

Children's body mass index, overweight and obesity

10

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Summary

- Childhood overweight and obesity has immediate and long-term physical and mental health risks. This chapter examines the patterns of overweight and obesity among children aged 2-15 in 2014, and the relationship with social and demographic variables.
- Overall, 17% of children were obese, and an additional 14% of children were overweight. The proportions were similar for boys and girls.
- The proportion of children classified as overweight including obese was inversely related to household income in both girls and boys. Overall, higher income quintiles had lower proportions of children who were overweight or obese.
- Among children aged 8-15, 22% of boys and 28% of girls were trying to lose weight. The majority were not trying to change their weight (71% and 68% respectively). A quarter of children who were not trying to change their weight were overweight or obese.
- The prevalence of obesity has increased since 1995, when 11% of boys and 12% of girls aged 2-15 were obese. Over the following ten years, there was a steady increase. Obesity peaked at 19% among boys in 2004 and girls in 2005. Levels of obesity have been slightly lower since. In 2014, obesity among boys aged 2-15 reached the peak level of 19% again, whereas for girls obesity was at a lower level, at 16%.
- The pattern of increase in obesity between 1995 and 2004 and 2005 was similar among both younger and older children (aged 2-10 and 11-15 respectively). Since then, the proportions of older children who were obese have remained broadly steady, with more variation among boys than girls. Among younger children, there was a slight dip in the proportion who were obese in 2011, but this has not been sustained.

10.1 Introduction

10.1.1 The impact of childhood overweight and obesity

Childhood obesity and its associated risks¹ are of a global concern, with the World Health Organisation (WHO) classifying it as 'one of the most serious public health challenges of the 21st century'.^{2,3} It is associated with conditions such as asthma,^{4,5} musculoskeletal problems,⁶ early onset of type-2 diabetes^{7,8} and cardiovascular risk factors.^{9,10,11} Additionally, obese children are more likely than normal weight children to have health-related limitations and need more medical care and days off school as a result of illness.¹² Over the long-term, childhood obesity is a strong predictor of obesity in adulthood,^{13,14} which is a major risk factor for several chronic conditions and premature mortality. Childhood obesity itself has also been linked to an increase in middle-age mortality¹⁵ and chronic diseases such as diabetes⁸ and cardiovascular dysfunction⁹ independent of adult obesity.

As well as the physiological health risks, childhood obesity increases the risk of psychological problems among children, which can continue into adulthood. These include low self-esteem or self-image,¹⁶ depression,^{17,18} and dissatisfaction with body size and shape, particularly among girls.^{19,20,21} However, the causal direction is not always clear, as symptoms of depression in childhood and adolescence have also been linked to higher BMI and low levels of physical activity.²² Associations between obesity and emotional and behavioural problems were found even among children aged as young as three, suggesting that the relationship between poorer mental health and obesity occurs from an early age.²³ The prevention and reduction of childhood obesity is therefore critical in reducing physical and psychological morbidity in childhood, as well as reducing the risk of chronic diseases later in life.

The concern over childhood obesity in England has grown against a backdrop of rising levels between the mid-nineties and mid-2000s. Obesity prevalence reached a peak of 19% for boys aged 2-15 in 2004 and for girls in 2005.²⁴ The Health Survey for England (HSE) in 2013 found that 16% of boys and 15% of girls aged 2-15 were classified as obese, with mean BMI increasing across the age group.²⁵ This is similar to findings from the National Child Measurement Programme (NCMP), which measures the weight and height of children in state schools in reception class (aged 4-5 years) and year 6 (aged 10-11 years). In the 2014/15 school year, 9.1% of children aged 4-5, and 19.1% aged 10-11 were obese.²⁶

10.1.2 Government initiatives to tackle obesity

Given the multitude of risks associated with childhood obesity, there have been many initiatives to reduce obesity levels in England. The Healthy Child Programme currently supports families in reducing the risk of overweight and obesity for school-aged children through developmental reviews and delivering guidance on healthy living,²⁷ as outlined in the government's White Paper *Healthy Lives, Healthy People: Our strategy for Public Health in England* in 2010.²⁸

Following on from this, *The Public Health Responsibility Deal*²⁹ was announced in 2011, with voluntary pledges made by the food industry and local businesses to tackle obesity through means such as promoting healthy eating and physical activity. These commitments to tackle obesity were later reinforced in the context of the new structure of the NHS and Public Health England in *Healthy Lives, Healthy People: A call to action on obesity in England*³⁰ published in October 2011. Recommendations centred on local and national level partnerships and a goal was set of sustaining the downward trend in the proportion of children with excess weight by 2020.

The National Institute for Health and Care Excellence (NICE) updated its guidelines on weight management services for children and young people in October 2013.³¹ Recommendations were made for lifestyle management programmes to combine components, including a focus on eating habits, physical activity, reducing sedentary time and behaviour change for the child and close family members. The influence of family is vital to the prevention and treatment of childhood obesity.³² Adults play a large role in

influencing the content and availability of food, and the food choices that children make.³³ With this in mind, since its inception in 2009, the *Change4Life* campaign has continued to use social marketing to encourage families to eat healthily and improve levels of activity.³⁴

10.1.3 Contents of this chapter

This chapter examines obesity and overweight among children aged 2-15, looking at patterns by age and sex and also social inequalities in obesity.³⁵ Trends are also discussed, including the extent to which the prevalence of childhood obesity has reached a plateau, as recent years would suggest. Among children aged 8-15 the desire to change weight is reported. Trend data on key HSE measures, including child obesity, are available in *Health Survey for England 2014 trend tables* on the Health and Social Care Information Centre website.²⁴

10.2 Methods and definitions

10.2.1 Methods

Body mass index (BMI), calculated as weight in kilograms divided by height in metres squared (kg/m^2), has been shown to correlate strongly with adiposity (excess body fat) in adults^{36,37} and children.^{38,39} It is the key measure of overweight and obesity used in this chapter. The decision to use BMI is supported by recommendations made by the International Obesity Task Force, which concluded that BMI is a reasonable measure of body adiposity in children.⁴⁰ As in previous HSE reports, information about children's overweight and obesity is based on the UK National BMI centiles classification.^{41,42}

Children aged 2-15 had their height and weight measured by trained interviewers; the body mass index (BMI) was calculated from the valid readings. 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, see section 10.2.2). Presentation of the results is based, however, 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.

Trends from HSE years 1995 to 2014 show BMI, overweight and obesity prevalence calculated for children aged 2-15. Children were first included in the HSE in 1995 and since then weighting has been necessary to compensate for the fact that the number of children interviewed in a household was limited to two: in households with more than two children, two were selected at random. Non-response weighting was also introduced in 2003. The child-selection weighted estimates are shown for 1995-2002 and the non-response weighted estimates (including adjustment for child selection) for 2003-2014. National trend data are presented separately for three age groups: all aged 2-15, and those aged 2-10 and 11-15.

Questions about children's desire to change their weight have been asked since 2006. Children aged 8-15 were asked as part of a self-completion questionnaire whether or not they thought they were about the right weight and whether they were trying to change their weight. This is presented separately for children aged 8-10 and 11-15, and then 8-15 combined when assessing by BMI status.

10.2.2 Definitions

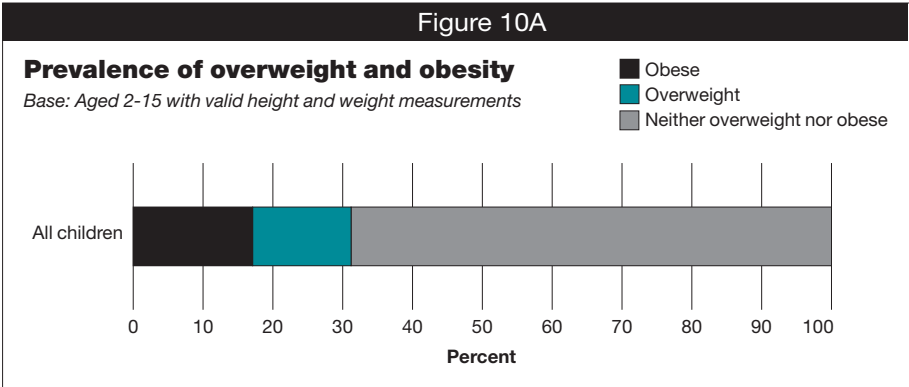
Different growth patterns among boys and girls at each age mean that, unlike for adults, a universal categorisation cannot be used to define childhood overweight and obesity. Overweight and obesity prevalence for children aged 2-15 is therefore estimated using age, categorised in six month bands and the sex-specific UK National BMI centiles classification.^{43,44} This classification gives the BMI threshold 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.⁴⁵

10.3 Prevalence of obesity and overweight

10.3.1 Obesity and overweight, by age and sex

Among all children aged 2-15, 14% were classified as overweight and an additional 17% were classified as obese, as Figure 10A shows. 32% of boys and 31% of girls (31% of all children) were classified as overweight including obese, with 19% and 16% respectively being classified as obese. A further 13% of boys and 15% of girls were overweight. There was no statistically significant variation by sex or age.

Tables 10.1, 10.2, Figure 10A



10.3.2 Obesity and overweight, by equivalised household income

Around 14% of children live in households that did not provide information about income. Children from such households are excluded from this analysis. As Figure 10B shows, the proportion of boys in the lowest income quintile who were obese (26%) was double the proportion of those in the highest quintile (13%). Among girls, the pattern for obesity was less clear cut. Overall, the proportion classified as overweight including obese was inversely related to income in both girls and boys, with higher income quintiles having lower proportions of children who were overweight or obese.

Table 10.3, Figure 10B



10.3.3 Obesity and overweight, by Index of Multiple Deprivation (IMD)

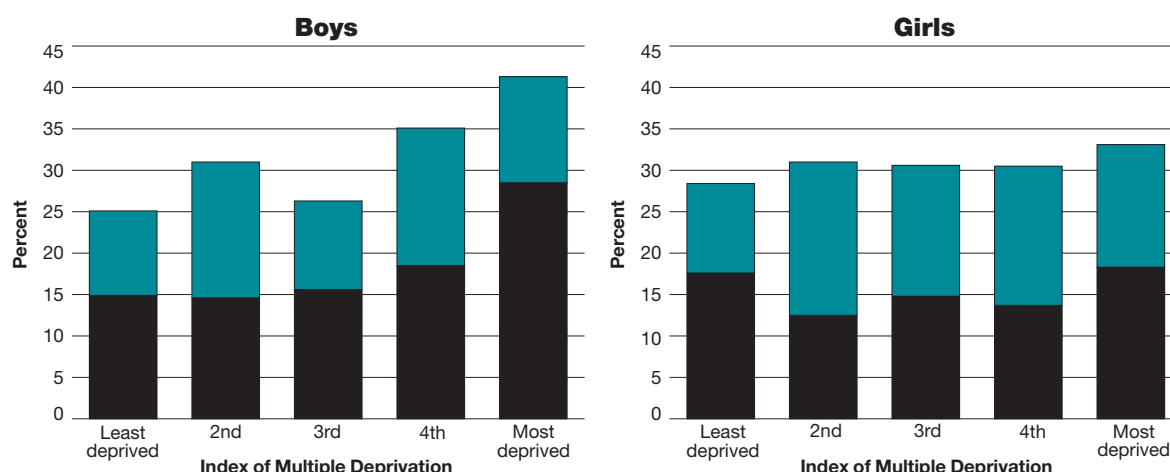
The impact of area deprivation was assessed by examining obesity prevalence by quintiles of the Index of Multiple Deprivation (IMD) as shown in Figure 10C. There was no statistically significant variation with IMD in the proportion of children aged 2-15 who were classified as obese. This may be due to chance variation because of the small sample of children; in recent years, there was a statistically significant relationship, with levels of obesity higher in the more deprived quintiles.²⁵

Table 10.4, Figure 10C

Figure 10C

Prevalence of overweight and obesity, by Index of Multiple Deprivation (IMD)

Base: Aged 2-15 with valid height and weight measurements

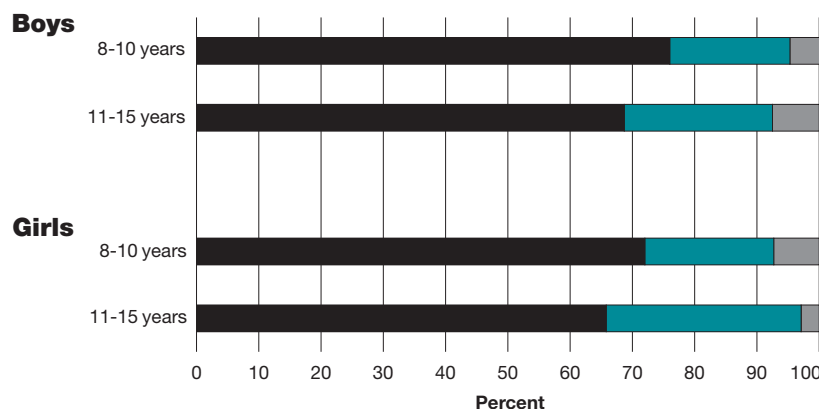
Overweight
Obese**10.3.4 Children trying to change weight**

Among children aged 8-15, 22% of boys and 28% of girls said they were trying to lose weight, and the proportion was greater among older children aged 11-15 (24% for boys, and 31% for girls). The majority were not trying to change their weight (71% and 68% respectively), as shown in Figure 10D.

Figure 10D

Desire to change weight, by age and sex

Base: Aged 8-15

Not trying to change weight
Trying to lose weight
Trying to gain weight

As expected, mean BMI was higher among children aged 8-15 who were trying to lose weight (22.7 kg/m²) than in those not trying to change their weight (18.8 kg/m²). 69% of children trying to lose weight were classified as overweight or obese, compared with 25% of children who were not trying to change. But 31% of children who were trying to lose weight were neither overweight nor obese (see Figure 10E). **Tables 10.5, 10.6, Figures 10D, 10E**

10.4 Trends in BMI, overweight and obesity

Mean BMI increased from 1995 to 2014 by 0.5 kg/m² for boys (17.7 kg/m² in 1995 and 18.2 kg/m² in 2014), and 0.3 kg/m² for girls (18.1 kg/m² in 1995 and 18.4 kg/m² in 2014). With fluctuations from year to year, overall increases in mean BMI were evident for both sexes during this period; for the last few years mean BMI has remained slightly lower than the peak that occurred around 2004 and 2005.

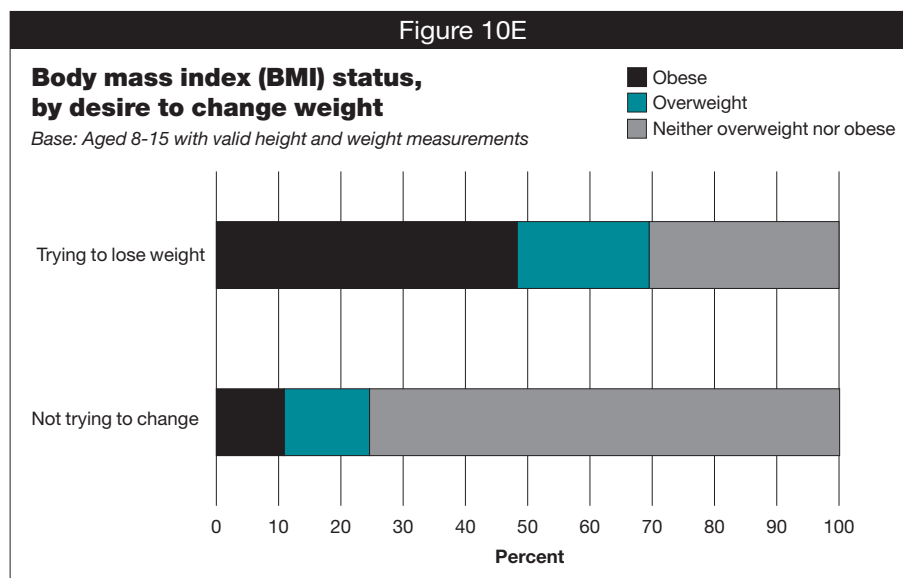


Figure 10F shows three-year moving averages from 1995 to 2014 for children aged 2-15 who were obese, and overweight including obese. Childhood obesity in England has increased significantly since 1995, when 11% of boys and 12% of girls were obese. The prevalence of obesity increased steadily in most years up to around 2004 and 2005, where it peaked at 19% among boys and girls. Levels have been slightly lower than this peak in the last few years, suggesting a flattening trend or a gradual downward shift. The proportion of children who were obese in 2014 was not statistically significantly different from the previous three years. However, obesity among boys in 2014 (19%) reached the same peak level as in 2004. Further years' data will be needed to see if there is a renewed upward trend or whether the level in 2014 among boys is due to random variation.

The proportion of children who were overweight varied less over the period than the proportion who were obese. In 1995, 13% of boys and girls were overweight, and in 2014, these proportions were 13% and 15% respectively. While there has been a slight increase overall, there have been fluctuations from year to year. Due to the smaller variation in the proportion who were overweight, this has contributed to a smaller increase in the levels of overweight including obesity than to obesity on its own. Levels of overweight including obesity were at 32% of boys and 31% of girls in 2014, and these levels are slightly closer to the peak levels of 35% in 2005 for boys and 2004 for girls than they have been for several years.

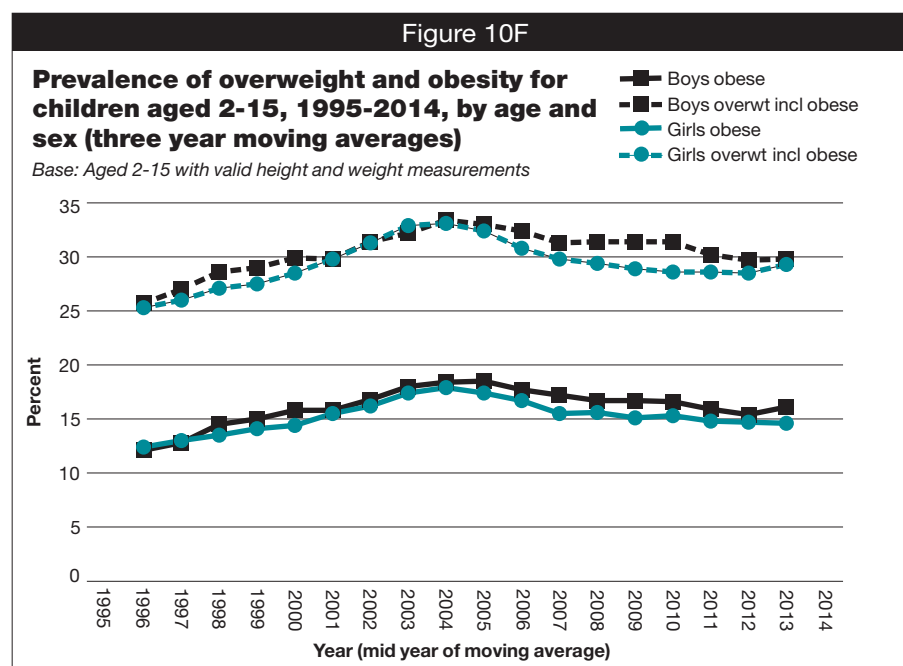
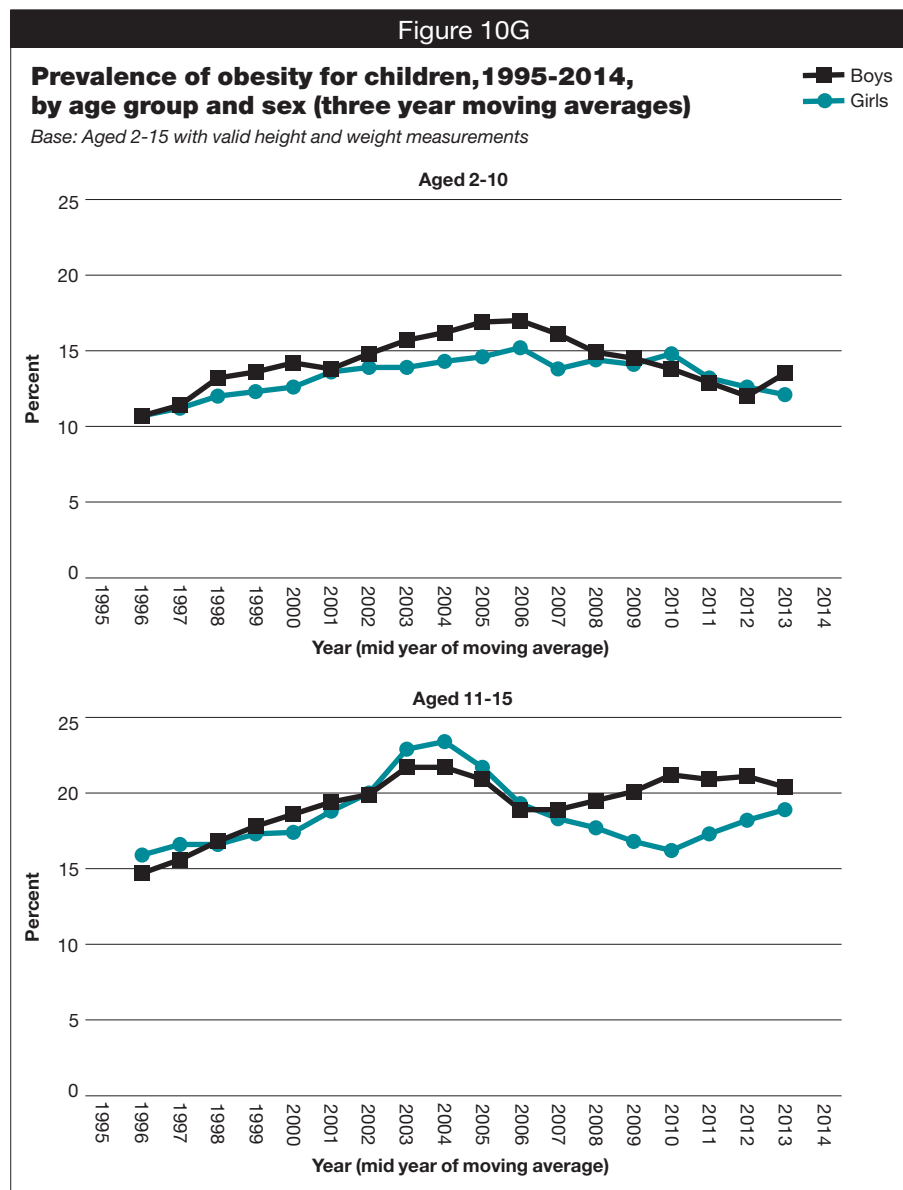


Figure 10G shows, for the period from 1995 to 2014, the proportion of children aged 2-10 and 11-15 who were obese. In general, among both age groups and both sexes, there was a similar pattern of increase up to the peak around 2004 and 2005; since then the proportion of boys aged 11-15 who were obese has remained at a broadly similar level. The pattern for girls in this age group is similar, but at a slightly lower level. Among children aged 2-10, there was a slight dip in the proportion who were obese in 2011, but this has not been sustained.

Tables 10.7-10.9, Figures 10F, 10G



10.5 Discussion

Compared with the general increase in childhood obesity from 1995 to 2004 and 2005, levels have stabilised thereafter showing a flatter trend at slightly lower levels, although with some fluctuation. This trend is consistent with other studies in England⁴⁶ and other high income countries^{47,48} suggesting levels of childhood obesity may be plateauing. However, for the first time since 2004, levels of childhood obesity among boys aged 2-15 reached peak levels of 19%, while for girls rates were steadier, remaining below peak levels (16%). Similarly, in 2013/14 and 2014/15 the NCMP found the proportion of obese children in year 6 (aged 10-11 years) to be higher than in 2012/13.²⁶ This counters arguments that obesity levels are on a downward trend, particularly among boys, although rates may have stabilised at or below the peak levels of 2004 and 2005. Further years' data will be needed to monitor this change to assess whether levels remain close to or below the peak. While

the increase in obesity may be levelling off, childhood obesity remains at high levels, with just under a third of boys (32%) and girls (31%) being overweight or obese. Stabilisation of levels of childhood obesity will not be sufficient to meet the government's goal of a sustained downward trend in the level of children with excess weight by 2020.³⁰

Previous HSE reports^{25,49,50} and other studies^{51,52,53} have found that many parents fail to identify whether their child is overweight or obese. For example, in 2013 just under a quarter of parents who had a child who was overweight or obese thought their child's weight was 'about right'.^{25,54} Parents who underestimate the weight status of their overweight or obese children may be less likely to provide them with the support they need to achieve a healthy weight. These parents are more likely to be Black or South Asian, have a male child, or come from more deprived backgrounds.⁵³ That parents from deprived backgrounds are more likely to underestimate their child's weight may be adding to the problem of social inequalities in obesity; the proportion of boys in the lowest income quintile who were obese was double the proportion in the highest quintile. Misperception by the child of their own weight is also a concern.^{24,25} Around a quarter of children aged 8-15 who thought their weight was about right were overweight or obese.²⁵ Inaccurate perception of excess weight by children and their parents is a barrier to behaviour change among children and adolescents.

Considering many children are unable to govern their food and activity choices independently, eradicating obesity has been deemed a 'multidimensional challenge' by the *World Health Organisation's (WHO) Commission on Ending Childhood Obesity* in 2015.⁵⁵ Various factors underlying the causes of childhood obesity were identified, such as the built environment, and the food industries' influence in contributing to an obesogenic environment, as well as culture, society and the context of the family. For the past decade, annual levels of childhood obesity have remained consistently higher than they were in the mid-nineties. Younger generations in the United Kingdom have been found to become obese at earlier ages than previous generations, indicating greater exposure to obesity, and thus increased risks of chronic conditions, across their lifetime.⁵⁶ Given the range of immediate and long-term health risks of childhood obesity, tackling it remains high on the public health agenda. In March 2015, after the data presented in this chapter were collected, NICE published new guidance on maintaining a healthy weight among adults and children, which updated a section of the 2006 NICE guideline CG43.⁵⁷ Self-monitoring of weight, physical activity and food choices are encouraged. In addition to recommendations made for people overall, parents of young children are encouraged to eat meals together with their children and support their child's physical activity at every opportunity.

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