Health Survey for England 2017
Adult and child overweight and obesity

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This report examines the prevalence of overweight and obesity among adults and children in England in 2017. It compares prevalence rates in different population groups by age, sex, region, household income and area deprivation, and looks at associated health risks. Children's BMI status is discussed in the context of their parents' weight.

Key findings

- The majority of adults in England in 2017 were overweight or obese; 67% of men and 62% of women. This included 27% of men and 30% of women in England who were obese. 2% of men and 5% of women were morbidly obese.
- 35% of men and 49% of women had a very high waist circumference.
- Diabetes prevalence was associated with central obesity, measured by waist circumference. 12% of men and 9% of women with a very high waist circumference had either diagnosed or undiagnosed diabetes. This compared to 6% of men and 2% of women with high waist circumferences and 4% of men and 1% of women with a desirable waist circumference.
- In 2017, 30% of children aged 2 to 15 in England were overweight or obese, including 17% who were obese.
- Children's overweight and obesity was associated with that of their parents. 28% of children of obese mothers were also obese, compared with 17% of children whose mothers were overweight but not obese, and 8% of children whose mothers were neither overweight nor obese. Similarly, 24% of children of obese fathers were themselves obese, compared with 14% of children whose fathers were overweight but not obese, and 9% of children whose fathers were neither overweight nor obese.
- Parents of overweight and obese children often thought that their child was the right weight. The majority of children who were overweight but not obese were described as being about the right weight by their mothers (90%) and fathers (87%). Around half of parents of obese children (47% of mothers and 52% of fathers) also said their child was about the right weight.

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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 and children in England.

Introduction

Contents

This report presents findings on the prevalence of overweight and obesity for adults and for children. Abdominal obesity is presented for adults only. The data were based on measurements of a representative sample of the general population who participated in the Health Survey for England 2017.[1]

The data are used to report overall prevalence of overweight and obesity, with comparisons by sex, age, region, household income and deprivation, as well as risks to health associated with obesity. Trends in adult and childhood overweight and obesity are discussed. Children's overweight and obesity are presented in the context of their parents' weight and parents' perceptions of their children's weight.

Detailed tables accompanying this chapter can be accessed via https://digital.nhs.uk/pubs/hse2017.

Background

Obesity has long been identified as a major public health problem, both internationally and within the UK. 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.[2,3] For individuals with excess weight, the risk of poor health increases sharply with increasing body mass index (BMI).[4]

Obesity in childhood is directly associated with various health conditions, including asthma[5,6], early onset type-2 diabetes[7,8], and cardiovascular risk-factors.[9,10,11] Children who are obese are also more likely to suffer from psychological problems,

[1] Some analyses include data from earlier survey years.

[2] Prospective Studies Collaboration. *Body-mass index and cause-specific mortality in 900,000 adults: collaborative analyses of 57 prospective studies.* Lancet 2009;373:1083-96

[3] Calle E, Rodriguez C, Walker-Thurmond K et al. *Overweight, Obesity, and Mortality from Cancer in a Prospectively Studied Cohort of U.S. Adults.* New England Journal of Medicine 2003;348:1625-38.

[4] Kopelman P. *Health risks associated with overweight and obesity.* Obesity reviews. 2007 Mar 1;8(s1):13-7.

[5] Egan K, Ettinger A, Bracken M. *Childhood body mass index and subsequent physician-diagnosed asthma: a systematic review and meta-analysis of prospective cohort studies.* BMC Pediatrics. 2013;13:121.

[6] von Mutius E, Schwartz J, Neas LM et al. *Relation of body mass index to asthma and atopy in children: the National Health and Nutrition Examination Study III.* Thorax 2001;56:835-838.

[7] Haines L, Wan KC, Lynn R et al. *Rising incidence of type 2 diabetes in children in the U.K.* Diabetes Care 2007;30:1097-1101.

[8] The NS, Richardson AS, Gordon-Larsen P. *Timing and duration of obesity in relation to diabetes: findings from an ethnically diverse, nationally representative sample.* Diabetes Care. 2013:34:865-872.

[9] Cote AT, Harris KC, Panagiotopoulos C et al. *Childhood Obesity and Cardiovascular Dysfunction.* Journal of the American College of Cardiology. 2013;62:1309-1319.

[10] Freedman D, Dietz WH, Srinivasan S et al. *The relation of overweight to cardiovascular risk factors among children and adolescents: The Bogalusa Heart Study.* Pediatrics 1999;103:1175-1182.

[11] van Emmerik NM, Renders CM, van de Veer M et al. *High cardiovascular risk in severely obese young children and adolescents.* Archives of Disease in Childhood. 2012;97:818-821.

such as depression[12,13], low-self-esteem[14,15] and dissatisfaction with their body[16 ,17 ,18]. An association between obesity and behavioural problems is also evident from a young age.[19]

In addition to these problems during childhood, being an obese child can have long term consequences for health in adulthood. Childhood obesity is a strong predictor of adult obesity.[20]

To address the issue of obesity, governments have put in place a number of policies and initiatives, 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.[21 ,22] The Change4Life public information campaign aims to improve diet and activity levels of parents and children.[23] The Public Health Responsibility Deal involved voluntary participation from food manufacturers and retailers in a number of areas including calorie reduction and improving food labelling systems.[24] 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. In particular, local authorities were encouraged to

[12] Sjoberg RL. *Obesity, shame, and depression in school-aged children: A population-based study*. Pediatrics 2005;116(3):389-392.

[13] Ball K, Burton NW, Brown WJ. *A prospective study of overweight, physical activity, and depressive symptoms in young women*. Obesity 2009;17:66-71

[14] Cornette R. *The emotional impact of obesity on children*. Worldviews on Evidence-based Nursing. 2008;5:136-141.

[15] Griffiths LJ, Parsons TJ, Hill AJ. *Review: Self-esteem and quality of life in obese children and adolescents: a systematic review.* International Journal of Pediatric Obesity. 2010 Aug; 5(4):282-304.

[16] Wadden TA, Foster GD, Stunkard AJ, Linowitz JR. *Dissatisfaction with weight and figure in obese girls: discontent but not depression*. International Journal of Obesity. 1989; 13(1):89-97.

[17] Hill AJ, Draper E, Stack J. *A weight on children's minds: body shape dissatisfactions at 9-years old.* International Journal of Obesity and Related Metabolic Disorders. 1994;18:383-389.

[18] Gustafson-Larson AM, Terry RD. *Weight-related behaviours and concerns of fourth-grade children*. Journal of the American Dietetic Association. 1992;92:818-822.

[19] Griffiths LJ, Dezateux C, Hill A. *Is obesity associated with emotional and behavioural problems in children? Findings from the Millennium Cohort Study*. International Journal of Pediatric Obesity. 2011;6:e423-432.

[20] M.K. Serdula, D. Ivery, R.J. Coates, D.S. Freedman, D.F. Williamson, T. Byers. Do Obese Children Become Obese Adults? A Review of the Literature. Preventive Medicine. 1993; 22:167-177.

[21] Department of Health. *UK physical activity guidelines for adults (19-64 years) and (65+ years).* Department of Health, London, 2011. https://www.gov.uk/government/publications/uk-physical-activity-guidelines

[22] Public Health England. Eatwell guide. Public Health England, London, 2017. https://www.gov.uk/government/publications/the-eatwell-guide

[23] NHS. Change4Life campaign. https://www.nhs.uk/change4life-beta/about-change4life

[24] Department of Health. *Public Health Responsibility Deal*. Department of Health, London, 2011. https://responsibilitydeal.dh.gov.uk/wp-content/uploads/2012/03/The-Public-Health-Responsibility-Deal-March-20111.pdf

use their powers to curb fast-food outlets and to promote exercise and active travel.[25,26]

The 2016 childhood obesity strategy outlined an action plan that set out a number of actions primarily focused on reducing sugar consumption and increasing physical activity among children.[27] In April 2018 the soft drinks industry levy (SDIL) was launched, which has seen some soft drinks producers reduce the sugar in their products and raise funds for sport in schools. In June 2018 an update to the action plan was published[28] setting a national ambition to "halve childhood obesity and significantly reduce the gap in obesity between children from the most and least deprived areas by 2030". The updated plan sets out actions focusing on sugar and calorie reduction, the advertising and promotion of unhealthy foods and working with local authorities and schools to deliver change.

This report presents key findings, charts, and tables primarily from the 2017 survey. Analysis of adult BMI and diabetes risk by ethnic group combines data from 2015 to 2017. Most tables referring to children combine data from 2016 and 2017, although headline 2017 figures for children's overweight and obesity are included in the trend tables. Because the 2017 survey did not include questions about parents' perceptions of child's weight, those tables are based on 2015 and 2016 data combined. Adult trend tables include data from 1993 and child trend tables include data from 1995 when children were first included in the survey.

Methods and definitions

Methods

Full details of the protocols for carrying out all the measurements are contained in the HSE 2017 Methods report.[29]

Height and weight were measured during the interviewer visit while waist and hip circumferences were measured during the nurse visit, for both adults and children.

In the 2015 and 2016 surveys, parents were asked for their assessment of their child's weight as part of a self-completion questionnaire.

[25] Public Health England. *Obesity and the environment briefing – regulating the growth of fast-food outlets.* Public Health England, London, 2014. www.gov.uk/government/publications/obesity-and-the-environment-briefing-regulating-the-growth-of-fast-food-outlets

[26] Public Health England. *Obesity and the environment briefing – increasing physical activity and active travel.* Public Health England, London, 2013. www.gov.uk/government/publications/obesity-and-the-environment-briefing-increasing-physical-activity-and-active-travel

[27] HM Government. *Childhood Obesity: A Plan for Action*. London, 2016. https://www.gov.uk/government/publications/childhood-obesity-a-plan-for-action

[28] HM Government: *Childhood obesity: a plan for action, chapter 2*. London 2018. https://www.gov.uk/government/publications/childhood-obesity-a-plan-for-action-chapter-2

[29] Health Survey for England 2017: Methods report, available via the report website https://digital.nhs.uk/pubs/hse2017 .

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).[30] 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 Table A below.

Table A: Classification of Body Mass Index (BMI) groups

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[31].

A universal categorisation cannot be used to define childhood overweight and obesity because boys and girls have different growth patterns at each age. Overweight and obesity prevalence for children aged 2 to 15 is therefore estimated using age, categorised in six-month bands, and the sex-specific UK National BMI centiles classification[32,33]. This classification gives the BMI threshold separately for boys and girls for each age above which a child is considered overweight or obese. The classification estimates were produced by calculating the proportion of boys and girls who were at or above the 85th (overweight) or 95th (obese) BMI centiles of the 1990 reference population.[33]

Assessment of a child's weight status compares the actual BMI with BMI centiles on published growth charts, using sex and age in six-month bands (extracted from the date of interview minus the date of birth). Presentation of the results is based on the age at last birthday, which is the HSE standard. Also, in line with the HSE standard for children, none of the results in this chapter have been age-standardised.

[30] Keys A, Fidanza F, Karvonen MJ, et al *Indices of relative weight and obe*sity. International Journal of Epidemiology, 2014;43:655–65..

[31] NHS Consensus Development Conference. *Gastrointestinal surgery for severe obesity*. Nutrition 1996;12:397-402.

[32] Stamatakis E. *Anthropometric measures, overweight, and obesity*. Chapter 9 in Sproston K, Primatesta P (eds). Health Survey for England 2002. The Stationery Office, London, 2003.

[33] Centiles are values of a distribution that divide it into 100 equal parts. For example, the 10th centile is the value of a distribution where 10% of the cases have values at or below the 10th centile.

Waist circumference

In order to measure abdominal obesity, waist circumference is measured, and categorised into desirable, high and very high, by sex-specific thresholds.[34]

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. [35,36] More recently, waist circumference has been identified as the most useful of these three measures of central obesity in determining health risk.

Table B: Classification of waist circumference groups

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

Age-standardisation

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

About the survey estimates

The Health Survey for England, in common with other surveys, collects information from a sample of the population. The sample is designed to represent the whole population as accurately as possible within practical constraints, such as time and cost. Consequently, statistics based on the survey are estimates, rather than precise figures, and are subject to a margin of error, also known as a 95% confidence interval. For example the survey estimate might be 24% with a 95% confidence interval of 22% to 26%. A different sample might have given a different estimate, but we expect that the true value of the statistic in the population would be within the range given by the 95% confidence interval in 95 cases out of 100.

Where differences are commented on in this report, these reflect the same degree of certainty that these differences are real, and not just within the margins of sampling error. These differences can be described as statistically significant.[37]

[34] World Health Organization, 2000. *Obesity: preventing and managing the global epidemic (No. 894)*. World Health Organization

[35] Lean M, Han T, Morrison C. *Waist circumference as a measure for indicating need for weight management*. BMJ 1995;311:158-61.

[36] Schneider HJ, Friedrich N, Klotsche J et al. *The Predictive Value of Different Measures of Obesity for Incident Cardiovascular Events and Mortality.* Journal of Clinical Endocrinology and Metabolism. 2010;95:1777-1785.

[37] Statistical significance does not imply substantive importance; differences that are statistically significant are not necessarily meaningful or relevant.

Confidence intervals are quoted for key statistics within this report and are also shown in more detail in the Excel tables accompanying this report. Confidence intervals are affected by the size of the sample on which the estimate is based. Generally, the larger the sample, the smaller the confidence interval, and hence the more precise the estimate.

Prevalence of adult overweight, obesity and high waist circumference

Adult overweight and obesity, by age and sex

Mean BMI among adults was 27.7 kg/m^2. As explained in the Introduction to this report, survey estimates are subject to a margin of error. It is likely that the mean BMI among adults within the population was between 27.5 kg/m^2 and 27.9 kg/m^2. Mean BMI was similar for men and women, 27.6 kg/m^2 and 27.8 kg/m^2 respectively. It increased with age and was highest among adults between the ages of 45 and 74.

64% of adults were classified as overweight or obese. As noted above, this is an estimate and subject to a margin of error: the proportion in the population likely to be somewhere between 63% and 66%. Overall, 67% of men and 62% of women were classed as overweight or obese. Being overweight but not obese was more common among men (40%) than women (31%).

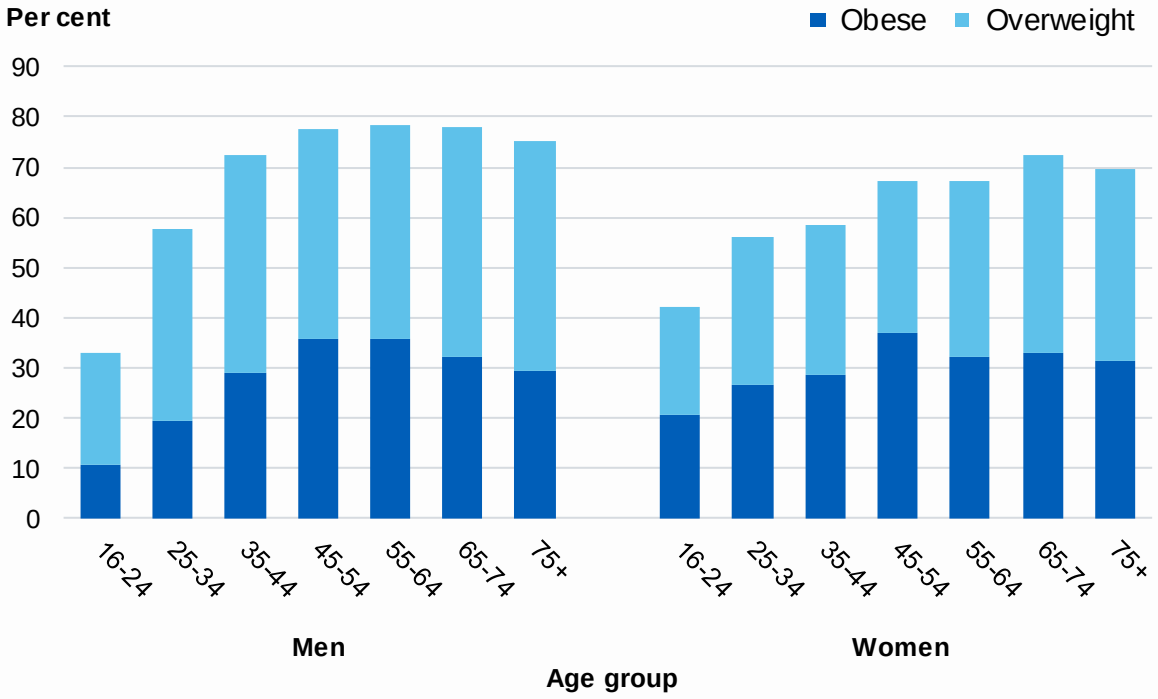
29% of adults were obese. As noted above, this is an estimate and subject to a margin of error: the proportion in the population likely to be somewhere between 27% and 30%. Obesity, including morbid obesity, was more common in women than men (30% and 27% respectively). A higher proportion of women were morbidly obese than men (5% and 2% respectively).

The proportion of adults who were overweight or obese increased with age among both men and women and was highest among men aged between 45 and 74 (78% across these age groups) and women aged between 65 and 74 (73%). The proportion of obese men and women also increased with age and was highest among men aged between 45 and 64 (36%) and among women aged between 45 and 54 (37%).

Figure 1, Table 1

Figure 1: Adult overweight and obesity prevalence, by age and sex

Base: Aged 16 and over



Source: NHS Digital

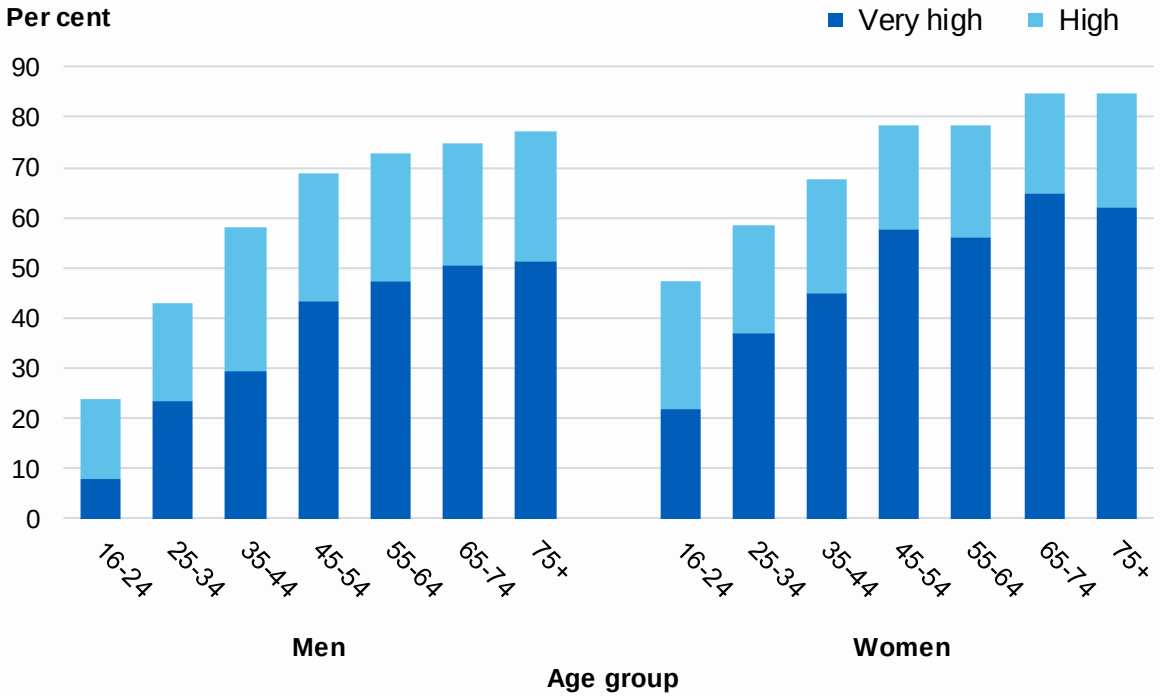
Adult waist circumference, by age and sex

The mean waist circumference was 97.8 cm for men and 89.4 cm for women. Overall, 35% of men and 49% of women had very high waist measurements and a further 24% of men and 22% of women had high waist measurements. This was more common in middle and older age groups; among adults aged over 45, between 43% and 51% of men and between 57% and 65% of women in each age group had very high waist measurements.

Figure 2, Table 5

Figure 2: High and very high waist circumference in adults, by age and sex

Base: Aged 16 and over



Source: NHS Digital

Adult obesity, overweight and waist circumference, by region and sex

Estimates by region are shown in the tables as both observed and age-standardised. Observed estimates show the actual levels of overweight, obesity, and high waist circumference in each region. Comparisons between regions should be based on the age-standardised data, which take into account the different regional age profiles.

The proportion of adults who were overweight (including obese) according to their BMI varied by region. After controlling for age, the lowest levels were in London and the highest levels in Yorkshire and the Humber and the West Midlands. There was no statistically significant variation for obesity.

Table 2

The proportions of men and women with a very high waist circumference varied by region, and was lowest in the South West and highest in the West Midlands.

Table 6

Adult obesity, overweight and waist circumference, by income and sex

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.[38] Households are divided into quintiles (fifths) based on this measure.

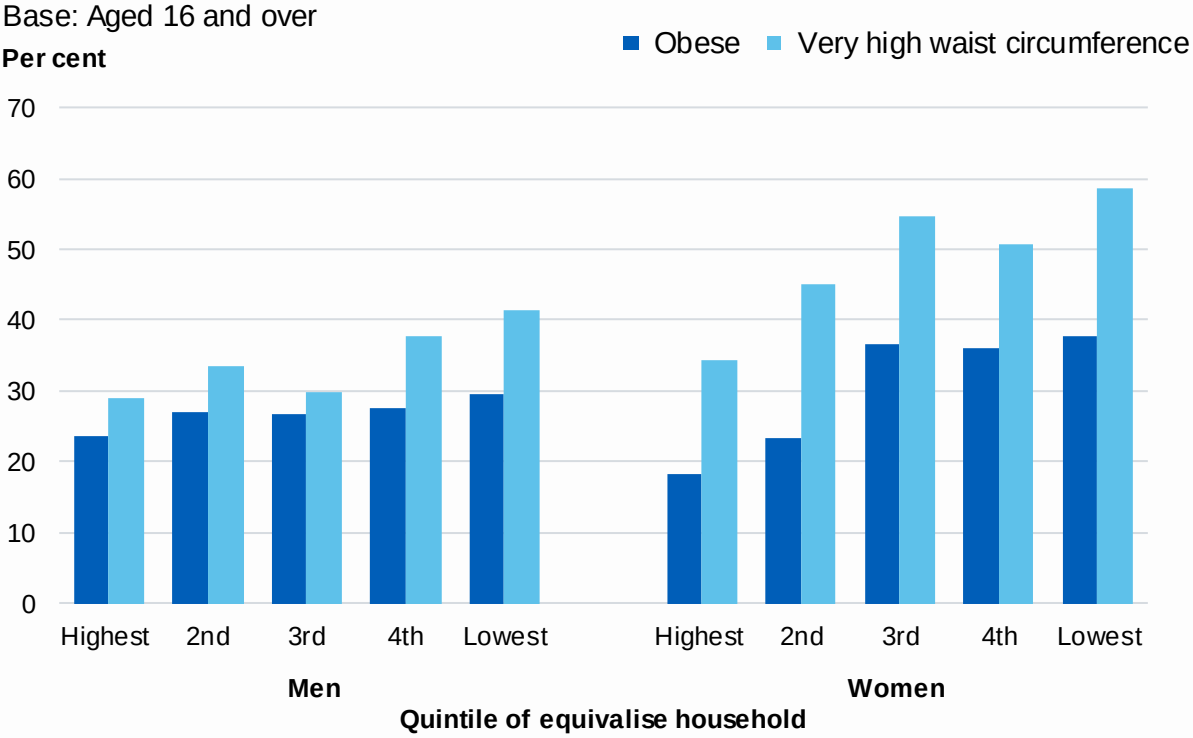
Obesity varied by household income, with those in the lowest quintile of household income having the highest mean BMI and highest prevalence of obesity. The variation was more pronounced among women and was around twice as common among women in the lowest quintiles as in women in the highest quintile (38% compared with 18%).

Waist circumference was associated with income for both men and women, with the highest levels of very high waist circumference in the lowest income groups. Figure 3 shows both measures of obesity, by income and sex.

Figure 3, Tables 3 and 7

Figure 3: Prevalence of BMI-defined obesity and very high waist circumference, by income and sex

Base: Aged 16 and over



Source: NHS Digital

Trends in adult obesity, overweight and waist circumference

Figure 4 shows trends in obesity and in overweight including obesity from 1993 to 2017, using three-year moving averages to smooth out any unusually high or low values in individual years.

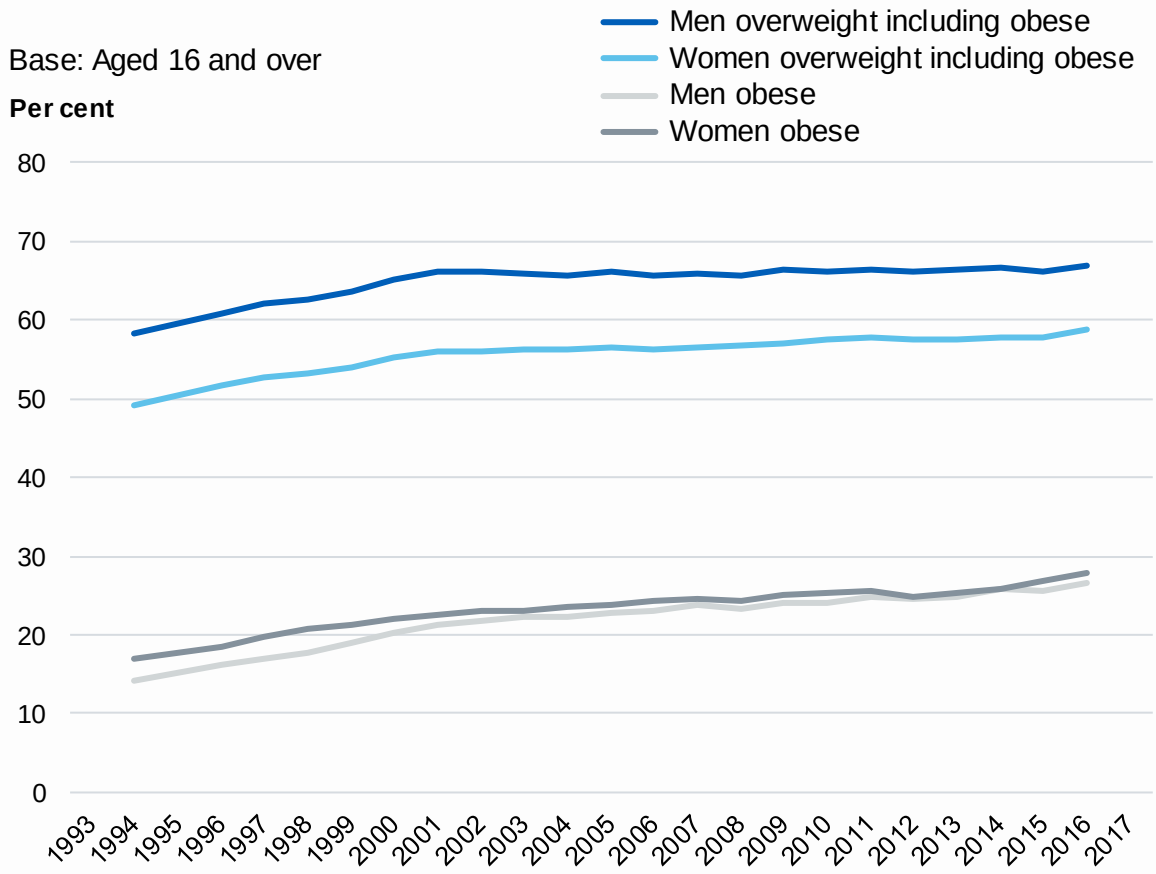
[38] See Health Survey for England 2017: Methods, Appendix B for a detailed description of how equivalised household income is calculated. https://digital.nhs.uk/pubs/hse2017 .

Rates of obesity and overweight were stable in recent years, but slightly increased in 2017. Obesity prevalence increased steeply between 1993 and around 2000, and there was a slower rate of increase after that. The prevalence of obesity has generally fluctuated between 23% and 27% from 2003 to 2016. In 2017, it was 29%, higher than in recent years.

Morbid obesity has also increased since 1993, with 2% of men and almost 5% of women morbidly obese in 2017, compared with fewer than 0.5% of men and just over 1% of women in 1993.

Figure 4, Table 4

Figure 4: Adult overweight and obesity prevalence, 1993-2017, by sex (three year moving average)



Source: NHS Digital

Following the same pattern as for BMI, there were noticeable increases between 1993 and 2017 for both men and women in the proportion with a very high waist circumference. The proportion of men with a very high waist circumference (more than 102 cm) rose from 20% in 1993 to 35% in 2017. The proportion of women with a very high waist circumference (more than 88 cm) rose from 26% to 49%.

Table 8

Health risk category with obesity, overweight and waist circumference

Combined assessment of health risk from BMI and waist circumference

In 2014, NICE published guidance on the identification, assessment and management of overweight and obesity in children, young people and adults, which partially updated its 2006 guidance. The guidance included a recommendation for health professionals to "think about using waist circumference, in addition to BMI, in people with a BMI less than 35 kg/m^2". The recommendation is to base the assessment of health risks associated with being overweight or obese on BMI and waist circumference, as in Table C below.[39] This is because some people, despite having a BMI of less than 35 kg/m^2, may have a higher risk of disease due to having a more 'central' fat distribution as identified by a high or very high waist circumference.[36,39]

For those with a BMI of 35 kg/m^2 or more, waist circumference has little added predictive power of disease risk, and these individuals are also unlikely to have a low waist circumference.**Error! Bookmark not defined.**

Table C: Health risk from BMI and waist circumference

Table C: Health risk from BMI and waist circumference

BMI classification	Waist circumference		
	Low	High	Very high
Normal weight (18.5 to less than 25)	No increased risk	No increased risk	Increased risk
Overweight (25 to less than 30)	No increased risk	Increased risk	High risk
Obesity I (30 to less than 35)	Increased risk	High risk	Very high risk
Obesity II (35 to less than 40)	Very high risk	Very high risk	Very high risk
Obesity III (40 or more)	Very high risk	Very high risk	Very high risk

Weight-related health risk by age and sex

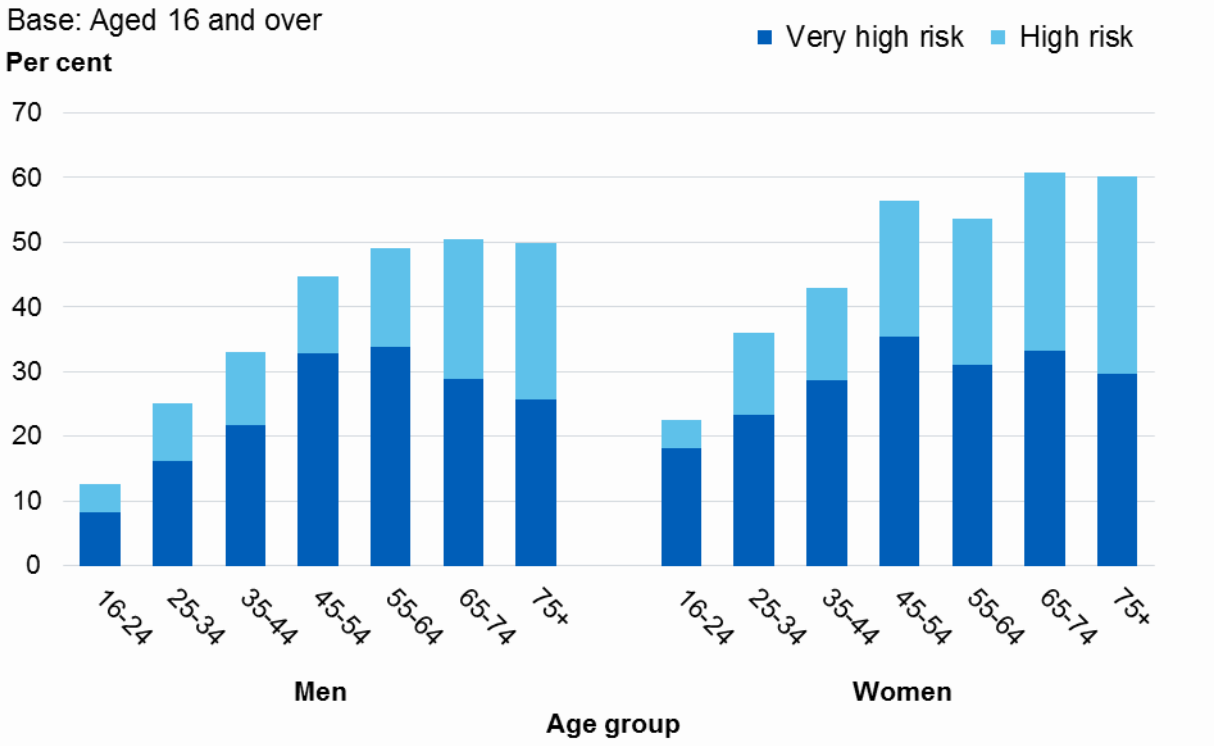
Participants with both BMI and waist measurements were assigned a health risk category, taking these two measures into account. More than half of participants (55% of men and 61% of women) were at increased, high or very high risk of chronic disease. Women were more likely than men to be in the high or very high risk categories (47% and 37% respectively). This includes 12% of women and 8% of men who were in the Obese II and Obese III categories, with BMI of 35 kg/m^2 or more, and were therefore at very high risk. Figure 5 shows that the proportion of people in these risk categories generally increased with age.

Figure 5, Table 9

[39] World Health Organization. Waist Circumference and Waist-Hip Ratio. Report of a WHO Expert Consultation. WHO, Geneva, 2008. http://apps.who.int/iris/bitstream/10665/44583/1/9789241501491_eng.pdf?ua=1

Figure 5: High or very high weight-related health risk, by age and sex

Base: Aged 16 and over



Source: NHS Digital

Almost all the men who had a normal BMI had a desirable waist circumference and were therefore at no increased risk. However, among the men who were overweight (BMI 25 to less than 30 kg/m^2, the most common weight category for men) a majority had either a high or very high waist circumference, putting them into the increased or high risk groups.

2% of women were at increased risk of chronic disease due to their very high waist circumference, despite having a BMI within the normal range. Overall 29% women were in one of the obese categories (I to III). Almost all women in category I had a very high waist circumference, putting them at very high risk of chronic disease. (Adults in categories II and III were all deemed to be at risk.)

Table 9

Trends in weight-related health risk

Following overall trends in BMI and waist circumference, there have been noticeable increases in the proportion of individuals at very high risk of chronic disease due to their weight between 1993 and 2017. The proportion of men at very high risk rose from 11% in 1993 to 20% in 2005, and has varied between 20% and 24% since. Similarly, the proportion of women at very high risk rose from 14% to 23% between 1993 and 2005 and then remained around that level since. In 2017, the proportion was higher than in recent years (29%).

Table 10

Adult weight and diabetes risk category

Diabetes status

The definition of diagnosed diabetes was based on a positive response to both of the questions asked at the interview: 'Do you now have, or have you ever had diabetes?' and 'Were you told by a doctor that you had diabetes?'.[40] The only exception was women who had diabetes only during pregnancy. No attempt was made to validate this self-reported data. There is therefore the possibility that some misclassification may have occurred, because some participants may not have remembered (or not remembered correctly) the diagnosis made by their doctor.

The definition of undiagnosed diabetes was based on those with blood glycated haemoglobin (HbA1C) level of 48 mmol/mol or above without doctor-diagnosed diabetes. Glycated haemoglobin (HbA1C), measured in the blood sample, is a validated tool for monitoring longer-term hyperglycaemia (raised levels of blood glucose).[41] HbA1C 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. It can be measured reliably in non-fasting blood samples, as collected in the HSE, whereas measurement of glucose requires fasting blood samples.

For further information about the measurement of diabetes within the Health Survey for England, see the 2017 Health Survey for England report on Adult Health.

Diabetes status by BMI and sex

Total diabetes, including diagnosed and undiagnosed diabetes, was more common in men than women (9% and 6% respectively). Among men, 7% had diagnosed diabetes and a further 2% had undiagnosed diabetes. For women, the figures were 5% and 1% respectively.

Diagnosed, undiagnosed and total diabetes were all associated with BMI status. Prevalence of total diabetes was greatest among those who were obese (14% of men and 11% of women) compared to those who were overweight but not obese (6% of both men and women) or those who were not overweight (4% and 2% respectively).

Table 11

Diabetes status by waist circumference and sex

Total diabetes was also associated with central obesity, measured by waist circumference. 12% of men and 9% of women with a very high waist circumference had either diagnosed or undiagnosed diabetes. This compared to 6% of men and 2% of women with high waist circumferences and 4% of men and 1% of women with a desirable waist circumference.

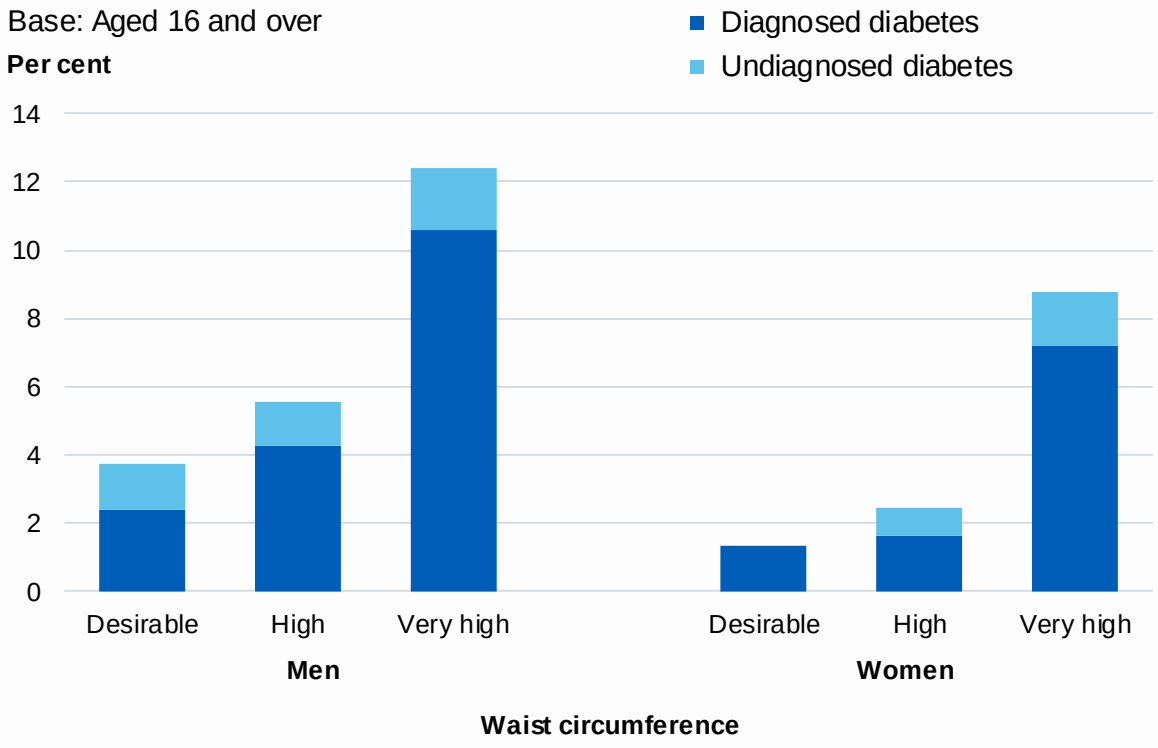
Figure 6, Table 12

[40] The interview makes no distinction between Type 1 and Type 2 diabetes.

[41] World Health Organisation. Use of Glycated Haemoglobin (HbA1C) in the Diagnosis of Diabetes Mellitus: Abbreviated Report of a WHO Consultation. www.who.int/diabetes/publications/diagnosis_diabetes2011/en

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

Base: Aged 16 and over



Source: NHS Digital

Ethnic-specific diabetes risk category

A WHO review in 2004 concluded that increased risk of chronic diseases occurred at lower BMI levels in Asians than White Europeans.[42] The majority of the evidence was related to diabetes, with increased risk at lower BMI cut-off points for Asian adults (including South Asian and Chinese adults). NICE guidance published in 2013 concluded that people from Black, Asian and other minority ethnic groups are at an equivalent risk of diabetes, other health conditions or mortality at lower BMI levels than the White European population.[43] The WHO recommends using lower BMI thresholds to indicate increased risk of type 2 diabetes and to trigger public health action in adult Asian populations, as shown in Table D. NICE has made similar recommendations but also extended these lower thresholds for action points to include Black as well as Asian adults. These ethnic-specific BMI thresholds are used in the classification of diabetes risk in Table 13.

[42] WHO expert consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet 2004;363 (9403):157-163.

[43] National Institute of Health and Care Excellence. BMI: preventing ill health and premature death in black, Asian and other minority ethnic groups. NICE, London, 2013. www.nice.org.uk/guidance/PH46

Table D: Ethnic-specific diabetes risk

Risk category	WHO recommendation for White European populations, also applied to adults of Mixed ethnicity	WHO recommendation for Asian populations, also applied by NICE to Black adults
Underweight	Less than 18.5kg/m^2	Less than 18.5kg/m^2
Increasing but acceptable risk	18.5 to less than 25kg/m^2	18.5 to less than 23kg/m^2
Increased risk	25 to less than 30kg/m^2	23 to less than 27.5kg/m^2
High risk	30 kg/m^2 or higher	27.5 kg/m^2 or higher

The WHO also recommends that countries should publish prevalence of BMI categories at the following thresholds, to allow for flexibility of use and international comparisons: 18.5 kg/m^2, 23 kg/m^2, 25 kg/m^2, 27.5 kg/m^2, 30 kg/m^2, 32.5 kg/m^2, 35 kg/m^2, 37.5 kg/m^2, and 40kg/m^2. These are therefore also shown in Table 13.[44] Data from 2015 to 2017 were combined to produce estimates of the number of people from each ethnic group at acceptable, increased or high risk of diabetes.

Diabetes risk by ethnicity

In this section, three years of HSE data have been combined to give robust base sizes for each ethnic group. The 'other' category has been omitted due to its small size and the fact that it is likely to include a number of diverse groups.

The risk of diabetes was derived from BMI and ethnicity. It differs from the calculation of chronic disease risk (including diabetes) discussed earlier in this report which combines BMI and waist circumference to derive risk categories for chronic disease for all ethnic groups. For participants not in Black or Asian groups, those who were overweight had increased risk of diabetes and those who were obese (any category) had a high risk of diabetes. For those in Black or Asian groups, these risks were present at BMI levels 2.5 kg/m^2 lower than in other ethnic groups. The proportions with increased and high risk of diabetes reported here reflect ethnic-specific definitions.

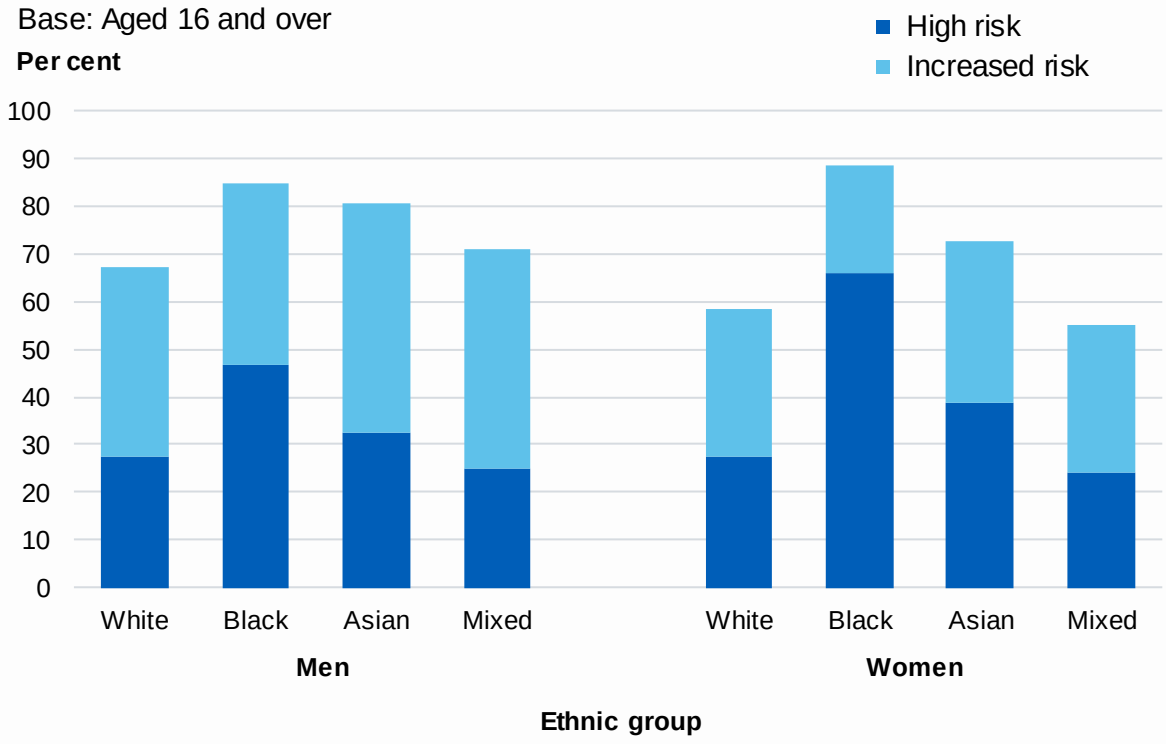
The proportion of adults at increased or high risk of diabetes varied by ethnicity, as shown in Figure 7. Black men and women were most at risk of diabetes, followed by Asian men and women. 85% of Black men and 81% of Asian men were at either increased or high risk of developing diabetes, compared with 71% of men from a mixed ethnic background and 67% of White men. Similarly, 88% of Black women, and 73% of Asian women were at increased or high risk, compared with 58% of White women and 55% of women from mixed ethnic backgrounds. In Black and Asian groups, women were more likely than men to be at high risk.

Figure 7 and Table 13

[44] For this analysis, White includes all those who identify themselves at the interview visit as White English, Welsh, Scottish, Northern Irish, British, Irish, Gypsy or Irish Traveller, or from any other White background. Black includes those who identify as African, Caribbean, or from any other Black background. Asian includes those who identify as Indian, Pakistani, Bangladeshi, Chinese or from any other Asian background. Mixed ethnicity includes those who identify as White and Black African, White and Black Caribbean, White and Asian or any other mixed or multiple ethnic background. 'Other' ethnicity includes those who identify as Arab or any other ethnic background.

Figure 7: Ethnic-specific diabetes risk, by ethnicity and sex (2015-2017)

Base: Aged 16 and over



Source: NHS Digital

Prevalence of child overweight and obesity

Child overweight and obesity by age and sex

Estimates of child overweight and obesity in this report are based on data from 2016 and 2017, unless otherwise stated.[45] Estimates for 2017 only are available in table 16 which also shows changes over time.

Boys and girls were equally likely to be overweight or obese (both 29%) and similar proportions of boys and girls were obese (17% and 16% respectively).

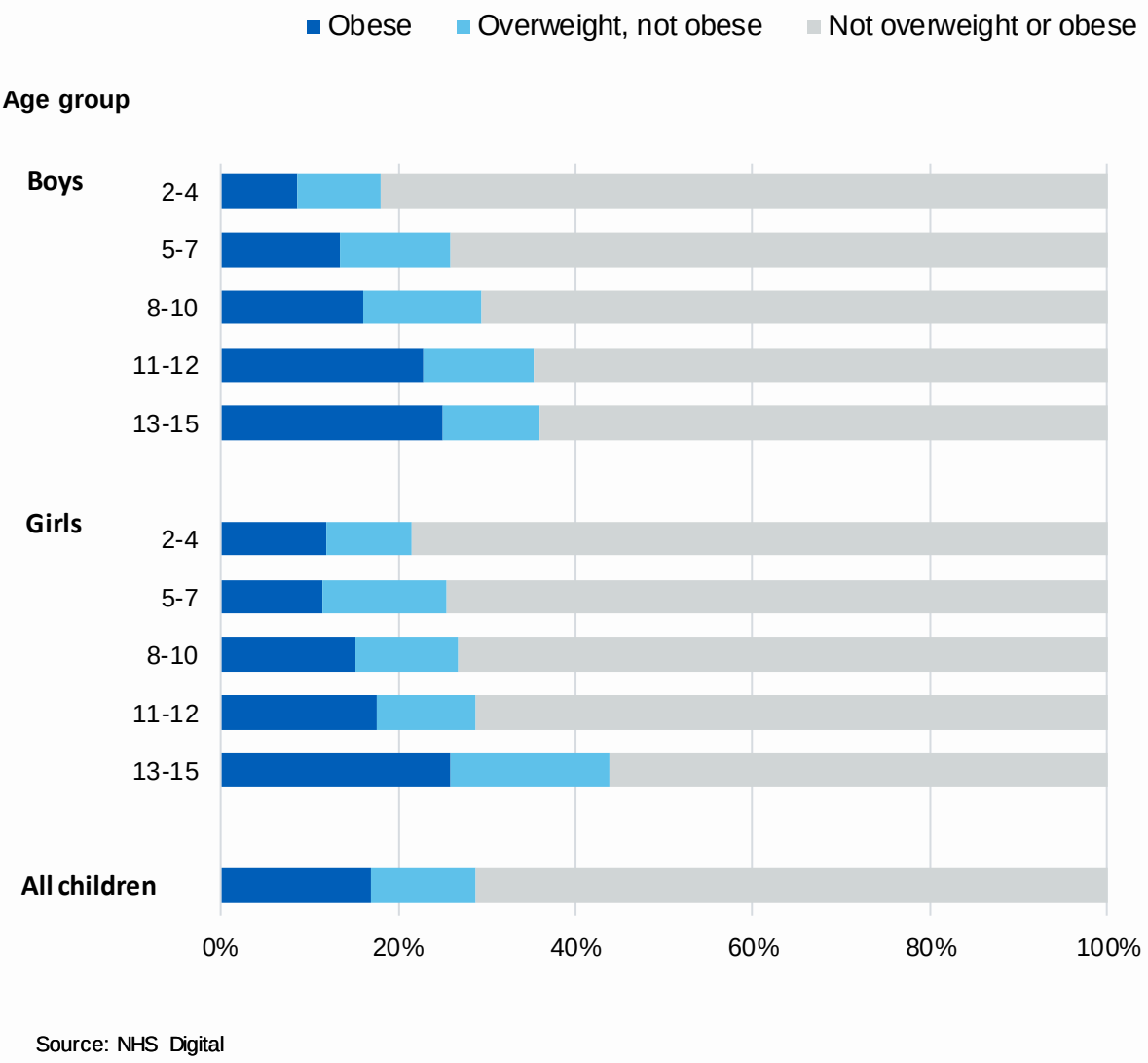
The prevalence of child obesity increased with age. 9% of boys and 12% of girls aged between 2 and 4 were obese compared with 25% of boys and 26% of girls aged 13 to 15. There was also an increase in the proportion of boys and girls categorised as overweight including obese. 18% of boys and 21% of girls aged 2 to 4 were overweight including obese compared to 36% of boys and 44% of girls aged 13 to 15.

Figure 8, Table 14

[45] In years when there is no child boost, as in 2015, around 1,300 children each year have valid height and weight measurements. Combining 2016 and 2017 data improves the precision of estimates.

Figure 8: Child overweight and obesity by age and sex (2016 and 2017)

Base: Aged 2 to 15



Source: NHS Digital

Child obesity and overweight by Index of Multiple Deprivation and sex

The Index of Multiple Deprivation (IMD) is a measure of area deprivation, based on 37 indicators, across seven domains of deprivation.[46] IMD is a measure of the overall deprivation experienced by people living in a neighbourhood, although not everyone who lives in a deprived neighbourhood will be deprived themselves. To enable comparisons, areas are classified into quintiles (fifths).[47]

[46] The seven domains used to calculate IMD are: income deprivation; employment deprivation; health deprivation and disability; education; skills and training deprivation; crime; barriers to housing and services; and living environment deprivation.

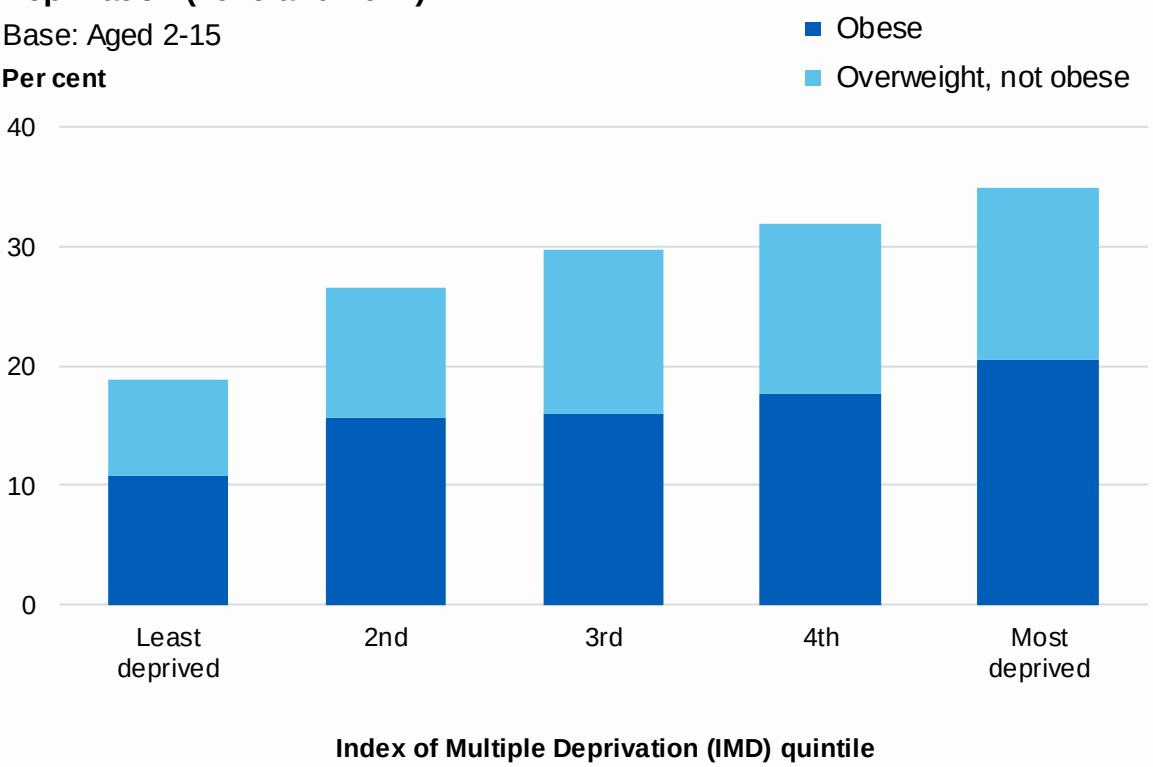
[47] For more information on the Index of Multiple Deprivation, see Health Survey for England 2017: Methods, available via the report website https://digital.nhs.uk/pubs/hse2017 .

As Figure 9 shows, the proportion of children who were obese was higher in the most deprived areas. Almost twice as many children living in the most deprived quintile were obese as those living in the least deprived quintile (21% and 11% respectively). A similar pattern was seen for boys and girls. 12% of boys and 10% of girls in the least deprived areas were obese, compared to 20% of boys and 21% of girls in the most deprived areas.

Figure 9, Table 15

Figure 9: Child overweight and obesity, by Index of Multiple Deprivation (2016 and 2017)

Base: Aged 2-15



Source: NHS Digital

Trends in child obesity and overweight

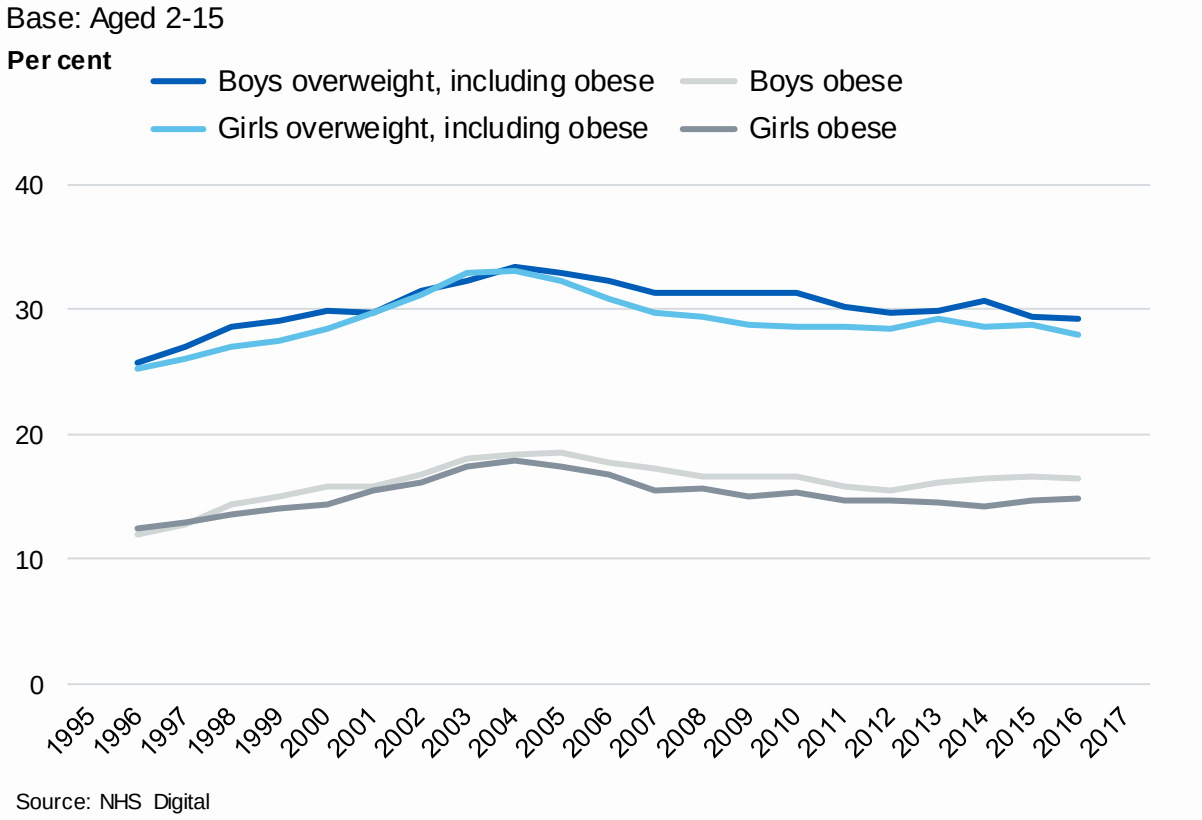
The prevalence of obesity and overweight for children aged 2 to 15 between 1995 and 2017 is shown in Figure 10, presented as three-year moving averages in order to reduce the impact of random variation. The prevalence of childhood obesity in England increased from 1995 to 2005 and then levelled out. The percentage of children who were obese has varied between 14% and 17% from 2006 to 2017. The variations between years are within survey sampling error.

In 2017, 30% of children aged 2 to 15 in England were overweight or obese, including 17% who were obese. These are estimates and subject to a margin of error: the proportion of children in the population who are overweight or obese is likely to be somewhere between 27% and 33%. Similarly, the proportion of obese children in the population is likely to be somewhere between 15% and 20%.

In 2017, the proportions of children aged 2 to 15 who were overweight (including obese) were 31% of boys and 28% of girls. These proportions have stayed relatively stable since 2001.

Figure 10, Table 16

Figure 10: Child overweight and obesity prevalence, 1995-2017, by sex (three year moving average)



Source: NHS Digital

Among younger children, aged 2 to 10, the estimated prevalence of obesity was in the range from 11% to 15% between 2008 and 2017. Among older children, aged 11 to 15, the estimated prevalence of obesity varied from 16% to 23% between 2005 and 2017, with no clear pattern across the period.

Table 16

Child overweight and obesity by parental weight

This section looks at the relationship between the weight of children and the weight of their parents, measured by BMI. The analysis is restricted to participating households where valid height and weight measurements were obtained from children and their resident parent or parents and is based on data from 2016 and 2017 combined. The focus of this analysis is on overweight and obesity; the group classified as of 'healthy weight' includes a small proportion of children whose BMI indicates that they are underweight.

Children's BMI status by mother's BMI status and sex

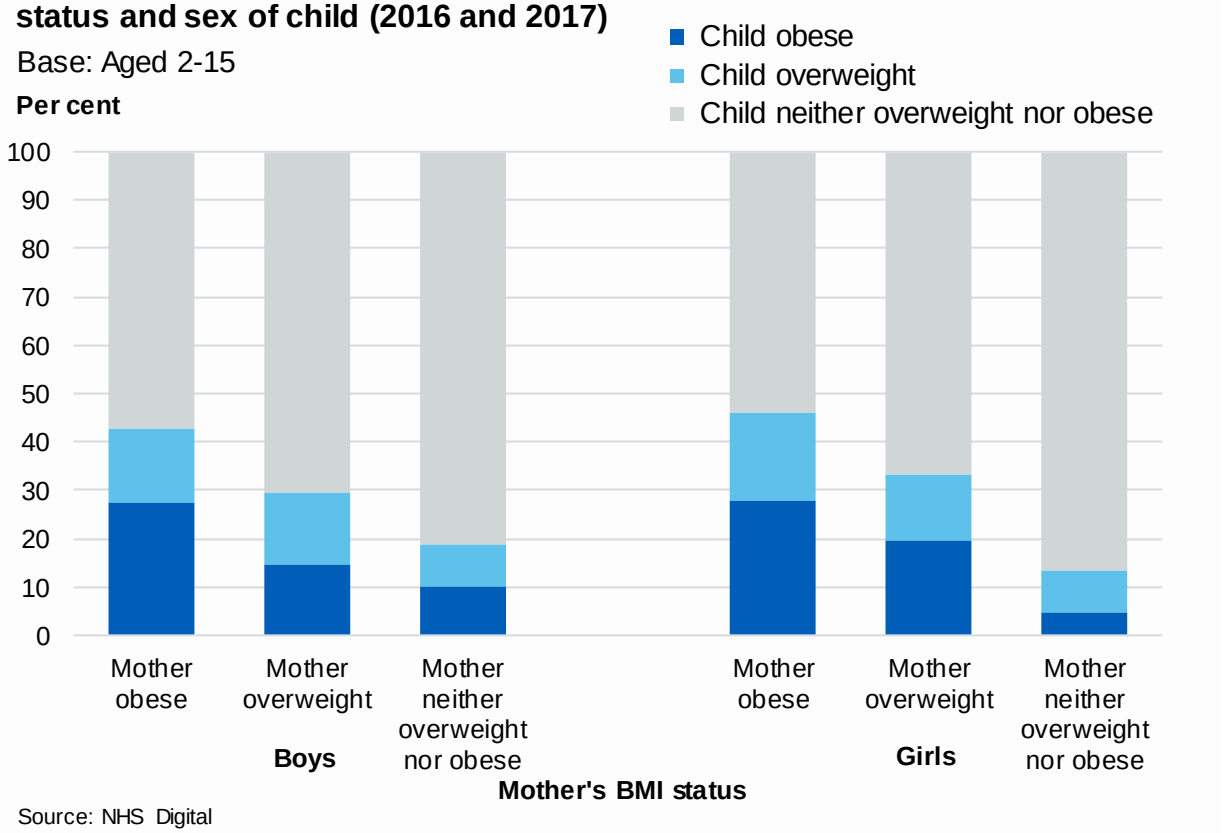
Children's BMI status was associated with their mother's BMI status. Obesity was most common in children with obese mothers (28%), less common in children whose mothers were overweight but not obese (17%) and was least common in children whose mothers were neither overweight nor obese (8%). These differences were more pronounced among girls than boys; for example, among children of mothers who were neither overweight nor obese, girls were less likely to be obese than boys (5% and 10% respectively).

Children of obese mothers were less likely to be a healthy weight (56%) than children whose mothers were overweight but not obese (68%) or those whose mothers were neither overweight nor obese (84%).[48]

Figure 11, Table 17

Figure 11: Child overweight and obesity by mother's BMI status and sex of child (2016 and 2017)

Base: Aged 2-15



Source: NHS Digital

Children's BMI status by father's BMI status and sex

Children's BMI status was also associated with their father's BMI status. One quarter (24%) of children with obese fathers were obese, compared to 14% of children whose fathers were overweight but not obese, and 9% of children whose fathers were neither overweight nor obese. Similarly, 60% of children of obese fathers were a healthy

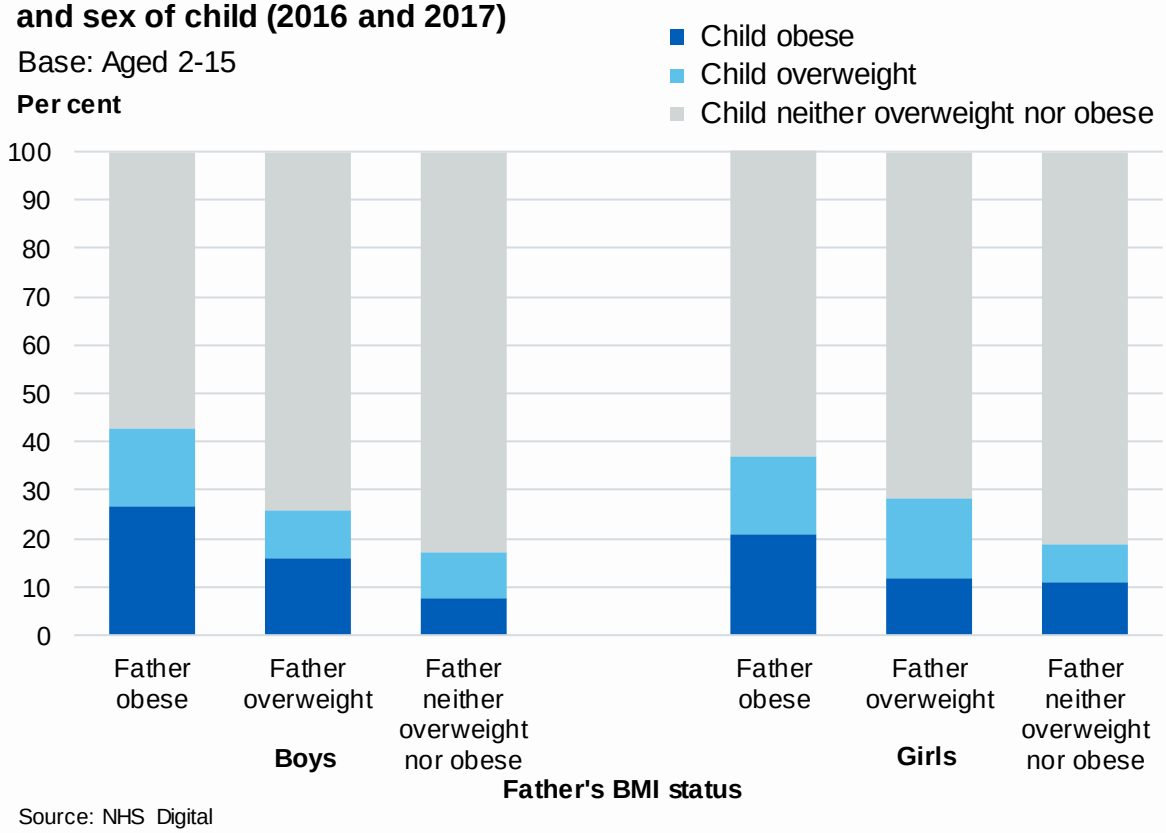
[48] As noted above, the healthy weight category includes a small number of children who were classified as underweight.

weight[49], compared to 73% of children whose fathers were overweight but not obese, and 82% of children whose fathers were neither overweight nor obese.

Figure 12, Table 18

Figure 12: Child overweight and obesity by father's BMI status and sex of child (2016 and 2017)

Base: Aged 2-15



Source: NHS Digital

Parents' perception of their child's weight

In 2015 and 2016 but not in 2017, parents were asked to give their opinion on the weight of each of their children. Overall, the majority of parents believed their child was about the right weight. 84% of children aged 2 to 15 were described by their mother as being about the right weight, 9% of children were described as too heavy and 8% were described as too light. Similarly, 84% of children aged 2 to 15 were described by their father as being about the right weight, 8% were reported as too heavy and 8% were felt to be too light.

The majority (89%) of mothers and fathers of children who were neither overweight nor obese described them as being about the right weight.

The majority of overweight children were also described as being about the right weight by their mothers (90%) and fathers (87%). A small proportion of parents of overweight children described their child as being too heavy (9% of mothers and 13% of fathers). Around half of parents of obese children (47% of mothers and 52% of

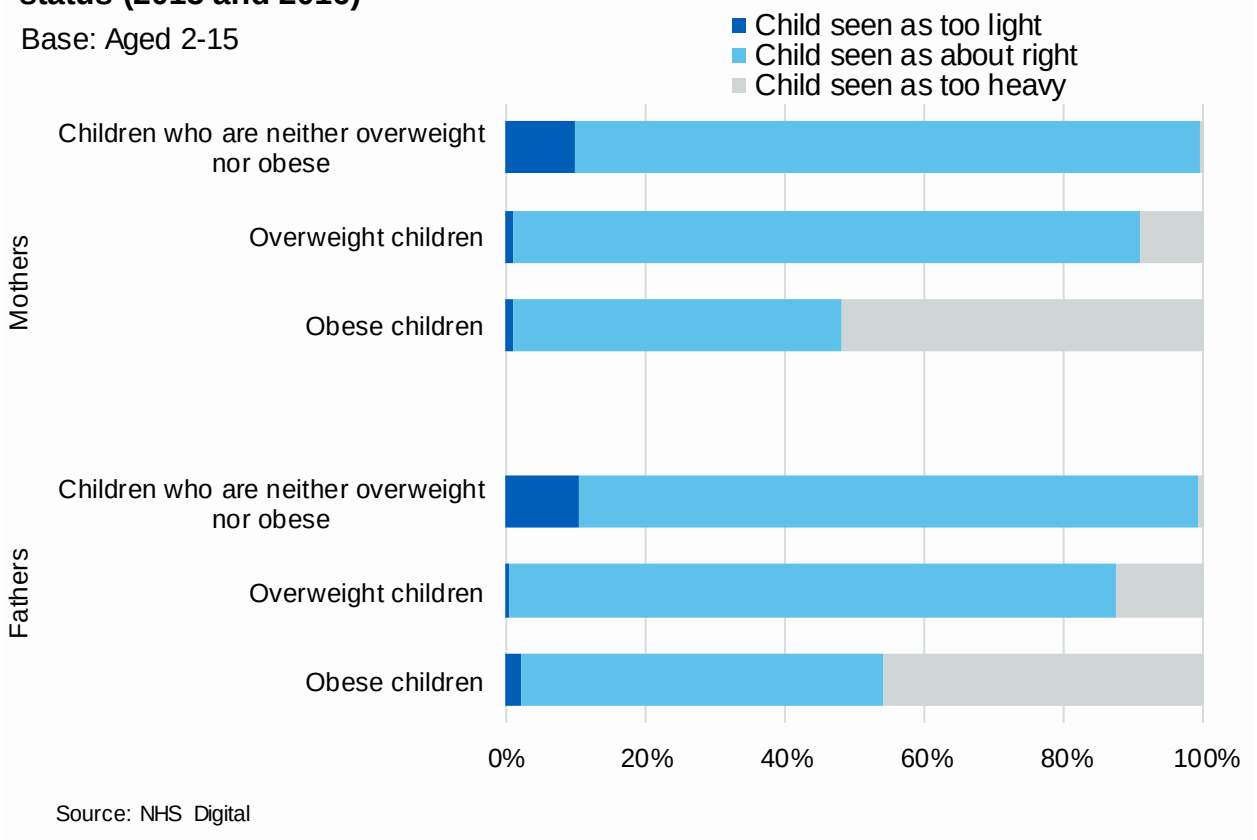
[49] As above, this includes a small number of children who were classified as underweight.

fathers) said their child was about the right weight. But similar proportions, 52% of mothers and 46% of fathers of obese children, described their child as too heavy.

Figure 13, Tables 19 and 20

Figure 13: Parents' perception of child's weight, by child's BMI status (2015 and 2016)

Base: Aged 2-15



Source: NHS Digital

Appendix: measurement methods

Full details of the protocols for carrying out all the measurements are contained in the HSE 2017 Methods report.[50]

Height

Height was measured using a portable stadiometer with a sliding head plate, a base plate and connecting rods marked with a measuring scale. One measurement was taken with the head positioned in the Frankfort plane.[51] Adult participants stretched to their maximum height and for child participants interviewers administered a child stretch. The reading was recorded to the nearest even millimetre. Participants who were unable to stand or were unsteady on their feet were not measured.

Weight

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

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 100 g. Adult participants who were pregnant, unable to stand, or unsteady on their feet were not weighed. Participants who weighed more than 200 kg were asked for their estimated weight because the scales are inaccurate above this level. These estimates have been included in the analyses. Very young children who found it difficult to or could not stand were weighed while being held by a parent; the parent's weight was measured separately and then subtracted from the joint weight measurement.

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 3 cm, 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.

[50] Health Survey for England 2017: Methods, available via the report website https://digital.nhs.uk/pubs/hse2017 .

[51] 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 head plate of the stadiometer will rest on the crown of the head.

Response to measurements

Within co-operating households, 72% of adults had their height measured and 70% had their weight measured. Women were more likely than men to take part in the interview and consequently were more likely to have their height and weight measured. Around half of men and women had their waist and hip measurements taken during the nurse visit (49% of men, 56% of women).

Within co-operating households, 68% of children (aged 2 and over) had their height measured and 68% of children (all ages) had their weight measured.

Full details of response to the measurements are given in Section 6 of the Methods report.[52]

[52] Health Survey for England 2017: Methods, available via the report website https://digital.nhs.uk/pubs/hse2017 .

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