

## NEW ZEALAND – WORLD HEALTH ORGANIZATION GROWTH CHARTS



New Zealand Government



## FACT SHEET 3

## MEASURING AND PLOTTING

This information sheet 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.

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](http://www.moh.govt.nz/wellchild)

## In this fact sheet

This fact sheet outlines the essentials of measuring and plotting (note that birth measurements are covered in Fact Sheet 4). Anyone who measures a child, and/or plots or interprets charts, should be suitably trained or be supervised by someone qualified to do so. They should also be aware of cultural issues. If you have never been formally taught, this fact sheet will introduce you to what you need to know. If you have been taught you can use it to refresh and check on your knowledge.

Topics covered in this fact sheet include:

- measuring weight, length, height and head circumference
- plotting measurements on the chart
- calculating age
- understanding centile positions.

## When should babies and children be weighed and measured?

Child growth and development should be assessed at each of the eight core Well Child/Tamariki Ora checks. Growth and length/height should be measured to age 5 years and head circumference measured to age 1 year. Additional growth assessments should be undertaken where there is concern about a child's growth.

The critical issue in assessing growth is the growth velocity. Any baby or child that is being charted as following parallel to the centile lines is doing well. If plotting shows they are falling away, or climbing rapidly, further assessment is required to determine the need for intervention.

## Calculating age

Age calculation errors or misplotting of age are the commonest mistakes made when plotting charts. To prevent errors in calculating age, calculate in weeks for at least the first 6 months, then in calendar months. When calculating age in weeks use a:

- calendar
- date wheel.

When calculating age in calendar months use the day of the birth date. If a child's date of birth was 23/1/10 then the child will be 9 calendar months old on 23/10/10, 10 months old on 23/11/10 and so on.

- Remember there are 13 weeks per 3 calendar months.

## How to measure

(Video clips of proper measuring technique are available at: [www.growthcharts.rcpch.ac.uk](http://www.growthcharts.rcpch.ac.uk))

## Measuring weight

Babies should be weighed without any clothes or nappy. Children older than 2 years can be weighed in vest and pants, but without shoes, footwear, and any dolls or teddies in hand. Only clinical electronic scales in metric setting should be used, to give accurate readings. Scales should be calibrated regularly (ideally, every six months).

## Measuring head circumference

Head circumference should be measured using a narrow plastic or disposable paper tape, and measurement should be taken where the head circumference is widest. It is good practice to take three measurements and use the average. Any hat or bonnet should be removed.



It is important that anyone measuring the head circumference is aware of the cultural issues around touching heads. For Māori the head is regarded as tapu (sacred) and patting the head of a child or placing hats and measuring tapes anywhere near food or on a table is unhealthy. Before starting, check with parents/caregivers that it is OK to touch the child's head and to remove any hat or bonnet.

## Measuring length and height

Proper equipment is essential for both. Always remove shoes or other footwear. Length should also be measured without a nappy, using a length board or mat. It is good practice to take three measurements and use the average.



- Under 2 years of age, measure length using a length board or mat.
- Over 2 years, measure height using a rigid upright measure with a T piece or a stadiometer.

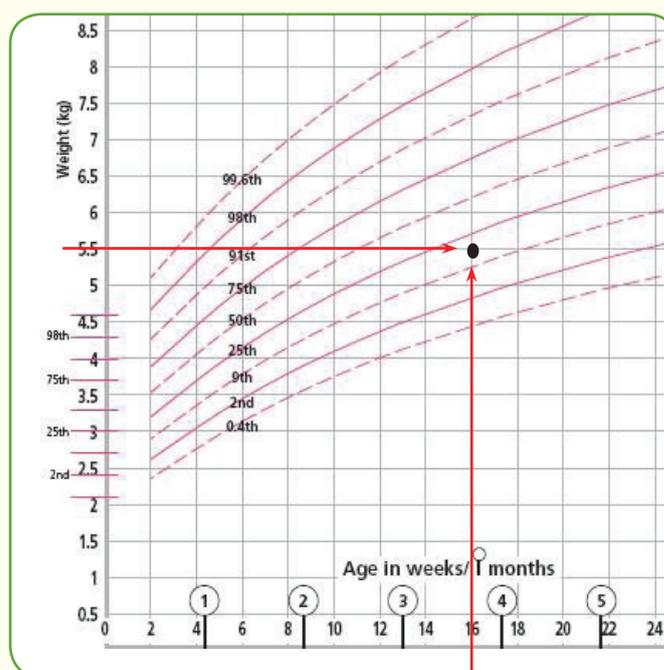


## Plotting measurements on the chart

## Basic plotting

Whatever measurement is being plotted, an accurate calculation of age is needed.

The chart section below indicates correct plotting using age and weight. The point on the graph is marked with a small but noticeable dot • drawn with a pencil, *not an ink pen*.



This chart section shows the plotted weight of a child who is 16 weeks old and weighs 5.5 kg. This child is described as being between the 9th and 25th centile for weight.

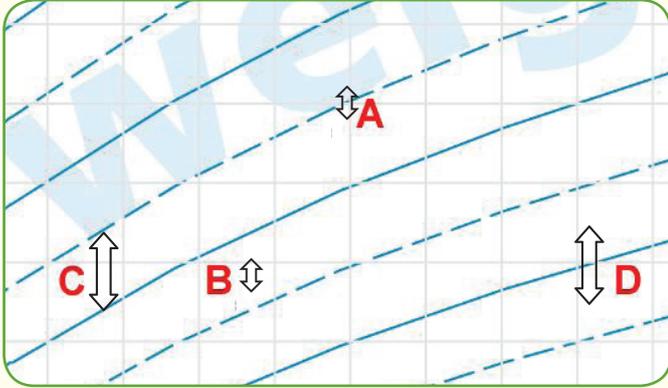
## What do centiles show?

### Finding the right centile

There are centile labels at both ends of each curve. The 50th centile does not stand out on the charts to avoid suggesting to parents that all children should be on or near this line. However, the 50th centile is easily identifiable, as the curve label ('weight', 'length' etc) always sits on the 50th centile.

### Understanding centile positions

Once plotted on a chart, a child's measurement will be described as being on a centile or between two centiles.

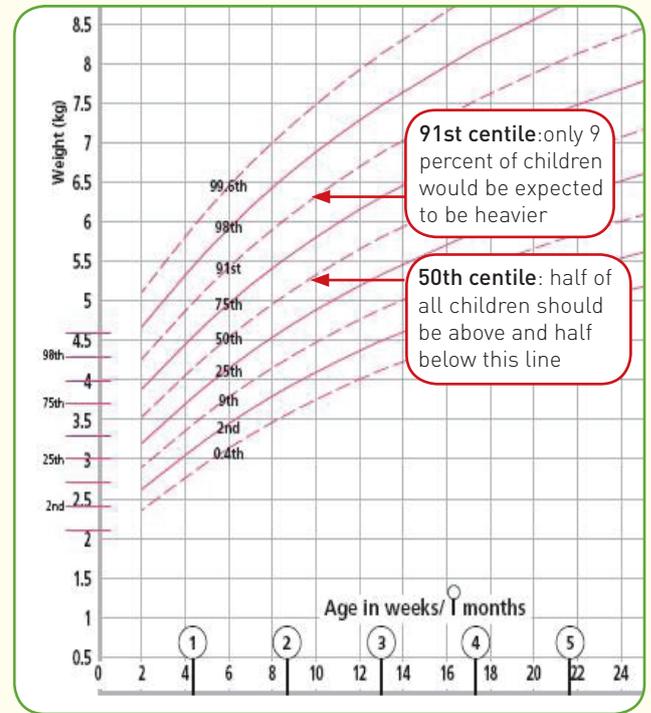


If the point marked is within  $\frac{1}{4}$  of a space of the line (see A above), the child is described as being on the centile: eg, on the 91st centile. If the point is further away (B), they should be described as being between the two centiles: eg, between the 75th and 91st centile.

A centile space is the distance between two of the marked centile lines (C), or equivalent distance if midway between centiles (D).

### Measurement key points

- All measurers should be trained
- Weighing:
  - Use only electronic scales that are calibrated regularly
  - Weigh babies naked, toddlers in vest and pants, without shoes
- Head circumference:
  - Use narrow, paper or plastic tape round widest part of the head
  - Average of three
- Length (up to age 2):
  - Proper equipment essential (length board or mat)
  - Shoes and nappy removed
  - Average of three
- Height (after age 2):
  - Rigid rule with T piece or stadiometer
  - Shoes removed
  - Average of three
- Never measure or weigh in shoes



Remember: Growth monitoring is a process of taking measurements and plotting to see the changes over time. It is important that each measurement is accurate and plotted correctly so that the pattern of growth can be properly assessed.

### Plotting key points

- Record measurement and date in ink.
- Plot in pencil.
- Age errors are the most common source of plotting mistakes.
- Centile describes the percentage expected to be below that line.
- A child is:
  - on a centile if within  $\frac{1}{4}$  space of line.
  - between the two centiles if not.
- A centile space is the distance between two centile lines.