation, in both men and women. It is likely that the pandemic has had a further negative impact. Indeed, the most recent Scottish Health Survey, undertaken in 2020, indicated that 39% of adults reported putting on weight.<sup>10</sup> Only when the Scottish Healthy Survey methodology allows us to resume trend comparisons will we truly know the impact of the pandemic on the weight of our population.

The data analysis in this report for children makes it clear that pre-pandemic we were not moving in the right direction in achieving healthy weight for children. We now have an aim from the Scottish Government to halve childhood obesity by 2030, with 2018 the stated baseline. Again, the indications from data measured in the Child Health Surveillance Programme is that rates of overweight and obesity in Primary 1 school children have risen as a result of the pandemic. We are therefore facing an increased challenge in achieving healthy weight for children. The lack of progress up to 2018 coupled with the implications of the pandemic on children's weight means immediate, bold action is required to protect the health of our children.

It is evident that policy measures that have been in place have been insufficient to tackle the epidemic of obesity and that means a continuing rise in the weight of the nation. The COVID-19 pandemic

further compounds the challenge the country faces and injects further urgency to taking proportionate action to address this serious problem and its many consequences.

There is no one solution to tackle this challenge; measures will need to be population-wide but also address the particular concerns and needs of men and women, boys and girls, people experiencing rising levels of multiple deprivation, and cultural issues for minorities that these surveys do not detect but are important for sub-populations.

Long-term strategies are necessary to address the complex and interacting influences which are causing the nation's weight to remain so high. Intersectoral and evidence-based policies should be implemented with a focus on addressing the commercial and structural determinants of health, along with the obesogenic environment. This would offer an equitable approach across the population, with groups facing the greatest socioeconomic hardship seeing the most improvement.<sup>11</sup>

While there has been an appreciation of the importance of obesity, no progress has been made in addressing it – an urgent policy response is needed across the food system and all settings that influence our diet. This has become particularly important in the context of COVID-19, where worse health outcomes are more common in those with obesity.

<sup>10</sup> Scottish Health Survey – telephone survey – August/September 2020: main report. Scottish Government. Available via: <https://www.gov.scot/publications/scottish-health-survey-telephone-survey-august-september-2020-main-report/pages/8/>

<sup>11</sup> WHO European Regional Obesity Report (2022). World Health Organisation. Accessed via: <https://www.euro.who.int/en/health-topics/noncommunicable-diseases/obesity/publications/2022/who-european-regional-obesity-report-2022>

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## APPENDIX

### ABOUT THE SCOTTISH HEALTH SURVEY

The Scottish Health Survey helps to monitor health in Scotland and provides information on different aspects of health, such as cardiovascular health, long-term conditions, smoking, alcohol, diet, obesity, dental health, physical activity, gambling or mental health.

The survey was first published in 1995, then in 1998, 2003, and since 2008 it has been published annually. The most recent survey was published in September 2019 and presents data from 2018. All surveys since 2020 have been heavily impacted by the coronavirus pandemic.

Every time the survey was done, the robust methods used, and the numbers of respondents were big enough to represent all Scottish people. For example, in 2018 it included 3743 adults and over 1317 children.

**This report shows how weight of the Scottish nation was changing with time. Therefore, we looked at two measurements only:**

» Body mass index (BMI) – a proportion of a person's weight to their height ( $\text{kg}/\text{m}^2$ ). Many websites can calculate BMI if weight and height is entered. For each Scottish Health Survey, a large group of adults and children were asked to be weighed and have their height measured. From these measurements, the researchers calculated BMI.

» Waist circumference – taken by putting a tape measure around a person's waist.

For everyone that took part in the survey, a set of background information was collected -for example, gender, age, deprivation, income or employment status. We have used this data to see if obesity rates were changing differently for different groups of our population.

There were two occasions between 1995 and 2018 where the methodology has changed, as is always a possibility with survey tools: this happened in 2008, for the 2008-2011 period and 2012, for the 2012-2015 period. The key changes to the methodology are outlined below. However, it is important to note the method used to calculate BMI remains the same throughout.

**The key changes to the methodology for 2008-2011 surveys are:**

- » Move to a continuous format – prior to 2008 the survey had only been carried out on three occasions (1995, 1998 and 2003).
- » Reduced nurse visits.
- » Core and modular questionnaire structure.
- » Optional NHS board boost.

### The key changes to the methodology in 2012-2015 are:

- » The sample was drawn by the Scottish Government: in previous iterations of the survey the sample was drawn by the contractor. This was to coincide with two other large population surveys commissioned by the Scottish Government to ensure households could only be selected for one of these three surveys.
- » There were 20 core questions introduced that will appear in all three Scottish Government population surveys each year.
- » The sample size target for the Scottish Health Survey was reduced from 6,400 interviews with adults and 2,000 interviews with children each year to a target of 4,000 adult and 1,800 child interviews annually for the 2012-2015 surveys. Data for the Scottish Health Survey was downloaded from the UK Data Service for all available years.

Design limitations in the Scottish Health Survey may have impacted the results presented in this report. For example, weight data collected from varying population samples can result in exclusion of people with very high BMIs ( $<40$ ) leading to underestimation of overall prevalence and trends.<sup>12</sup>

The surveys are a set of 'slices' of the population and do not record individual people's experiences over time, as different people provide data for the survey each year.

## STATISTICAL METHODS

The statistical analysis was undertaken by Health Statisticians from University of Aberdeen and Diffley Partnerships. A further technical report on the statistical tests applied is available on request.

<sup>12</sup> Williamson, K., Nimegeer, A. and Lean, M., 2020. Rising prevalence of BMI  $\geq 40$  kg/m<sup>2</sup>: A high demand epidemic needing better documentation. *Obesity reviews*, 21(4), p.e12986.

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