

NEW ZEALAND – WORLD HEALTH ORGANIZATION GROWTH CHARTS

FACT SHEET 6

PLOTING AND ASSESSING INFANTS AND TODDLERS UP TO AGE FIVE YEARS



New Zealand Government



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Before 2008, the growth charts used in New Zealand were based on the growth patterns of a mixture of breast- and bottle-fed babies.

The charts now use the growth patterns of babies that have only been breastfed, and are based on optimal growth rather than on average growth.

This fact sheet is one of a series that explains how to use the adapted growth charts. All fact sheets are available on the Ministry of Health's website: www.moh.govt.nz/wellchild

In this fact sheet

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 Well Child/Tamariki Ora checks. If there is concern, weigh more often, but in general weighing at intervals too close together is misleading.

Head circumference should be measured around birth, but note that measurements taken in the first 24 hours are unreliable as the head will have been subjected to moulding.

Weight, head circumference, length or height should be measured at each core Well Child/Tamariki Ora check. Take additional measurements:

- 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 or loss
- if the weight is above the 99.6th centile.

Note that head circumference should only be routinely measured to age 1 year.

For children over 2, who are plotted as being above the 99.6th centile on the growth chart, calculate body mass index to help you tell whether referral for further assessment is required. In addition, head circumference should be measured.

What is a normal rate of weight gain?

The charts allow for the normal slower pattern of weight gain up to age 2 weeks on average, so children will be on the same centile at 2 weeks as at birth. This is different from charts used pre-2008, 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.

What is a normal rate of growth?

Length/height

It is often difficult to get an accurate measurement of length or height in a 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. 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 referred for further assessment.

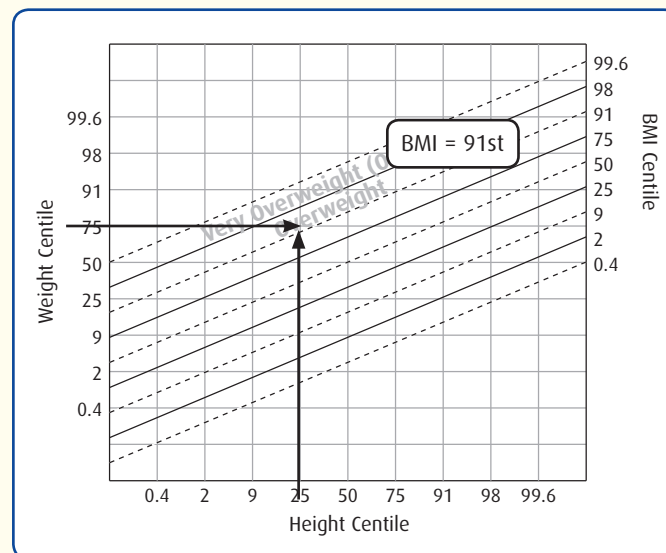
Head circumference

The head circumference centile may show some variation over time, but most measurements track within one centile space and fewer than 1 percent of infants drop or rise through more than two centile spaces after the first few weeks. The head circumference only needs to be measured up to 1 year.

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 overweight or underweight 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.

Weight-height BMI conversion chart



How to calculate and plot BMI

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

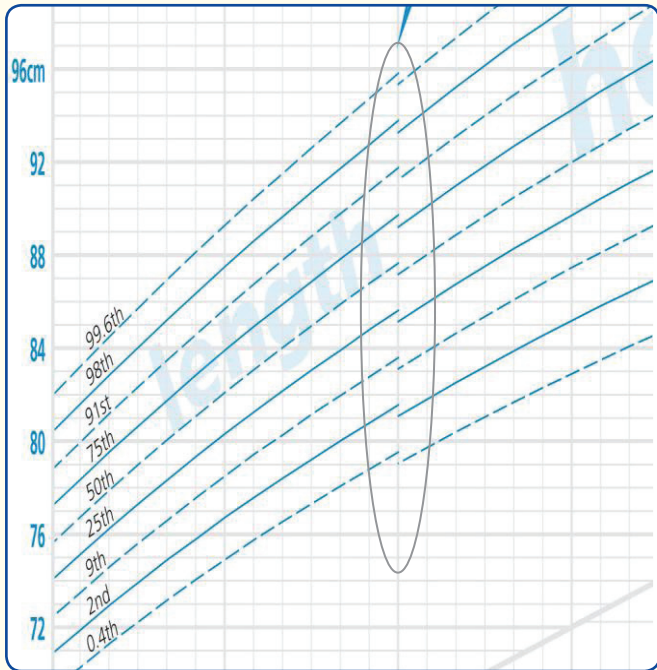
Interpreting body mass index (BMI)

- 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).

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

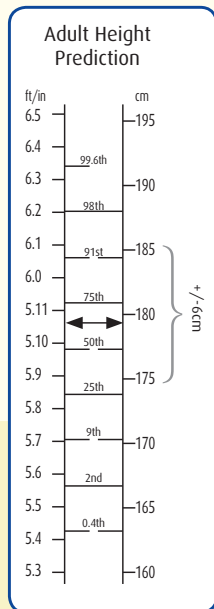
Measure length up to age 2, and height from then on. A child's height is usually slightly less than their length, since when a child is measured standing up the spine is squashed a little compared with lying down.



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

The Health Professionals' Notes include a chart on which adult height can be predicted. For example, if a boy's height is midway between the 50th and the 75th centile, the corresponding centile on the adult height prediction scale suggests his adult height will be 179 cm. The prediction does not have a 100 percent probability. There is an 80 percent probability that boys will be within plus or minus 6 cm of the predicted value. So in this case, there is an 80 percent chance that his height will be between 173 and 185 cm.



When to refer

Children aged under 2 years

Infants and toddlers who show a sustained drop or rise across two or more weight centile spaces should be referred for further assessment. Referral due to concerns about length should be based on clinical judgement.

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 two or more centile spaces, the child should be referred for further assessment.

Children aged 2 to 5 years

Weight

- BMI does not need to be calculated for all children.
- BMI should be calculated if the child is plotted as being above the 99.6th centile on the weight chart.
- If the child's BMI is above the 99.6th centile when plotted on the weight-height to BMI conversion chart, the child should be referred for further assessment – for ongoing weight monitoring and the management of the complications of obesity.
- Parents or caregivers should be given information about healthy eating and healthy activity for children with a BMI above the 98th centile.
- BMI should also be calculated if the child is plotted as being below the 0.4th centile on the weight chart or if their growth crosses two percentiles downward.
- If the child's BMI is below the 0.4th centile when plotted on the weight-height to BMI conversion chart, the child should be referred for further assessment.
- The child's parent or caregiver should also be given information about nutritious meals and snacks and healthy activity.

Height

- Refer for further assessment if a child's height is below the 0.4th centile.
- The child's parent or caregiver should also be given information about healthy eating and healthy activity.
- If the child is taller than average, no referral is needed.

If there is concern about a significantly disproportionate height and weight, identify the child's BMI centile and refer if appropriate – see above guidelines for BMI referral.

Key points

Plotting and assessing infants and toddlers

- Weigh at the time of each core Well Child/Tamariki Ora check.
- Measure length or height and head whenever concerned about weight gain, growth or development.
- Infants and toddlers who show a sustained drop or rise over two or more centiles should be referred for further assessment.
- Any child with measurements consistently below the 0.4th centile should be referred for further assessment.
- If weight is above the 99.6th centile, BMI should be calculated using BMI conversion chart.
- If BMI is below the 0.4th or above the 99.6th centile, the child should be referred for further assessment.
- Use clinical judgement to make referral outside these criteria. Document reasons for referral in clinical notes.
- 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: 47–49.

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):40–43.