Guideline

NSW GOVERNMENT | Health

Growth Assessment in Children and Weight Status Assessment in Adults

Summary To support core patient care, this document describes the following:

- A standardised approach to measuring weight and height in children and adults, and to measuring length and head circumference in younger children.
- Interpreting and recording these measurements as part of determining weight status.
- Key equipment and patient considerations around taking these measurements.

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GUIDELINE SUMMARY

GROWTH ASSESSMENT IN CHILDREN AND WEIGHT STATUS ASSESSMENT IN ADULTS

PURPOSE

To support core patient care, this document describes the following:

- A standardised approach to measuring weight and height in children and adults, and to measuring length and head circumference in younger children.
- Interpreting and recording these measurements as part of determining weight status.
- Key equipment and patient considerations around taking these measurements.

KEY PRINCIPLES

Weight and height measurement of children and adults – or weight, length and head circumference measurement of younger children – should be performed on a regular basis as part of providing good clinical care. For example, it is necessary to measure weight, height and head circumference in order to monitor children's growth. It is also necessary to measure weight and height (or length) to determine weight status in children and adults.

Standardised measurement and interpretation of weight, height, length and weight status, will improve the accuracy and usefulness of measurements over time and across facilities, and support clinical decision making.

USE OF THE GUIDELINE

This guideline helps clinicians perform weight, height, length, or head circumference measurements of their patients, and to use these measurements to assess their patients' weight status.

This guideline also helps managers design and establish workflow practices that enable routine measurements.

REVISION HISTORY

Version	Approved by	Amendment notes
November 2017 (GL2017_021)	Deputy Secretary, Population and Public Health	New Guideline.

ATTACHMENTS

1. Growth Assessment in Children and Weight Status Assessment in Adults: Guideline

Growth Assessment in Children and Weight Status Assessment in Adults

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GUIDELINE

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1 INTRODUCTION

1.1 Purpose

It is necessary to measure weight, height, and head circumference in order to monitor children's growth. It is also necessary to measure weight and height to determine weight status in children and adults. Weight and height measurement of both children and adults should therefore be performed on a regular basis as part of providing good clinical care.

This document describes a standardised approach to measuring weight and height in children and adults, and to measuring length and head circumference in younger children. This document also describes interpreting and recording these measurements as part of determining weight status.

Standardised measurement and interpretation of weight, height, and weight status will improve the accuracy and usefulness of measurements over time and across facilities, and support clinical decision making.

1.2 Key definitions and abbreviations

BMI	Body mass index, an indicator of weight status, calculated by dividing the weight in kilograms by the height in metres squared (kg/m^2).
Children	Used in this document to refer to children from birth to age 16.
Percentile	A percentile or 'centile' is a measure indicating the value below which a given percentage of observations fall. For weight and height measurements, the observed value is compared to a standard reference population. For example, if a patient's measured BMI is on the 85th percentile, it means that 85% of observed BMIs in the standard reference population fall at or below the patient's BMI.
Stadiometer	Equipment for measuring height or length. A standing stadiometer is used for measuring height, and a supine or recumbent stadiometer is used for measuring length. A supine stadiometer may also be referred to as an infantometer or length board.
Weight status	Based on BMI measurements in adults, and on sex-specific BMI-for-age centiles in children, the weight status provides a clinical description of whether a patient is below a healthy weight (underweight), at a healthy weight, above a healthy weight (overweight), or well above a healthy weight (obese).

2 PREPARATION

2.1 Equipment

2.1.1 Types of equipment

Contingent on clinical setting, types of equipment required can include:

- Infant scales, accurate to 10 grams, and with a weight capacity of 20kg.
- Weight scales, including sitting (chair) and standing scales, accurate to 10 grams for children, and to 100 grams for adults. Standing scales should have a weight capacity of above 300 kilograms in adult settings or 150 kilograms in paediatric-only settings, and a platform size appropriate for patients who are above a healthy weight. Chair scales should be battery operated, to facilitate bedside access and reduce dependence on power outlet availability.
- Supine stadiometers, also known as an infantometer or length board, with a fixed head piece, horizontal backboard, and adjustable footboard, or an purpose-built infant measuring mat, for measuring length in young children.
- Standing stadiometers, either wall mounted or portable, with a fixed backboard, adjustable headboard, and a marked calibration point, for measuring height, accurate to millimetres. Stadiometers should have a calibration point that enables regular accuracy checks.
- Tape measures accurate to millimetres, for other measurements such as head circumference, leg length, and arm span. Depending on the measurement, tape measures can be paper, non-stretchable plastic, or metal.

2.1.2 Using equipment

Equipment should be calibrated and maintained on a regular basis, according to protocol and as guided by manufacturer instructions. This includes calibration of all equipment at least once every 12 months, and more frequently with some equipment.

Co-locate equipment in an easily accessible space to promote efficient workflow practice. Ideally, identify a central, designated location for all weight and height/length equipment, so that measurements can be easily performed, recorded at point of care, and entered directly into the electronic medical record (eMR) via a fixed or portable computer.

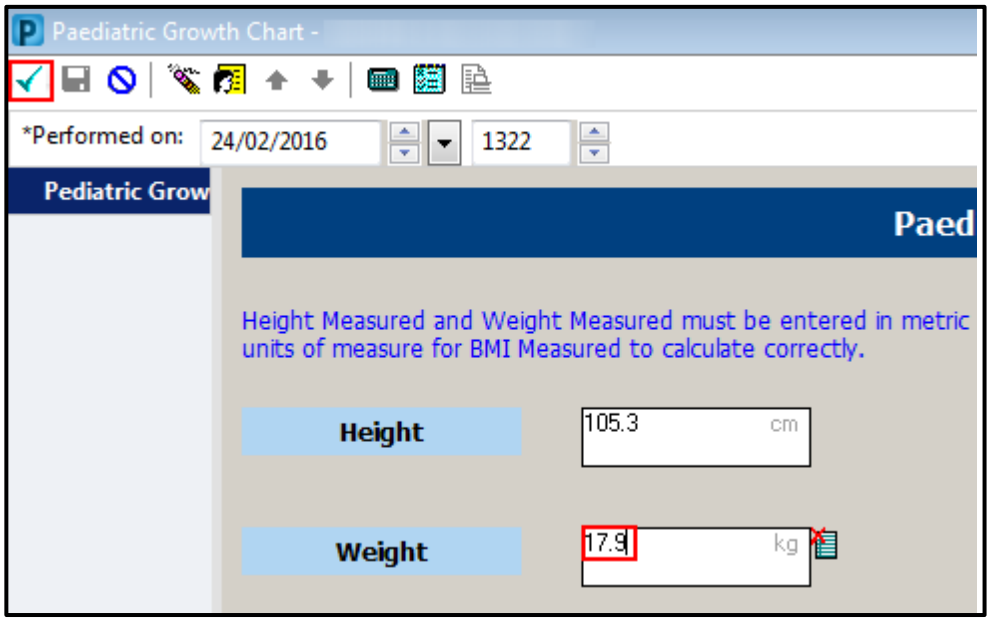
Measurements should be entered into the local eMR entry fields for actual weight, height, or length. As an example, Figure 1 (*below*) shows these fields as they appear in PowerChart.

Provide adequate storage space for equipment, as well as access to power outlets. Store equipment used for bedside measurements adjacent to the ambulatory equipment.

Clean all equipment before and after use according to infection control protocols where applicable.

Children should not be left unsupervised with measurement equipment.

Figure 1: Weight and height entry fields as they appear on PowerChart's Paediatric Growth Chart



2.1.3 Procurement considerations

An equipment review may be relevant to your clinical setting and the process may include the following steps:

- Identification of all available equipment, including scales and stadiometers.
- Review of equipment's inclusion in asset logs and calibration protocol.
- Assessment of the location, condition, and appropriateness of equipment.
- Check of the accuracy and calibration of weight and height/length equipment with a fixed measure.
- Assessment of the efficiency of local work flow practices, including equipment co-location.
- Assessment of the proximity of electronic device for direct entry into eMR.
- A photograph of each piece of equipment, where possible.

A nominated staff member for each clinical area should be responsible for identifying the most appropriate measurement location, and for developing a clinical workflow that supports efficient measurement practice and routine entry into the eMR in each area.

A nominated officer should oversee the purchase and allocation of equipment, and work with local ward or clinic staff to develop a 'measurement station' as appropriate.

Consider the area's clinical requirements and the patient population when considering an upgrade or replacement of equipment for the measurement of weight and height/length. For example, a lightweight, battery-operated infant scale is more appropriate where bench space is limited, and expensive scales that record body fat percentage are only required in highly specialist areas.

2.2 Patient considerations

2.2.1 Clinical appropriateness

Weight and height measurements should be performed wherever practical and appropriate.

As per the '*Nutrition Care Procedure*'(1):

- All patients under the age of 18 years **must** have their weight and height/length measured and documented within 24 hours of admission and weight should continue to be measured and documented at least weekly in the acute setting and at least monthly in long stay facilities. Head circumference should also be measured and documented from birth to at least two years of age on admission.
- All patients 18 years and older should have their weight and height measured and documented within 24 hours of admission and weight should continue to be measured and documented at least weekly in the acute setting and at least monthly in long stay facilities (e.g. multipurpose services, rehabilitation centres, mental health facilities).

There are a small number of clinical situations where measuring weight and height may not be appropriate, or else does not enhance patient care, such as life-threatening illness and end-of-life care.

2.2.2 Preparation

- The procedure for measuring weight and height should be explained to all patients; and with children, to their parents or caregivers, where applicable. Explanation should include how measurements will be taken and recorded, as well as the importance of obtaining an accurate measurement. Health professionals should be considerate of patient sensitivities and anxieties and should address these as part of the explanation.
- Adolescents may prefer to be away from their parents for measurement or discussion. Cultural needs and religious practices should be respected.
- Privacy should be provided as far as practical. Private or semi-private (curtained) areas are most appropriate.
- Patients with comprehension or language difficulties should be assessed with the help of a carer or an interpreter as appropriate.

2.2.3 Considering children

Explain to the child and the family what you are doing and why. Explain to the family that younger children can experience distress when measurements are taken, and that a caregiver's presence and reassurance can minimise the child's distress. Consider engaging younger children in play, including demonstrating with toys, to reduce anxiety. It can be helpful to ask a caregiver to assist with holding a child in the correct position while measurements are taken.

2.2.4 Advising the patient of their weight status

Given the importance of weight status in many clinical settings and for preventive care (2), weight and height should always be evaluated with reference to the patient's medical history. Understanding the family or social circumstances may also help to deliver the information in an appropriate way.

Patients and/or their families should be advised of the patient's weight status in a positive, sensitive and non-judgemental manner. Avoid any suggestion of blame or disapproval, and focus on delivering the advice using clear language appropriate to the patient.

Avoid language that can be potentially offensive or stigmatising, such as "malnourished", "skinny", "obese", "morbidly obese", and "obesity".

Describe weight status using the following recommended terms, which have been shown to be acceptable to patients and carers:

- Below a healthy weight (instead of underweight)
- At a healthy weight
- Above a healthy weight (instead of overweight)
- Well above a healthy weight (instead of obese)

Advice about weight status should ideally be accompanied with written and visual information, such as a completed BMI-for-age chart for children (*Attachment 3*).

Clinical issues identified by weight and height measurements should be referred for medical or allied health review. These can include concerns with feeding, nutrition, or a weight status below or above a healthy weight.

Weight and height measurements and weight status assessments should be clearly documented in medical records and on discharge summaries. Where a discussion about weight status has occurred, this should be documented as well.

3 MEASURING WEIGHT, HEIGHT, AND HEAD CIRCUMFERENCE IN CHILDREN

Section 3 describes procedures for taking weight, height, length, and head circumference measurements in children. Section 3 also describes conducting a weight status assessment in children. Please refer to Section 5 for measuring children with special requirements.

In children who were born before 37 completed weeks of gestation, it is standard practice to use corrected age instead of gestational age until they are 2 years old. Corrected age is obtained by subtracting the number of weeks premature from the actual age.

This section has been adapted from the Royal Children's Hospital Melbourne's resource on growth measurement. (3,4)

3.1 Weighing children less than 2 years

3.1.1 Equipment

- Use a levelled pan scale, either high quality electronic digital or beam balance. Portable or 'fixed' options are suitable.
- Scale should weigh up to 20kg, in 5 g (0.005kg) increments.
- The tray needs to be large enough to support children up to 2 years of age.
- No length or stature device should be attached, because they do not have a stable platform.
- The scales should be located on a stable, non-carpeted surface.
- Clean the scales after every use.
- Service the scale (including calibration) according to manufacturers' guidelines. This is usually annually or more frequently if the scales are moved regularly; or there are concerns about accuracy.

3.1.2 Preparation

- Place a sheet/paper towel on the scale.
- Child is undressed with the nappy removed.

3.1.3 Procedure

- Turn on scale and 'tare' to zero.
- Place the baby in the centre of the scale and ensure that weight is evenly distributed.
- Weigh with parent/carer on a platform scale if unable to weigh alone. This can be done either using a scale which can be 'zeroed' after the parent/carer stands on

them (a 'taring' scale) or by subtraction as follows:

For example: 60kg parent/carer and a 6.5kg child.
1. Weigh the parent/carer and record weight = 60kg
2. Weigh the parent carer with child = 66.5kg
3. Difference is the weight of the child. e.g. 66.5-60 = 6.5kg

3.1.4 Recording

- Wait until the scales settles at a reading.
- Record weight to the nearest 5g (0.005 kg).
- Make a note if the child is in plaster, harness, or any other item unable to be removed.
- Plot the World Health Organization (WHO) weight-for-age growth chart (*Attachment 2*).
- Children less than 2 who can stand without assistance may be weighed on either infant or platform scales.
- Include measurements and weight status description on relevant clinical documents such as discharge summaries, and in the Child Personal Health Record where appropriate.

3.2 Weighing children 2 years and over

3.2.1 Equipment

- Scales for weighing children can be either high quality beam balance with movable weights, or high quality electronic.
- The scale should weigh in 100g (0.1kg) increments, and can be 'locked' in.
- The scale can be easily 'zeroed'.
- Scales should have a stable weighing platform, which is large enough to support the child.
- If a stature device is attached, the unit must be stable, and requires a stable upright and clearly-identified heel and measuring locations.
- Service the scale (including calibration) according to manufacturers' guidelines. This is usually annually, or more frequently if the scales are moved regularly or there are concerns about accuracy.

3.2.2 Preparation

- Place the scale on a firm surface (not carpet).
- Explain to the child that you are measuring their weight.

- Make sure that any outer heavy clothing such as a coast, jacket, or jumper is removed. Light clothing can be worn.
- Remove shoes and socks and ensure pockets are empty.

3.2.3 Procedure

- Turn the scales on and wait until they zero.
- Ask the child to stand on the middle of the scales, look straight ahead and stand still.
- You may need to move them into the right position.
- Check the child is not holding onto a wall or table; and arms are at their side.
- Wait until the scales settle at a reading.

3.2.4 Recording

- Bend down if necessary to read the scale at eye level.
- Record weight to the nearest 100g (0.1kg).
- Plot weight on the appropriate weight-for-age growth chart (*Attachment 2*).
- Include measurements and weight status description on relevant clinical documents such as discharge summaries, and in the Child Personal Health Record where appropriate.

3.3 Length measurement for children less than 2 years

3.3.1 Equipment

- Length is measured in the recumbent position using an infantometer (infant length board or mat) designed for the purpose.
- The measuring board or mat should have a firm, flat, horizontal surface with a fixed measure in 1mm (0.1cm) increments.
- The device has a fixed head-board at right angles to the measuring board or mat, and a smoothly-moving foot-board perpendicular to the measuring board or mat.

3.3.2 Preparation

- Ask the child to remove their shoes and socks.

3.3.3 Procedure:

- Ask the parent/carer to place the child on the length-board.
- The child should be facing vertically upwards with the crown of the head firmly on the headboard.
- Ensure the child’s body and pelvis are straight along the measuring device.

- Parent holds the child's head against the immovable headboard.
- A second person straightens both of the child's legs, holds the feet with toes pointing directly up and moves the foot-board into position against the child's feet.

3.3.4 Recording

- Record length to the nearest 1mm (0.1cm).
- Plot length of the WHO length-for-age chart (*Attachment 2*).
- Record whether length or height/stature has been measured because length is greater than height/stature. If measuring length of a child over 2 years, subtract 0.7 centimetres from the length to convert it to height, because length measurements are usually larger than height measurements by this amount (5).
- Include measurements and weight status description on relevant clinical documents such as discharge summaries, and in the Child Personal Health Record where appropriate.

3.4 Height/stature measurement for children 2 years and older

3.4.1 Equipment

- Height is measured in the standing position using a stadiometer (height measurer).
- A stadiometer consists of a vertical board with an attached metric ruler with an easily moveable horizontal headboard that can be brought into contact with the most superior part of the head.
- The equipment has a wide and stable platform, or firm uncarpeted floor as the base.
- Equipment should be accurately and firmly mounted on a wall.
- Ensure that fixed position devices have been installed correctly, and re-check after moving or re-location.
- Should have an easy-to-read, stable metric ruler or digital readout in 1mm (0.1cm) increments.

3.4.2 Preparation

- Show the child the stadiometer and explain you are going to see how tall they are.
- It can be helpful to measure the parent first if the child is hesitant.
- Take the child over to the stadiometer and make sure they face away from the equipment.
- Remove the child's shoes and socks.

3.4.3 Procedure

- Position the child facing away from the stadiometer or wall:
  - with bare feet close together,
  - legs straight,
  - arms at sides and shoulders relaxed.
- Ask the child to look straight ahead, and take a big breath in and out to relax.
- Double-check their position, making sure their knees are straight, heels on the floor, and head, shoulder blades, bottom, and heels are in contact with the stadiometer (height measurer) or the wall. Check that their arms are by their sides, and shoulders relaxed. Check that a horizontal line can be drawn from the lower border of the eye to the tragus, located over the ear canal.
- Bring the measuring device down to rest on the child's head.

3.4.4 Recording

- Record height to the nearest 1mm (0.1cm).
- Plot height on the appropriate height-for-age growth chart (*Attachment 2*).
- Record whether height/stature has been measured because length is greater than height/stature.
- Include measurements and weight status description on relevant clinical documents such as discharge summaries, and in the Child Personal Health Record where appropriate.

3.5 Determining weight status in children

In children aged up to 2 years old, appropriate interpretation of serial measurements on the weight-for-age and length-for-age growth charts will allow determination of the child's weight status (*Attachment 2*). For example:

- If the percentile recorded on the weight-for-age chart is roughly the same as the percentile recorded on the length-for-age chart, the child is growing appropriately.
- If the percentile documented on the weight-for-age chart is higher than the percentile documented for the length-for-age chart, and especially if the difference is increasing, then the child is accumulating excess weight for their length, and the child's feeding pattern and intake should be discussed with the parent.
- If the percentile documented on the weight-for-age chart is lower than the percentile documented for the length-for-age chart, and especially if the difference is becoming more pronounced, then the child is not gaining enough weight for their length, and the child's feeding pattern and intake should be discussed with the parent.

If a more accurate weight status is required in children aged up to 2 years, the appropriate weight-for-length percentile chart can be used.

In children 2 years and older, the weight status is informed by the BMI. BMI is defined as the weight in kilograms divided by the square of the height in metres (kg/m^2). For example, a child who weighs 43.6 kg and whose height is 1.42 m will have a BMI of 21.6kg/m^2 when rounded to 1 decimal place.

$$\begin{aligned} BMI &= 43.6\ kg / (1.42\ m^2) \\ &= 43.6 / 2.0164 \\ &= 21.6\ kg/m^2 \end{aligned}$$

BMI calculators are available in eMR systems and online. An online weight status calculator for children is also available at: https://pro.healthykids.nsw.gov.au/calculator/ (*Attachment 6*).

Interpretation of BMI in children is guided by age and sex. A child's BMI should be plotted against their respective age on the appropriate BMI-for-age chart (*Attachment 3*). An online description of how to plot a child's BMI-for-age is available at: https://pro.healthykids.nsw.gov.au/assess/.

Plotting BMI-for-age will reveal a percentile, which should be interpreted as follows:

- Below the 5th percentile: below a healthy weight
- 5th to below the 85th percentile: a healthy weight
- 85th to below 95th percentiles: above a healthy weight
- 95th percentile and above: well above a healthy weight

A child's weight status should be interpreted with reference to previous assessments. A weight status trend over two or more assessments is more useful for clinical management than a single assessment.

A child's weight status should be interpreted in the context of a thorough clinical assessment, including the child's family, developmental, and social history.

3.6 Head circumference measurement

This section describes head circumference measurement using a tape, either paper or non-stretchable plastic (6). This section is applicable to children aged up to 2 years.

Procedure:

1. Remove any relevant items worn on the head, including accessories such as bows and headbands. Undo hairstyles such as braids or ponytails.
2. Sit the child on the carer's lap facing you.
3. Securely wrap the tape around the widest possible circumference of the head. The tape should be positioned at the broadest part of the forehead above the eyebrows, above the ears, and across the most prominent part at the back of the child's head.

4. Pull the tape gently to compress hair. Read the measurement to the nearest complete 1mm (0.1cm) (do not round up).
5. Take the measurement three times and select the largest measurement.
6. Record the measurement into the medical records and plot on relevant growth chart (*Attachment 2*). Include the measurement on relevant clinical documents such as discharge summaries, and in the Child Personal Health Record where appropriate.

Refer the child for further medical assessment if there are clinical concerns arising from the measurement. This can include:

- the head circumference measurement is, or is trending, below the 3rd or above the 97th percentile.
- the head circumference measurement, or the measurement trend, is disproportionate to the length or the weight. For example, if the head circumference is at the 20th percentile but the length is at the 90th percentile, or if the head circumference is trending up percentiles while the length is trending down.

4 MEASURING WEIGHT AND HEIGHT IN ADULTS

4.1 Weight measurement in adults

This section describes weight measurement using standing or sitting (chair) scales. Please refer to *Section 5* for measuring patients with special requirements.

1. Ensure that the equipment has been checked and calibrated to avoid systematic errors. Position the scales on a flat, hard surface (not carpet), switch it on. Ensure that the display shows 0 kg (usually by pressing ‘tare’ to ‘zero’ the scales).
2. Ask the patient to remove their footwear, outer garments (e.g. jackets, heavy jumpers), items in their pockets, and heavy watches and jewellery.
3. Ask the patient to step onto (or sit on) the scale, completely and evenly, and to remain still.
4. Wait for the output screen to stabilise. Read the value to the nearest 100g (0.1kg). Do not round measurements to the nearest whole or half kilogram. Read the measurements at the eye-level of the measurer.
5. Re-measure if measurement accuracy is in doubt.
6. Ask the patient to step down from the scales and put on removed articles of clothing and accessories.

7. Make appropriate adjustments to the measurement for heavy items worn for medical reasons.
8. Record the measurement into the medical records (to the nearest 100g [0.01kg]) and include the measurement in relevant clinical documents such as discharge summaries.

4.2 Height measurement in adults

This section describes height measurement in adults using a standing stadiometer. Please refer to *Section 5* for measuring patients with special requirements.

1. Ask the patient to remove their shoes and any relevant items worn on the head, including hats, coverings, and accessories such as bows. If it would be insensitive to remove religious headwear, take measurements over light fabric.
2. Stand the patient in the middle of the stadiometer, ensuring that the headboard is well above the patient's head. Ask the patient to stand tall, with knees and heels together, legs straight, shoulders back and relaxed, and hands at the side. Ensure that the patient's heels, head, shoulders, buttocks, and knees are touching the backboard as much as possible. If the patient is unable to stand with all these points touching the board, ensure that the patient's torso remains vertical and that the patient is looking straight ahead.
3. Position the headboard on the patient's head, moving the headboard slowly. Check that the patient's head remains in the Frankfort position, wherein a horizontal line can be drawn from the lower border of the eye to the tragus, located over the ear canal.
4. Ask the patient to breathe in, stand tall, and relax. You can support the patient's head with gentle upward pressure on the mastoid processes (behind the ears) to help the patient stretch. Ask the patient to breathe out and relax whilst stretch is maintained. Check that the headboard remains in contact with the patient's head.
5. Read the height to the nearest 1mm (0.1cm) (do not round up). Read from the same height as the top of the patient's head. If used, remove the 500g weight from the headboard. Move the headboard back into a high position and ask the patient to step away.
6. Re-measure if measurement accuracy is in doubt. Stance-related errors can arise from lumbar lordosis and abdominal protrusion, head and shoulder position, bent knees, or a patient trying very hard to stand straight, including heels being off the ground.
7. Record the measurement (to the nearest 1 mm [0.1cm]) into the medical records and include the measurement in relevant clinical documents such as discharge summaries.

4.3 Determining weight status in adults

BMI is a simple weight-for-height index commonly used to classify weight status. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m^2). For example, an adult who weighs 63.4 kg and whose height is 1.73 m will have a BMI of 21.2 kg/m^2 when rounded to 1 decimal place.

BMI = 63.4 kg / (1.73 m^2)

= 63.4 / 2.9929

= 21.2 kg/m^2

BMI calculators are available on eMR systems and online. Refer to *Attachment 6* (Additional resources) for an online weight status calculator for adults.

Table 1 (*below*) shows the international classification of adult weight status (18 years and older) according to the BMI.

Table 1: Classification of adult (18 years and older) underweight, overweight, and obesity according to body mass index, adapted from the World Health Organization (7)

Classification	Body mass index (kg/m^2) cut-off points
Underweight	**<18.50**
Normal range	**18.50-24.99**
Overweight	**25.00-29.99**
Obese	**≥30.00**
Obese class I	30.00-34.99
Obese class II	35.00-39.99
Obese class III	≥40.00

Note that while these classifications used accepted clinical terms, many people prefer to have their weight status described as ‘above a healthy weight’, rather than ‘obese’.

Across people of different ages, genders, and ethnicities, the proportion and distribution of adiposity is variable. Thus, BMI may not be an accurate index of adiposity in all people, and should be interpreted using clinical judgement.

Borderline-high BMIs should be interpreted with greater concern in people who may be predisposed to higher cardiometabolic risk at lower BMI readings, in people of Asian (including South Asian) Indigenous Australian, or Maori and Pacific Islander descent (2, 7-10).

Conversely, patients with high lean muscle mass, such as athletes, may have a lower risk profile at a higher BMI (2).

5 PATIENTS WITH SPECIAL REQUIREMENTS

5.1 Situations requiring other measurements

Measurements such as height or length may not be possible or practical in the context of a number of medical conditions. Measurements other than height or length may be required to assess growth or cardiometabolic risk, or to estimate adiposity or body surface area. These methods should be performed in consultation with specialist health professionals. Situations that may require an alternate measurement include the following.

- Patients who are able to sit but unable to stand, including:
  - Patients with causes of lower limb deformity, contractures, or muscle wasting, such as spina bifida.
  - Patients who are unable to stand because they are elderly or frail.
  - Patients who are unable to stand because of a fracture or other musculoskeletal condition.
- Limb loss, including amputation and shortened or absent limbs.
- Kyphosis, lordosis, and other conditions affecting spine curvature, including patients who are unable to sit or stand straight due reasons of illness or ageing.

5.2 Situations requiring modified measurement

This section outlines some situations that require modifying weight or height measurement procedures. Modifications are described under each respective situation.

- **Patients with equipment**

  Modification: Patients can present with equipment such as wheelchairs, plasters, spinal braces, or other equipment. Weight measurements must account for equipment weight. Weigh the equipment alone where possible, so that it can be subtracted from the weight of the patient with their equipment. Where the weight of the equipment does not change over time, such as a spinal brace but not a wheelchair with storage, a record of the equipment's weight should be kept for future measurements.

- **Patients with lower limb length discrepancies**

  Modification: Measure height by placing a block under the shorter leg to support a neutral stance.

- **Skeletal dysplasia, including achondroplasia, and syndromes**

  Modification: Use condition-specific sex-specific BMI-for-age charts as guided by specialist health professionals. These include condition-specific growth charts for achondroplasia; and Down, Prader-Willi, and Turner syndromes.

- **Eating disorders**

  Modification: Patients can change into hospital gowns only, with bra and underpants for female patients and underpants for male patients, or as guided by specialist health professionals.

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9. Deurenberg P, Deurenberg-Yap M, Guricci S. Asians are different from Caucasians and from each other in their body mass index/body fat per cent relationship. Obes Rev 2002; 3(3):141-46.
10. National Health and Medical Reseach Council. Nutrition in Aboriginal and Torres Strait Islander peoples. An information paper. Canberra: National Health and Medical Research Council; 2000.
11. World Health Organization. The WHO child growth standards; 2017. [Available from: http://www.who.int/childgrowth/en/.
12. Centers for Disease Control and Prevention. CDC growth charts; 2016. [Available from: https://www.cdc.gov/growthcharts/cdc_charts.htm.

7 LIST OF ATTACHMENTS

1. Implementation checklist
2. World Health Organization (WHO) growth charts (0-2 years)
3. Centers for Disease Control and Prevention (CDC) growth charts (2-18 years)
4. Guide to accurate height measurement of a child
5. Guide to accurate length measurement of a child
6. Additional resources

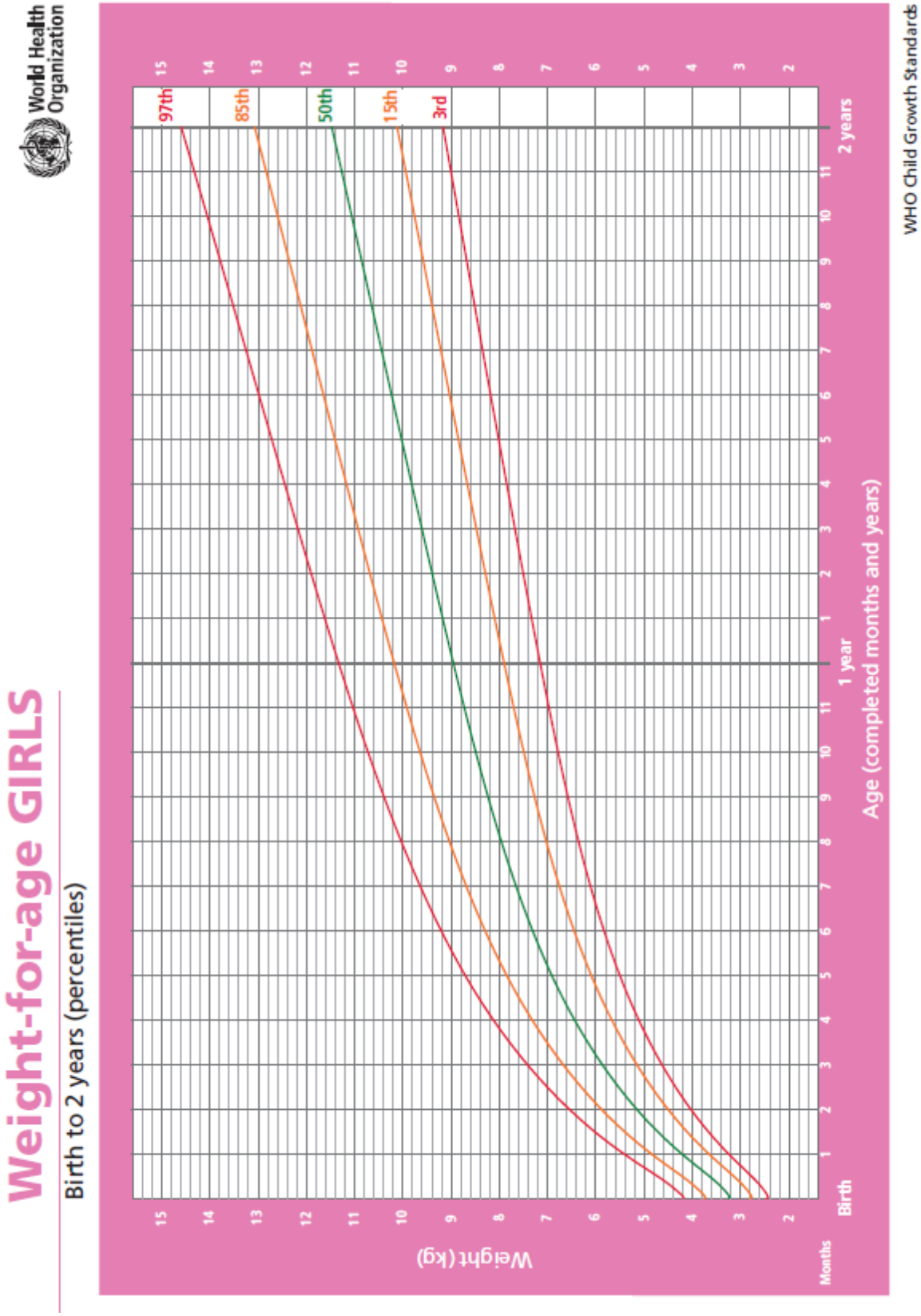
7.1 Attachment 1: Implementation checklist

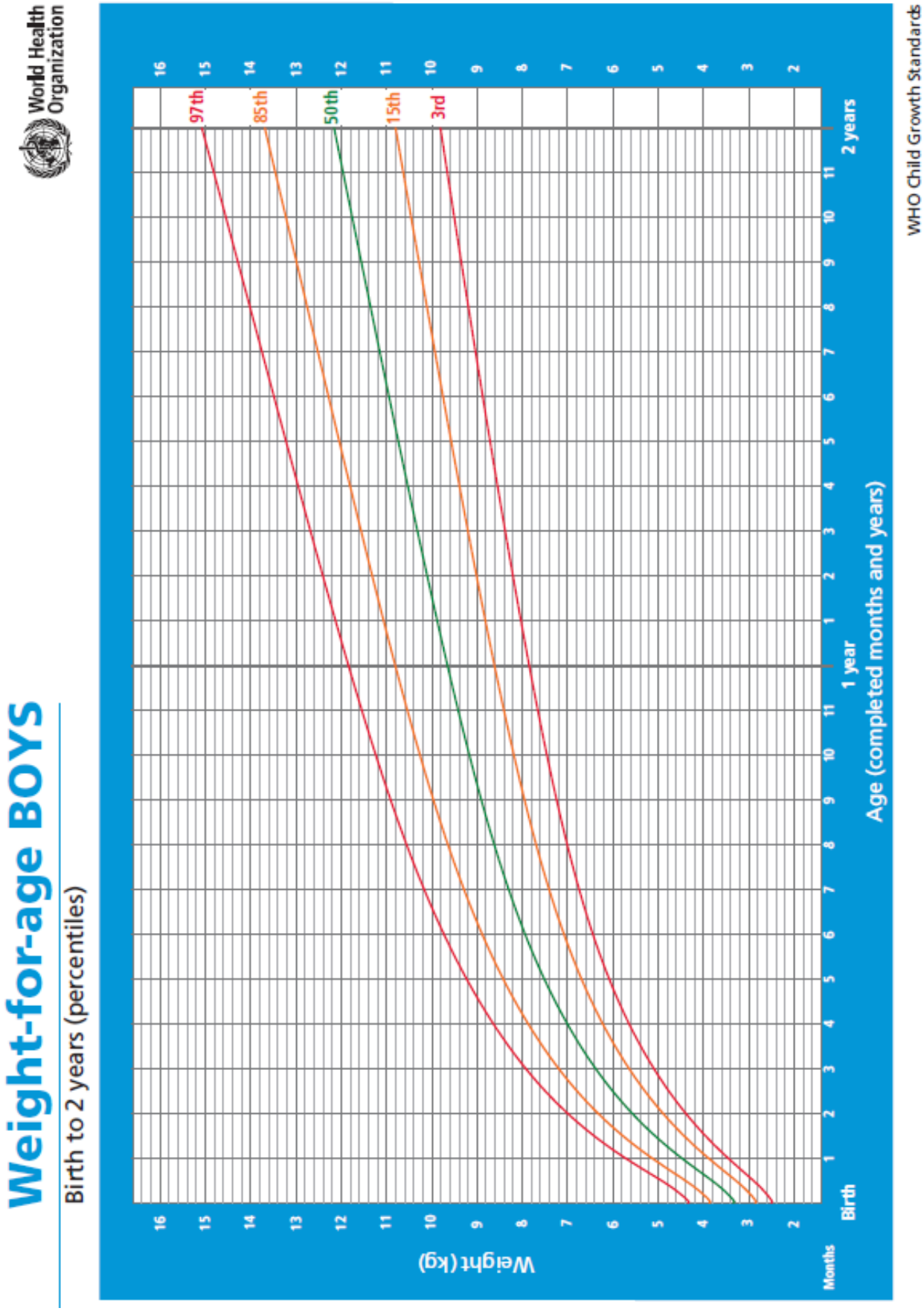
LHD/Facility:			
Assessed by:		Date of Assessment:	
IMPLEMENTATION REQUIREMENTS	**Not commenced**	**Partial compliance**	**Full compliance**
1. Identify all available infant, child and adult measurement equipment, including scales and stadiometers. Where appropriate, infant scales should be on a wall-mounted bench or on a four-wheel trolley that complies with infection control practised with, at minimum, a roll-up infant measure available on the trolley.	❑	❑	❑
	Notes:		
2. Ensure all equipment is included in asset logs and calibration protocol.	❑	❑	❑
	Notes:		
3. Ensure scales and stadiometers are calibrated and maintained on a regular basis, according to protocol and as guided by manufacturer instructions. This includes calibration of all equipment at least once every 12 months, and more frequently with some equipment. Ensure equipment can be quickly checked for accuracy by clinical staff using a fixed measure. All equipment must carry a compliance sticker with a due date.	❑	❑	❑
	Notes:		
4. Assess the appropriateness, location and condition of equipment.	❑	❑	❑
	Notes:		

5.Identify the most appropriate measurement station location, and develop a clinical workflow that supports efficient measurement practice and routine entry into the eMR in each area. Measurement stations must be labelled and should display length and height techniques.	❑	❑	❑
	Notes:		
6.Assess the proximity of electronic device for direct entry into eMR or physical records.	❑	❑	❑
	Notes:		
7.Ensure appropriate growth charts are in use for children up to 2 years old (WHO), and for children 2 years and over (CDC 2000).	❑	❑	❑
	Notes:		
8.Ensure all equipment is cleaned before and after use according to infection control protocols where applicable.	❑	❑	❑
	Notes:		
9.Ensure routine measurements occur at least once every 3 months in children and ideally at least once a year in adults. For inpatients, weigh acute care patients each week, or each month in long stay facilities.	❑	❑	❑
	Notes:		
10.Ensure weight and height measurements and weight status assessments are clearly documented in medical records and on discharge summaries.	❑	❑	❑
	Notes:		
11.Where a discussion about weight status has occurred, ensure this is routinely documented as well.	❑	❑	❑
	Notes:		

7.2 Attachment 2: WHO growth charts (0-2 years)

The following growth charts are from the World Health Organization(11).

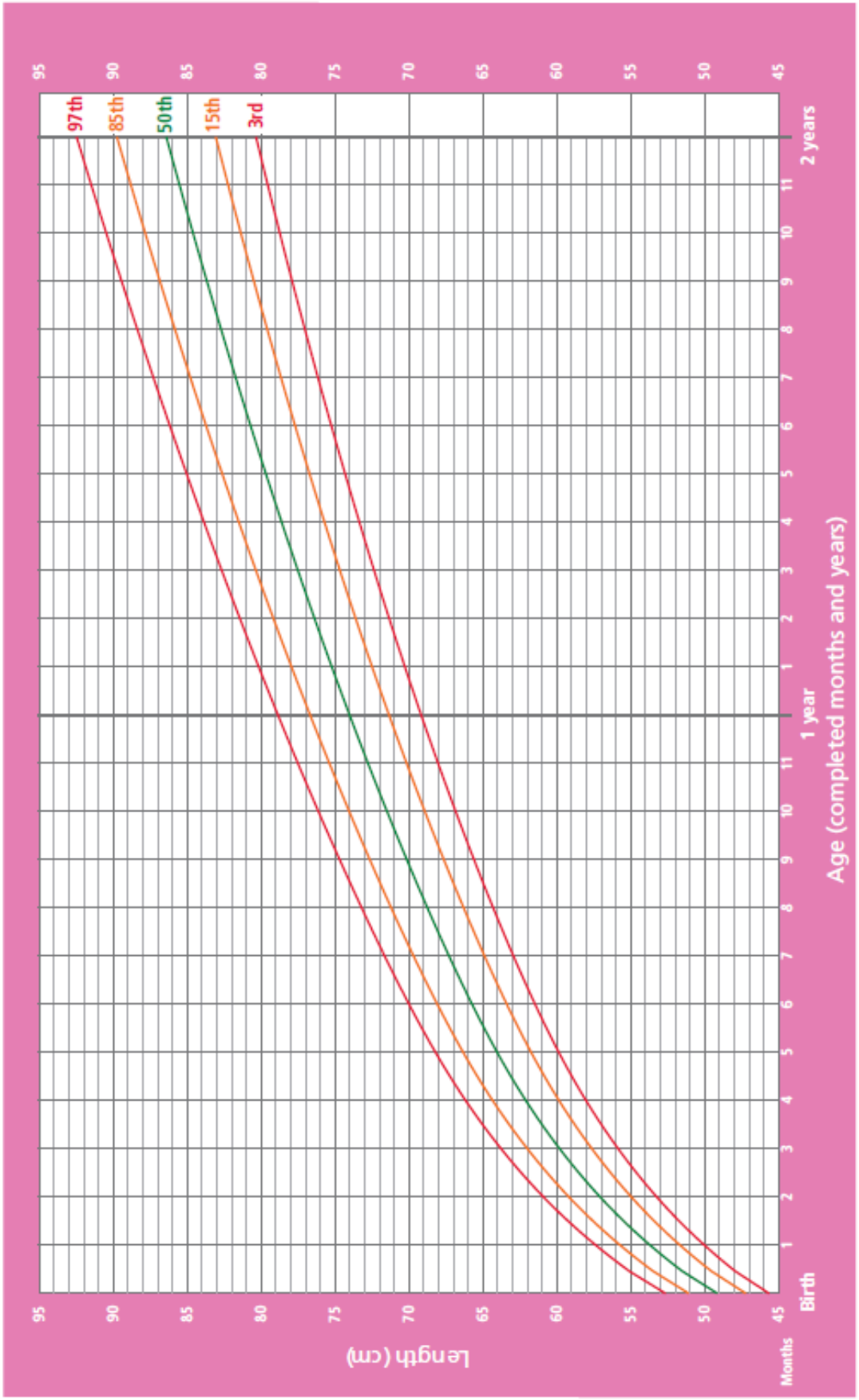



World Health Organization
Weight-for-age BOYS
Birth to 2 years (percentiles)
97th
85th
50th
15th
3rd
Weight (kg)
Months
Birth
1 year
2 years
Age (completed months and years)
WHO Child Growth Standards

World Health Organization

Length-for-age GIRLS

Birth to 2 years (percentiles)

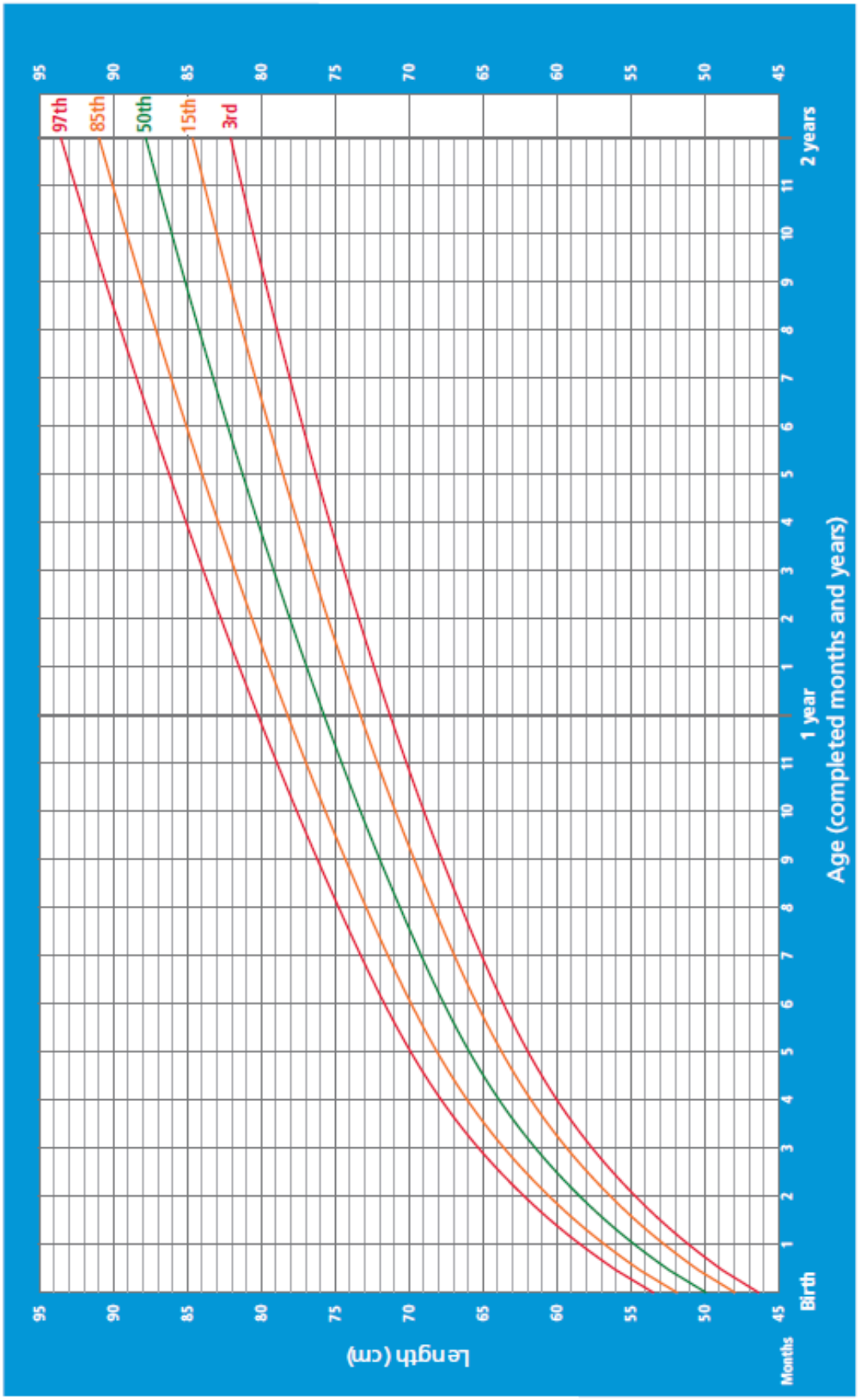


WHO Child Growth Standards

World Health Organization

Length-for-age BOYS

Birth to 2 years (percentiles)

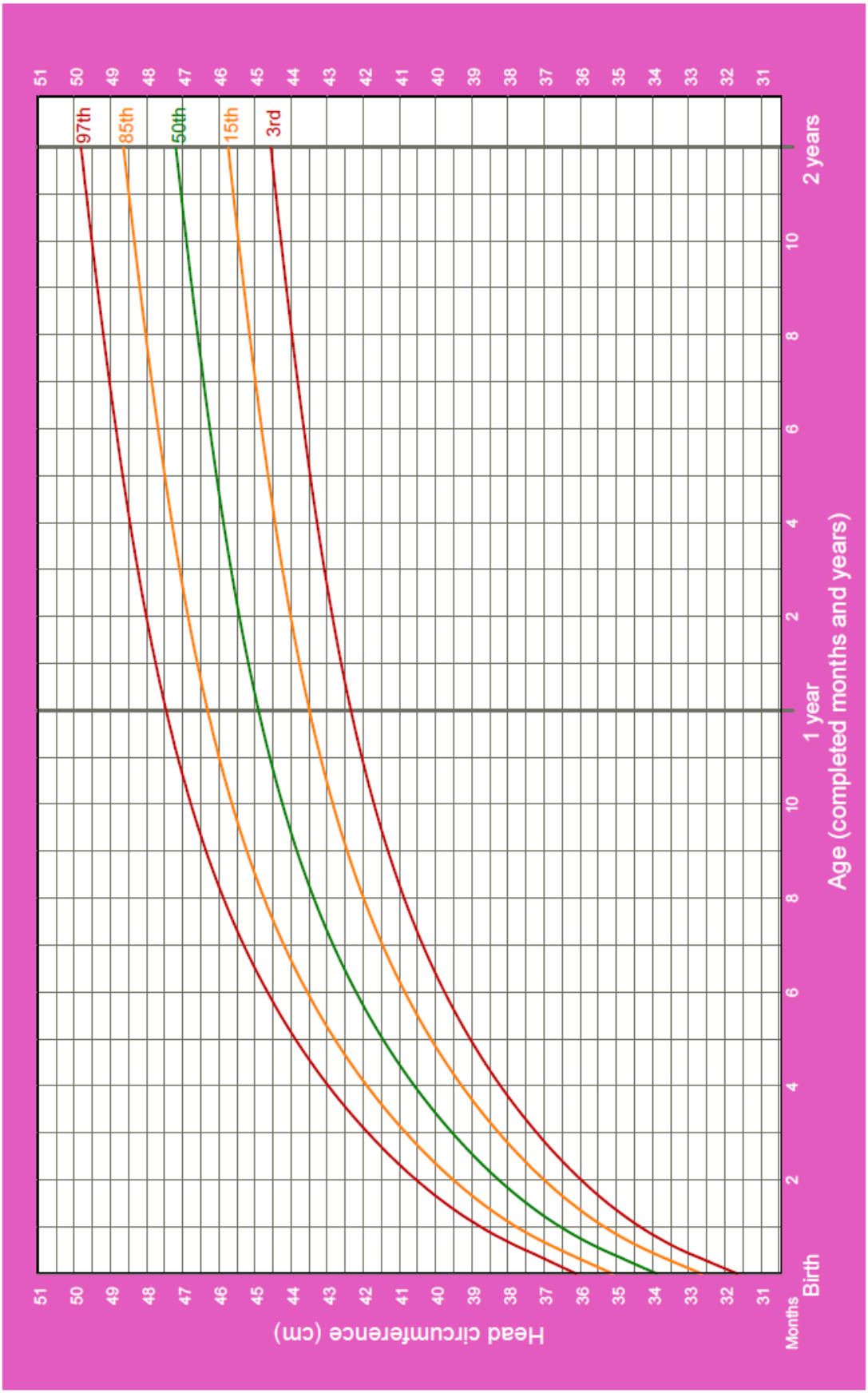


WHO Child Growth Standards

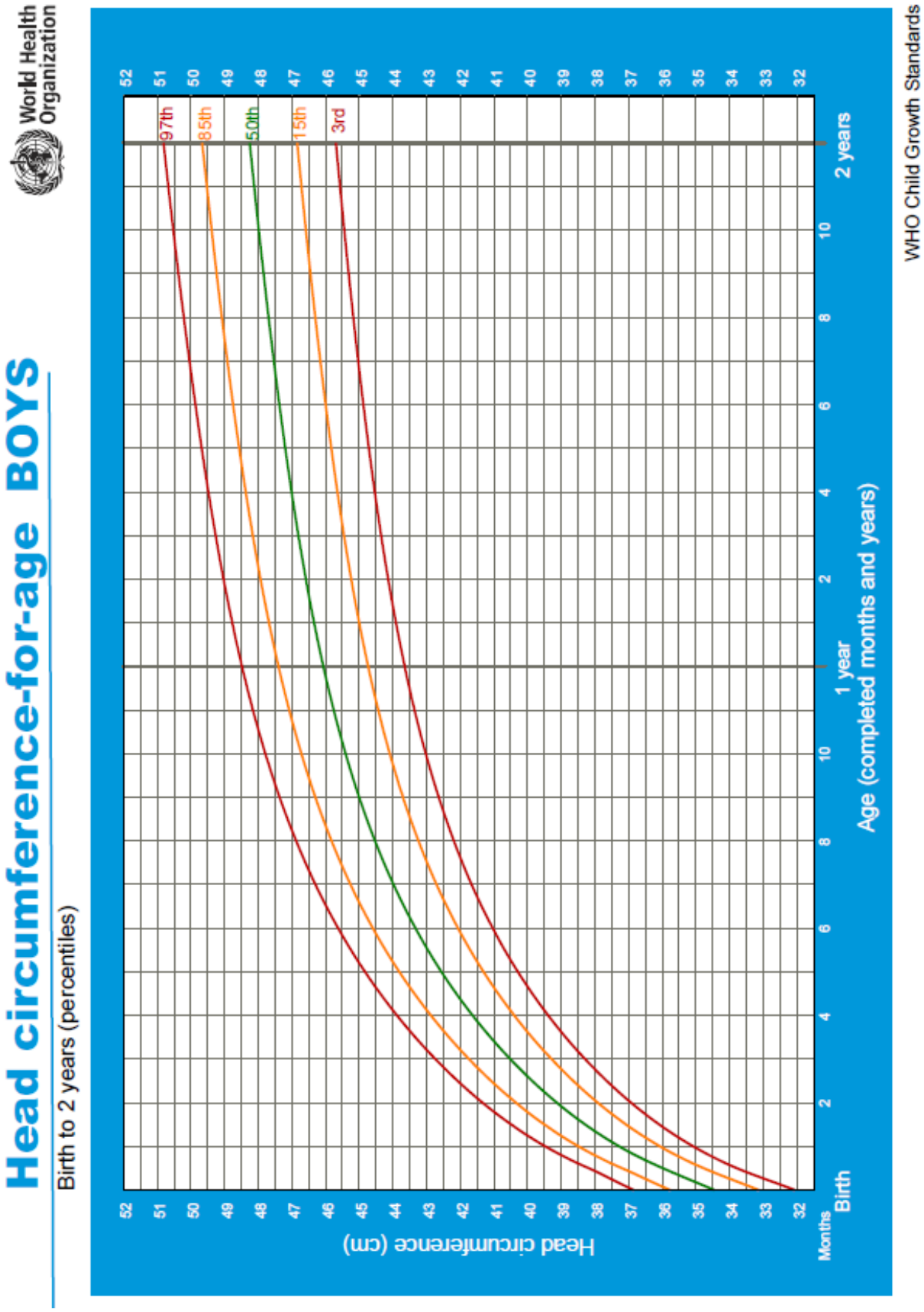
World Health Organization

Head circumference-for-age GIRLS

Birth to 2 years (percentiles)



WHO Child Growth Standards


World Health Organization
Head circumference-for-age BOYS
Birth to 2 years (percentiles)
97th
85th
50th
15th
3rd
Head circumference (cm)
52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32
Months
Birth
2 4 6 8 10
1 year
2 years
Age (completed months and years)
WHO Child Growth Standards

World Health Organization

Weight-for-length GIRLS

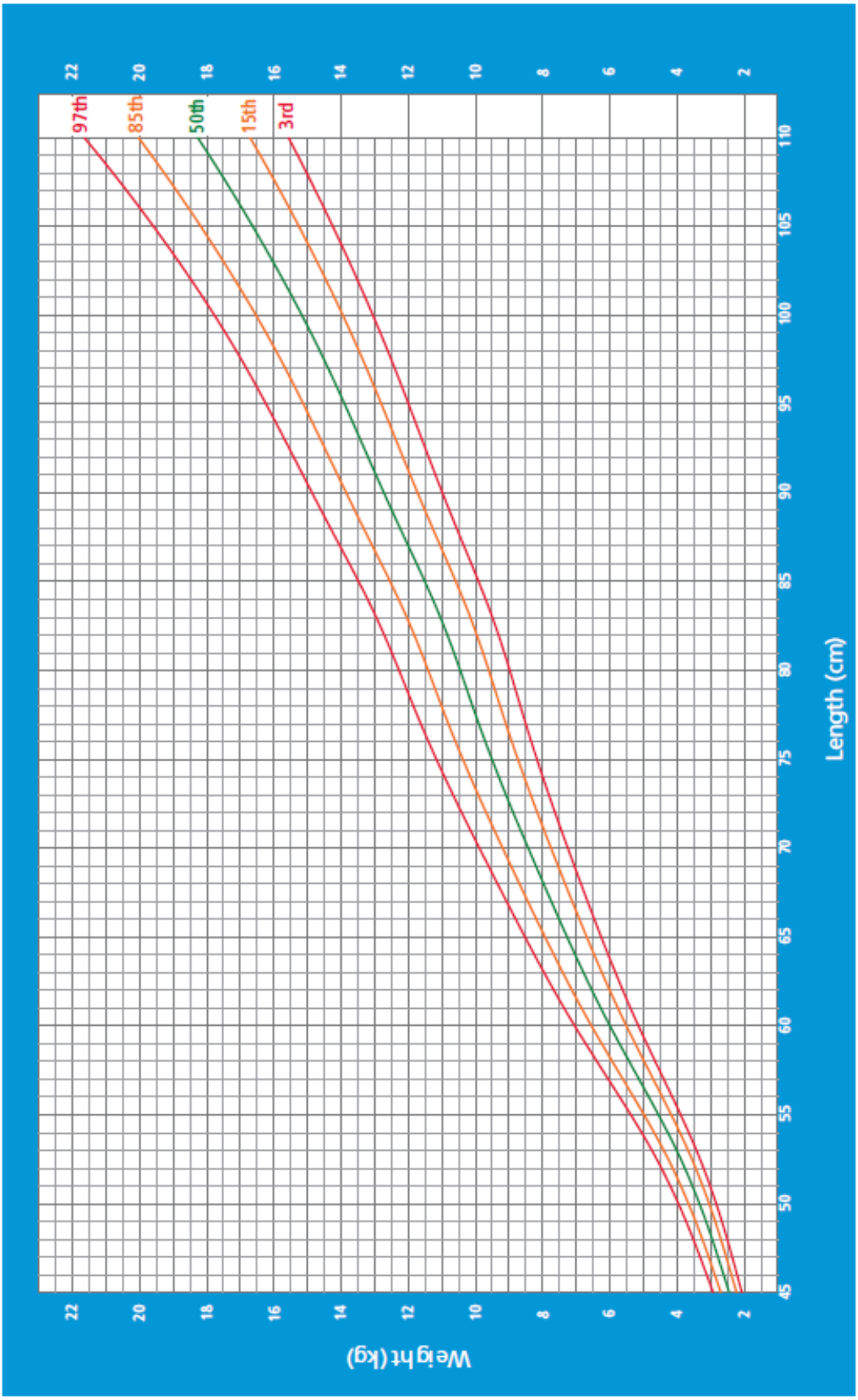
Birth to 2 years (percentiles)

WHO Child Growth Standards

World Health Organization

Weight-for-length BOYS

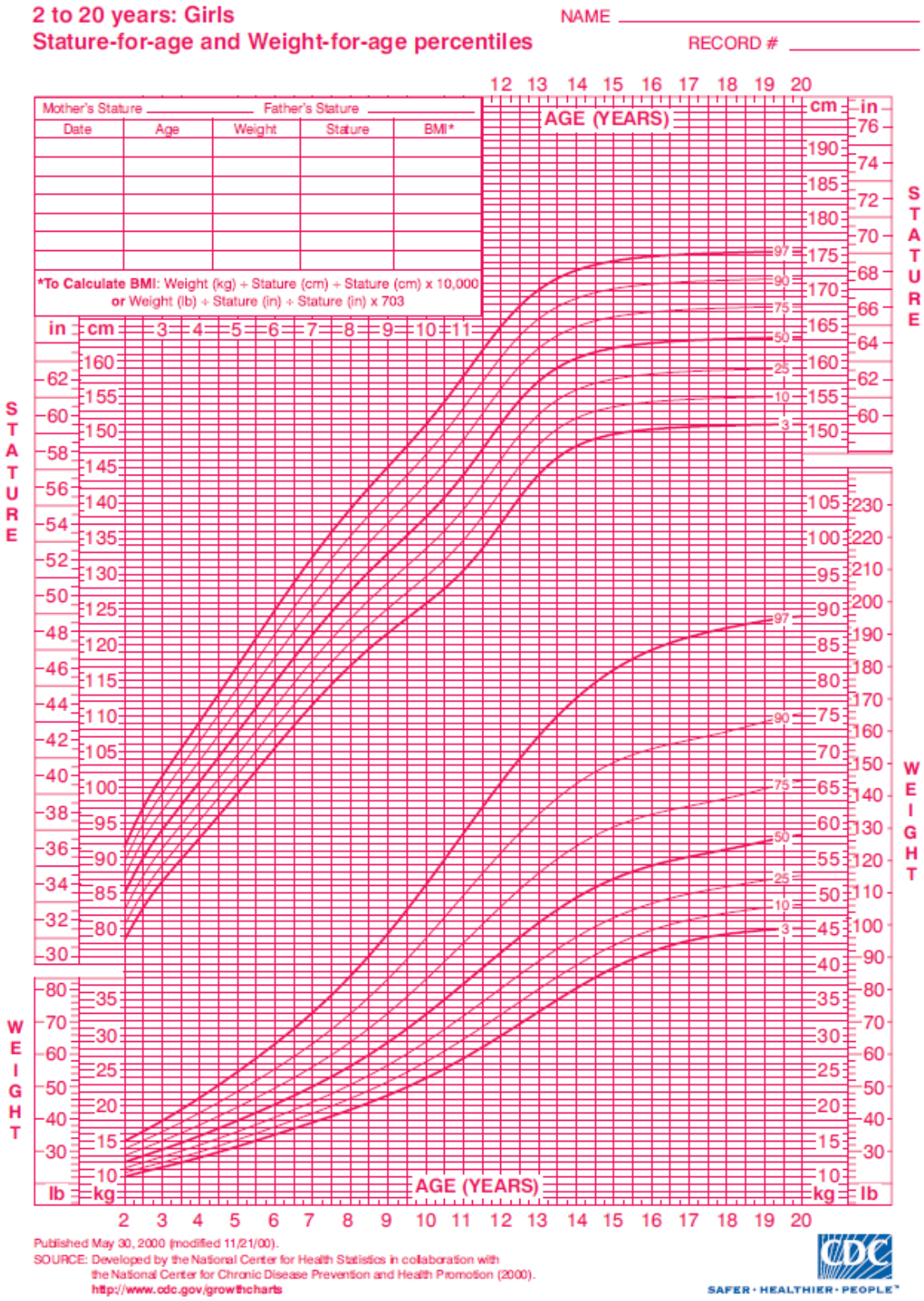
Birth to 2 years (percentiles)



WHO Child Growth Standards

7.3 Attachment 3: CDC growth charts (2-18 years)

The following growth charts are from the Centers for Disease Control and Prevention(12).



2 to 20 years: Boys
Stature-for-age and Weight-for-age percentiles

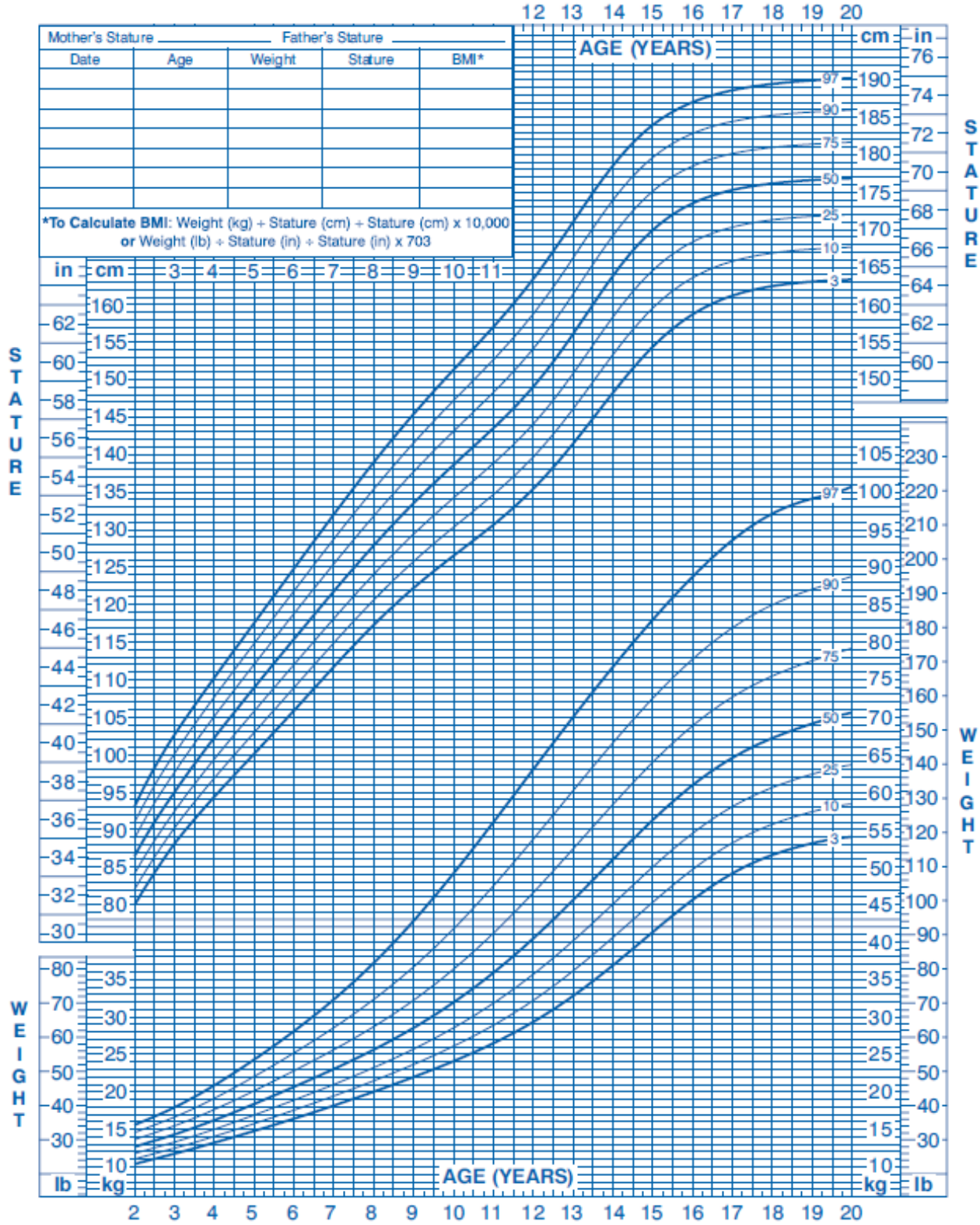
NAME _____

RECORD # _____

Mother's Stature _____ Father's Stature _____

Date	Age	Weight	Stature	BMI*

***To Calculate BMI:** Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 11/21/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

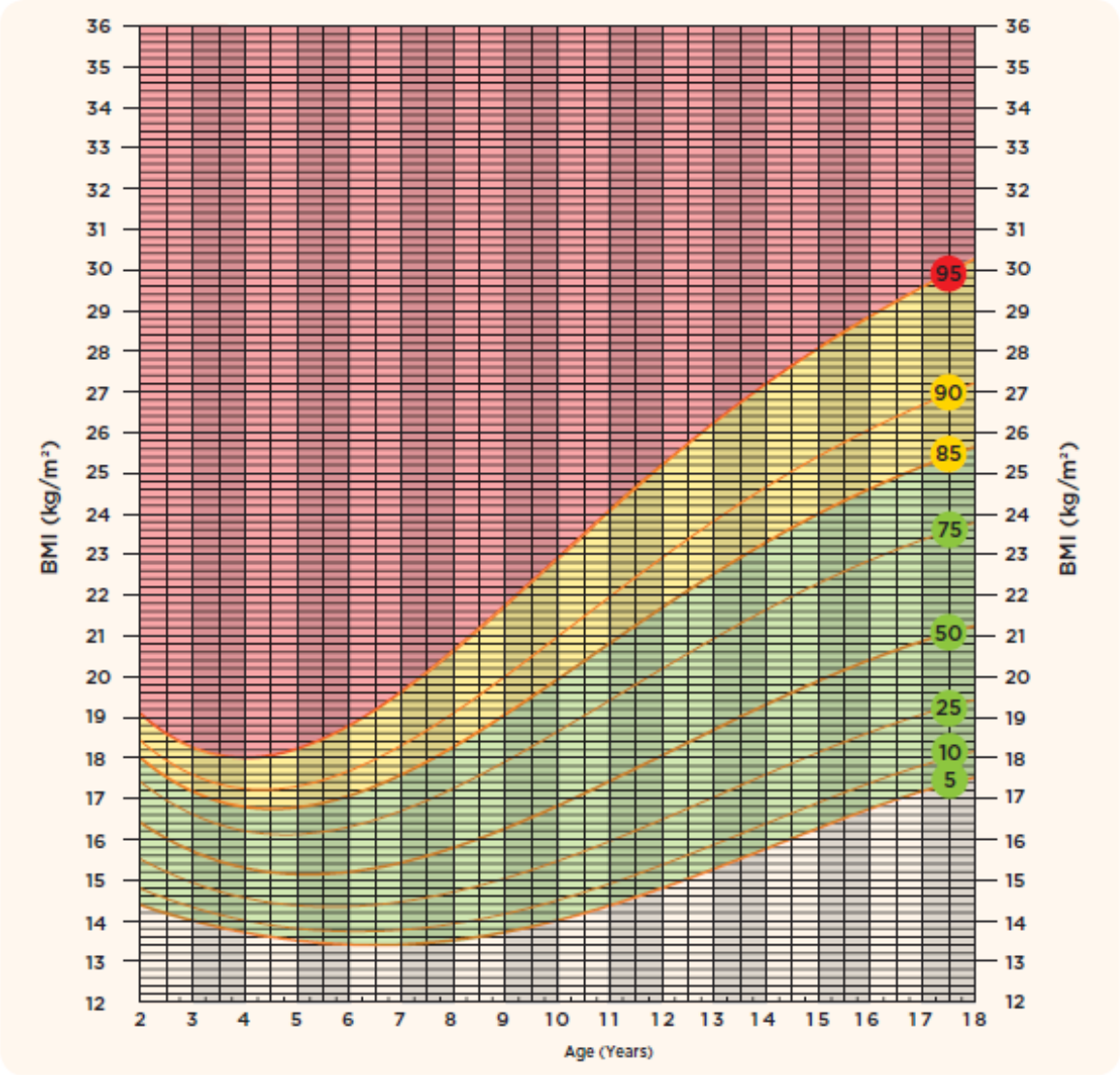
CDC SAFER · HEALTHIER · PEOPLE™

Name: _____ Record number: _____

DOB: _____

Girls: 2 to 18 years

Body mass index (BMI)–for-age percentile chart



Below a healthy weight < 5th percentile (underweight)	Healthy weight 5th percentile to < 85th percentile	Above a healthy weight 85th percentile to < 95th percentile (overweight)	Well above a healthy weight 95th percentile and above (obesity)

Source: Centers for Disease Control and Prevention (CDC) (2000). The BMI for age chart takes the age, height, weight and sex of the child into consideration. The CDC charts are appropriate for children aged 2 to 18 years old.

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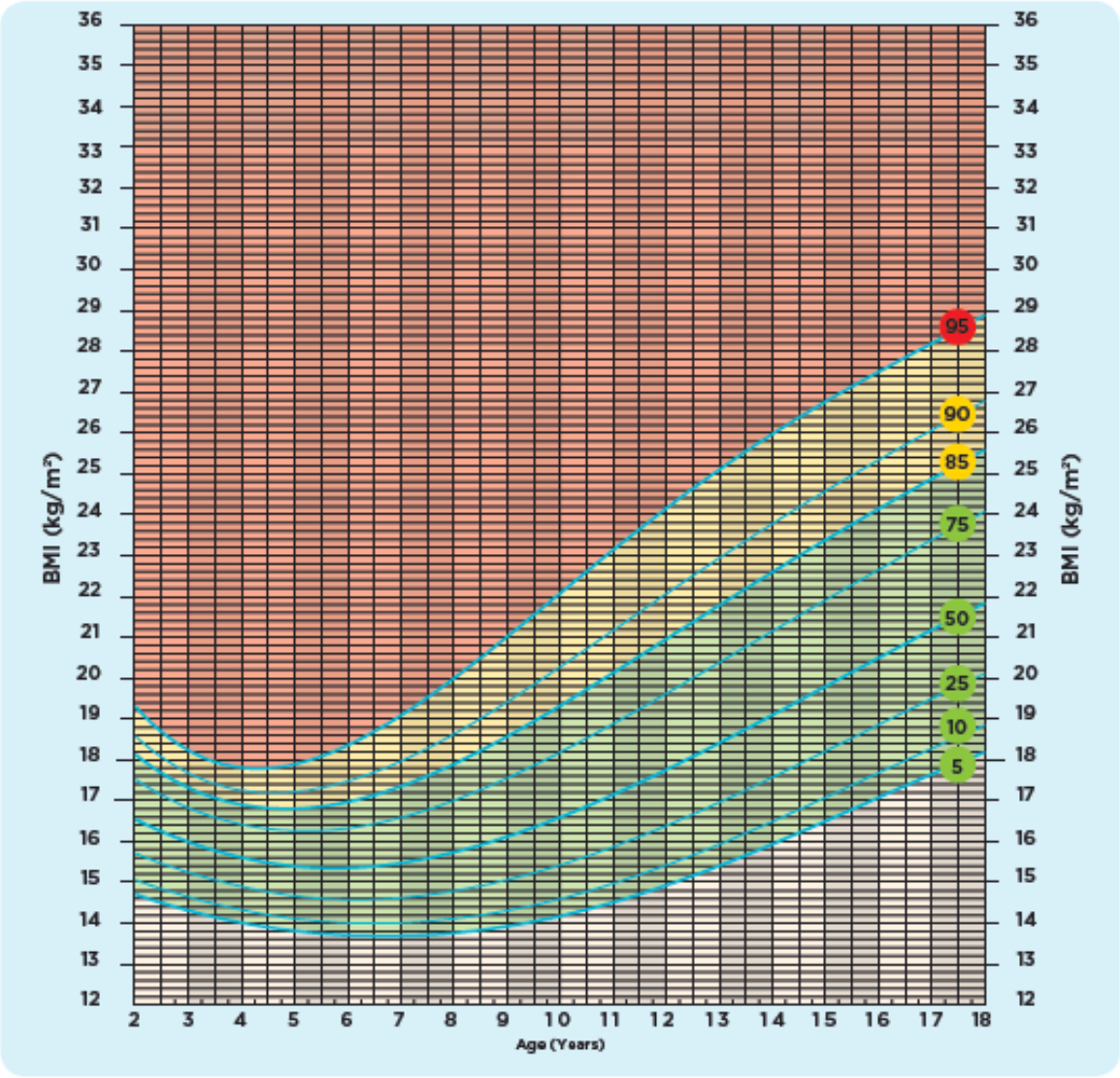
Name: _____ Record number: _____

DOB: _____

Boys: 2 to 18 years

Body mass index (BMI)–for-age percentile chart



Below a healthy weight < 5th percentile (underweight)	Healthy weight 5th percentile to < 85th percentile	Above a healthy weight 85th percentile to < 95th percentile (overweight)	Well above a healthy weight 95th percentile and above (obesity)

Source: Centers for Disease Control and Prevention (CDC) (2000). The BMI for age chart takes the age, height, weight and sex of the child into consideration. The CDC charts are appropriate for children aged 2 to 18 years old.

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BMI Boys 02 U V1 | MARCH 2017

7.4 Attachment 4: Guide to accurately measuring the height of a child

Guide to accurately measuring the height of a child

Standing height measurement is appropriate for most children 2 years, and older.

1.

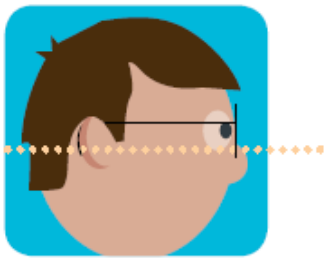
The child should stand barefoot, with heels together, legs straight and shoulders relaxed.

2.

Heels, buttocks and, if possible, scapulae should be against the wall.

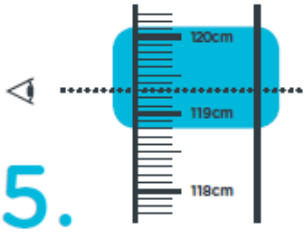
3.

Position the headboard on the child's head and check that the child is looking straight ahead, with the lower margins of their eyes in the same horizontal plane as their ear canal.



4.

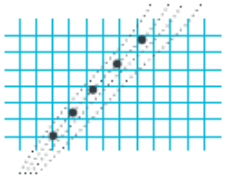
Tell the child to 'breathe in and stand tall'. Apply gentle but firm pressure to help the child stretch. Ensure the heels are not lifted from the ground. Tell the child to 'breathe out and relax' while the measurer maintains pressure on the head.



5.

Read the height to the last complete **millimetre** (do not round up!) Read from the same height as the top of the head.

6.



Plot the height measurement on the standard centile chart of height for age and sex and include in the child's medical record.

If required, ask another staff member or the parent for assistance to ensure the child stands in the correct position

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GTAMeasure EGU V1 | MARCH 2017

7.5 Attachment 5: Guide to accurately measuring the length of a child

Guide to accurately measuring the length of a child

Length measurement is appropriate for most children under 2 years, and older if unable to stand.

Measuring the length of a child may require two people to ensure correct measurement.

1.

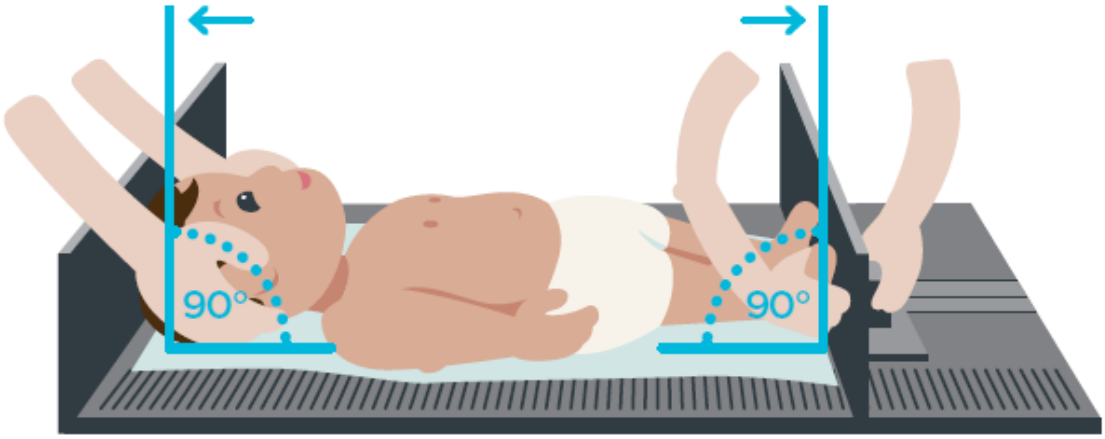
Lay child with their head against the headboard, and feet flat on the footboard, with their shoes and socks removed.

2.

Gently bring the top of the child's head into contact with the fixed headboard. The child should be looking straight up.

3.

Hold the child's knees and feet so they are together and flat against the board.



4.

Apply firm pressure to the child's feet and knees. The child's feet should be at right angles to the base of the board.

5.

Read the length to the nearest complete millimetre (do not round up!)

6.

Plot the length measurement on the relevant chart and include in the child's medical record.

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7.6 Attachment 6: Additional resources

1: Healthy Kids for Professionals

The Healthy Kids for Professionals website is available at:
http://pro.healthykids.nsw.gov.au

The website contains weight management resources for health professionals, along with other clinical information to help children and families achieve healthier lifestyles.

2: Weight4Kids online training

Weight4Kids online training modules are available at: http://weight4kids.learnupon.com/

3: Growth charts

WHO charts

WHO weight-for-age, girls, 0-2 years:
http://www.who.int/childgrowth/standards/cht_wfa_girls_p_0_2.pdf

WHO weight-for-age, boys, 0-2 years:
http://www.who.int/childgrowth/standards/cht_wfa_boys_p_0_2.pdf

WHO length-for-age, girls, 0-2 years:
http://www.who.int/childgrowth/standards/cht_lfa_girls_p_0_2.pdf

WHO length-for-age, boys, 0-2 years:
http://www.who.int/childgrowth/standards/cht_lfa_boys_p_0_2.pdf

WHO head circumference-for-age, girls, 0-2 years:
http://www.who.int/childgrowth/standards/second_set/cht_hcfa_girls_p_0_2.pdf

WHO head circumference-for-age, boys, 0-2 years:
http://www.who.int/childgrowth/standards/second_set/cht_hcfa_boys_p_0_2.pdf

WHO weight-for-length percentiles, girls, 0-2 years:
http://www.who.int/childgrowth/standards/cht_wfl_girls_p_0_2.pdf?ua=1

WHO weight-for-length percentiles, boys, 0-2 years:
http://www.who.int/childgrowth/standards/cht_wfl_boys_p_0_2.pdf?ua=1

CDC charts

CDC stature-for-age (height-for-age) and weight-for-age, girls, 2-20 years:
https://www.cdc.gov/growthcharts/data/set2clinical/cj41c072.pdf

CDC stature-for-age (height-for-age) and weight-for-age, boys, 2-20 years:
https://www.cdc.gov/growthcharts/data/set2clinical/cj41c071.pdf

CDC BMI-for-age, girls, 2-20 years:
https://pro.healthykids.nsw.gov.au/wp-content/uploads/2017/04/HNSW_223514_BMI-Chart-Sheets-Girls_Web_FA.pdf

CDC BMI-for-age, boys, 2-20 years:

https://pro.healthykids.nsw.gov.au/wp-content/uploads/2017/04/HNSW_223514_BMI-Chart-Sheets-Boys_Web_FA.pdf

4: Online weight status calculators

An online weight status calculator for children is available at:
https://pro.healthykids.nsw.gov.au/calculator/

An online weight status calculator for adults is available at:
http://www.health.nsw.gov.au/heal/Pages/bmi.aspx

5: Child Personal Health Record (blue book)

The Child Personal Health Record (blue book) is available at:

http://www.health.nsw.gov.au/kidsfamilies/MCFhealth/Pages/child-blue-book.aspx