

Plotting and assessing infants and toddlers up to age 4 years



This fact sheet covers the plotting and assessment of infants and toddlers from the age of 2 weeks onwards.

Topics in this fact sheet include ...

- ✓ Knowing how often and when to weigh
- ✓ Normal rates and variations of growth or weight gain
- ✓ Length centile changes at 2 years

When to weigh and measure

After the neonatal period and once feeding is established, babies usually need only be weighed at around 8, 12 and 16 weeks and at 1 year; at the time of routine immunisations or checks. If there is concern, weigh more often, but in general weighing at intervals too close together is misleading.

This means that well babies should be weighed *no more than*:

- ✓ once a month before 6 months
 - ✓ once per two months aged 6-12 months
 - ✓ once per 3 months over age one year
- Most children do not need to be weighed this often*

Head Circumference, Length or height should be measured:

- ✓ Whenever there are any worries about a child's weight gain, growth or general health
 - ✓ If the weight is below the 0.4th centile
 - ✓ If there is very rapid weight gain
 - ✓ If the weight is above the 99.6th centile
- For children over two calculate body mass index to help you tell whether the child is relatively over or underweight*

In addition, head circumference should be measured:

- ✓ Around birth, but measurements taken in the first 24-hours are unreliable as the head will have been subjected to moulding
- ✓ At the 8 week check
- ✓ At any time after that if there are any worries about the child's head growth or development

What is a normal rate of weight gain?

As the new charts allow for the normal slower pattern of weight gain up to age 2 weeks, on average, children will be on the same centile at 2 weeks as at birth. This is different from previous charts where children appeared to drop half a centile space between birth and 2 weeks.

After the neonatal period weights usually track within one centile space, but individual measurements often show wide variation. Acute illness may be accompanied by weight loss and weight centile fall. However, a child's weight usually returns to its previous centile within 2 to 3 weeks.

Less than 2% of infants show a sustained drop through two or more weight centile spaces on the new WHO charts. If such a drop occurs, the child should be assessed in more detail.

What is a normal rate of growth?

Length/Height

It is often difficult to get an accurate measurement of length or height in an uncooperative baby or toddler, so successive measurements commonly show wide variation. It is therefore important not to place too much reliance on single measurements or apparent changes in centile position between just two measurements. If there are worries about growth (or weight gain) it is a good idea to measure on a few occasions in order to get a sense of the child's average centile and healthy children will generally show a stable average position over time. If after a number of measurements there seems to be a consistent change in centile position by more than one centile space, the child should usually be assessed in more detail. All children below the 0.4th centile should be assessed by a Paediatrician at some stage even if apparently growing steadily.

Head circumference

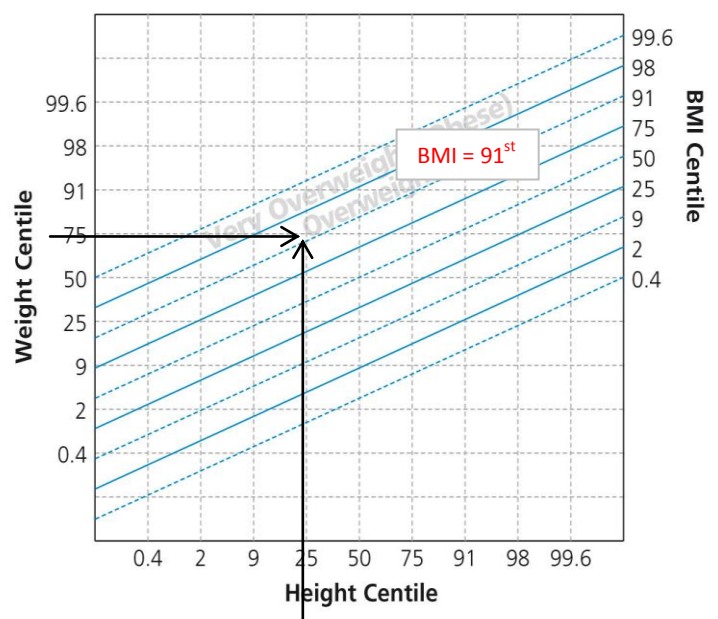
The head circumference centile may show some variation over time, but most measurements track within one centile space and fewer than 1% of infants drop or rise through more than 2 centile spaces after the first few weeks.

Very rapid head growth with upward centile crossing can be a sign of hydrocephalus or other problems while slowing of head growth, with a fall down the centiles may also be a sign of underlying problems of brain or skull growth and development.

If there is a fall or rise through 2 or more centile spaces, the child should be carefully assessed.

Body Mass Index (BMI) conversion chart

Body mass index (BMI) tells you how heavy a child is relative to their height and is the best measure of fatness and thinness from the age of 2, when height can be measured fairly accurately. The BMI conversion chart provides an approximate BMI centile accurate to a quarter of a centile space.



How to calculate and plot BMI

1. Read off the weight and height centiles from the A4 chart.
2. Plot the weight centile (left axis) against the height centile (bottom axis) on the BMI conversion chart.
3. Read off the corresponding BMI centile from the slanting lines.
4. Record the centile with the date in the data box underneath the lookup.

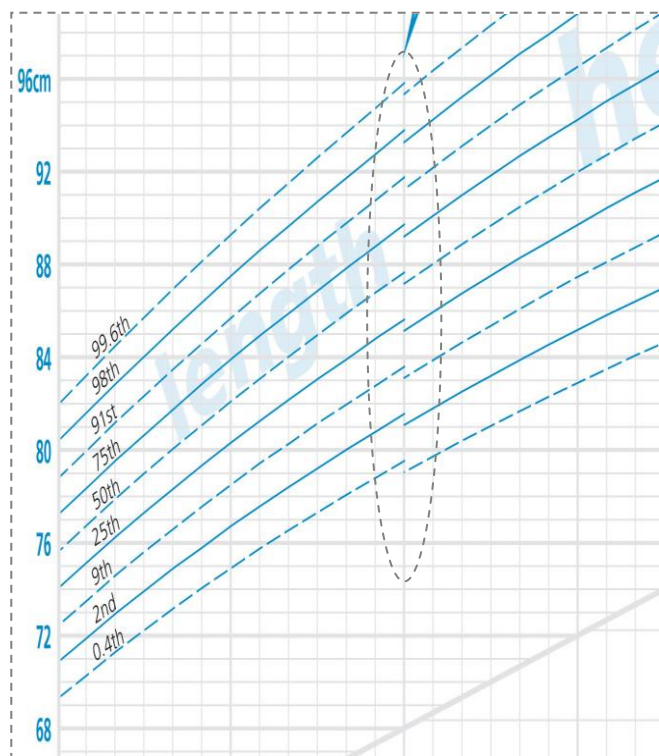
Interpreting Body Mass Index (BMI)

- A child whose weight is *average* for their height will have a BMI between the 25th and 75th centiles (whatever their height centile)
- BMI above the 91st centile suggests that the child is overweight
- BMI above the 98th centile is *very overweight* (clinically obese) and is usually associated with excess fatness

BMI below the 2nd centile is unusual and may reflect undernutrition, though it may also be seen in children with unusual body shapes, particularly if they have chronic illness or disability

Length to height change at 2 years

Measure length up to age 2, and height from then on. A child's height is usually slightly less than their length since when a child is measured standing up the spine is squashed a little compared with lying down.



The centile lines on the chart shift down slightly at age 2 to allow for this.

It is important that this transition does not worry parents; what matters is whether the child continues to follow their new centile position after the transition.

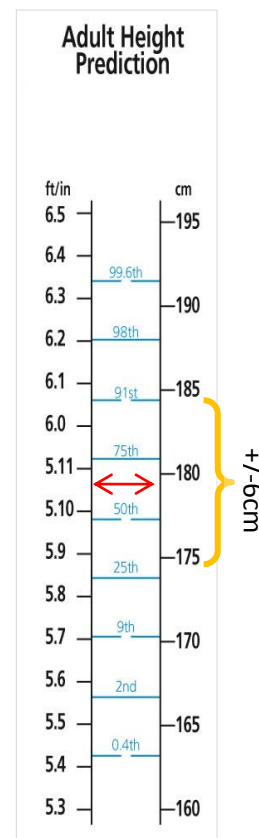
Adult height prediction

For example, if a boy's height is mid-way between the 50th and the 75th centile, the corresponding centile on the Adult Height Prediction scale (see right) suggests his adult height will be 179 cm (5 foot 10½ inches). The prediction has a range of uncertainty such that four-fifths of boys will be within plus or minus 6 cm of the predicted value. So there is a four-fifths chance that his height will be between 173 and 185 cm.

The prediction has a range of uncertainty such that four-fifths of boys will be within plus or minus 6 cm of the predicted value. So there is a four-fifths chance that his height will be between 173cm and 185cm, i.e. between 5 feet 10½ inches and 6 feet one inch.

The adult height prediction differs from the target height calculation on the UK1990 height chart.

Target height compares the child's height with those of their parents, and identifies children who are unusually tall or short compared to their parents. The adult height prediction tool provides a good prediction of adult height for most children, including those who are unusually tall or short, but it does not compare them with their parents.



Summary

Plotting and assessing infants and toddlers:

- ✓ Weigh at the time of routine immunisations / checks
- ✓ Measure length or height and head whenever concerned about weight gain, growth or development
- ✓ Any child with measurements consistently below the 0.4th centile should be assessed in more detail
- ✓ If weight is above the 99.6th centile BMI should be calculated using BMI conversion chart
- ✓ Adult height can be predicted from recent height centile using the adult height predictor

Further reading

Cole TJ. 1997. Growth monitoring with the British 1990 growth reference. Archives of Disease in Childhood 76 No 1:47-9.

Cole TJ. 2002. A chart to link child centiles of body mass index, weight and height. Eur J Clin Nutr 56(12):1194-9.

Wright CM, Waterston A, Matthews JNS, Aynsley-Green A. 1994. What is the normal rate of weight gain in infancy? Acta Paediatrica 83:351-6.

Wright C, Avery A, Epstein M, Birks E, Croft D. 1998. New chart to evaluate weight faltering. Arch Dis Child 78(1):40-3.