## Summary

- This chapter reports on measurements relevant to obesity: body mass index (BMI), prevalence of overweight and obesity, and waist circumference.

- Body mass index (BMI), defined as weight in kilograms divided by the square of the height in metres (kg/m²), was used to assign adult participants into categories such as overweight and obese.

- Mean BMI was 27.4 kg/m² in men and 27.1 kg/m² in women. Generally mean BMI increased with age in both sexes, but dropped back slightly among those in the oldest age group.

- More than a quarter of adults were obese (26% of both sexes). 68% of men and 58% of women were overweight or obese.

- Mean BMI increased in both sexes between 1993 and 2010. Mean BMI increased from 25.9 kg/m² in 1993 to 27.4 kg/m² in 2010 among men, and from 25.7 kg/m² in 1993 to 27.1 kg/m² in 2010 among women.

- The prevalence of obesity increased from 13% in 1993 to 26% in 2010 in men, and from 16% in 1993 to 26% in 2010 in women. While the rate of increase in obesity was slower in the second half of the period, in 2010 obesity was at its highest level since 1993, and in men the 2010 level was also significantly higher than in the period between 2000 and 2005.

- Among both men and women the proportion that was classified as overweight did not change significantly between 1993 and 2010 (42% and 32% in men and women respectively in 2010).

- Mean waist circumference was 97.7 cm in men and 88.3 cm in women. A higher proportion of women than men had a raised waist circumference (46% and 34% respectively). The prevalence of raised waist circumference increased with age between the age groups 16-24 and 65-74 in both sexes.

- The age-standardised prevalence of obesity and raised waist circumference were higher in women in households in lower quintiles of equivalised household income. These measures were not related to income in men, but men from households in the highest two income quintiles had a greater prevalence of being overweight.

- National Institute for Health and Clinical Excellence (NICE) guidelines recommend a combination of BMI and waist circumference to assess health risks from obesity. The guidelines define low, high and very high waist measurements for men and women. A high or very high waist circumference is associated with increased health risks for those with a BMI below 35 kg/m²; health risks are very high for those with a BMI of 35 kg/m² or more regardless of waist circumference.

- Most men and women who were overweight or obese tended also to have a high or very high waist circumference, and according to the NICE classification were therefore at increased health risk. Using combined categories of BMI and waist circumference, 22% of men were estimated to be at increased risk, 12% at high risk and 23% at very high risk. The equivalent proportions for women were 14% at increased risk, 19% at high risk and 25% at very high risk.
10.1 Introduction

10.1.1 Contents of the chapter

The anthropometric measures presented in this chapter for adults (aged 16 and over) focus on measurements relevant to obesity. Height and weight data have been collected in each year of the Health Survey series, and waist circumference in most years. Height and weight data were used to calculate body mass index (BMI); waist circumference was used to assess central obesity. The methods and definitions of these measurements are described in Section 10.2. Relationships are examined between BMI, overweight, obesity and raised waist circumference prevalence, and age and sex, Strategic Health Authority, equivalised household income and Spearhead Primary Care Trust (PCT) status. Participants are classified according to the National Institute for Health and Clinical Excellence (NICE) obesity categories for health risk using both BMI and waist circumference. Previous HSE reports have included more detailed exploration of the factors associated with obesity measures. The 2007 report included a regression analysis of the risk factors for those classified as ‘most at risk’ according to the NICE categories using BMI and waist circumference criteria; the 2006 report included a regression analysis exploring the risk factors associated with a raised waist circumference; and the 2003 report included a regression analysis of risk factors associated with overweight and obesity.

10.1.2 Context

Overweight or obesity occurs when energy intakes exceed energy expenditure (through metabolism and daily physical activity) and are of particular interest because they are major risk factors for disease and mortality. A number of studies have established that overweight or obesity are associated with cardiovascular risk, cardiovascular-related mortality, cancer, disability during older age, and decreased life expectancy. Furthermore, obesity is associated with serious chronic conditions such as Type 2 diabetes, hypertension, and hyperlipidaemia (i.e. high levels of fat in the blood that can lead to narrowing and blockages of blood vessels), which are major risk factors for cardiovascular disease.

It is generally recognised that the central deposition of fat (abdominal or visceral obesity) is closely associated with chronic diseases and is a key constituent of the metabolic syndrome, a disorder characterised by increased risk of developing diabetes and cardiovascular disease. Through increasing the risk of these diseases, a BMI of 30-35kg/m² leads to a decrease in median survival by 2-4 years. For a BMI of 40-45kg/m², the reduction is 8-10 years. It was highlighted in a World Health Organisation (WHO) report in 2000 that the co-morbidities of obesity would be more easily predicted if intra-abdominal fat were also monitored, in addition to BMI, by simple measures such as waist circumference. The NICE guidance in 2006 includes a combination of BMI and waist circumference to classify health risk from obesity.

Worldwide, the number of overweight individuals has more than doubled since 1980: there were 1.5 billion overweight adults (aged 20 and over) in 2008. Of these, more than 200 million men and nearly 300 million women were classified as obese. Although the rise in the last few years has been less than in the 1990s, the prevalence of obesity in England has been increasing at all ages; almost two thirds of adults and a third of children are either overweight or obese. In 2009, 44% of men and 32% of women were overweight and 22% of men and 24% of women were classified as obese, i.e. 66% of men and 57% of women were either overweight or obese. England has some of the highest levels of obesity reported in Europe.

Using the HSE data from 1994 to 2004, the Foresight report estimated that by 2015, 36% of men and 28% of women (aged between 21 and 60) will be obese; by 2025, 47% of men and 36% of women will be obese; and by 2050, 60% of men and 50% of women - and 25% of children (aged between 6 and 20) will be obese. Recently data from the HSE suggests that the obesity trends may have started to flatten out; re-forecasting obesity trends using more recent data shows lower estimates of future obesity rates.
There is a general consensus that the increase in prevalence of obesity in the United Kingdom is mostly due to two major lifestyle factors: the energy content of modern diet and an increasingly sedentary lifestyle. Overwhelming evidence indicates that the incorporation of physical activity into individual lifestyles will result in health benefits, such as reduced risk of Type 2 diabetes and cardiovascular disease. This was acknowledged by the government in 2004 through its obesity strategy.

In England there is an increased government interest in healthy lifestyles. In 2008, the government at the time announced its ambition via the Healthy Weight, Healthy Lives programme to be the first major country to reverse the rising tide of obesity and overweight in the population. With an initial focus on children, the aim was to reduce the prevalence of overweight and obesity in children to the 2000 levels by 2020. There has been encouraging progress made on achieving the original ambition to halt the rise in child obesity expressed in the PSA target set out in 2004, and the challenges ahead are to achieve a reduction in child obesity and to tackle adult obesity. As part of the Healthy Weight, Healthy Lives strategy, the Change4Life campaign was launched in January 2009, with the aim of preventing people from becoming overweight by encouraging them to eat healthily and move more.

This chapter examines 2010 data in detail, and also looks at trends in obesity and overweight since 1993. Trend data on adult and child obesity, and other key measures, can also be found in Health Survey for England 2010 trend tables on The NHS Information Centre website.

**10.2 Methods and definitions**

Full details of the protocols for carrying out all the measurements are contained in Volume 2 of this report, Methods and documentation, Appendix B and are summarised briefly here. Height and weight were measured during the interviewer visit while waist and hip circumferences were measured during the nurse visit.

**10.2.1 Methods**

**Height**

Height was measured using a portable stadiometer with a sliding head plate, a base plate and connecting rods marked with a measuring scale. Participants were asked to remove their shoes. One measurement was taken, with the participant stretching to the maximum height and the head positioned in the Frankfort plane. The reading was recorded to the nearest millimetre. Participants who were pregnant, unable to stand or were unsteady on their feet were not measured.

**Weight**

Weight was measured using Soehnle, Seca and Tanita electronic scales with a digital display. Participants were asked to remove their shoes and any bulky clothing. A single measurement was recorded to the nearest 100g. Participants who were pregnant, unable to stand, or unsteady on their feet were not weighed. Participants who weighed more than 130kg were asked for their estimated weight because the scales are inaccurate above this level. These estimated weights were included in the analysis.

In the analysis of height and weight, data were excluded from those who were considered by the interviewer to have unreliable measurements, for example those who were too stooped or wearing excessive clothing.

**Waist circumference**

The waist was defined as the midpoint between the lower rib and the upper margin of the iliac crest. It was measured using a tape with an insertion buckle at one end. The measurement was taken twice, using the same tape, and was recorded to the nearest millimetre. Those whose two waist measurements differed by more than 3cm had a third
measurement taken. The mean of the two valid measurements (the two out of the three measurements that were the closest to each other, if there were three measurements) were used in the analysis.

Participants were excluded from waist measurements if they reported that they were pregnant, had a colostomy or ileostomy or were unable to stand. All those with measurements considered unreliable by the nurse, for example due to excessive clothing or movement, were also excluded from the analysis.

**Response to anthropometric measures**

Response rates to anthropometric measurements are shown in Table 10.1. For men, the response rates for height and weight measurements were between 74% and 90%; the equivalent figures for women were 69% to 90%. The response was significantly lower among men aged 75 and over and among women aged 65 and over, reflecting a greater proportion that were unable to be measured, rather than unwillingness. Response to waist measurements was very high among every age group (99% of men and 97% of women).

**10.2.2 Definitions**

**Body mass index (BMI)**

In order to define overweight or obesity, a measurement is required that allows for differences in weight due to height. A widely accepted measure of weight for height, the body mass index (BMI), defined as weight in kilograms divided by the square of the height in metres (kg/m²), has been used for this purpose in the HSE series.

BMI was calculated for all those participants for whom both a valid height and weight measurement were recorded. Adult participants were classified into the following BMI groups according to the WHO BMI classification.

<table>
<thead>
<tr>
<th>BMI (kg/m²)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 18.5</td>
<td>Underweight</td>
</tr>
<tr>
<td>18.5 to less than 25</td>
<td>Normal</td>
</tr>
<tr>
<td>25 to less than 30</td>
<td>Overweight</td>
</tr>
<tr>
<td>30 or more</td>
<td>Obese</td>
</tr>
<tr>
<td>40 or more</td>
<td>Morbidly obese</td>
</tr>
</tbody>
</table>

BMI categories of overweight and obese have frequently been combined to show the proportion who are either overweight or obese. As in previous years’ reports, a subset of the obese category has also been defined, namely those with morbid obesity (BMI 40kg/m² or more), who are at highest risk of morbidity and mortality.

**Waist circumference**

BMI does not distinguish between mass due to body fat and mass due to muscular physique. It also does not take account of the distribution of fat. It has therefore been postulated that waist circumference may be a better measure than BMI or waist to hip ratio (WHR) to identify those with a health risk from being overweight.

A raised waist circumference has been taken to be greater than 102cm in men and greater than 88cm in women, in accordance with the definition of abdominal obesity used by the National Institutes of Health (USA) ATP (Adult Treatment Panel) III. These levels identified people at risk of the metabolic syndrome. It has been shown recently that these levels corresponded fairly closely to the 95th percentile of waist circumference for healthy people, indicating that few healthy people have a waist circumference above these thresholds.

**Combined assessment of health risk from obesity**

The 2006 NICE evidence-based guidelines include details on prevention, identification, assessment and management of overweight and obesity, with one aim being to increase...
health professionals’ awareness of how to manage overweight and obesity in primary care. The guidelines highlight the impact of overweight and obesity on risk factors for developing other long-term health problems such as coronary heart disease, Type 2 diabetes, osteoarthritis and some cancers. It states that risk of these co-morbidities should be identified using both BMI and waist circumference as assessment tools in those with a BMI less than 35 kg/m². The NICE guidance states that ‘waist circumference is a valid measure of abdominal fat mass and disease risk in individuals with a BMI less than 35. If BMI is 35 or more, waist circumference adds little to the absolute measure of risk provided by BMI’. The NICE categories are defined as follows:

<table>
<thead>
<tr>
<th>BMI classification</th>
<th>Waist circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Normal weight (18.5 to less than 25 kg/m²)</td>
<td>No increased risk</td>
</tr>
<tr>
<td>Overweight (25 to less than 30 kg/m²)</td>
<td>No increased risk</td>
</tr>
<tr>
<td>Obesity I (30 to less than 35 kg/m²)</td>
<td>Increased risk</td>
</tr>
<tr>
<td>Obesity II (35 to less than 40 kg/m²)</td>
<td>Very high risk</td>
</tr>
<tr>
<td>Obesity III (40 kg/m² or more)</td>
<td>Very high risk</td>
</tr>
</tbody>
</table>

Source: NICE guidelines

For men, low waist circumference in this classification is defined as less than 94 cm, high as 94–102 cm, and very high as greater than 102 cm. For women, low waist circumference is less than 80 cm, high is 80–88 cm and very high is greater than 88 cm.

NICE also defines categories of Obesity II (35 to less than 40 kg/m²) and Obesity III (40 kg/m² or more). For adults with a BMI of 35 kg/m² or more, risks are assumed to be very high with any waist circumference.

Note that these combined measures (shown in Table 10.10) are based on all adults with valid height, weight and also waist circumference measurements. The data may therefore vary slightly from those presented in Table 10.2 for mean BMI and BMI categories which are based on adults with valid height and weight measurements.

### 10.3 Prevalence of obesity, overweight and raised waist circumference

#### 10.3.1 Prevalence of obesity, overweight and raised waist circumference, by age and sex

Table 10.2 shows mean BMI and BMI status by age and sex. Overall, mean BMI was significantly higher in men than women (27.4 kg/m² and 27.1 kg/m² respectively). Generally mean BMI increased with age in both sexes, but dropped back slightly in participants in the oldest age group.

A similar proportion of men and women were obese (26%). However, a higher proportion of men than women were overweight (42% and 32% respectively). Thus 68% of men and 58% of women were overweight or obese and a lower proportion of men than women had a BMI in the normal range (31% and 40% respectively). Figure 10A shows the prevalence of overweight and obesity by age. Among both men and women, prevalence of overweight and obesity was lowest in the 16-24 age group, and generally increased in the older groups, but as with mean BMI prevalence was slightly lower among those aged 75 and over.

Table 10.2, Figure 10A

Table 10.6 shows mean waist circumference and prevalence of raised waist circumference by age and sex. Mean waist circumference was 97.7 cm in men and 88.3 cm in women, and increased with age in both men and women. Women were significantly more likely than men to have a raised waist circumference (46% and 34% respectively). As with mean waist circumference, prevalence of a raised waist circumference increased substantially with age between the age groups 16-24 and 65-74 (from 13% to 49% in men and from 18% to 64% in women).

Table 10.6
10.3.2 Prevalence of obesity, overweight and raised waist circumference, by Strategic Health Authority

Table 10.3 presents the observed and age-standardised prevalence of overweight and obesity by Strategic Health Authority (SHA). There was no significant difference by SHA in age-standardised mean BMI, prevalence of obesity, or overweight.

The distribution of waist circumference by SHA is presented in Table 10.7. There was also no significant variation by SHA in the distribution of age-standardised mean waist circumference, nor in the age-standardised prevalence of raised waist circumference.

10.3.3 Prevalence of obesity, overweight and raised waist circumference, by equivalised household income

Table 10.4 shows age-standardised BMI by equivalised household income. For women, mean BMI increased as household income decreased (mean BMI 25.8kg/m² in the highest and 28.2kg/m² in the lowest income quintile). Mean BMI did not vary by income in men.

Figure 10B shows the prevalence of overweight and obesity by equivalised household income for men and women. The prevalence of obesity showed an inverse relationship with income in women, ranging from 33%-34% among those in the lowest two income quintiles to 17% among those in the highest income quintile. This was not seen in men, for whom there was no clear pattern.
Among men, the prevalence of overweight was lower in the lower income quintiles and higher in the higher quintiles (35-38% in the lower three income quintiles and 46-47% in the highest two quintiles). Among women, the prevalence of overweight varied little by income.

Table 10.4, Figure 10B

Table 10.4 shows age-standardised mean waist circumference and the prevalence of raised waist circumference by equivalised household income. There were no significant differences in mean waist circumference by equivalised household income in men. Mean waist circumference in women was highest for those in the lowest two income quintiles (90.4 - 90.5cm) and lowest in those in the highest income quintile (84.7cm).

The prevalence of raised waist circumference by equivalised household income is shown in Figure 10C. As with obesity and mean waist circumference, the proportion of women with raised waist circumference differed significantly by income. The prevalence was highest among women in the lowest quintiles (52% in the 4th income quintile and 53% in the lowest income quintile) and lowest in women in the highest quintile of income (36%). There was no equivalent pattern in men.

10.3.4 Prevalence of obesity, overweight and raised waist circumference, by Spearhead status

Spearhead PCTs are the most health deprived areas of England. They are defined as the local authority areas that are in the bottom fifth nationally for three or more indicators relating to life expectancy at birth, cancer and cardiovascular disease (CVD) mortality rates, and the index of multiple deprivation.
Table 10.5 shows that there was no significant variation in mean BMI in men but among women, those living in Spearhead PCTs had a higher mean BMI than those in non-Spearhead PCTs (27.6kg/m² and 26.9kg/m² respectively). There was no significant variation in the prevalence of obesity in men or women according to whether they lived in Spearhead or non-Spearhead PCTs.

Table 10.9 shows that mean waist circumference did not vary by Spearhead status for men or women. The prevalence of a raised waist circumference was higher for women living in Spearhead PCTs than those living in non-Spearhead PCTs (49% and 45%, respectively), while in men the association was not significant.

### 10.4 Health risk category with overweight, obesity and waist circumference

NICE recommends using both BMI and waist circumference as assessment tools to identify the risk of co-morbidities; different levels of health risk have been defined for different combinations of these two measures (as outlined in section 10.2.2). The NICE guidance states that for those with a BMI of 35 or more, waist circumference adds little to the absolute measure of risk provided by BMI. Table 10.10 shows the proportion by age and sex that were in different health risk categories, as determined by these two measures.

Using combined categories of BMI and waist circumference to assess risk, 22% of men were at increased risk, 12% at high risk and 23% at very high risk. The equivalent proportions for women were 14% at increased risk, 19% at high risk and 25% at very high risk. Around two in five were not at increased risk (43% of men and 41% of women).

Figure 10D shows the risk categories by age. The proportion of those at high or very high risk generally increased with age up to the 65–74 age group.

Those who were overweight and had a very high waist circumference were defined as being at increased risk of health problems from obesity. This category also included the very small proportions who were normal weight but with a very high waist circumference (fewer than 1% of men and 2% of women), or obese I but with a low waist circumference (fewer than 1% of both men and women). Among men, the prevalence of increased risk was lowest among the youngest age groups.

Those who were overweight with a very high waist circumference (10% of men and 18% of women) were defined as being at high risk of health problems. In addition small proportions that were in the obesity I group with a high waist circumference (2% of men and 1% of women) were also defined as high risk. Prevalence increased with age up to the age group 65-74 among men, and up to the age group 55-64 among women.
As indicated above, those who were obese (category I) had increased health risks, even with a low waist circumference (less than 1% of men and women). 2% of men and 1% of women were categorised as obese I with a high waist circumference (high risk). A further 17% of men and 15% of women were categorised as obese I with a very high waist circumference (very high risk).

People who were obese II or III (BMI 35 and over) are defined as being at very high risk of health problems, regardless of their waist circumference. 5% of men and 6% of women were in the obese II group; 2% of men and 4% of women were in the obese III group.

10.5 Trends in obesity

Mean BMI and prevalence of obesity increased in both sexes between 1993 and 2010. Mean BMI increased from 25.9kg/m² in 1993 to 27.4kg/m² in 2010 among men, and from 25.7kg/m² in 1993 to 27.1 kg/m² in 2010 among women. Among both men and women, there has been little change in mean BMI over the last five or six years.

Figure 10E shows the trends in obesity and overweight including obesity from 1993 to 2010, using three year moving averages to smooth out any unusually high or low values in individual years.

There has been a marked increase in the proportion who were obese (BMI 30kg/m² or over) between 1993 and 2010. 13% of men were categorised as obese in 1993, compared with...
26% in 2010, and among women, 16% were obese in 1993 and 26% were obese in 2010. The rate of increase in obesity prevalence has been slower in the second half of the period than the first half, and there are indications that the trend may have been flattening out in recent years. However, obesity in men and women in 2010 was at its highest level since 1993, and in men the 2010 level was also significantly higher than in the period between 2000 and 2005.

Among men and women, the proportion who were overweight (BMI 25 to less than 30kg/m²) has changed very little between 1993 and 2010, fluctuating between 41% and 47% in men and between 31% and 34% in women.

References and notes


9 Metabolic syndrome is a combination of medical disorders that increase the risk of developing cardiovascular disease and diabetes. The disorders include central obesity, abnormal fat levels in the blood which can lead to arteriosclerosis (fatty plaques) on the walls of blood vessels, high blood pressure, and insulin resistance or glucose intolerance.

**Tables**

10.1 Response to anthropometric measurements, by age and sex

10.2 Body mass index (BMI), overweight and obesity prevalence, by age and sex

10.3 Body mass index (BMI), overweight and obesity prevalence (observed and age-standardised), by Strategic Health Authority and sex

10.4 Body mass index (BMI), overweight and obesity prevalence (age-standardised), by equivalised household income and sex

10.5 Body mass index (BMI), overweight and obesity prevalence (age-standardised), by Spearhead status and sex

10.6 Waist circumference, by age and sex

10.7 Waist circumference (observed and age-standardised), by Strategic Health Authority and sex

10.8 Waist circumference (age-standardised), by equivalised household income and sex

10.9 Waist circumference (age-standardised), by Spearhead status and sex

10.10 Health risk category associated with overweight and obesity based on body mass index (BMI) and waist circumference, by age and sex

10.11 Trends in overweight and obesity prevalence, 1993 to 2010, by age and sex
Table 10.1

Response to anthropometric measurements, by age and sex

Aged 16 and over who were interviewed/had a nurse visit 2010

<table>
<thead>
<tr>
<th>Proportion providing valid measurements</th>
<th>Age group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16-24 %</td>
<td>25-34 %</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>90%</td>
<td>89%</td>
</tr>
<tr>
<td>Weight</td>
<td>89%</td>
<td>87%</td>
</tr>
<tr>
<td>BMI</td>
<td>88%</td>
<td>87%</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>88%</td>
<td>90%</td>
</tr>
<tr>
<td>Weight</td>
<td>86%</td>
<td>89%</td>
</tr>
<tr>
<td>BMI</td>
<td>85%</td>
<td>89%</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>99%</td>
<td>98%</td>
</tr>
</tbody>
</table>

Bases (unweighted)

| Men                                    |         |         |         |         |         |         |       |
| Height, weight, BMI (interviewed)      | 379     | 493     | 643     | 625     | 642     | 518     | 402   |
| Waist circumference (saw nurse)        | 208     | 291     | 422     | 413     | 431     | 361     | 271   |

| Women                                  |         |         |         |         |         |         |       |
| Height (interviewed)                   | 476     | 695     | 820     | 874     | 723     | 566     | 564   |
| Weight, BMI (interviewed)             | 454     | 628     | 795     | 874     | 723     | 566     | 564   |
| Waist circumference (saw nurse)        | 270     | 388     | 561     | 621     | 526     | 394     | 362   |

| Women                                  |         |         |         |         |         |         |       |
| Height (interviewed)                   | 610     | 686     | 760     | 730     | 631     | 470     | 442   |
| Weight, BMI (interviewed)             | 585     | 616     | 737     | 730     | 631     | 470     | 442   |
| Waist circumference (saw nurse)        | 379     | 416     | 492     | 483     | 414     | 310     | 292   |

* Excluding pregnant women.
Table 10.2

Body mass index (BMI), overweight and obesity prevalence, by age and sex

Aged 16 and over with both valid height and weight measurements 2010

<table>
<thead>
<tr>
<th>BMI (kg/m²) and BMI status (%)a</th>
<th>Age group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16-24</td>
<td>25-34</td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean BMI (kg/m²)</td>
<td>24.4</td>
<td>26.3</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>0.27</td>
<td>0.26</td>
</tr>
<tr>
<td>% Underweight</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>% Normal</td>
<td>61</td>
<td>41</td>
</tr>
<tr>
<td>% Overweight</td>
<td>22</td>
<td>37</td>
</tr>
<tr>
<td>% Obese, excluding morbidly obese</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>% Morbidly obese</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>% Overweight, including obese</td>
<td>35</td>
<td>57</td>
</tr>
<tr>
<td>% Obese</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean BMI (kg/m²)</td>
<td>24.2</td>
<td>26.2</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>0.28</td>
<td>0.23</td>
</tr>
<tr>
<td>% Underweight</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>% Normal</td>
<td>62</td>
<td>49</td>
</tr>
<tr>
<td>% Overweight</td>
<td>21</td>
<td>28</td>
</tr>
<tr>
<td>% Obese, excluding morbidly obese</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>% Morbidly obese</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>% Overweight, including obese</td>
<td>32</td>
<td>49</td>
</tr>
<tr>
<td>% Obese</td>
<td>11</td>
<td>21</td>
</tr>
</tbody>
</table>

| Bases (unweighted)              |           |       |       |       |       |       |     |
|**Men**                          | 334       | 431   | 553   | 533   | 552   | 446   | 295  | 3144 |
|**Women**                        | 387       | 559   | 693   | 750   | 613   | 460   | 381  | 3843 |

| Bases (weighted)                |           |       |       |       |       |       |     |
|**Men**                          | 564       | 611   | 651   | 619   | 516   | 368   | 235  | 3563 |
|**Women**                        | 500       | 544   | 643   | 631   | 529   | 378   | 297  | 3523 |

a Underweight: less than 18.5 kg/m²
Normal weight: 18.5 to less than 25 kg/m²
Overweight: 25 to less than 30 kg/m²
Obese, excluding morbidly obese: 30 to less than 40 kg/m²
Morbidly obese: 40 kg/m² or more
Overweight, including obese: 25 kg/m² or more
Obese: 30 kg/m² or more
Table 10.3

Body mass index (BMI), overweight and obesity prevalence (observed and age-standardised), by Strategic Health Authoritya and sex

Aged 16 and over with both valid height and weight measurements 2010

<table>
<thead>
<tr>
<th>BMI (kg/m²) and BMI status (%)b</th>
<th>Strategic Health Authoritya</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North East</td>
</tr>
<tr>
<td></td>
<td>%</td>
</tr>
</tbody>
</table>

**Men**

**Observed**

<table>
<thead>
<tr>
<th>Mean BMI (kg/m²)</th>
<th>27.5</th>
<th>27.4</th>
<th>27.4</th>
<th>27.9</th>
<th>27.8</th>
<th>27.5</th>
<th>27.3</th>
<th>27.0</th>
<th>27.6</th>
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<tbody>
<tr>
<td>Standard error of the mean</td>
<td>0.39</td>
<td>0.27</td>
<td>0.35</td>
<td>0.38</td>
<td>0.35</td>
<td>0.29</td>
<td>0.35</td>
<td>0.35</td>
<td>0.34</td>
<td>0.31</td>
</tr>
<tr>
<td>% Underweight</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>% Normal</td>
<td>28</td>
<td>30</td>
<td>30</td>
<td>28</td>
<td>27</td>
<td>33</td>
<td>35</td>
<td>29</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td>% Overweight</td>
<td>43</td>
<td>41</td>
<td>42</td>
<td>40</td>
<td>45</td>
<td>40</td>
<td>40</td>
<td>46</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>% Obese, excluding morbidly obese</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>27</td>
<td>25</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>27</td>
<td>24</td>
</tr>
<tr>
<td>% Morbidly obese</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>% Overweight, including obese</td>
<td>69</td>
<td>67</td>
<td>68</td>
<td>69</td>
<td>72</td>
<td>67</td>
<td>64</td>
<td>69</td>
<td>67</td>
<td>66</td>
</tr>
<tr>
<td>% Obese</td>
<td>27</td>
<td>26</td>
<td>26</td>
<td>29</td>
<td>28</td>
<td>27</td>
<td>25</td>
<td>23</td>
<td>27</td>
<td>25</td>
</tr>
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</table>

**Standardised**

<table>
<thead>
<tr>
<th>Mean BMI (kg/m²)</th>
<th>27.6</th>
<th>27.4</th>
<th>27.5</th>
<th>27.7</th>
<th>27.8</th>
<th>27.5</th>
<th>27.4</th>
<th>27.1</th>
<th>27.5</th>
<th>27.3</th>
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<tbody>
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<td>0.35</td>
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<td>0.32</td>
<td>0.34</td>
<td>0.34</td>
<td>0.32</td>
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<tr>
<td>% Underweight</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
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<td>0</td>
<td>1</td>
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<td>-</td>
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<tr>
<td>% Normal</td>
<td>27</td>
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<td>29</td>
<td>30</td>
<td>26</td>
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<td>40</td>
<td>41</td>
<td>47</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>% Obese, excluding morbidly obese</td>
<td>26</td>
<td>25</td>
<td>26</td>
<td>26</td>
<td>25</td>
<td>24</td>
<td>25</td>
<td>22</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>% Morbidly obese</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>% Overweight, including obese</td>
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<td>67</td>
<td>70</td>
<td>66</td>
<td>73</td>
<td>67</td>
<td>67</td>
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<td>% Obese</td>
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<td>27</td>
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<td>27</td>
<td>27</td>
<td>26</td>
<td>23</td>
<td>26</td>
<td>26</td>
</tr>
</tbody>
</table>

**Bases (unweighted)**

- Men | 249 | 425 | 296 | 309 | 317 | 363 | 302 | 270 | 279 | 334 |

**Bases (weighted)**

- Men | 167 | 473 | 350 | 320 | 367 | 414 | 505 | 295 | 281 | 392 |

---

a This table provides data for regional analysis by the configuration of Strategic Health Authorities (SHAs) in place from July 2006.

b Underweight: less than 18.5 kg/m²
Normal weight: 18.5 to less than 25 kg/m²
Overweight: 25 to less than 30 kg/m²
Obese, excluding morbidly obese: 30 to less than 40 kg/m²
Morbidly obese: 40 kg/m² or more

Overweight, including obese: 25 kg/m² or more
Obese: 30 kg/m² or more

Continued…
Table 10.3 continued

Aged 16 and over with both valid height and weight measurements 2010

<table>
<thead>
<tr>
<th>Strategic Health Authoritya</th>
<th>North East</th>
<th>North West</th>
<th>Yorkshire &amp; the Humber</th>
<th>East Midlands</th>
<th>West Midlands</th>
<th>East of England</th>
<th>London</th>
<th>South East Coast</th>
<th>South Central</th>
<th>South West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aged 16 and over with both valid height and weight measurements</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td><strong>BMI (kg/m²) and BMI status (%)b</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Observed</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>28.1</td>
<td>27.1</td>
<td>27.1</td>
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<td>26.1</td>
<td>27.4</td>
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<td>0.27</td>
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<td>0.33</td>
<td>0.43</td>
<td>0.35</td>
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<td>1</td>
<td>3</td>
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<td>1</td>
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<td>% Overweight</td>
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<tr>
<td>% Obese, excluding morbidly obese</td>
<td>27</td>
<td>21</td>
<td>24</td>
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<td>22</td>
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<td>4</td>
<td>4</td>
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<td>5</td>
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<tr>
<td>% Overweight, including obese</td>
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<td>61</td>
<td>63</td>
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<td>53</td>
<td>56</td>
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<tr>
<td>% Obese</td>
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<td>27.1</td>
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<td>27.4</td>
<td>26.8</td>
</tr>
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<td>0.35</td>
<td>0.28</td>
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<td>0.39</td>
<td>0.32</td>
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<td>0.34</td>
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<td>% Underweight</td>
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<td>1</td>
<td>3</td>
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<td>1</td>
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<td>35</td>
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<td>46</td>
<td>39</td>
<td>48</td>
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<td>42</td>
</tr>
<tr>
<td>% Overweight</td>
<td>30</td>
<td>33</td>
<td>32</td>
<td>33</td>
<td>35</td>
<td>28</td>
<td>32</td>
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<td>36</td>
<td>31</td>
</tr>
<tr>
<td>% Obese, excluding morbidly obese</td>
<td>26</td>
<td>20</td>
<td>25</td>
<td>24</td>
<td>23</td>
<td>21</td>
<td>20</td>
<td>21</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>% Morbidly obese</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>% Overweight, including obese</td>
<td>58</td>
<td>57</td>
<td>63</td>
<td>62</td>
<td>60</td>
<td>53</td>
<td>57</td>
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<td>56</td>
</tr>
<tr>
<td>% Obese</td>
<td>28</td>
<td>24</td>
<td>30</td>
<td>29</td>
<td>25</td>
<td>25</td>
<td>24</td>
<td>22</td>
<td>26</td>
<td>26</td>
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<tr>
<td><strong>Bases (unweighted)</strong></td>
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<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Women</td>
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<td>497</td>
<td>363</td>
<td>374</td>
<td>374</td>
<td>418</td>
<td>381</td>
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<td><strong>Bases (weighted)</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>179</td>
<td>467</td>
<td>359</td>
<td>312</td>
<td>352</td>
<td>392</td>
<td>484</td>
<td>324</td>
<td>270</td>
<td>383</td>
</tr>
</tbody>
</table>

a This table provides data for regional analysis by the configuration of Strategic Health Authorities (SHAs) in place from July 2006.

b Underweight: less than 18.5 kg/m²

Normal weight: 18.5 to less than 25 kg/m²

Overweight: 25 to less than 30 kg/m²

Obese, excluding morbidly obese: 30 to less than 40 kg/m²

Morbidly obese: 40 kg/m² or more

Overweight, including obese: 25 kg/m² or more

Obese: 30 kg/m² or more
Table 10.4

Body mass index (BMI), overweight and obesity prevalence (age-standardised), by equivalised household income and sex

Aged 16 and over with both valid height and weight measurements 2010

<table>
<thead>
<tr>
<th>BMI (kg/m²) and BMI status (%)²</th>
<th>Equivalised household income quintile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highest</td>
</tr>
</tbody>
</table>

**Men**

<table>
<thead>
<tr>
<th>Mean BMI (kg/m²)</th>
<th>27.5</th>
<th>27.8</th>
<th>27.6</th>
<th>27.4</th>
<th>27.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard error of the mean</td>
<td>0.24</td>
<td>0.29</td>
<td>0.27</td>
<td>0.27</td>
<td>0.31</td>
</tr>
<tr>
<td>% Underweight</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>% Normal</td>
<td>28</td>
<td>26</td>
<td>31</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>% Overweight</td>
<td>47</td>
<td>46</td>
<td>38</td>
<td>37</td>
<td>35</td>
</tr>
<tr>
<td>% Obese, excluding morbidly obese</td>
<td>23</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>25</td>
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<tr>
<td>% Morbidly obese</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>% Overweight, including obese</td>
<td>71</td>
<td>73</td>
<td>67</td>
<td>65</td>
<td>63</td>
</tr>
<tr>
<td>% Obese</td>
<td>24</td>
<td>27</td>
<td>29</td>
<td>28</td>
<td>28</td>
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</tbody>
</table>

**Women**

<table>
<thead>
<tr>
<th>Mean BMI (kg/m²)</th>
<th>25.8</th>
<th>26.7</th>
<th>27.4</th>
<th>28.0</th>
<th>28.2</th>
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</thead>
<tbody>
<tr>
<td>Standard error of the mean</td>
<td>0.24</td>
<td>0.22</td>
<td>0.26</td>
<td>0.30</td>
<td>0.31</td>
</tr>
<tr>
<td>% Underweight</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>% Normal</td>
<td>48</td>
<td>42</td>
<td>38</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>% Overweight</td>
<td>32</td>
<td>34</td>
<td>34</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>% Obese, excluding morbidly obese</td>
<td>16</td>
<td>20</td>
<td>23</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>% Morbidly obese</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>% Overweight, including obese</td>
<td>49</td>
<td>57</td>
<td>60</td>
<td>63</td>
<td>62</td>
</tr>
<tr>
<td>% Obese</td>
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<td>33</td>
<td>34</td>
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</table>

**Bases (unweighted)**

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>617</td>
<td>587</td>
<td>543</td>
<td>482</td>
<td>353</td>
</tr>
<tr>
<td>Women</td>
<td>643</td>
<td>674</td>
<td>651</td>
<td>644</td>
<td>548</td>
</tr>
</tbody>
</table>

**Bases (weighted)**

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>681</td>
<td>667</td>
<td>607</td>
<td>515</td>
<td>419</td>
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<td>Women</td>
<td>596</td>
<td>629</td>
<td>581</td>
<td>571</td>
<td>497</td>
</tr>
</tbody>
</table>

¹ Underweight: less than 18.5 kg/m²
Normal weight: 18.5 to less than 25 kg/m²
Overweight: 25 to less than 30 kg/m²
Obese, excluding morbidly obese: 30 to less than 40 kg/m²
Morbidly obese: 40 kg/m² or more
Overweight, including obese: 25 kg/m² or more
Obese: 30 kg/m² or more
<table>
<thead>
<tr>
<th>Spearhead status</th>
<th>BMI (kg/m²)</th>
<th>BMI status (%)</th>
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</thead>
<tbody>
<tr>
<td>Non-Spearhead PCT</td>
<td>27.4</td>
<td>27.6</td>
</tr>
<tr>
<td>Spearhead PCT</td>
<td>27.6</td>
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</tbody>
</table>

**Men**

<table>
<thead>
<tr>
<th></th>
<th>Mean BMI (kg/m²)</th>
<th>Standard error of the mean</th>
<th>% Underweight</th>
<th>% Normal</th>
<th>% Overweight</th>
<th>% Obese, excluding morbidly obese</th>
<th>% Morbidly obese</th>
<th>% Overweight, including obese</th>
<th>% Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27.4</td>
<td>0.13</td>
<td>1</td>
<td>32</td>
<td>41</td>
<td>25</td>
<td>1</td>
<td>67</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>27.6</td>
<td>0.18</td>
<td>2</td>
<td>28</td>
<td>43</td>
<td>24</td>
<td>2</td>
<td>70</td>
<td>26</td>
</tr>
</tbody>
</table>

**Women**

<table>
<thead>
<tr>
<th></th>
<th>Mean BMI (kg/m²)</th>
<th>Standard error of the mean</th>
<th>% Underweight</th>
<th>% Normal</th>
<th>% Overweight</th>
<th>% Obese, excluding morbidly obese</th>
<th>% Morbidly obese</th>
<th>% Overweight, including obese</th>
<th>% Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26.9</td>
<td>0.14</td>
<td>2</td>
<td>42</td>
<td>31</td>
<td>22</td>
<td>3</td>
<td>56</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>27.6</td>
<td>0.20</td>
<td>2</td>
<td>36</td>
<td>33</td>
<td>23</td>
<td>5</td>
<td>62</td>
<td>28</td>
</tr>
</tbody>
</table>

**Bases (unweighted)**

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1981</td>
<td></td>
<td>1163</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2368</td>
<td></td>
<td>1457</td>
</tr>
</tbody>
</table>

**Bases (weighted)**

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2323</td>
<td></td>
<td>1240</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2272</td>
<td></td>
<td>1251</td>
</tr>
</tbody>
</table>

a Spearhead PCTs are the most health deprived areas of England. They are areas in the bottom fifth nationally for three or more indicators relating to life expectancy at birth, cancer and cardiovascular disease (CVD) mortality and the index of multiple deprivation.

b Underweight: less than 18.5 kg/m²
Normal weight: 18.5 to less than 25 kg/m²
Overweight: 25 to less than 30 kg/m²
Obese, excluding morbidly obese: 30 to less than 40 kg/m²
Morbidly obese: 40 kg/m² or more
Overweight, including obese: 25 kg/m² or more
Obese: 30 kg/m² or more
Table 10.6

Waist circumference, by age and sex

Aged 16 and over with a valid waist measurement 2010

<table>
<thead>
<tr>
<th>Waist circumference (cm) and raised waist circumference (%)</th>
<th>Age group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16-24</td>
<td>25-34</td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean waist circumference (cm)</td>
<td>86.3</td>
<td>92.9</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>0.84</td>
<td>0.86</td>
</tr>
<tr>
<td>% with raised waist circumference a</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean waist circumference (cm)</td>
<td>79.7</td>
<td>83.6</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>0.79</td>
<td>0.68</td>
</tr>
<tr>
<td>% with raised waist circumference a</td>
<td>18</td>
<td>34</td>
</tr>
</tbody>
</table>

| Bases (unweighted)                                          |           |       |       |       |       |       |      |
| Men                                                         | 207       | 291   | 415   | 410   | 427   | 355   | 259   |
| Women                                                       | 266       | 381   | 548   | 608   | 514   | 377   | 343   |

| Bases (weighted)                                            |           |       |       |       |       |       |      |
| Men                                                         | 418       | 458   | 489   | 471   | 396   | 278   | 201   |
| Women                                                       | 374       | 409   | 482   | 472   | 405   | 297   | 275   |

* Raised waist circumference: greater than 102cm in men and greater than 88cm in women.
## Table 10.7

Waist circumference (observed and age-standardised), by Strategic Health Authority and sex

Aged 16 and over with a valid waist measurement 2010

| Waist circumference (cm) and raised waist circumference (%) | Strategic Health Authority |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  | North | North | Yorkshire & the Humber | East Midlands | West Midlands | East of England | London | South East Coast | South Central | South West |
| **Men** |  |  |  |  |  |  |  |  |  |
| **Observed** |  |  |  |  |  |  |  |  |  |
| Mean waist circumference (cm) | 96.9 | 97.7 | 97.9 | 98.3 | 97.6 | 97.8 | 96.9 | 98.8 | 97.5 | 97.9 |
| Standard error of the mean | 1.15 | 1.00 | 1.28 | 0.98 | 1.04 | 0.89 | 1.27 | 1.06 | 1.12 | 1.15 |
| % with raised waist circumference | 33 | 36 | 37 | 37 | 32 | 35 | 32 | 36 | 34 | 31 |
| **Standardised** |  |  |  |  |  |  |  |  |  |
| Mean waist circumference (cm) | 96.8 | 97.7 | 98.3 | 96.8 | 97.8 | 97.6 | 97.5 | 98.9 | 97.4 | 97.5 |
| Standard error of the mean | 1.18 | 1.03 | 1.29 | 1.13 | 0.88 | 0.92 | 1.20 | 1.09 | 1.16 | 1.25 |
| % with raised waist circumference | 33 | 36 | 38 | 35 | 32 | 34 | 33 | 35 | 34 | 30 |
| **Women** |  |  |  |  |  |  |  |  |  |
| **Observed** |  |  |  |  |  |  |  |  |  |
| Mean waist circumference (cm) | 88.8 | 88.7 | 88.9 | 88.7 | 88.2 | 89.6 | 87.0 | 87.5 | 88.8 | 87.6 |
| Standard error of the mean | 0.99 | 0.84 | 1.21 | 0.88 | 0.82 | 0.97 | 0.89 | 0.98 | 1.28 | 0.87 |
| % with raised waist circumference | 50 | 46 | 48 | 47 | 45 | 50 | 43 | 45 | 49 | 44 |
| **Standardised** |  |  |  |  |  |  |  |  |  |
| Mean waist circumference (cm) | 87.9 | 88.5 | 88.9 | 88.0 | 88.2 | 89.0 | 87.9 | 87.4 | 89.0 | 87.2 |
| Standard error of the mean | 1.04 | 0.86 | 1.21 | 0.91 | 0.85 | 0.98 | 0.86 | 0.98 | 1.37 | 0.86 |
| % with raised waist circumference | 47 | 45 | 49 | 44 | 46 | 48 | 46 | 45 | 49 | 43 |
| **Bases (unweighted)** |  |  |  |  |  |  |  |  |  |
| Men | 213 | 299 | 232 | 251 | 232 | 284 | 194 | 203 | 207 | 249 |
| Women | 306 | 366 | 300 | 299 | 292 | 349 | 287 | 266 | 258 | 314 |
| **Bases (weighted)** |  |  |  |  |  |  |  |  |  |
| Men | 135 | 361 | 274 | 241 | 293 | 315 | 375 | 222 | 224 | 271 |
| Women | 145 | 358 | 280 | 230 | 282 | 301 | 409 | 231 | 204 | 272 |

---

*a This table provides data for regional analysis by the configuration of Strategic Health Authorities (SHAs) in place from July 2006.

*b Raised waist circumference: greater than 102cm in men and greater than 88cm in women.
### Table 10.8

**Waist circumference (age-standardised), by equivalised household income and sex**

_Aged 16 and over with a valid waist measurement 2010_

<table>
<thead>
<tr>
<th>Equivalised household income quintile</th>
<th>Highest</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>Lowest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean waist circumference (cm)</td>
<td>97.8</td>
<td>97.9</td>
<td>97.0</td>
<td>98.3</td>
<td>98.2</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>0.91</td>
<td>0.71</td>
<td>0.87</td>
<td>1.08</td>
<td>1.03</td>
</tr>
<tr>
<td>% with raised waist circumference&lt;sup&gt;a&lt;/sup&gt;</td>
<td>33</td>
<td>34</td>
<td>32</td>
<td>41</td>
<td>36</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean waist circumference (cm)</td>
<td>84.7</td>
<td>87.0</td>
<td>89.0</td>
<td>90.4</td>
<td>90.5</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>0.73</td>
<td>0.61</td>
<td>0.69</td>
<td>0.75</td>
<td>0.77</td>
</tr>
<tr>
<td>% with raised waist circumference&lt;sup&gt;a&lt;/sup&gt;</td>
<td>36</td>
<td>42</td>
<td>50</td>
<td>52</td>
<td>53</td>
</tr>
</tbody>
</table>

*<sup>a</sup> Raised waist circumference: greater than 102 cm in men and greater than 88 cm in women.*

**Bases (unweighted)**

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Women</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>474</td>
<td>459</td>
<td>427</td>
<td>372</td>
<td>283</td>
<td>514</td>
<td>535</td>
<td>546</td>
<td>490</td>
<td>438</td>
</tr>
</tbody>
</table>

**Bases (weighted)**

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Women</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>522</td>
<td>535</td>
<td>479</td>
<td>395</td>
<td>355</td>
<td>448</td>
<td>480</td>
<td>468</td>
<td>424</td>
<td>393</td>
</tr>
</tbody>
</table>

### Table 10.9

**Waist circumference (age-standardised), by Spearhead status<sup>a</sup> and sex**

_Aged 16 and over with a valid waist measurement 2010_

<table>
<thead>
<tr>
<th>Spearhead status</th>
<th>Non-Spearhead PCT</th>
<th>Spearhead PCT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean waist circumference (cm)</td>
<td>97.7</td>
<td>97.7</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>0.43</td>
<td>0.52</td>
</tr>
<tr>
<td>% with raised waist circumference&lt;sup&gt;b&lt;/sup&gt;</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean waist circumference (cm)</td>
<td>87.8</td>
<td>88.8</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>0.41</td>
<td>0.40</td>
</tr>
<tr>
<td>% with raised waist circumference&lt;sup&gt;b&lt;/sup&gt;</td>
<td>45</td>
<td>49</td>
</tr>
</tbody>
</table>

*<sup>a</sup> Spearhead PCTs are the most health deprived areas of England. They are areas in the bottom fifth nationally for three or more indicators relating to life expectancy at birth, cancer and cardiovascular disease (CVD) mortality and the index of multiple deprivation.*

*<sup>b</sup> Raised waist circumference: greater than 102 cm in men and greater than 88 cm in women.*
### Table 10.10

Health risk category associated with overweight and obesity based on body mass index (BMI) and waist circumference, by age and sex

Aged 16 and over with valid height, weight and waist circumference measurements\(^a\) 2010

<table>
<thead>
<tr>
<th>BMI(^b) and waist circumference classification(^c)</th>
<th>Health risk category(^d)</th>
<th>Age group</th>
<th>16-24</th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65-74</th>
<th>75+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>Low waist circumference</td>
<td>Not applicable</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>High waist circumference</td>
<td>Not applicable</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Very high waist circumference</td>
<td>Not applicable</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>All underweight</td>
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<td>1</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Normal</td>
<td>Low waist circumference</td>
<td>No increased risk</td>
<td>60</td>
<td>39</td>
<td>22</td>
<td>14</td>
<td>12</td>
<td>14</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td>High waist circumference</td>
<td>No increased risk</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Very high waist circumference</td>
<td>Increased risk</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>All normal</td>
<td>61</td>
<td>41</td>
<td>24</td>
<td>20</td>
<td>18</td>
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<td>21</td>
<td>31</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Overweight</td>
<td>Low waist circumference</td>
<td>No increased risk</td>
<td>12</td>
<td>18</td>
<td>14</td>
<td>13</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>High waist circumference</td>
<td>Increased risk</td>
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<td>19</td>
<td>24</td>
<td>24</td>
<td>27</td>
<td>25</td>
<td>21</td>
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</tr>
<tr>
<td>Very high waist circumference</td>
<td>High risk</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>22</td>
<td>20</td>
<td>10</td>
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<td>All overweight</td>
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<td>47</td>
<td>48</td>
<td>46</td>
<td>54</td>
<td>52</td>
<td>43</td>
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<td>-</td>
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<tr>
<td>Obesity I</td>
<td>Low waist circumference</td>
<td>Increased risk</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>High waist circumference</td>
<td>High risk</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Very high waist circumference</td>
<td>Very high risk</td>
<td>8</td>
<td>9</td>
<td>18</td>
<td>21</td>
<td>26</td>
<td>18</td>
<td>19</td>
<td>17</td>
<td>-</td>
</tr>
<tr>
<td>All obese I</td>
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<td>14</td>
<td>21</td>
<td>23</td>
<td>27</td>
<td>19</td>
<td>21</td>
<td>19</td>
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</tr>
<tr>
<td>Obesity II</td>
<td>Low waist circumference</td>
<td>Very high risk</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>High waist circumference</td>
<td>Very high risk</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Very high waist circumference</td>
<td>Very high risk</td>
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<td>2</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td></td>
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<tr>
<td>All obese II</td>
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<td>5</td>
<td>8</td>
<td>7</td>
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<td>4</td>
<td>5</td>
<td>-</td>
<td>-</td>
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<td>Obesity III</td>
<td>Low waist circumference</td>
<td>Very high risk</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>High waist circumference</td>
<td>Very high risk</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Very high waist circumference</td>
<td>Very high risk</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>All obese III</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Men – Overall risk(^d)</td>
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<td>-</td>
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<td>0</td>
<td>0</td>
<td>-</td>
<td>1</td>
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</tr>
<tr>
<td>No increased risk</td>
<td>73</td>
<td>58</td>
<td>38</td>
<td>32</td>
<td>24</td>
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<td></td>
</tr>
<tr>
<td>High risk</td>
<td>5</td>
<td>7</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>23</td>
<td>22</td>
<td>12</td>
<td></td>
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</tr>
<tr>
<td>Very high risk</td>
<td>10</td>
<td>13</td>
<td>26</td>
<td>30</td>
<td>35</td>
<td>25</td>
<td>24</td>
<td>23</td>
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</tr>
<tr>
<td><strong>Bases (unweighted)</strong></td>
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<td>384</td>
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\(^a\) Percentages and bases in this table are based on those who have a valid measurement for waist circumference, in addition to valid measurements of height and weight. Therefore subtotals for BMI categories by age and sex in this table are not definitive and may vary from estimates shown in Table 10.2.

\(^b\) BMI categories according to National Institute for Health and Clinical Excellence (NICE) guidelines: Underweight: Less than 18.5kg/m\(^2\), Normal: 18.5 to less than 25kg/m\(^2\), Overweight: 25 to less than 30kg/m\(^2\), Obesity I: 30 to less than 35kg/m\(^2\), Obesity II: 35 to less than 40kg/m\(^2\), Obesity III: 40kg/m\(^2\) or more.

\(^c\) Waist circumference categories according to NICE guidelines:

<table>
<thead>
<tr>
<th>Men</th>
<th>Women</th>
</tr>
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<tbody>
<tr>
<td>Low</td>
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<tr>
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<td>more than 102cm</td>
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\(^d\) Health risk category according to NICE Guidelines.
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</table>

* a Percentages and bases in this table are based on those who have a valid measurement for waist circumference, in addition to valid measurements of height and weight. Therefore subtotals for BMI categories by age and sex in this table are not definitive and may vary from estimates shown in Table 10.2.

* b BMI categories according to National Institute for Health and Clinical Excellence (NICE) guidelines: Underweight: Less than 18.5kg/m², Normal: 18.5 to less than 25kg/m², Overweight: 25 to less than 30kg/m², Obesity I: 30 to less than 35kg/m², Obesity II: 35 to less than 40kg/m², Obesity III: 40kg/m² or more.

* c Waist circumference categories according to NICE guidelines:

<table>
<thead>
<tr>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Less than 94cm</td>
</tr>
<tr>
<td>High</td>
<td>94–102cm</td>
</tr>
<tr>
<td>Very high</td>
<td>More than 102cm</td>
</tr>
</tbody>
</table>

* d Health risk category according to NICE Guidelines.
### Table 10.11

**Trends in overweight and obesity prevalence, 1993 to 2010, by age and sex**

Aged 16 and over with both valid height and weight measurements 1993-2010

<table>
<thead>
<tr>
<th>BMI status</th>
<th>Age group</th>
<th>16-24</th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65-74</th>
<th>75+</th>
<th>Total</th>
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<td><strong>Men</strong></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
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**Notes:**
- **BMI status:** Overweight: 25 to less than 30 kg/m²; Obese, including morbidly obese: 30 kg/m² or more.
- **From 2003 onwards, data have been weighted for non-response.**

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a Overweight: 25 to less than 30kg/m²; Obese, including morbidly obese: 30kg/m² or more.
b From 2003 onwards, data have been weighted for non-response.
### Table 10.11 continued

**Aged 16 and over with both valid height and weight measurements 1993-2010**

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| Men 2004 | 418 | 481 | 573 | 465 | 399 | 276 | 160 | 2772 | |
| Men 2005 | 491 | 552 | 620 | 521 | 462 | 311 | 187 | 3144 | |
| Men 2006 | 930 | 991 | 1246 | 993 | 888 | 599 | 368 | 6014 | |
| Men 2007 | 461 | 499 | 603 | 514 | 446 | 296 | 189 | 3008 | |
| Men 2008 | 1029 | 1068 | 1243 | 1059 | 968 | 610 | 409 | 6385 | |
| Men 2009 | 334 | 346 | 389 | 343 | 291 | 207 | 147 | 2055 | |
| Men 2010 | 564 | 611 | 651 | 619 | 516 | 368 | 235 | 3563 | |
| Women 2003 | 912 | 1085 | 1289 | 1073 | 982 | 694 | 536 | 6570 | |
| Women 2004 | 378 | 460 | 564 | 459 | 425 | 295 | 231 | 2812 | |
| Women 2005 | 432 | 524 | 628 | 517 | 489 | 322 | 272 | 3194 | |
| Women 2006 | 866 | 942 | 1207 | 914 | 637 | 511 | 6074 | |
| Women 2007 | 405 | 466 | 599 | 497 | 452 | 312 | 252 | 2983 | |
| Women 2008 | 935 | 1020 | 1241 | 1057 | 985 | 663 | 549 | 6450 | |
| Women 2009 | 297 | 315 | 393 | 346 | 313 | 216 | 166 | 2045 | |
| Women 2010 | 500 | 544 | 643 | 631 | 529 | 378 | 297 | 3523 | |

<sup>a</sup> Overweight: 25 to less than 30kg/m<sup>2</sup>; Obese, including morbidly obese: 30kg/m<sup>2</sup> or more.

<sup>b</sup> From 2003 onwards, data have been weighted for non-response.