Health Survey for England 2015
Adult overweight and obesity

This report examines the prevalence of overweight and obesity in England in 2015. It compares the prevalence of obesity in different population groups, by age, sex, income and region; and shows to what extent hypertension, diabetes, and longstanding illness are more common among obese people.

Key findings

- Over a quarter of adults in England (27% of men and women) were obese, with a body mass index (BMI) of $30kg/m^2$ or higher. A further 41% of men and 31% of women were overweight, with a BMI of at least 25 but less than $30kg/m^2$. 2% of men and 4% of women were morbidly obese, with a BMI of at least $40kg/m^2$.

- Obesity prevalence varied with household income in women but not in men: 39% of women in the 2nd lowest household income quintile were obese, compared with 17% of women in the highest income quintile.

- Abdominal obesity (very high waist circumference) varied with household income in both men and women: 55% of women in the 2nd lowest income quintile had a very high waist circumference, compared with 37% of those in the highest income quintile.

- Obesity was associated with several other conditions, notably diabetes (both diagnosed and undiagnosed), hypertension, and limiting longstanding illness.

- Following a steep rise in obesity and abdominal obesity in the 1990s, increases were more gradual between 2001 and 2010, and appear to have plateaued since then.

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Contents

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This report may be of interest to members of the public, policy officials, people working in public health and to commissioners of health and care services to see the prevalence of overweight and obesity among adults in England.

Introduction

Contents

This chapter presents height, weight, and waist circumference data from adult Health Survey for England participants in 2015. The data were based on measurements of a representative sample of the general population aged 16 and over, and are used to show the overall prevalence of overweight and obesity (including abdominal obesity, determined by waist circumference), in addition to comparisons by sex, age, region and income.

Detailed tables accompanying this chapter can be accessed via http://digital.nhs.uk/pubs/hse2015

Background

Being overweight or obese is associated with an increased risk of a number of common diseases and causes of premature death, including diabetes, cardiovascular disease and some cancers.[1,2] For individuals with excess weight, the risk of poor health increases sharply with increasing body mass index (BMI).[3] Obesity is estimated to be the fourth largest risk factor contributing to deaths in England (after hypertension, smoking, and high cholesterol) according to the NHS Atlas of Risk.[4]

BMI is a widely used value of weight that takes into account the individual's height, and is defined as weight in kilograms divided by the height in metres squared (kg/m^2).[5] However 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 suggested that waist circumference, waist to hip ratio or waist to height ratio may be useful supplements to BMI to identify central (abdominal) obesity, which increases the health risk from being overweight.[6,7] More recently, waist circumference has been identified as the most useful of these three measures of central obesity in determining health risk.[8,9]

Previous surveys have shown that around a quarter of adults in England are obese (have a BMI of $30kg/m^2$ or higher) and many have a very high waist circumference (45% of women had a waist circumference over 88cm and 32% of men had a waist circumference over 102cm in 2014[10]). Other research has shown that the burden of obesity falls particularly on those in lower income households, and in more deprived areas of the country. Obesity therefore continues to be an important public health concern, and a driver of health inequalities.

To address the issue of obesity, a number of government policies and initiatives are in place, aimed at individuals, the NHS, local authorities and food manufacturers and retailers. Physical activity and 'eatwell' guidelines give informed advice for a healthier lifestyle, including a healthier weight.[11,12] The 2016 childhood obesity action plan includes many measures that affect all ages, including the soft drinks industry levy, and the PHE-led sugar reduction programme.[13] The Public Health Responsibility Deal involves voluntary participation from food manufacturers and retailers in a number of areas including calorie reduction and improving food labelling systems.[14] The *Change4Life* public information campaign aims to improve diet and activity levels of parents and children.[15] The *Living Well for Longer* policy document aims to encourage local authorities and clinical commissioning groups (CCGs) to follow the lead of Public Health England in acting on obesity.[16] In particular, local authorities are being

encouraged to use their powers to curb fast-food outlets[17] and to promote exercise and active travel.[18]

This report presents key findings, charts, and tables primarily from the 2015 survey. Further details of trends are given in the HSE 2015 Trend tables and in previous reports, for example HSE 2014 report. Advice for individuals and families can be found at Change4Life, for health professionals from the National Institute for Clinical Excellence, and for policy makers at Public Health England.

Methods and definitions

Methods

Full details of the protocols for carrying out all the measurements are contained in the Methods report http://digital.nhs.uk/catalogue/PUB22610/HSE2015-methods.pdf

they are summarised briefly here. Height and weight were measured during the interviewer visit, while waist and hip circumferences were measured during the nurse visit.

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.[19] The reading was recorded to the nearest millimetre. Participants who were unable to stand or were unsteady on their feet were not measured.

Weight

New Class III Seca scales were introduced for HSE 2011, and have been used since then. These measure up to a maximum of 200kg.

For the weight measurement, participants were asked to remove their shoes and any bulky clothing or heavy items in pockets etc. 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 200kg were asked for their estimated weight because the scales are inaccurate above this level. These estimates have been included in the analyses.

In the analysis of height and weight, data were excluded for 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 (hip bone). The measurement was taken twice, using the same tape (waist and hip measurements were alternated), and was recorded to the nearest even millimetre. Where the two waist measurements differed by more than 3cm, a third measurement was 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) was 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 measurements

Response rates to measurements are shown in Table 1. 87% of adults provided valid height and 87% valid weight measurements, with 85% providing both (enabling BMI calculations for 85%). Among those who received a nurse visit, waist measurements were obtained from 97%. Response rates for all three measures, but particularly for height, were lower among those aged 85 and over. Among those aged under 75, missing measurements were primarily because of refusal; after this age, the main causes were health related (unsteadiness, inability to stand, other disability).

Age-standardisation

Age-standardised data are presented in this chapter for most analyses shown in the text, tables and charts. Age-standardisation allows comparisons between groups after adjusting for the effects of any differences in their age distributions.

For regions, both observed and age-standardised data are provided. Those wishing to ascertain the actual levels of overweight and obesity, etc. in each region should use the observed data, while those making comparisons between regions should use the age-standardised data. The comments on region in this chapter are based on age-standardised results.

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 is the body mass index (BMI), defined as weight in kilograms divided by the height in metres squared (kg/m^2).[5] This has been used as a measure of obesity in the HSE series. Adult participants were classified into the following BMI groups according to the World Health Organization (WHO) BMI classification, shown in the table below.[20]

BMI (kg/m2)	Description
Less than 18.5	Underweight
18.5 to less than 25	Normal
25 to less than 30	Overweight, not obese
30 or more	Obese, including morbidly obese
40 or more	Morbidly obese

Within this report, BMI categories of overweight and obese have frequently been combined to show the proportion whose BMI is above the normal range. As in previous years' reports, a subset of the obese category has also been defined, namely those with morbid obesity (BMI $40kg/m^2$ or more), who are at highest risk of morbidity and mortality.[21]

Waist circumference

BMI does not distinguish between mass due to body fat and mass due to muscular physique, nor the distribution of fat. In order to measure abdominal obesity, waist

circumference is measured, and categorised into desirable, high and very high, by sex-specific thresholds.[22]

Men's waist circumference (cm)	Women's waist circumference (cm)	Description
Less than 94	Less than 80	Desirable
94-102	80-88	High
More than 102	More than 88	Very high

Hypertension

During the nurse visit, blood pressure was measured three times, following the standard HSE protocol (see the Methods report, Appendix B at http://digital.nhs.uk/catalogue/PUB22610/HSE2015-methods.pdf). The mean of the second and third readings were used to determine the presence of hypertension, in conjunction with whether or not the participant was currently taking medication to control blood pressure.

The criteria for the four categories are shown in the following table.

Hypertension category	Description[a]	Blood pressure range[a]
Normotensive	Within normal range, and not currently taking medication specifically prescribed to treat high blood pressure	SBP less than 140mmHg, DBP less than 90mmHg
Hypertensive controlled	Within normal range, and currently taking medication specifically prescribed to treat high blood pressure	SBP less than 140mmHg and DBP less than 90mmHg
Hypertensive uncontrolled	Above normal range, currently taking medication specifically prescribed to treat high blood pressure	SBP at least 140mmHg and/or DBP at least 90mmHg
Hypertensive untreated	Above normal range, not currently taking medication specifically prescribed to treat high blood pressure	SBP at least 140mmHg and/or DBP at least 90mmHg

[a] SBP: systolic blood pressure; DBP: diastolic blood pressure

Diabetes

Participants were defined as having diagnosed diabetes if they reported that a doctor has diagnosed this, and that the diabetes was *not* solely during pregnancy. Both type 1 and type 2 diabetes are included in the definition.

Glycated haemoglobin (HbA_{1C}), measured in the blood sample, is a validated tool for monitoring longer-term hyperglycaemia (raised levels of blood glucose).[23] HbA_{1C} shows the proportion of haemoglobin in the circulation to which glucose is bound. It reflects the average level of blood glucose during approximately three months preceding the measurement and has been suggested as a diagnostic or screening tool for diabetes.

In 2009, an international expert committee recommended using levels of 6.5% (48mmol/mol[24]) or more to diagnose diabetes.[25] This was confirmed by the World Health Organisation in 2011.[23] A level of 48mmol/mol (6.5%) or above represents raised glycated haemoglobin (hyperglycaemia) and in people without diagnosed diabetes, this level indicates undiagnosed diabetes.

Longstanding illness

Longstanding illness is defined as any physical or mental health conditions or illnesses lasting or expected to last 12 months or more. A limiting longstanding illness is one that reduces an individual's ability to carry out day-to-day activities.

# Prevalence of overweight, obesity, and high waist circumference

Mean BMI, obesity and overweight, by age and sex

Mean BMI was in the 'overweight' range for both men ($27.6kg/m^2$) and women ($27.1kg/m^2$), and increased with age, peaking around age 55-64. Being overweight (without being obese) was more common among men (41%) than women (31%), however 27% of both sexes were obese, so overall, 68% of men and 58% of women were above a normal weight for their height. Prevalence of both overweight and of obesity varied by age, particularly in men.

Figure 1, Table 2

Figure 1 Prevalence of overweight and obesity, by age and sex

Base: Aged 16 and over
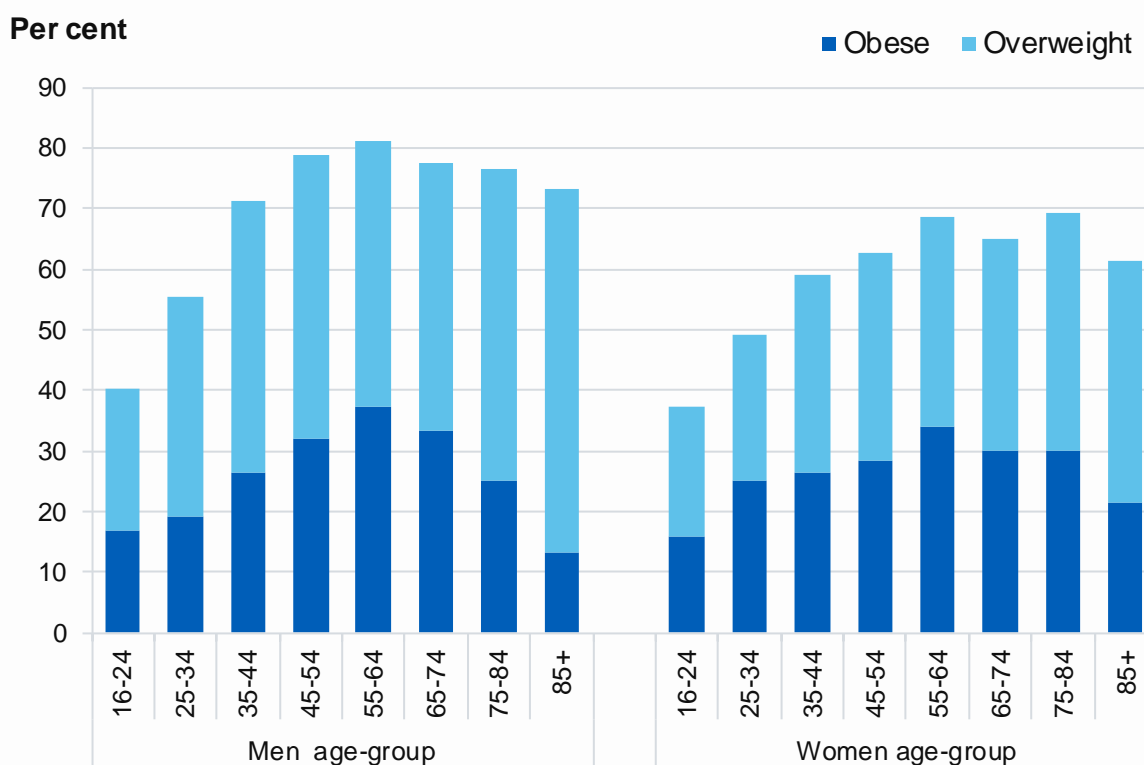
Source: NHS Digital

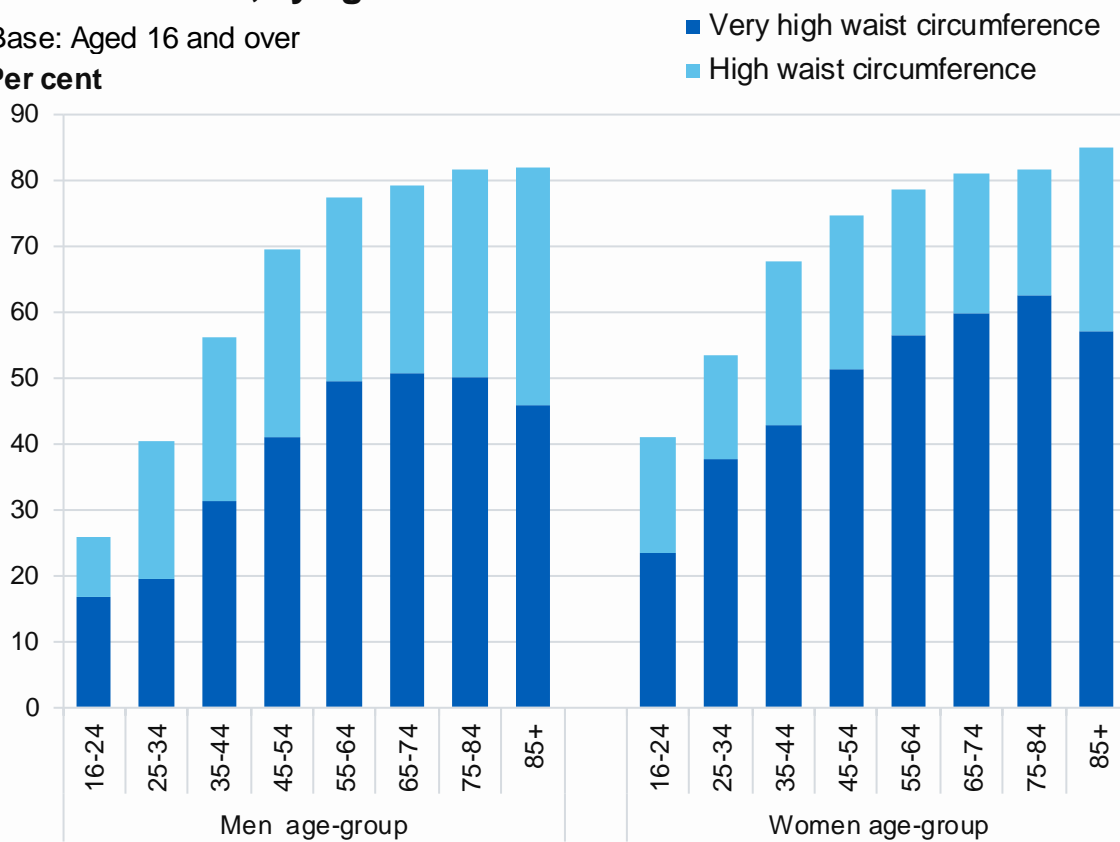## Waist circumference, by age and sex

The mean waist circumference was 97.4cm for men, which is considered 'high', and 88.4cm for women which is just above the threshold to be considered 'very high'. Overall, 35% of men and 47% of women had very high waist measurements. This was more common in middle aged and older adults than it was among younger people.

Figure 2, Table 5

Figure 2 Prevalence of high and very high waist circumference, by age and sex

Base: Aged 16 and over

Per cent

Source: NHS Digital

Prevalence of obesity, overweight and high waist circumference by region

Obesity and overweight varied by region and were generally more prevalent in the north of England and midlands than in the south of England. The proportion of adults with a high or very high waist circumference also varied by region in a similar way, as is shown in Figure 3.

Figure 3, Tables 3 and 6

Figure 3 Prevalence of BMI-defined obesity and very high waist circumference, by region

Base: Aged 16 and over
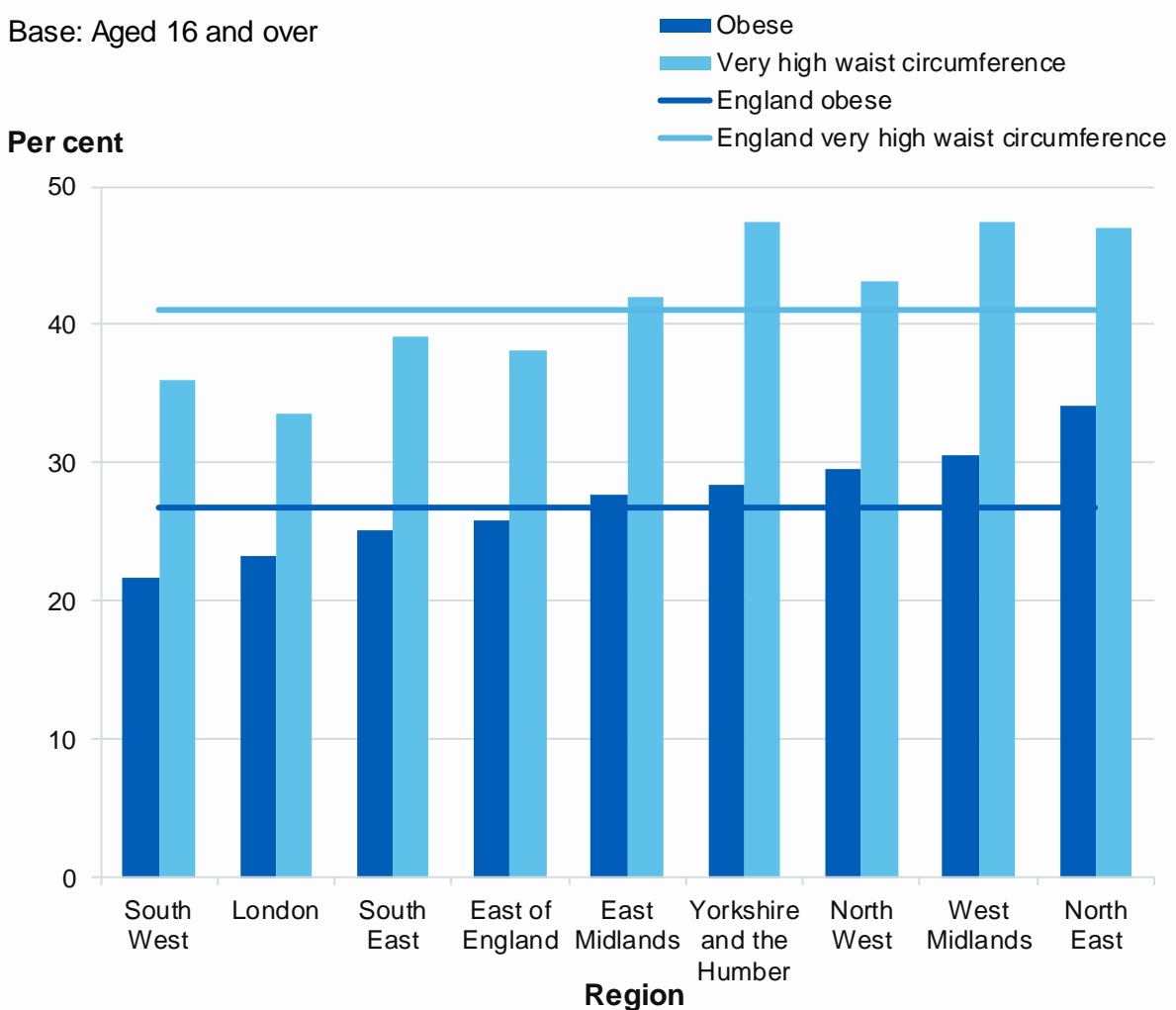
Obese
Very high waist circumference
England obese
England very high waist circumference

Per cent

Source: NHS Digital

## Prevalence of obesity, overweight and high waist circumference by income

The HSE uses the measure of equivalised household income, which takes into account the number of adults and dependent children in the household as well as overall household income.[26] Households are divided into quintiles (fifths) based on this measure.

Obesity varied by household income in women but not in men. Among women, those in the second lowest quintile of household income had the highest mean BMI and highest prevalence of obesity. Obesity was around twice as common among these women as in women in the highest household income quintile (39% compared with 17%). Waist circumference was related to income for both men and women, with lowest levels of very high waist circumference in the highest income groups. Figure 4 shows both measures of obesity, by income and sex.

Figure 4, Tables 4 and 7

Figure 4 Prevalence of BMI-defined obesity and very high waist circumference, by income and sex

Base: Aged 16 and over
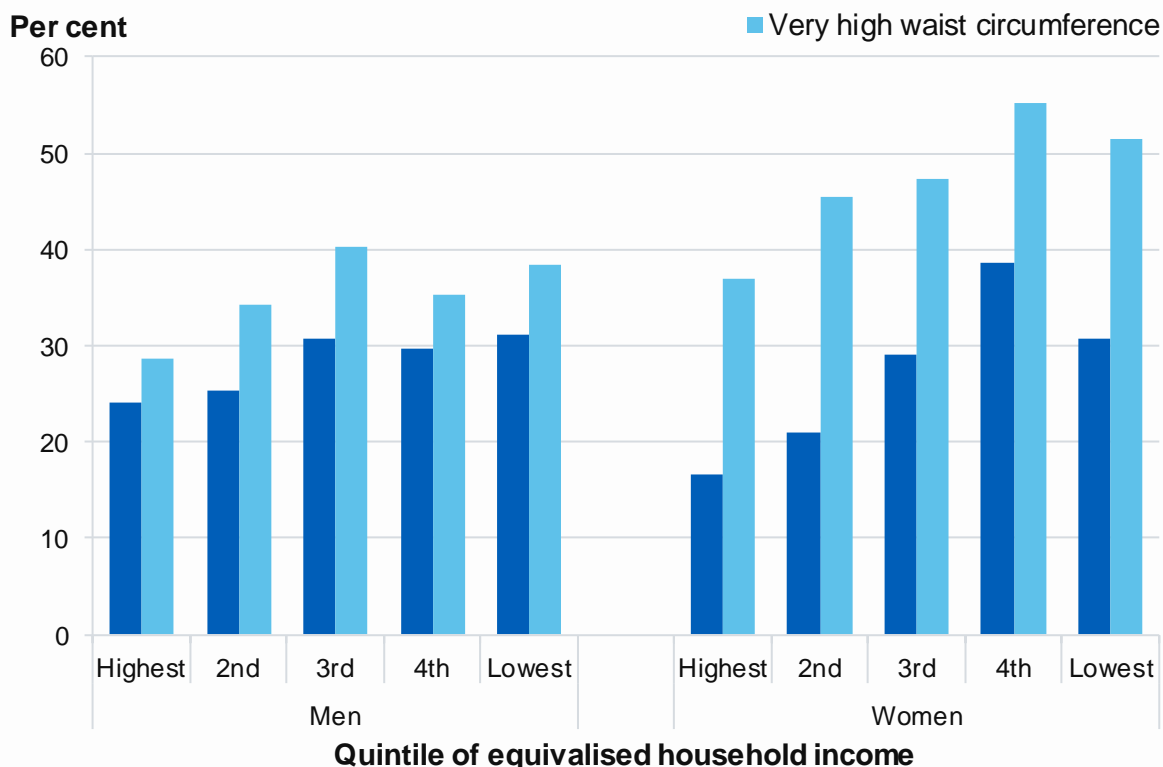
Source: NHS Digital

Health conditions and obesity, overweight and waist circumference

Hypertension

Hypertension was twice as common among obese adults as among those of a normal weight; 43% of obese men and 37% of obese women were hypertensive, compared with 21% of men and 18% of women whose BMI was within the normal range. Similarly 41% of men and 31% of women with a very high waist circumference were hypertensive, compared with 22% of men and 16% of women with a desirable waist circumference.

Figure 5, Tables 8 and 9

Figure 5 Prevalence of hypertension, by BMI group and sex

Base: Aged 16 and over

Per cent
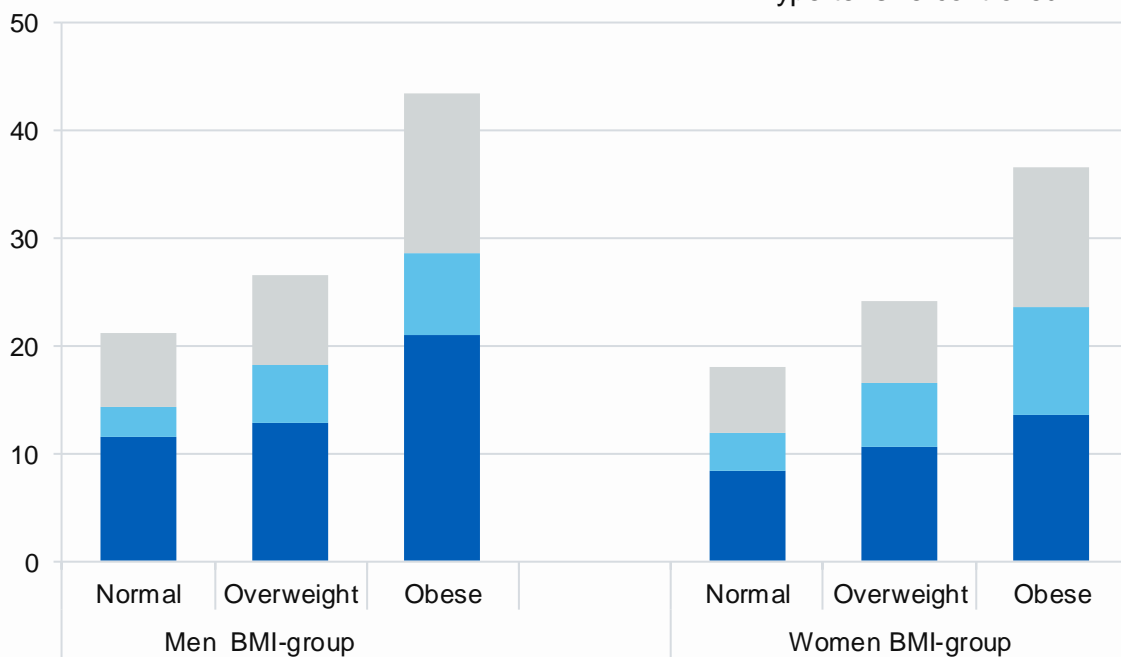
Source: NHS Digital

Diabetes

The prevalence of both diagnosed and undiagnosed diabetes rose with BMI, from 3% of normal weight adults, to 15% of obese adults. Prevalence of diabetes among adults with desirable and very high waist circumference was 2% and 11% respectively.

Figure 6, Tables 10 and 11

Figure 6 Prevalence of diabetes, by waist circumference group and sex

Base: Aged 16 and over

■ Diagnosed diabetes
■ Undiagnosed diabetes

Per cent
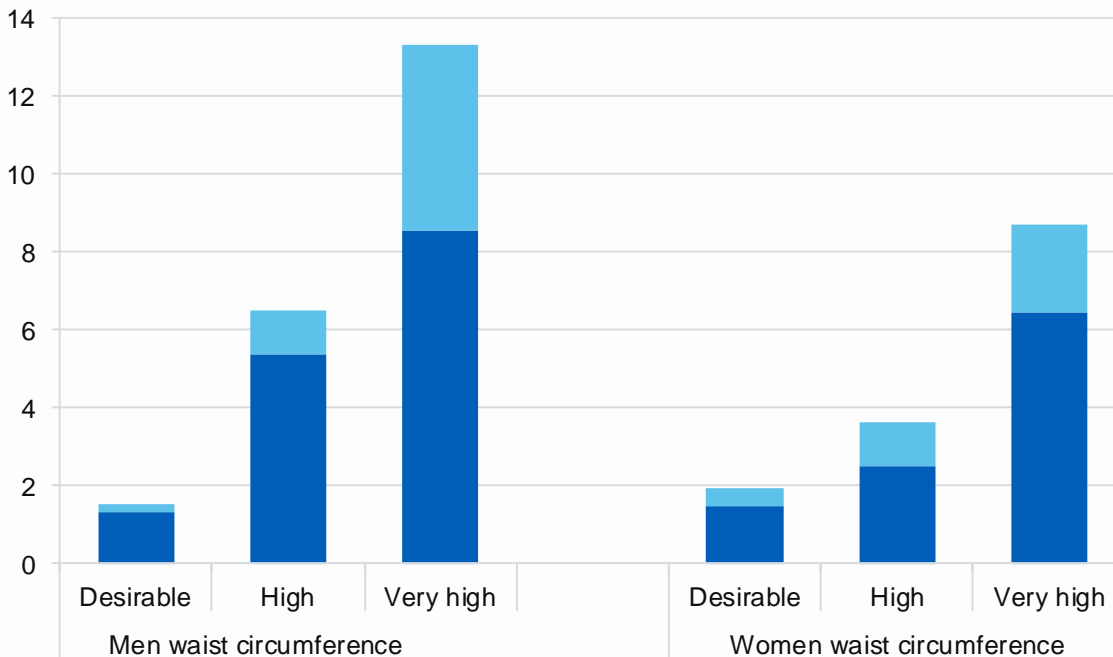
Source: NHS Digital

Longstanding Illness

Limiting longstanding illness was associated with obesity, more strongly for women than for men. Among those of normal weight, 17% of women had a limiting longstanding illness, but 33% of obese women had limiting longstanding illness. Among men, the difference was smaller (18% of normal weight men and 24% of obese men had a limiting longstanding illness.

Figure 7, Tables 12 and 13

Figure 7 Prevalence of longstanding illness, by BMI group and sex

Base: Aged 16 and over   ■ Limiting longstanding illness
                                          ■ Non-limiting longstanding illness
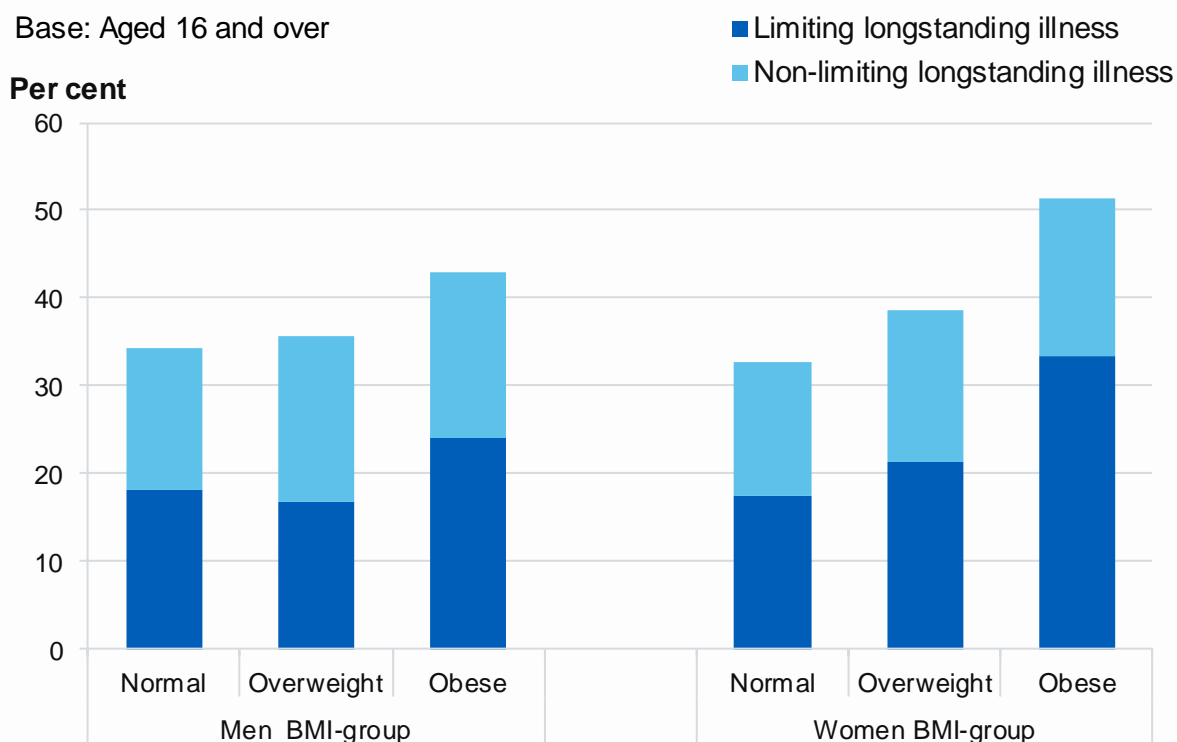
Source: NHS Digital

A similar pattern was found for waist circumference: limiting longstanding illness was reported by 28% of adults with a very high waist circumference and by 18% of adults with a desirable or high waist circumference.

Discussion

Trends in overweight, obesity and high waist circumference

The increase in overweight and obesity during the 1990s, was a cause for concern, because of the associated risks of ill-health and premature mortality. Between 1993 and 2001, the prevalence of overweight including obesity increased from 53% to 62% of adults in England. Since around 2001, the proportion of adults who are overweight or obese has changed little, and now stands at 63%.

However, between 2001 and 2010 there was a gradual increase in the proportions who were obese, from 22% to 26% with very little change since then. There was a small decrease in the proportion of adults who were overweight from 39% in 2001 to 36% in 2015. This latter change occurred largely between 2001 and 2010, with very little additional change since then. The table below summarises these changes; for more detail see the trend tables.[27]

Selected years	Overweight (%)	Obese (%)	Overweight /obese (%)	Morbidly obese (%)	High waist circumference (%)
1993	38	15	53	0.8	23
2001	39	22	62	1.7	35
2005	37	23	61	1.8	37
2010	37	26	63	2.7	40
2015	36	27	63	2.9	41

Between 1993 and 2015, morbid obesity increased from 0.8% to 2.9% of adults. Statistics collated by NHS digital show an increase in inpatient treatments with a primary diagnosis of obesity from two thousand in England in 2004-5, rising to over 11 thousand in 2010-11, and an increase in anti-obesity drugs from 7 hundred thousand in 2002, to over 1.4 million in 2009. This increase may be driven by increasing availability of specialist facilities or trained medical staff (e.g. bariatric surgeons), or of suitable drugs, as well as by increased need. Since around 2010, the number of inpatient treatments has decreased, partly due to the movement of gastric band maintenance to community based care. Prescriptions for obesity drugs have also decreased since that time, which may be partly due to the licencing of the most commonly prescribed obesity drug Orlistat for sale without prescription. [28]

Figure 8 shows the change in the prevalence of overweight and obesity over time. In order to reduce the impact of year-on-year change, the trend lines show three-year moving averages.

Figure 8

Figure 8 Trends in overweight and obesity (three-year rolling average)

Base: Aged 16 and over

—— Men overweight   —— Men obese
—— Women overweight   —— Women obese

Per cent
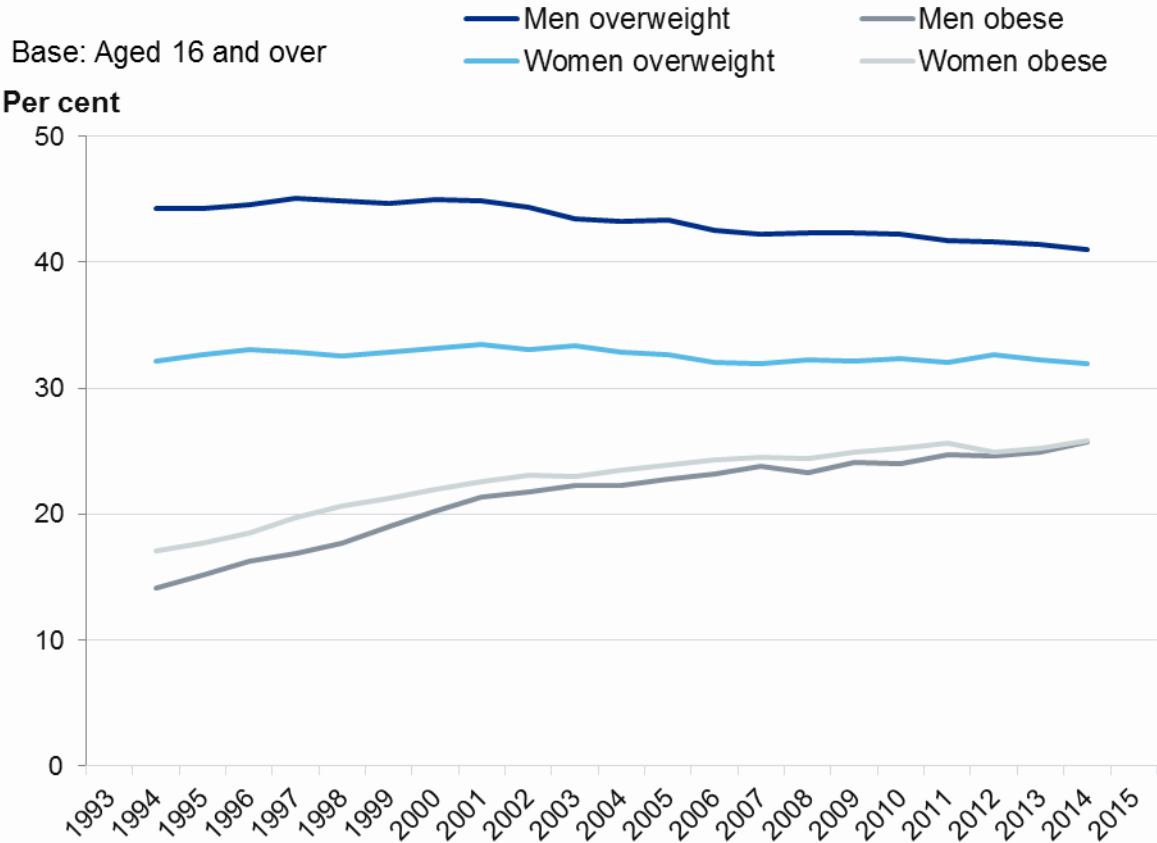
Source: NHS Digital

In 2015, 35% of men and 47% of women had a very high waist circumference.[29] These proportions rose from 20% and 26% respectively in 1993 to 31% and 38% in 2001. As with obesity, the increase since 2001 has been more gradual and occurred mostly between 2001 and 2010.[27]

It appears therefore that the trajectory of overweight and obesity has plateaued, as there has not been a statistically significant increase since 2010. However, levels of both general and abdominal obesity remain high and unequally distributed in the adult population in England, with important consequences for health and health inequalities.

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[19] The Frankfort Plane is an imaginary line passing through the external ear canal and across the top of the lower bone of the eye socket, immediately under the eye. A participant's head is positioned so that the Frankfort Plane is horizontal. In this position the headplate of the stadiometer will rest on the crown of the head.

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[24] The Standard International (SI) unit for measurement of HbA$_{1C}$ has been changed to mmol/mol. From June 2009 until May 2011, laboratories in England provided results as both percentage and mmol/mol; since June 2011, results have been provided only in mmol/mol. See Drugs and Therapeutics Bulletin. *Change in units for HbA1c.* http://dtb.bmj.com/site/about/HBA1C_chart_Feb_10.pdf

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[26] Not all households provide information about household income. 16% of adults with valid height and weight measurements, and 15% with valid waist measurements, lived in households that did not have any information about household income.

[27] Health Survey for England: Trend tables 2015 http://digital.nhs.uk/hse2015trend

[28] NHS Digital. *Statistics on Obesity, Physical Activity and Diet – England 2016.* NHS Digital, 2016. http://content.digital.nhs.uk/catalogue/PUB20562

[29] While there is a large degree of overlap with BMI, 8% of obese adults have a low or high waist circumference, 3% of those with normal weight and 38% of overweight have a very high waist circumference. These figures can be calculated from the combined BMI and waist circumference health risk table in the trend tables http://digital.nhs.uk/hse2015trend

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