



Key Points

- Childhood obesity is a global public health challenge for the 21st century
- In 2015/16, 10% of Primary 1 children in Scotland were already at risk of obesity
- In 2015 in Scotland, 15% of children aged 2-15 years old were at risk of obesity and a further 13% were at risk of overweight*
- One in five pregnant women in Scotland is obese
- Inequalities in childhood obesity have widened over recent years in Scotland
- The environment around us has a powerful effect on a child's diet, physical activity levels and obesity
- Childhood obesity is increased by poor food behaviours, lack of sleep, television watching and having a TV set in the bedroom
- Childhood obesity generates adverse consequences over the entire lifespan and into the next generation
- Consequences of childhood obesity are striking. They include stigma and discrimination, mental health problems, musculoskeletal complications, heart disease, stroke and common cancers later in life. All result in worse quality of life
- Preventing obesity in childhood is far preferable to attempting obesity treatment in later life, because returning to normal body weight and maintaining this weight loss is extremely difficult for people who are already obese
- Insufficient action and resources are directed towards prevention and treatment of childhood obesity in Scotland
- Policies and programmes to manage childhood obesity should be multi-component, including healthy diet and dietary habits, physical activity and be family-based



...because of the rising levels of obesity in children, ***the current generation may have a shorter life span than their parents for the first time in 200 years.*** This is because the majority of obese children become obese adults, with all the associated health issues that this brings¹

* According to the epidemiological definition of childhood obesity used in the Scottish Health Survey.

Key Actions

- Create environments and influence culture to support children and parents eating healthier foods and being more active in all settings, through government intervention to foster healthy living environments and the delivery of more targeted programmes
- Co-produce solutions with children, their families and communities most affected by obesity
- Tackle the growing inequalities gap associated with childhood obesity
- Child healthy weight should be a priority issue for all services and policies which cover pre and post conception and early years
- Develop existing Child Healthy Weight programmes into comprehensive multi-component services to address prevention and treatment
- Improve population-wide surveillance by adding an additional measurement of weight and height in Primary 7 to the Child Health Programme

Definition of Childhood Obesity

As with adults, obesity in children aged 2 and older is defined using Body Mass Index (BMI). BMI is calculated by dividing an individual's weight (in kilograms) by their height squared (in metres).

Proportions of children's height and weight change as they develop, therefore age- and sex-specific growth reference data has to be used to interpret their BMI values.

Two sources of data on children's weight in Scotland use epidemiological BMI thresholds to report numbers of children at risk of underweight, overweight and obesity.*

Scotland's Children: the Facts and Figures

Scotland has one of the highest levels of obesity in the OECD countries with more than a million adults and over 150,000 children obese².



Organisation for Economic
Cooperation and
Development

There are two sources of data on children's weight in Scotland. The Scottish Health Survey³ includes a sample of children (n = 1421 in 2015) aged 2 to 15 years old. The Child Health Programme includes measurements taken by Health Boards of height and weight for all Primary 1 pupils (aged 4.5 to 6.5) in Scotland.

The Scottish Health Survey data for 2015 indicates the following³:

- 15% of children are at risk of obesity
- Since 1998, the percentage of children at risk of obesity has fluctuated between 16% and 17%
- 28% of children are at risk of overweight (including obesity)
- Since 1998, the percentage of children at risk of overweight (including obesity) has fluctuated between 28% and 33%

* These thresholds define children in the 2nd percentile of BMI or less as at risk of underweight; those with BMI higher than the 2nd percentile and below the 85th percentile as healthy weight; those with BMI between the 85th and 95th percentile as at risk of overweight; and children in the 95th percentile of BMI or higher as **at risk of obesity**. The phrase 'at risk of' is correct when using these thresholds, however, English reports that use these thresholds do not use 'at risk of'.

Data from the Primary 1 measurement programme⁴ which in 2015/16 captured 92% of children in Primary 1 indicates the following:

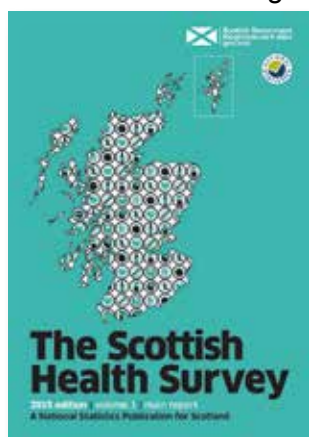
- the percentage of Primary 1 children at risk of overweight and obesity was 22% in 2015/16. It has fluctuated between 21 and 23% over the last 10 years and has not shown any significant or sustained improvement
- 77% of children at Primary 1 were classified as 'healthy weight'

At the moment the Child Health Programme⁵ includes measurement of height and weight of children at a national level at primary school entry only. Secondary school entry measurement was recommended⁶ to develop population-wide surveillance of the obesity epidemic and outcomes of Child Healthy Weight services⁷ (see 'Treatment' below) but this has yet to be implemented.

Childhood overweight and obesity is one of the indicators selected to monitor progress of the Scottish Government's *Preventing Overweight and Obesity in Scotland: A Route Map Towards Healthy Weight*⁸ and is used to identify patterns amongst children of different ages and by area of deprivation.

Childhood Obesity and Inequalities

A recent report by the Royal College of Paediatrics and Child Health⁷⁷ found that children from deprived backgrounds have much worse health and wellbeing and are more likely to be



overweight and obese than other children and young people. The 2015 Scottish Health Survey⁹ which reports statistics for children aged 2-15, showed a difference in overweight and obesity rates between children from the least and most deprived areas (28% vs. 37%).

Similarly, measurements of Primary 1 children in 2015/16 showed that in the least deprived areas in Scotland only 17.6% were classified as at risk of overweight and obesity compared to 25.8% in the most deprived areas⁴. Socio-economic differences in BMI widen with increasing age¹⁰.

Primary 1 statistics show that the gap between numbers of children at risk of obesity from the least and most deprived areas has been widening over the last decade. While there has been no change in the numbers of children at risk of obesity from more deprived areas, the rate of reduction is clear for children from more affluent areas⁴.

A recent publication from the *Growing Up in Scotland* (GUS)¹¹ study showed that when you compare the lowest income group with the highest:

	Not Breastfed	Low Birth Weight	Poor Diet at Age 5
Lowest Income	55%	9%	39%
Highest Income	19%	6%	13%

The Scottish Public Health Obesity Special Interest Group (SPHOSIG) suggested that while:

“ Scotland has not done enough to see significant and sustained reductions in the proportion of its child population that is overweight and obese, (...) what has been done, has increased rather than decreased the inequality gap in obesity risk between the most affluent and the most deprived amongst Scottish children⁶.

It was recommended that:

- NHS Health Scotland extend their current support for Child Healthy Weight programmes by developing approaches to reduce the inequalities that give rise to obesity across the life-course
- NHS Health Scotland integrate overweight and obesity impact within health and health inequality impact assessment tools
- NHS Boards and Community Planning Partnerships develop existing Child Healthy Weight programmes to support those at greatest risk of health inequality associated with childhood obesity

A prospective cohort study of British children¹² showed that BMI in childhood is prognostic of their future BMI, especially for children with obesity. The study noted strong socio-economic patterns, suggesting that the observed trend in growing inequalities may be rooted in early life and that mediating mechanisms for obesity appear to be in the pregnancy and infant period. Therefore, efforts to curb the increasing prevalence of obesity, particularly amongst disadvantaged children, should start early in life¹³. Targeted and effective approaches for obesity prevention in children most at risk are necessary¹⁴.

Causes

Childhood obesity is complex and has multiple causes. The nutrition and body weight of mothers, both pre-conception and during pregnancy, have effects on the health and weight of their offspring.

Child nutrition in early life, especially breast feeding, is crucial for appropriate child development and healthy weight. Body weight in childhood may be partly determined by genes¹⁵. However, it is very rarely caused by genes alone and the environment in which a child lives remains the strongest determinant¹⁶.

childhood BMI is prognostic of adult BMI

Environments can promote health but they can also cause ill health and obesity¹⁷. The current obesity epidemic is caused by the modern environment where cheap, energy-dense, nutrient-poor and ultra-processed food and drinks are widely available and acceptable, where physical activity is limited by lack of recreation areas and poor walking and cycling infrastructure^{18,19}. Children have reduced active play opportunities^{20,21} and spend hours engaged in sedentary activities every day^{22,23}. Such environments have negative effects on parents and children. While the treatment of obesity is extremely important, Scotland's obesity crisis will never be solved without addressing the root cause of it: the environment that promotes weight gain.

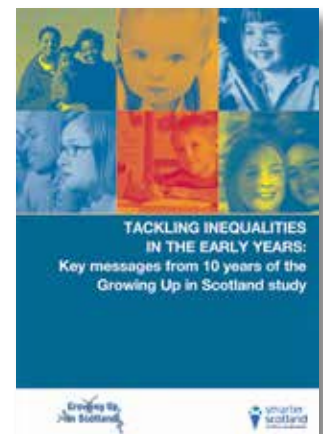
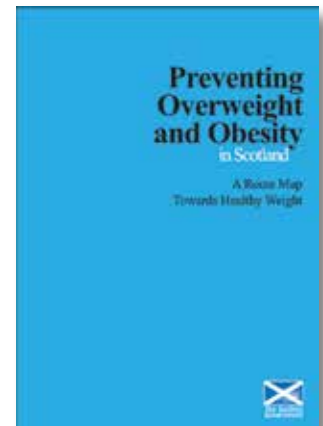
Maternal Obesity

Maternal obesity and excessive gestational weight gain, resulting in over-nutrition of the foetus, are known to be major contributors to obesity and metabolic disturbances in children²⁴ including insulin resistance in utero²⁵.

Women with overweight and obesity are far more likely to have children who will themselves be overweight or obese^{26,27,28}.

Scotland's 2010 obesity strategy *Preventing Overweight and Obesity in Scotland: A Route Map Towards Healthy Weight*⁸ noted the impact of obesity in pregnancy on the short and long term health of mothers and babies as an area of particular concern.

The latest European Perinatal Health Report²⁹ showed that the lowest levels of overweight or obesity in pregnant women were in Poland (25.6%), France (27.2%) and Slovenia (27.8%). The majority of other European countries had rates of 30–37%, but Scotland had a prevalence of **48.4%**, with 20.7% of all pregnant women in the range of obesity – the highest rate for all reporting countries. The next closest rate was Germany at 13.7% of all pregnant women in the range of obesity. Germany has a similar age distribution for pregnant women as Scotland.



The most current data indicates that 22.2% of pregnant women in Scotland are obese at their first antenatal booking with a further 27.4% classified as overweight³⁰.

Birth Weight

Children weighing more than 4kg (9lb) at birth are at an increased risk of type 2 diabetes, hypertension, and obesity in adulthood³¹. Women with obesity are 2-3 times more likely to have a baby of high birth weight.

Adverse pregnancy outcomes with babies of high birth weight are more common for obese mothers than those of healthy weight³². Complications include shoulders being trapped under the mother's pelvic bones with subsequent risk of induced labour, delivery by Caesarean section³³ and the need for neonatal resuscitation³⁴. Rapid weight gain in the first few months of life was also shown to increase the risk of obesity later in life³⁵.

Low birth weight, just as high birth weight, is associated with a higher percentage of body fat later in childhood³⁶. It was also shown to be linked to more fat tissue around the waist³⁷ and development of type 2 diabetes³⁸.

Childhood Nutrition

Breastfeeding is the natural source of nutrition that every baby should benefit from at the beginning of their life. Breastfed children are at lower risk of respiratory infections, gastroenteritis, allergies, sudden infant death syndrome, diabetes (types 1 and 2) and obesity^{39,40}. For women, breastfeeding protects from cancer, hip fractures later in life, and postmenopausal factors for cardiovascular disease.

Breastfeeding rates are low in Scotland. Although the World Health Organisation (WHO) recommends exclusive breastfeeding until 6 months of age, these numbers have not been reported in the most recent breastfeeding statistics in Scotland⁴¹. In 2015/16 39% of babies were breastfed at the 6–8 week review. Similarly,

the GUS study¹¹ reported that 42% of children were breastfed at 6-8 weeks. These numbers increased slightly over the last decade. However, mothers in the least deprived areas were nearly three times more likely to exclusively breastfeed at 6 - 8 weeks compared with mothers in the most deprived areas.

The evidence for breastfeeding protecting against obesity is stronger earlier in life^{42,43} and gets smaller with time⁴⁴. The protective effect is likely to stem from nutritional composition of breastmilk, slower growth rate of breastfed children, different feeding patterns and healthier food environment of women who breastfeed.

Breastfeeding is also associated with positive dietary beliefs and behaviours by children, independent of a child's age, gender, socio-economic status, living area, diet quality, and child and parental BMI⁴⁵.

Parental influence on health, nutritional habits and diet of a child is crucial:

- Parents create environments that may promote either healthy eating behaviours and weight, or overweight and/or disordered eating in children⁴⁶
- Nutritional behaviour of parents and children are similar⁴⁷, therefore parents play an integral role both in shaping children's eating behaviour and body dis- and satisfaction⁴⁸. The GUS study showed that frequent snacking on sweets and crisps at toddler age, skipping breakfast, not eating the main meal in a dining area of the home and low parental supervision are all associated with a greater likelihood of a child being overweight and/or obese²⁸
- Food behaviour and choices that are established in childhood or adolescence are likely to continue into adulthood⁴⁹

In 2015/16, 39% of babies were breastfed at the 6–8 week review

- Parents who fail to recognise the future health implications of their child's overweight or obesity may be less inclined to encourage their child's participation in healthy behaviours⁵⁰
- Parents with overweight or obesity more often perceive their child's weight status as normal when their child is actually overweight or obese^{51,52}. The GUS study showed that only 14% of mothers of children with overweight and obesity recognised their child as overweight²⁸.

Lack of Sleep

Lack of sleep can contribute to obesity in childhood. Research from the UK and US showed that children sleeping less than 12 hours a night were at a higher risk of becoming obese^{53,54}. It was also shown that reduced sleep later in life may cause fatigue leading to inactivity during the day. This, over time, may lead to obesity which is in turn related to poor sleeping patterns⁵⁵.

Television

Prolonged television (TV) viewing is the most prevalent and pervasive sedentary behaviour in industrialised countries and is associated with morbidity and mortality.

TV watching plays a role in childhood obesity; it highlights the complex and multifactorial nature of the problem⁵⁶. It is well established that the more television children watch, the more likely they are to gain excess weight^{57,58,59,60}.

Children who have TV sets in their bedrooms are more likely to gain excess weight than those who do not^{61,62}.

It also appears that heavy childhood TV use persists into young adulthood and is associated with increased BMI⁶³. Indeed, the findings of a 32-year follow-up of the 1970 British Cohort Study⁶⁴ (a longitudinal observational study of

17,248 British people born in a single week of 1970) suggest that childhood TV viewing time tracks into adulthood; this supports the case for early life interventions tackling sedentary behaviours.

In adults, for every two hours a day spent watching TV, the relative risk of developing diabetes, heart disease and early death increased by 20, 15, and 13 per cent, respectively⁶⁵.

Advertising and Marketing

Marketing by commercial companies is a strong influence on food preference, choice and consumption in children. A recent UK study⁶⁶ showed that the link between television viewing and poor diet was strongest for children who watched the most commercial television, and those who were actually exposed to advertisements embedded within programmes.

Food and drink that are high in fat, sugar and salt (HFSS) are in the UK defined by the Food Standards Agency (FSA)/Ofcom nutrient profiling model from 2007⁶⁷. Public Health England (PHE) criticised the model⁶⁸ and recommend reviewing and strengthening it. In its recent Childhood Obesity Plan, the UK Government committed to a review of the model⁶⁹.

In the UK advertising of HFSS products on children's TV is restricted. However, the definition of children's TV is very narrow. Consequently, these restrictions currently only apply to a minority of programmes that children watch.

An evaluation of these regulations showed that while they were well adhered to, they failed to change the relative exposure of children to HFSS food. One possible explanation was that children view many programmes not classed as children's TV and these are not covered by the FSA/Ofcom regulation. In that context, PHE recommended the introduction of a blanket ban before 9pm⁶⁸.

The most striking benefits to population wellbeing have come from public health, not medical interventions

Consequences of Childhood Obesity

Health Risks Now

Obesity during childhood can have a harmful effect on the body in a variety of ways. Children who are obese have a greater risk of:

- high blood pressure and high cholesterol, which are risk factors for cardiovascular disease (CVD). In one study, 70% of obese children had at least one CVD risk factor, and 39% had two or more
- increased risk of impaired glucose tolerance, insulin resistance and type 2 diabetes
- breathing problems, such as sleep apnoea and asthma
- joint problems and musculoskeletal discomfort
- fatty liver disease, gallstones and gastro-oesophageal reflux (heartburn)
- poor mental health, including depression, behavioural problems and issues in school
- low self-esteem and low self-reported quality of life
- impaired social, physical and emotional functioning

Health Risks Later

- children who are obese are more likely to become obese adults
- adult obesity is associated with a number of serious health conditions including heart disease, type 2 diabetes, metabolic syndrome and cancer
- if children are obese, the obesity and disease risk factors in adulthood are likely to be more severe

Source: Childhood Obesity Causes & Consequences, US Centers for Disease Control and Prevention www.cdc.gov/obesity/childhood/causes.html

While TV remains an important marketing outlet, effective at influencing children's food preferences, many different types of marketing become increasingly influential. A review produced for the Committee of Advertising Practice (CAP) showed that online advertising increased significantly in recent years⁷⁰ coinciding with sharp increases in online media use.

Following a public consultation, CAP announced that new rules will be in force from June 2017⁷¹. They will restrict advertising of HFSS products to children online and on social media, in cinemas and in print. The new restrictions will only apply to media where more than 25% of the audience are children.

Childhood Physical Activity

The recent Scottish Health Survey showed that in 2015 73% of children met the physical activity recommendations³. This was higher than in 2008

and 2009 (71%). Boys (77%) were more likely than girls (69%) to meet the guideline.

The physical activity guideline for children aged 5 to 18 is a minimum of one hour and up to several hours per day of moderate to vigorous intensity including school-based activity. Once walking, younger children should be active for at least three hours spread throughout the day. Meeting the above levels of physical activity promotes healthy weight, development and health of children but is not aimed at weight loss. The amount and intensity of physical activity required to address childhood obesity is unclear (SIGN, 2010). An increase in 'lifestyle' physical activity has more potential of achieving healthy weight than structured exercise.

Prevention

Preventing obesity in childhood is far preferable to attempting obesity treatment in later life, because returning to normal body weight is

Returning to normal body weight loss is extremely difficult for people who are already obese

Preventative actions that emerge regularly in systematic reviews, recommendations and strategies

(based on the references listed in this briefing)



Environment

- environments and cultural practices that support children eating healthier foods and being active throughout the day



Parents

- parental support and home activities that encourage children to be more active, eat more nutritious foods and spend less time in screen based activities



Schools

- improvements in nutritional quality of the food supply in schools
- a school curriculum that includes healthy eating, physical activity and body image
- increased sessions for physical activity throughout the school week
- support for teachers and other staff to implement health promotion strategies and activities (e.g. professional development, capacity building activities)

extremely difficult for people who are already obese: it was estimated that only 1 in 124 women and 1 in 210 men who have BMI between 30 and 35 are likely to return to normal body weight and maintain it⁷². It gets even less likely for higher BMIs. Luckily, there is strong evidence that child obesity prevention programmes reduce children's BMI⁷³.

The need for change in the environmental factors that promote healthy weight through cross-departmental involvement was the first recommendation by the Scottish Public Health Obesity Special Interest Group (SPHOSIG) in the report on the Child Healthy Weight Programme. The 2015 NICE quality statement⁷⁴ also focuses on creating an environment that promotes healthy food and drink choices, provides nutritional information and allows easy access to local lifestyle weight management programmes for children and young people, their parents or carers.

The WHO Commission on Ending Childhood Obesity (ECHO)⁷⁵ developed a set of recommendations covering six areas, five of which focus on prevention:

- promote intake of healthy foods and reduce the intake of unhealthy foods and sugar-sweetened beverages (SSBs)

- promote physical activity and reduce sedentary behaviour
- improve guidance for pre-conception and pregnancy care
- provide guidance on, and support for, healthy diet, sleep and physical activity in early childhood
- implement comprehensive programmes that promote healthy school environments, health and nutrition literacy and physical activity among school-age children and adolescents

Further supporting the necessary changes to our environment, the Royal College of Paediatrics and Child Health cautioned that reliance on personal responsibility was not enough as infants and children do not have freedom of choice and are vulnerable to the actions of adults. The most striking benefits to population wellbeing have come from public health, not medical interventions. Strategies that are most likely to prevent childhood obesity require government leadership, including legislative actions to create a healthier environment, as well as the delivery of targeted programmes.

Treatment

Treatment of obesity is important not only for the health and wellbeing of children but also for that of their future children⁷⁹. Obesity treatment in children and adolescents is different to obesity treatment of adults, as it should acknowledge a young person's growing needs.

Evidence shows that longer (over 6 months) and intensive (high contact time) interventions are most effective for children and young people⁶.

Since 2008, Scottish NHS Boards have been developing and running Child Healthy Weight (CHW) programmes to reduce childhood obesity. Scottish Government set NHS Boards a Health, Efficiency, Activity and Treatment (HEAT) target for the provision and delivery of CHW programmes between 2008 and 2014.

CHW interventions are drawn from those identified within clinical guidance published (see tab below). CHW programmes were evaluated in 2013. In 2014, in the light of these evaluations and local experience, an expert group made recommendations on the future of CHW programmes⁸⁰. This included developing the programmes into comprehensive services across the full range of services within a Health Board setting.

Guidelines by SIGN (2010) and NICE (2013) (see table below), as well as the sixth recommendation of the WHO Commission on Ending Childhood Obesity⁷⁵ stress that weight management programmes for children should be multi-component:

- be family based, involving at least one parent/ carer
- incorporate behaviour change components: aiming to change behaviour of the child or young person as well as all close family members
- address diet and healthy eating habits
- increase levels of physical activity
- decrease time spent in sedentary behaviours (screen time)

Following their recommendations, the WHO Committee on ECHO published a draft implementation plan⁷⁶ and suggested the following childhood obesity action framework:



Childhood Obesity Guidelines and Policies

Prevention and Treatment

NICE (2015) Quality Standard. Obesity in children and young people: prevention and lifestyle weight management programmes (qs94)

Report of the WHO Commission on Ending Childhood Obesity (2016)

UK Government's Childhood Obesity: A Plan for Action. Published in August 2016

Treatment

SIGN (2010) Guideline 115. Management of Obesity. A national clinical guidance.

NICE (2014) Clinical Guideline. Obesity: identification, assessment and management of overweight and obesity in children, young people and adults (cg189)

NICE (2013) Public Health Guideline. Weight management: lifestyle services for overweight or obese children and young people. Public health guideline (ph47)



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ObesityActionScotland

Obesity Action Scotland was established mid-2015 to provide clinical leadership and independent advocacy on preventing and reducing overweight and obesity in Scotland.

Our main aims:

- To raise awareness and understanding of what drives obesity and the health problems associated with obesity and overweight with health practitioners, policy makers and the public
- To evaluate current research and identify strategies to prevent obesity and overweight based on the best available evidence
- To work with key organisations in Scotland, the rest of the UK and worldwide, to promote healthy weight and wellbeing

Overseeing our work is the Steering Group whose membership spans various disciplines involved in preventing and tackling obesity and its consequences: clinicians, public health experts, epidemiologists, nutritionists and dieticians, GPs and weight management experts. There are four members of staff.

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