



TOOL E4 Measurement and assessment of overweight and obesity – CHILDREN

TOOL
E4

For:	All healthcare professionals measuring and assessing overweight and obese children
About:	This tool contains detailed information on the measurement and assessment of overweight and obesity in children. It provides information on how to measure overweight and obesity using Body Mass Index (BMI) and growth reference charts; provides information on measuring waist circumference; and provides details on how to assess overweight and obesity in children. BMI charts are provided at the end of this tool for girls and boys. This tool is consistent with NICE guidance and also Department of Health recommendations.
Purpose:	To provide an understanding of how children are measured and assessed.
Use:	To be used as background information when in consultation with an overweight or obese child.
Resource:	<i>Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children.</i> ⁶ www.nice.org.uk <i>Measuring childhood obesity. Guidance to primary care trusts.</i> ²⁰⁷ www.dh.gov.uk

Measuring overweight and obesity using Body Mass Index

The National Institute for Health and Clinical Excellence (NICE) recommends that BMI (adjusted for age and gender) should be used as a practical estimate of overweight in children and young people. The BMI measurement in children and young people should be related to the UK 1990 BMI growth reference charts to give age- and gender-specific information. Pragmatic indicators for action have been recommended as the 91st centile for overweight, and the 98th centile for obesity.⁶ (For reference charts, see pages 215 and 216.)

BMI is calculated by dividing an individual's weight in kilograms by the square of their height in metres (kg/m²).

There is widespread international support for the use of BMI to define obesity in children,^{3, 23, 120} even though there is no universally accepted BMI-based classification system for childhood obesity. This is because for children and young people, BMI is not a static measurement, but varies from birth to adulthood, and is different between boys and girls. Interpretation of BMI values in children and young people therefore depends on comparisons with population reference data, using cut-off points in the BMI distribution (BMI percentiles).³

Different growth reference charts can be used to assess the degree of overweight or obesity of a child. These are calculated to allow for age, sex and height. NICE has recommended that the BMI measurement in children and young people should be related to the UK 1990 BMI growth reference charts⁴ to give age- and gender-specific information.⁶ The Growth Reference Review Group, a working group convened by the Royal College of Paediatrics and Child Health (RCPCH), has also recommended that for children under the age of 2 years, the UK 1990 reference charts²¹³ are the only suitable charts for weight, length and head circumference. It also recommended that

the UK 1990 BMI reference is the only suitable reference for assessing weight relative to height.²¹⁴ However, the Australian NHMRC guidelines for children highlighted several difficulties with the BMI-for-age percentile cut-offs:

- Data are derived from a reference population.
- Classifying a child as overweight or obese on the basis of BMI being above a certain percentile is an arbitrary decision and is not based on known medical or health risk.¹²⁷

These difficulties have resulted in different BMI centiles being used. For example, the NHMRC guidelines have recommended that a BMI above the 95th percentile is indicative of obesity and a BMI above the 85th percentile is indicative of overweight.¹²⁷ However, the SIGN guidelines have recommended that a BMI at the 98th percentile or over is indicative of obesity (on the UK 1990 reference charts for BMI centiles for children²¹³), and a BMI at the 91st percentile is indicative of overweight.²³ The Department of Health has also recommended that the 98th and 91st centiles of the UK 1990 reference chart for age and sex be used to define obesity and overweight, respectively.¹²⁰ This is because when using the BMI of more than the 91st centile on the UK 1990 charts, sensitivity is moderately high (it diagnoses few obese children as lean) and specificity is high (it diagnoses few lean children as obese) which is paramount for routine clinical use.^{23, 215}

Note: NICE recommendation for specific cut-offs for overweight and obesity – NICE considered that there was a lack of evidence to support specific cut-offs in children. However, the recommended pragmatic indicators for action are the 91st and 98th centiles (overweight and obese, respectively).⁶

See pages 215 and 216 for centile BMI charts for boys and girls.

Use of growth reference charts in clinical settings

The growth reference or BMI charts are used in two broad clinical settings: for the assessment and monitoring of individual children, and for screening whole populations.²¹⁴

Assessing and monitoring individual children

- BMI reference curves for the UK, 1990²¹³ – NICE recommends that the 91st centile (overweight) and the 98th centile (obese) of the 1990 UK reference chart be used for assessing and monitoring individual children.⁶ The Department of Health and SIGN make the same recommendation.^{23, 120}

Screening whole populations

- *UK National BMI Percentile Classification*²¹³ – The majority of published epidemiological work has used a definition of obesity as a BMI of more than the 95th centile, and overweight as a BMI of more than the 85th centile of the UK 1990 reference chart for age and sex.²³ SIGN has recommended that, for comparative epidemiological purposes, it is important to retain this definition.

- *International Classification* – An alternative method for measuring childhood obesity is the International Obesity Task Force (IOTF) international classification²¹⁶ using data collected from six countries (UK, Brazil, Hong Kong, the Netherlands, Singapore and the United States) of a total of 190,000 subjects aged from 0 to 25 years. This classification links childhood and adult obesity/overweight standards using evidence of clear associations between the adult BMI cut-off values of 25kg/m² and 30kg/m² and health risk. However, it has been reported that the international cut-offs exaggerate the differences in overweight and obesity prevalence between boys and girls by underestimating prevalence in boys. Other possible limitations include concerns about sensitivity (the ability to identify all obese children as obese), the limited sample size of the reference population and the lack of BMI cut-off points for underweight.²¹⁷

Measuring waist circumference

Until recently, waist circumference in children had not been regarded as being an important measure of fatness. Although the health risks associated with an excessive abdominal fat distribution in children in comparison with adults remain unclear, mounting evidence suggests that this is an important measurement. For example, data from the Bogalusa Heart Study showed that an abdominal fat distribution (indicated by waist circumference) in children aged between 5 and 17 years was associated with adverse concentrations of triglyceride, LDL cholesterol, HDL cholesterol and insulin.²¹⁸ The first set of working waist circumference percentiles was produced using data collected from British children.²¹⁹ Although there is no consensus about how to define obesity among children using waist measurement, for clinical use the 99.6th or 98th centiles are the suggested cut-offs for obesity and the 91st centile is the cut-off for overweight.²¹⁹

NICE⁶ and the Department of Health¹²⁰ do not currently recommend using waist circumference as a means of diagnosing childhood obesity as there is no clear threshold for waist circumference associated with morbidity outcome in children and young people.^{127, 207} Thus, NICE recommends that waist circumference is not used as a routine measurement in children and young people, but may be used to give additional information on the risk of developing other long-term health problems.

Assessment

NICE recommends that assessment should begin by measuring BMI and relating it to the UK 1990 BMI charts to give age- and gender-specific information.⁶ See charts on pages 215 and 216.

It recommends the approach to assessing and classifying overweight and obesity in children shown in the box on the next page.

Assessment and classification of overweight and obesity in children

Determine degree of overweight or obesity

- Use clinical judgement to decide when to measure weight and height.
- Use BMI; relate to UK 1990 BMI charts to give age- and gender-specific information.
- Do not use waist circumference routinely; however, it can give information on risk of long-term health problems.
- Discuss with the child and family.

Consider intervention or assessment

- Consider tailored clinical intervention if BMI at 91st centile or above.
- Consider assessing for comorbidities if BMI at 98th centile or above.

Assess lifestyle, comorbidities and willingness to change, including:

- presenting symptoms and underlying causes of overweight or obesity
- willingness and motivation to change
- comorbidities (such as hypertension, hyperinsulinaemia, dyslipidaemia, type 2 diabetes, psychosocial dysfunction and exacerbation of asthma) and risk factors
- psychosocial distress such as low self-esteem, teasing and bullying
- family history of overweight and obesity and comorbidities
- lifestyle – diet and physical activity
- environmental, social and family factors that may contribute to overweight and obesity and the success of treatment
- growth and pubertal status.

Source: Reproduced from National Institute for Health and Clinical Excellence, 2006⁶

The Department of Health,¹²⁰ the Royal College of Paediatrics and Child Health (RCPCH) and the National Obesity Forum (NOF)¹²² provide similar recommendations for assessing childhood overweight and obesity.



Tool E1 provides further information on NICE and Department of Health guidance for assessing and managing overweight and obesity in a clinical setting.

Recording of children's data

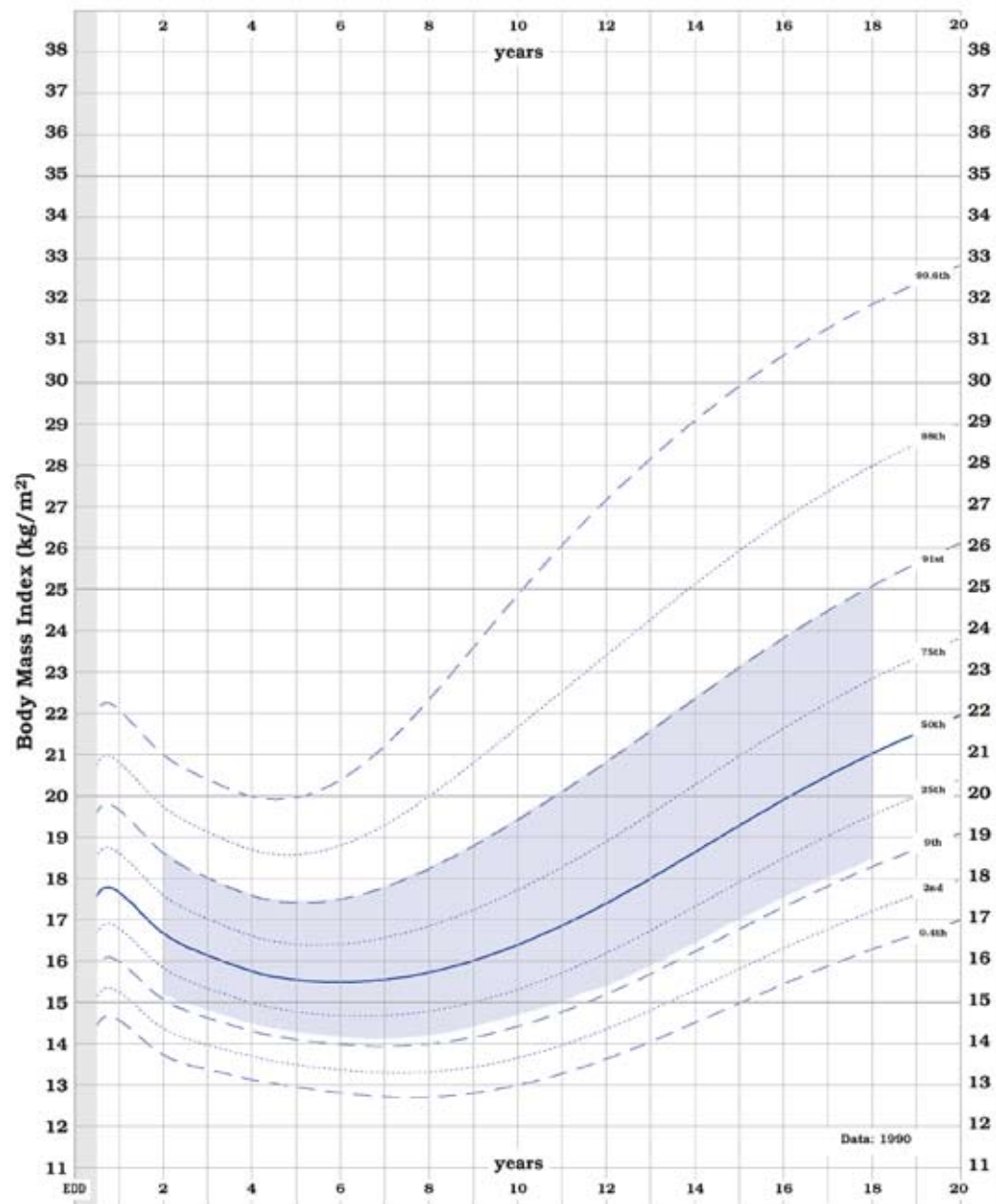
The Department of Health and the Department for Children, Schools and Families have developed guidance for PCTs and schools on how to measure the height and weight of children.^{139, 140} All children in Reception (4-5 year olds) and Year 6 (10-11 year olds) should be measured on an annual basis as part of the National Child Measurement Programme (NCMP). The guidance is available at www.dh.gov.uk/healthyliving



See also **Tool E9** for more information about the NCMP.

Centile BMI charts – CHILDREN

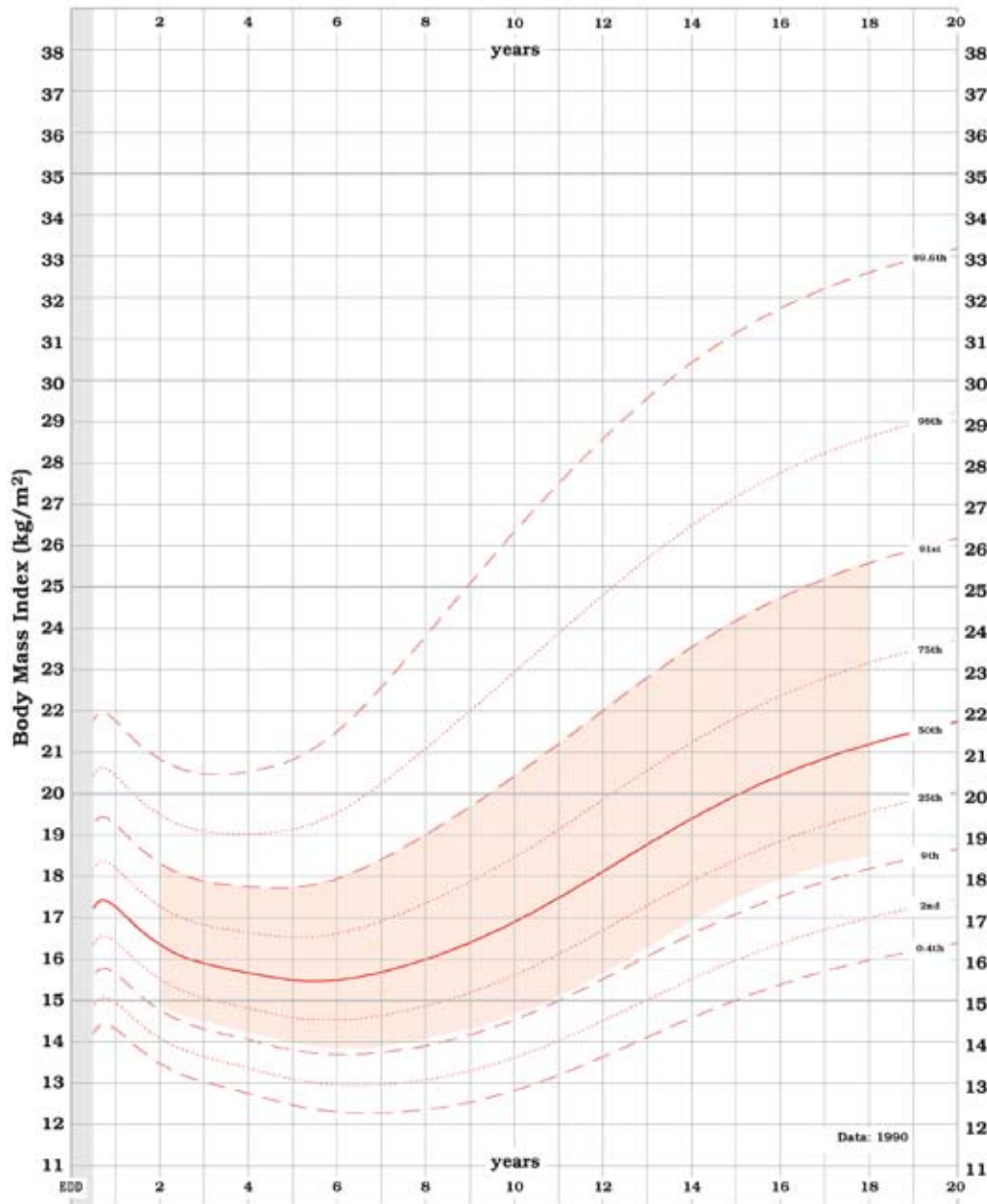
Boys BMI chart – Identification^{213, 216}



Note: This chart is based on the UK population, **not** the IOTF populations.

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Girls BMI chart – Identification^{213, 216}



Note: This chart is based on the UK population, **not** the IOTF populations.

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