**Health Professionals’ Notes**

**Boys New Zealand – World Health Organization Growth Chart 0–5 Years**

This information is based on original materials developed by and copyright © 2009 Royal College of Paediatrics and Child Health, United Kingdom. It was adapted by the New Zealand Ministry of Health in July 2010.

**Who should use this chart?**

Anyone who measures a child, and/or plots or interprets charts, should be suitably trained or be supervised by someone qualified to do so. For further information and training materials see www.moh.govt.nz/wellchild and www.growthcharts.rcpch.ac.uk

A growth chart for all children

This chart, which is suitable for use with New Zealand children of any race, combines World Health Organization (WHO) standards with United Kingdom preterm and birth data. The chart from 2 weeks to 5 years of age is based on the WHO growth standard, derived from measurements of healthy, non-deprived, breastfed children of mothers who did not smoke. The chart for birth measurements (32–42 weeks gestation) is based on British children measured around 1990. The charts depict a healthy pattern of growth that is desirable for all children, whether breastfed or formula fed, and of whatever ethnic origin.

### Weighing and measuring

**Weight:** use only clinical electronic scales in metric setting. For children up to 2 years, remove all clothes and nappy; children older than 2 years should wear minimal clothing only. Always remove shoes. **Length:** (before 2 years of age): proper equipment is essential (length board or mat). Measurers should be trained. The child's shoes and nappy should be removed.

**Height:** (from 2 years): use a rigid rule with 1 piece, or stadiometer; the child’s shoes should be removed.

**Head circumference:** use a narrow plastic measuring tape where the head circumference is greatest. Any hat or bonnet should be removed. Be aware of cultural issues around touching heads.

**When to weigh**

*Baby should be weighed in the first week as part of the assessment of feeding. Recovery of birthweight usually occurs by 10 to 14 days, and indicates that feeding is effective and that the child is well. Once feeding is established, babies should usually be weighed at the time of routine checks. If there is concern, weigh more often; however, weights measured too close together are often misleading, so babies should not be routinely weighed more frequently than at each Well Child/ Tamaki Oranga check.*

### Interpreting the chart

**Assessing weight loss after birth**

Most babies lose some weight after birth, but 80% will have regained this by 2 weeks of age. Careful clinical assessment and evaluation of feeding technique is indicated when weight loss exceeds 10% or recovery of birth weight is slow.

*Percentage weight loss can be calculated as follows:*

- **Weight loss = current weight – birth weight**
- **Percentage weight loss = weight loss / Birth weight**

For example, a child born at 3.50kg who drops to 3.15kg at 5 days has lost 350g or 10%; in a baby born at 3.00kg, a 300g loss is 10%.

### What do the centiles mean?

A single point on these charts indicates a child’s size compared with children of the same age and maturity who have shown optimum growth. When there is more than one point, the chart shows how quickly a child is growing. The centile lines indicate a range of weights and heights (or lengths), each describes the number of children expected to be below that line (eg, 50% below 50th, 91% below the 91st). Children come in all shapes and sizes, but 99 out of 100 children who are growing optimally will be between the two outer lines (0.4th and 99.6th centiles); half will lie between the 25th and 75th centile lines.

*Being very small or very big can sometimes be associated with underlying illness. If there is concern, weigh more often and with care. A child’s weight or height is definitely abnormal, but only 4 per 1000 children who are growing optimally are below the 0.4 centile, so these children should be assessed at some point to exclude any problems. Those above the 99.6 centile for height are almost always healthy. Also calculate BMI for children over 2, so weight and height centiles appear very different (more than two centile lines different).*

### What is a normal rate of weight gain and growth?

*Without illness, babies do not attain a linear growth pattern at the same rate, so a baby’s weight often does not follow a particular centile line, even in the first year. Weight is most likely to track within one centile space (the gap between two centile lines, see diagram). In any healthy child, acute illness can lead to sudden weight loss and a weight centile fall but on recovery the child’s weight usually returns to its normal centile within 2–3 weeks. However, a consistent drop through two or more weight centile spaces is unusual (fewer than 2% of infants) and should be carefully assessed by the primary care team, including measuring length/height.*

Because it is difficult to measure length and height accurately in pre-school children, success measurements commonly overlap at a wide variation. If there are worries about growth, it is useful to measure on a few occasions over time; most healthy children will show a stable average position over time. Head circumference centiles usually track within a range of one centile space. For infants, the first few weeks a drop or rise through two or more centile spaces is unusual (lower than 1% of infants) and should be carefully assessed.

### Why do the length/height centiles change at 2 years?

The growth standards show length data up to 2 years of age, and height from age 2 onwards. When a child is measured standing up, the spine is squashed a little, so their height is slightly less than when they are sitting down. This should shift down slightly at age 2 to allow for this. It is important that this difference does not worry parents; what matters is whether the child continues to follow the same centile after the transition.

### Predicting adult height

*(Note that this is in the Health Professionals’ Notes, but not the Well Child/Tamaki Oranga Healthbook.)*

Parents like to know how tall their child will be as an adult. The centile most recent height centile (aged 2–5 years) gives a good idea of this for healthy children. Plot this centile on the adult height predictor to the right of the height chart to find the average adult height for children on this centile. Four out of five children will have adult heights that are within 6cm above or below this value.

### Weight-height to BMI conversion chart

BMI indicates how heavy a child is relative to his or her height and is the simplest measure of underweight or overweight from the age of 2, when height can be measured fairly accurately. This chart provides an approximate BMI centile, accurate to a quarter of a centile space.

**Instructions for use**

1. *Read off the weight and height centiles from the growth chart.*
2. *Plot the weight centile (left axis) against the height centile (bottom axis) on the chart box.*
3. *If between centiles, read across in this position.*
4. *Read off the corresponding BMI centile from the slanting lines.*
5. *Record the centile with the date and child’s age in the data box.*

**Interpretation**

In a child over 2 years of age, the BMI centile is a better indicator of overweight or underweight than the weight centile; 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; a child above the 98th centile is very overweight (clinically obese). BMI below the 2nd centile is unusual and may reflect undernutrition.

### References

1. www.stats.waikato.ac.nz/dgrawt/dwv
Plot actual age then draw a gestational correction.

Some degree of weight loss is common after birth. Calculating the percentage weight loss is a useful way to identify babies who need assessment.

Measure length until age 2; measure height after age 2.