



OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE



Maternal Health Task Force



INTERGROWTH-21st course on maternal, fetal and newborn growth monitoring

Module 1 Assessing newborn size by anthropometry



On successful completion of this module you should be able to:

- List the instruments used for neonatal anthropometry.
- Accurately measure newborn weight, length and head circumference.
- Use the INTERGROWTH-21st standards for newborn size at birth and INTERGROWTH-21st Newborn Size Application Tool.



- The lack of growth standards for pregnancy dating, fetal growth, maternal weight gain, newborn size and preterm postnatal growth greatly limits our understanding of early growth and development during pregnancy and comparisons across international populations (Bhutta, 2013; Villar et al., 2015).
- The aetiology and epidemiology of fetal growth restriction and preterm birth syndromes are also significantly impaired by the absence of an international standard for intrauterine growth with which to compare deviations and identify phenotypes (Bhutta, 2013; Villar et al., 2015).
- Since optimal fetal and neonatal growth and their implications for long-term outcomes are of utmost importance, it is a priority to define optimal intrauterine growth in populations where nutrition and health needs are met (Bhutta, 2013; Villar et al., 2015).



- The International Fetal and Newborn Growth Consortium for the 21st Century (INTERGROWTH-21st) Project aimed to prospectively define fetal and newborn growth, and postnatal growth among preterm infants (Bhutta, 2013).
- The INTERGROWTH-21st Project was a multicentre, multi-ethnic, population-based project in eight urban study sites (Villar et al., 2015).
- Populations were first selected by geographical location (altitude, level of antenatal care, absence or low levels of major known non-microbiological contamination) and then by individual characteristics (e.g. maternal demographics and medical history) (Villar et al., 2014).



- The INTERGROWTH-21st Project produced international standards (Villar et al., 2015):
 - For gestational age estimation
 - First-trimester fetal size
 - Fetal growth
 - Newborn size for gestational age
 - Postnatal growth of preterm infants
 - Maternal gestational weight gain
- The [Anthropometry Handbook](#) used in this project describes how to perform accurate, precise and standardised anthropometric measurements for the assessment of maternal and newborn size.



Neonatal anthropometry



Equipment

The following instruments are required for infant anthropometry:

1. Baby Scale:

The baby scale should measure to the nearest 5 g up to 7.5 kg, and to the nearest 10 g up to 20 kg, preferably with a tare function that allows the baby to be covered in a blanket in cold climates and in cultures where it is unacceptable to undress a baby. For example the Seca 376 is a portable electronic weighing scale used in the INTERGROWTH-21st Project.

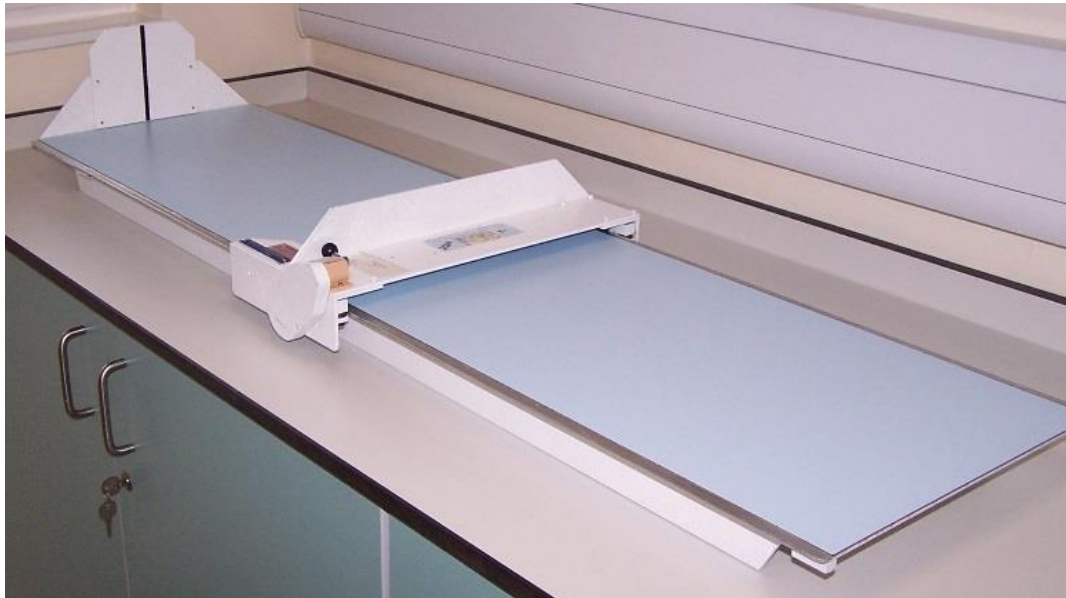




Equipment

2. Infantometer

The Harpenden Infantometer was used in the INTERGROWTH-21st Project, which has a measurement range from 300–1100 mm and a fixed headboard and moveable footboard with a digital counter precise to 0.1 cm.

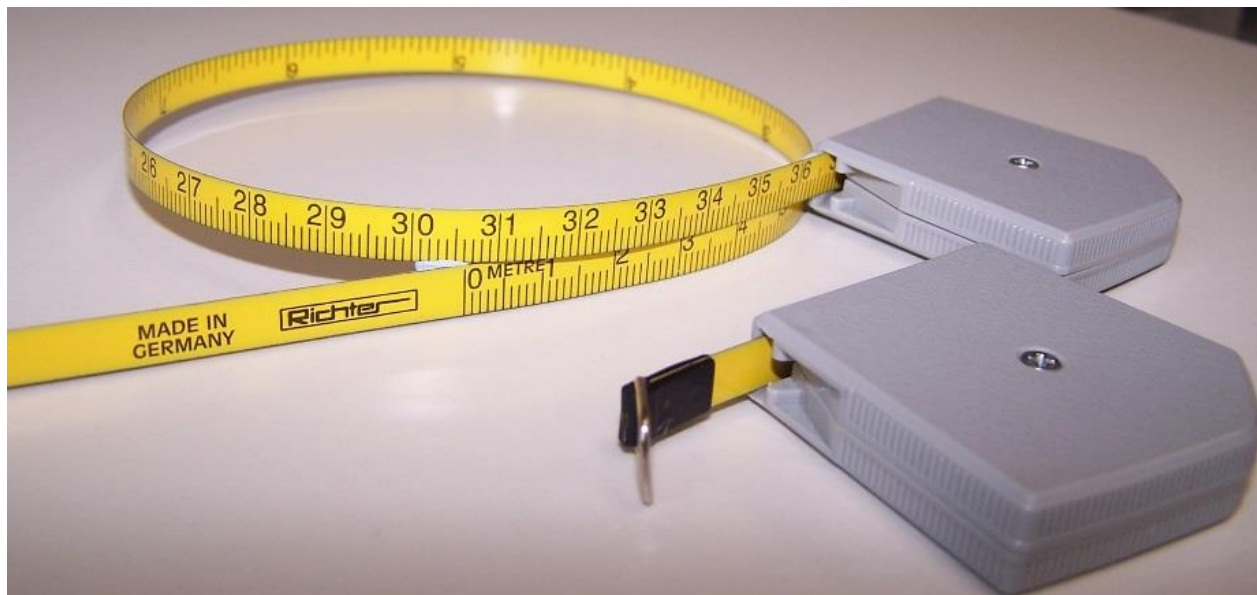




Equipment

3. Head Circumference Tape:

A metal tape marked in centimetres and millimetres is needed to measure head circumference. The tape used in the INTERGROWTH-21st Project was a special metal tape measure (CMS ref. 3105); flat metal blade with blank lead-in, self-retracting, 0.7 cm wide, range 0–2 m, precise to 1 mm.





Equipment calibration

- Calibration of the baby scale and the infantometer should be done twice a week at a minimum.
- Calibration is not necessary for the head circumference tape.
- If the equipment is being transported for home visits or between clinics, it should be calibrated every day.





Equipment maintenance

Maintenance is important for keeping the equipment accurate and extending its lifespan

All equipment should be handled with care during storage, transportation and use

It should be kept clean and stored and transported with care

Cool, dry and clean storage is a standard requirement for anthropometric equipment. Different instruments and parts will require different materials for cleaning and regular care

To know more about the calibration and maintenance of the equipment, please consult the [Anthropometry Handbook](#).



Knowledge test

How do you make sure that the equipment for infant anthropometry is working?

Answer:

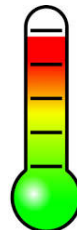
To make sure that the equipment is working:

- It should be calibrated at least twice a week (more often if transported for home visits).
- It should be kept in a cool, dry, and clean storage.
- It should be transported carefully according to instructions.

NO!



NO!



NO!





Measurement Technique: **Weight**

Using the Seca Baby Scale 376:

1. Check that the scale is on a flat, level surface, with no obstructions. *The SECA scales have a built-in spirit level at the back to check that they are on a level surface.*
2. Turn on scale : with the scale empty, press the green **START** button and wait until the figure 0.000 appears on the display. *Ensure that the scale is set in the correct position ([1] for infants up to 7.5kg and [2] up to 20kg). To switch setting, press and hold the NET button (In newer versions of the scale, the selection between position [1] and [2] is automatic).*



In this picture, the measurers are placing the infant on the scale with the nappy on. This is acceptable providing the nappy is removed before pressing the HOLD button.



3. The baby should be naked. *In cold climates, an incandescent light bulb can be positioned over the scale to warm the surface of the weighing pan, making it more comfortable for the baby. In cultures where it is unacceptable to undress the baby, the scale can be tared using a blanket.*
4. Carefully place the baby on the scale. Wait for the baby to settle, then press the HOLD button. The display will flash until a stable weight is measured. The word HOLD and the symbol $\Delta!$ should appear on the display.
5. When the display freezes, read and **record the weight to the nearest gram** and give the baby back to the mother.
6. Turn off the scale by pressing the **START** button.

To tare the scale:

Place the blanket or cloth on the scale; press the NET button for 2 seconds. The word NET appears. Wait until the display stops flashing and shows 0.000. Then place the baby on the scale and wrap the blanket around him/her. Record the value as it appears on the scale.





Knowledge test

When measuring weight, how should the child be?

Answer:

When taking a weight measurement, the child should be:

- Calm. An agitated infant is upsetting for the parents and the measurers and it takes longer to obtain a measurement.
- Naked.





Knowledge test

Why is it important to have a TARE function on the scale?

Answer:

As a general rule, to make the scale more comfortable for the infant, it is better to cover the scale pan with soft paper or a light blanket. The weight of these items should be taken into account; the TARE function allows this to take place.

If the infant is cold or in settings where it is unacceptable for him/her to be naked, he/she should be wrapped in a blanket which has already been accounted for by taring.





Knowledge test

You have just weighed a baby that was wrapped in a blanket. Do you need to subtract the weight of the blanket?

Answer:

YES if you have not tared it before weighing.

NO if you have tared the blanket before weighing.





Measurement Technique: **Length**

To measure the length with the Harpenden infantometer:

1. Place the infantometer on a raised flat surface like a large table so that it is level and stable.
2. The baby should have their bottom-half naked. *Measuring length can provoke anxiety and crying in infants. The mother should be asked to calm the baby. To avoid causing discomfort, cover the horizontal board with a thin cloth or soft paper.*
3. The lead measurer stands on the side to hold down the baby's legs with one hand and move the foot board with the other hand. The assisting measurer stands at the head board and positions the infant's head in the Frankfurt Vertical Plane.
4. The head should be positioned correctly and legs and feet held firmly to allow an accurate measurement. The assisting measurer holds the infant's head so that the top of the head touches the fixed headboard.
5. Gently slide the foot board flat against the infant's feet.
6. Read and record the measurement as soon as possible after the footboard has been positioned, **to the last completed 1mm**



Length – position of the head

Position the infant's head such that a vertical line from the ear canal to the lower border of the eye socket is perpendicular to the horizontal board. This head position is known as the **Frankfort Vertical Plane**.



Frankfort Vertical Plane



Frankfort Vertical Plane

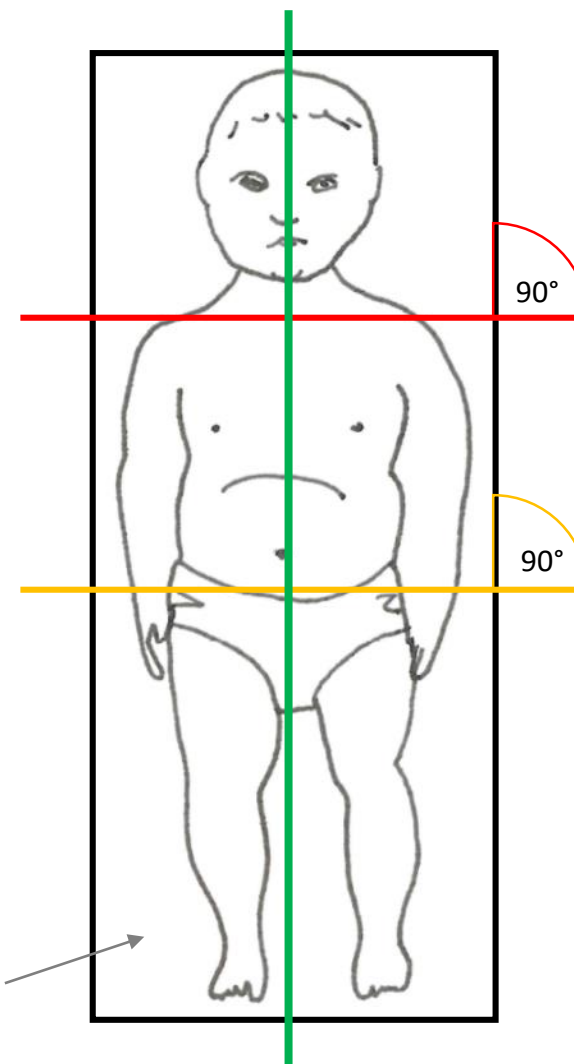




Length – Body position

- To keep the infant's head in the correct position, the assisting measurer should gently cup his or her hands over the infant's ears.
- The mother can stand close on the side to reassure the infant.
- The lead measurer should position the infant so that shoulders and hips are aligned at right angles to the long axis of the body and the infantometer. Gentle pressure should be applied on the knees to straighten the legs.

Infantometer



INTERGROWTH-21st
Module 1
Assessing newborn
size by anthropometry



OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE



Maternal Health Task Force



Enabling research by sharing knowledge



The lead measurer should position the infant so that **shoulders** and **hips** are aligned at right angles to the **long axis of the body** and the infantometer.

Gentle pressure should be applied on the knees to straighten the legs.

INTERGROWTH-21st
Module 1
Assessing newborn
size by anthropometry



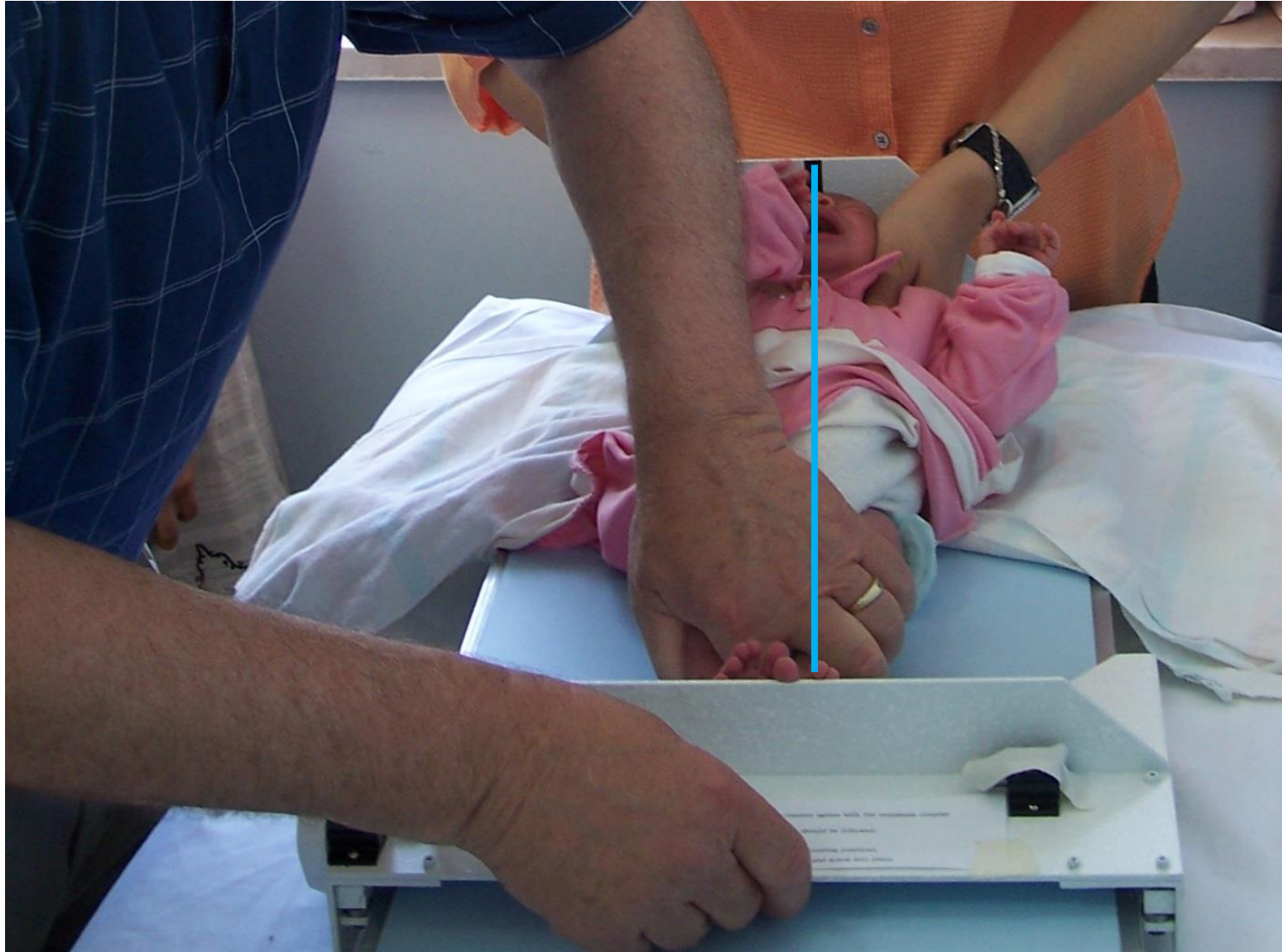
OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE



Maternal Health Task Force



Enabling research by sharing knowledge



The lead measurer should position the infant so that shoulders and hips are aligned at right angles to the long axis of the body and **the infantometer**.

Gentle pressure should be applied on the knees to straighten the legs.

INTERGROWTH-21st
Module 1
Assessing newborn
size by anthropometry



OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE

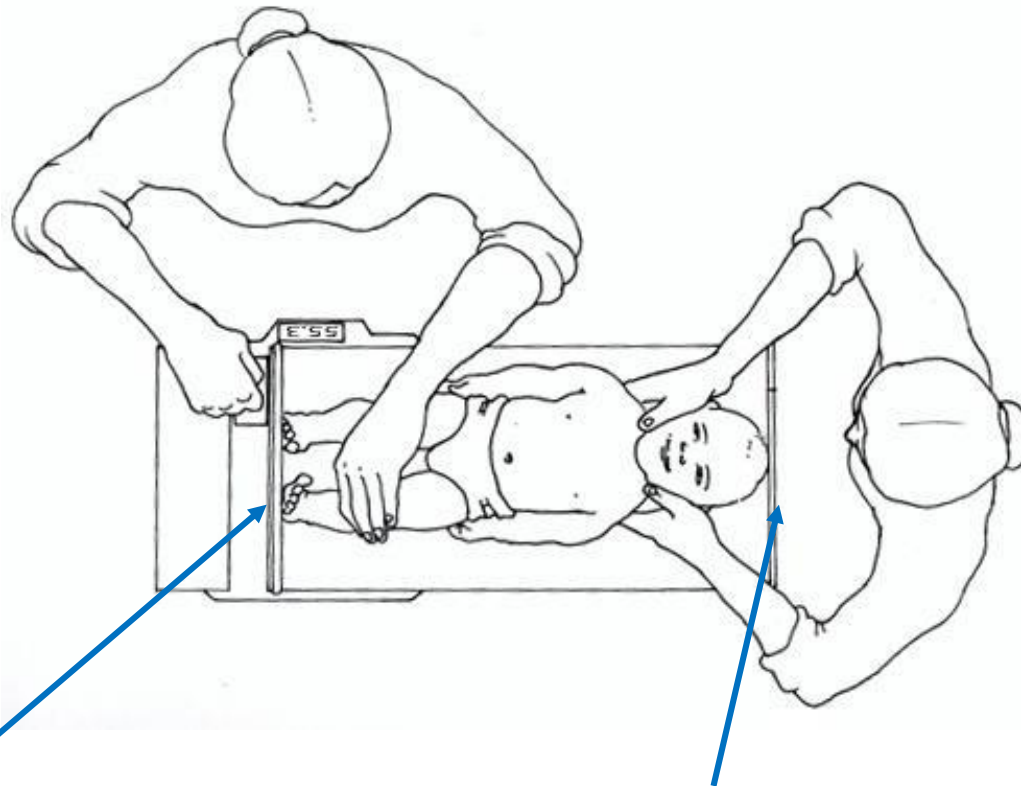


Maternal Health Task Force



NOTE: the lead measurer SHOULD be on the same side as the counter on the infantometer.

Lead measurer



Assisting measurer

Moveable footboard

Fixed headboard

INTERGROWTH-21st

Module 1

Assessing newborn size by anthropometry



OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE



Maternal Health Task Force



The lead measurer stands on the side to hold down the baby's legs with one hand and move the foot board with the other hand. The assisting measurer stands at the head board and positions the infant's head in the Frankfurt Vertical Plane.



Measurement Technique: **Length – Precautions**

1. Any **hair ornaments** that interfere with positioning the head and should be removed.
2. **Diapers/nappies** increase the difficulty of holding the infant's legs together and straightening them. They should be removed.
3. **Take care that the knees are straightened only as far as they can go without causing harm to the infant.** Be aware that for newborns and very premature infants, it is impossible to straighten the knees to the same degree as for older infants. The knees are fragile and could easily be injured if too much pressure is applied to them. Therefore, the measurer should apply only very minimum pressure on the infants' knees.



4. As a general principle, length should be measured by extending **both legs**. However, if the infant is restless, obtaining a one-leg measurement is acceptable but should remain an exception.





MAKE SURE that the body position on the infantometer is correct

NO **X**



On this picture, one can see that both shoulders and hips are not perpendicular to the board but are skewed.

YES **✓**



On this picture, one can see that both shoulders and hips are perpendicular to the board.



5. The soles of the feet should be flat on the board, toes pointing upwards. If the infant bends the toes and prevents the foot board touching the soles of his or her feet, scratch the soles slightly and draw in the foot board when he or she draws the toes up.





6. The assisting measurer should check that the infant is **not arching the spine** when the reading is taken, and should alert the lead measurer should the infant shift out of position. Press the footboard against the feet gently so that there is small compression of the tissue on the feet.



INTERGROWTH-21st
Module 1
Assessing newborn
size by anthropometry



OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE



Maternal Health Task Force



Read and record the measurement as soon as possible after the footboard has been positioned **to the last completed 1mm.**

For example, on the picture the length to be recorded should be **42.3 cm** and not 42.4 cm.



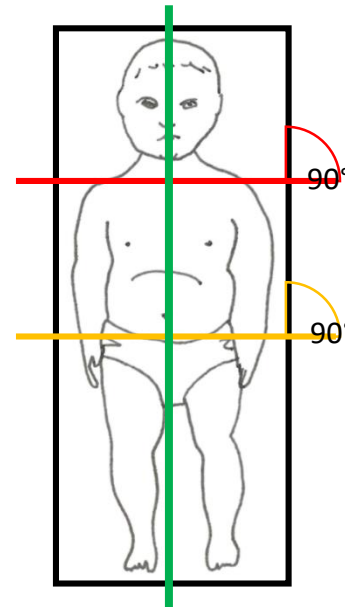
Knowledge test

When measuring length, what is the correct position of the child's body?

Answer:

The correct position of the child is:

- The head should be in the Frankfurt Vertical Plane.
- The body should be straight on the infantometer.
- The hips and shoulders parallel to the head board.
- The spine should not be arched.





Knowledge test

What should each measurer be doing during length measurements?

Answer:

The **lead measurer** should:

- Position the infant so that shoulders and hips are aligned at right angles to the long axis of the body.
- Apply gentle pressure on the knees to straighten the legs.
- Make sure that the sliding board should be flat against the baby's feet soles but not compress them too much.

The **assisting measurer** should:

- Gently cup his or her hands over the infant's ears.
- Hold firmly the head against the headboard (but not pressing hard!).
- Check that the infant is not arching the spine and
- **If anything is wrong, he/she should alert the lead measurer!**



Knowledge test

What precautions should the measurer be taking?

Answer:

The measurer should make sure of the following before AND during the measurement;

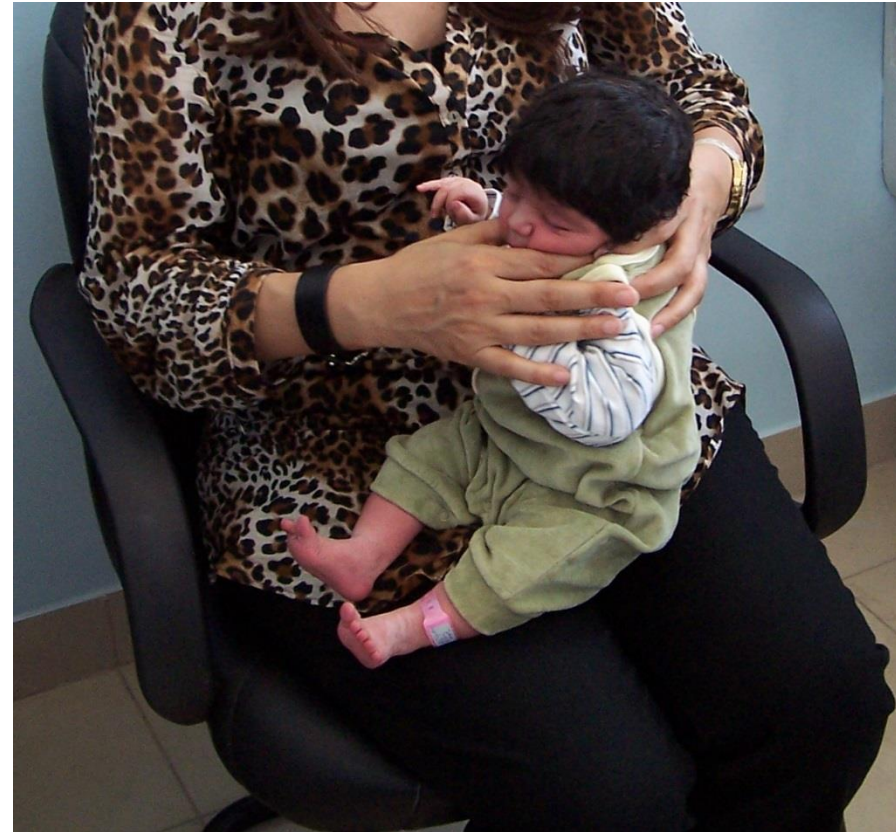
- Hair ornaments and diaper/nappy have been removed.
- Carefully straighten the infant's legs.
- Be aware of the infant's position on the board.
- The soles of the infant's feet are flat against the sliding board .



Measurement Technique: **Head Circumference**

A metal tape marked in centimetres and millimetres is used to measure head circumference.

1. Hair pins or head bands interfere with the positioning of the tape around the head and should be removed
2. The infant is held on the assistant measurer's or mother's lap. It is not always easy for the measurer to manipulate and secure the tape correctly around the head because many infants, especially the older ones, find this measurement uncomfortable.
3. The lead measurer should be at eye level with the tape measure and in front of the person holding the infant.





4. Loop the tape before slipping it over the head. Take care that the side of the tape marked in centimetres is on the outside for the reading, with the zero end in the inferior position (see diagram in the next slide).
5. The measurer should anchor the tape just above the eyebrows, with the zero point on the side closest to him or her. At the back of the head, the tape is positioned over the fullest protuberance of the skull.
6. The other measurer helps by positioning the tape correctly, i.e. level and not going over the infant's ear on the other side of the head.
7. Once the tape is positioned correctly, pull tight to compress the hair and subcutaneous fat. Be careful not to pull the tape too tight and cause injury to newborns. Keep hands and fingers out of the way for the reading.
8. **Read and record the measurement to the last completed 1mm** and remove the tape from the infant's head

INTERGROWTH-21st
Module 1
Assessing newborn
size by anthropometry



OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE



Maternal Health Task Force

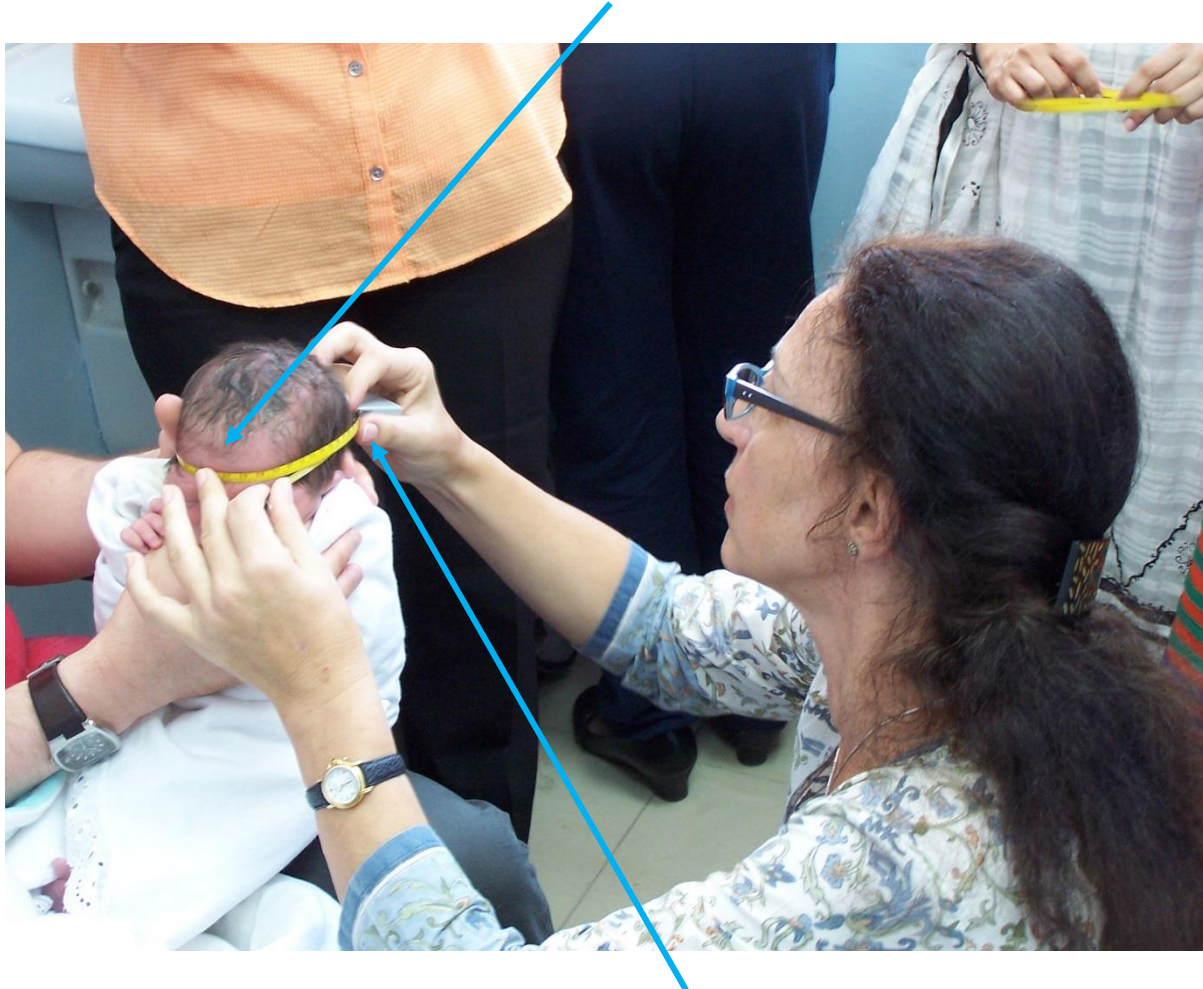


Note: The measuring tape should leave a light pressure mark on the child's forehead that should disappear almost instantly.

Zero end of the tape in the inferior position



The tape just above the eyebrows, with the zero point on the side closest to the measurer



At the back of the head, the tape is positioned over the fullest protuberance of the skull.

INTERGROWTH-21st
Module 1
Assessing newborn
size by anthropometry



OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE



Maternal Health Task Force



The tape should be level around the child's head

NO **X**



YES **✓**





Knowledge test

What are the landmark on a child's skull to measure HC?

Answer:

The measuring tape should be passing:

- At the front just above the eyebrows and
- At the back at the fullest part of the skull.





Knowledge test

Why is it important to always use the same landmark?

Answer:

- To standardise the measurements in order to obtain reliable results, between and within measurers and
- To have good records of the child's growth over time.



Knowledge test

What should the measurer be aware of?

Answer:

When measuring HC, the measurer should:

- Be sure to have the tape going over the correct landmark,
- Make sure with the assistant measurer that the tape is level around the child's head and not going over the ears
- When tightening the tape, the measurer should be aware of how much pressure to apply in order to have a reliable measurement (compress hair and subcutaneous fat) but at the same time not hurting the infant.



Infant Anthropometry Checklist

Weight:

1. Turn scale on
2. Tare if necessary
3. Place baby on scale
4. Press HOLD
5. Remove baby
6. Record to the nearest gram



Infant Anthropometry Checklist

Length:

1. Position head
2. Top of head (vertex) touching headboard
3. Body straight
4. Legs straight
5. Footboard to touch heel(s)
6. Read to last completed unit (mm)



Infant Anthropometry Checklist

Head circumference:

1. Position head
2. Anchor tape just above eyebrows
3. Palpate most posterior part of head
4. Pass tape around head
5. Cross-over tape ends
6. Hold tape against front and back of head
7. Pull tight
8. Read to last completed unit (mm)



INTERGROWTH-21st standards for newborn size at birth



INTRODUCTION

The Newborn Cross-Sectional Study (NCSS), a component of INTERGROWTH-21st Project developed international anthropometric standards to assess newborn size (weight, length, head circumference).

To construct the newborn standards, all pregnancies in women meeting (in addition to the underlying population characteristics) strict individual eligibility criteria for a population at low risk of impaired fetal growth were selected.

The women had a reliable ultrasound estimate of gestational age using CRL before 14 weeks' gestation or BPD if antenatal care started between 14 and ≤ 24 weeks' gestation.

Newborn anthropometric measures were obtained in duplicate ideally within 12 hours of birth (no later than 24h) by 2 trained and standardised anthropometrists from each site using the same equipment.

Fractional polynomials assuming a skewed t distribution were used to estimate the fitted centiles.

Please click [here](#) to read more about the study.



INTERGROWTH-21st standards for newborn size at birth

INTERGROWTH-21st Newborn Size at Birth Chart is a practical chart for health practitioners to use to assess newborn size (weight, length, head circumference) at birth against global standards.

[Click to download the Newborn Size at Birth Chart \(Boys\)](#)

[Click to download the Newborn Size at Birth Chart \(Girls\)](#)

[Click to download the Newborn Size at Birth Chart \(Boys\) \(US print version\)](#)

[Click to download the Newborn Size at Birth Chart \(Girls\) \(US print version\)](#)

These charts are also available for download at:

<https://intergrowth21.tghn.org/articles/intergrowth-21st-newborn-size-birth-chart/>



INTERGROWTH-21st standards for newborn size at birth

The INTERGROWTH-21st Newborn Birth Length, Head Circumference and Birth Weight Standards are global standards for newborn length, head circumference and birth weight at birth.

[Click to download the Birth Length Standards \(Boys\)](#)

[Click to download the Birth Length Standards \(Girls\)](#)

[Click to download the Head Circumference Standards \(Boys\)](#)

[Click to download the Head Circumference Standards \(Girls\)](#)

[Click to download the Birth Weight Standards \(Boys\)](#)

[Click to download the Birth Weight Standards \(Girls\)](#)

The standards can be also be downloaded from: <http://intergrowth21.ndog.ox.ac.uk/>



INTERGROWTH-21st Newborn Size Application Tool

The application allows:

- Individual data to be entered manually. Results can be compared to, and plotted graphically against the international standards (see next slide)
- Large datasets to be imported and processed directly into the application. Results can be exported for further analysis.

The application can be downloaded at these links: [The INTERGROWTH-21st tool for Windows](#) and [The INTERGROWTH-21st tool for Mac](#). Download the application installation user guide for Windows at this link: [Installation user guide](#). Please read the installation instructions before use. An online, browser only version is available via this link: [The INTERGROWTH-21st tool browser version](#).

INTERGROWTH-21st

Module 1

Assessing newborn size by anthropometry



OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE

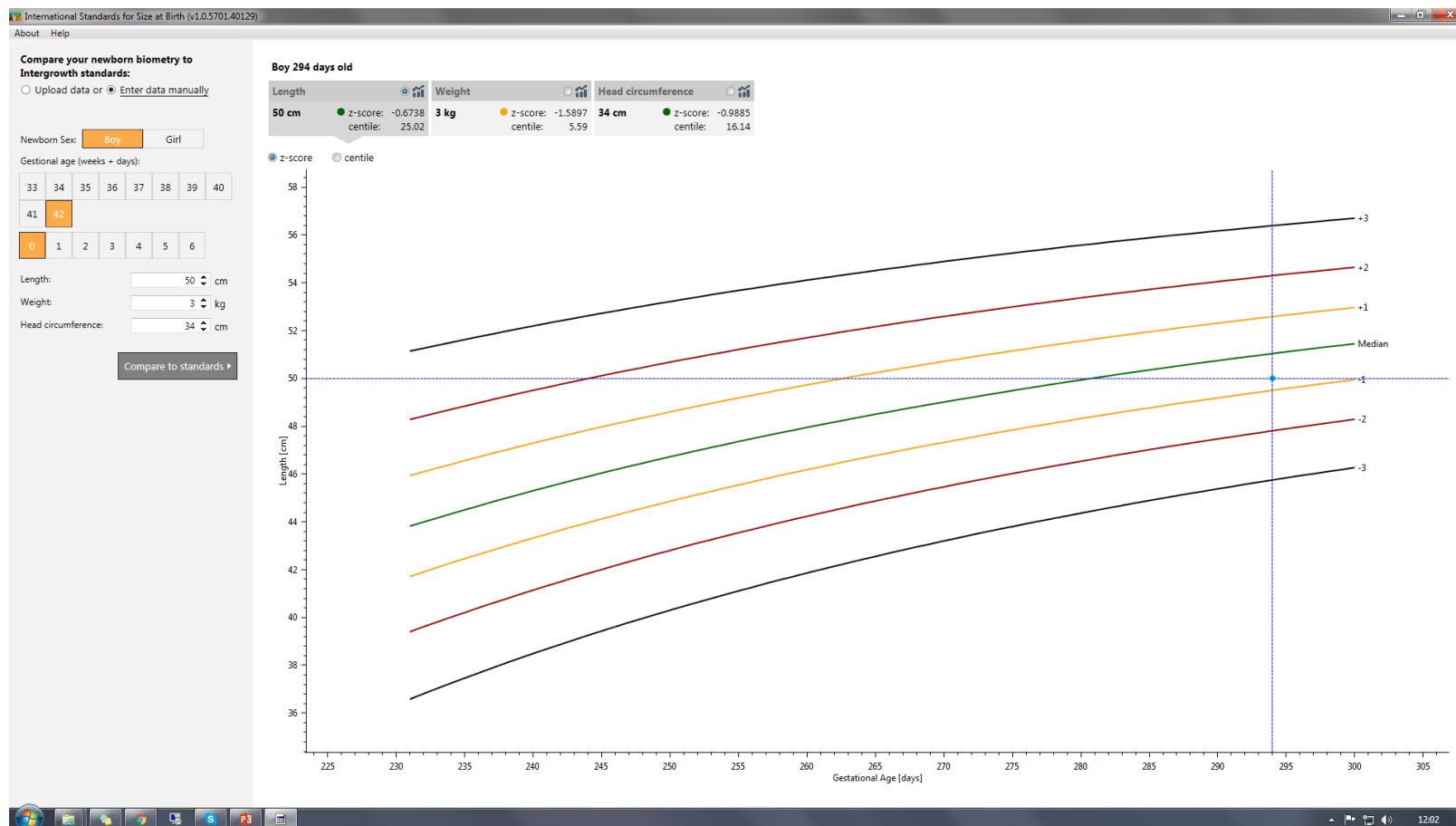


Maternal Health Task Force



THE
GLOBAL
HEALTH
NETWORK
Enabling research by sharing knowledge

INTERGROWTH-21st Newborn Size Application Tool



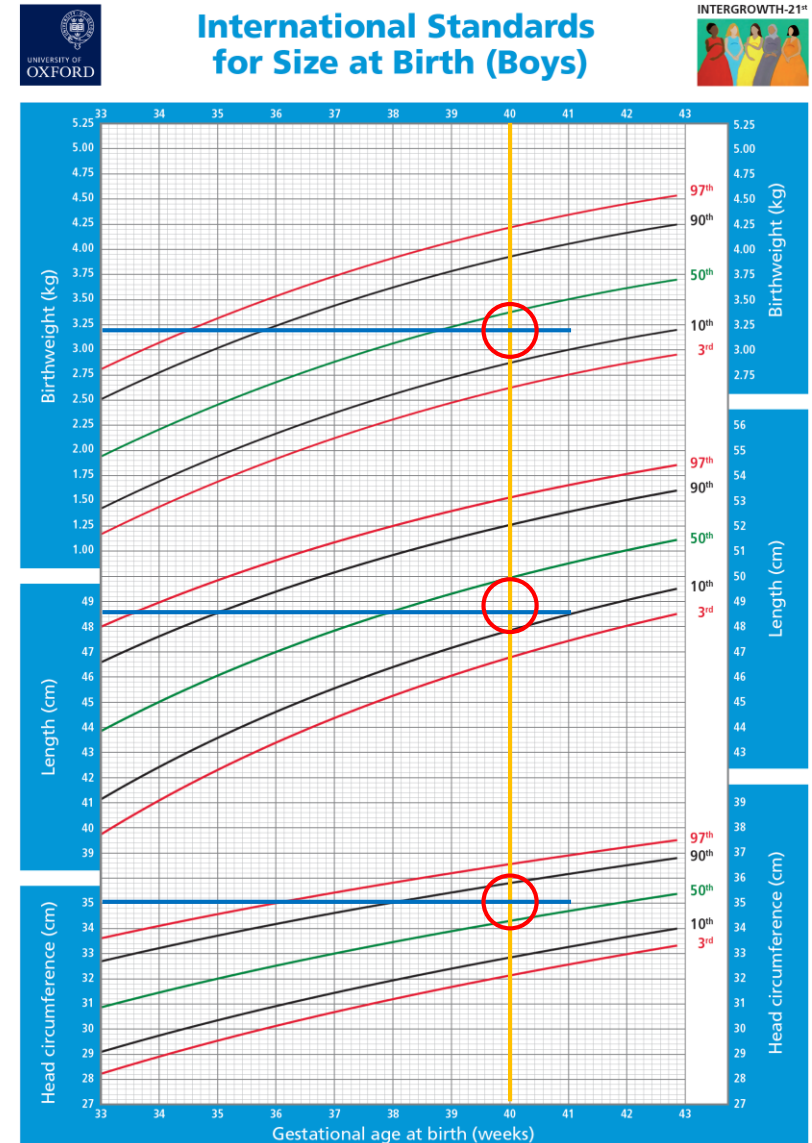
Manual entry on the [The INTERGROWTH-21st tool for Windows](#) showing a male newborn with gestational age 42 weeks + 0 days, length 50 cm, birth weight 3kg and head circumference 34cm. As you can see on the plot, the newborn has a birth length z-score below the median for his gestational age, at the 25th centile.



Example: A newborn male, gestational age (GA) 40 weeks, length 48.6cm, weight 3.2kg and head circumference 35.0cm.

Using the INTERGROWTH-21st Newborn Size at Birth chart :

- Choose the chart for boys.
- Draw a line from the newborn's GA to the corresponding weight, length and head circumference.
- Where the lines intersect is the centile for each measurement.



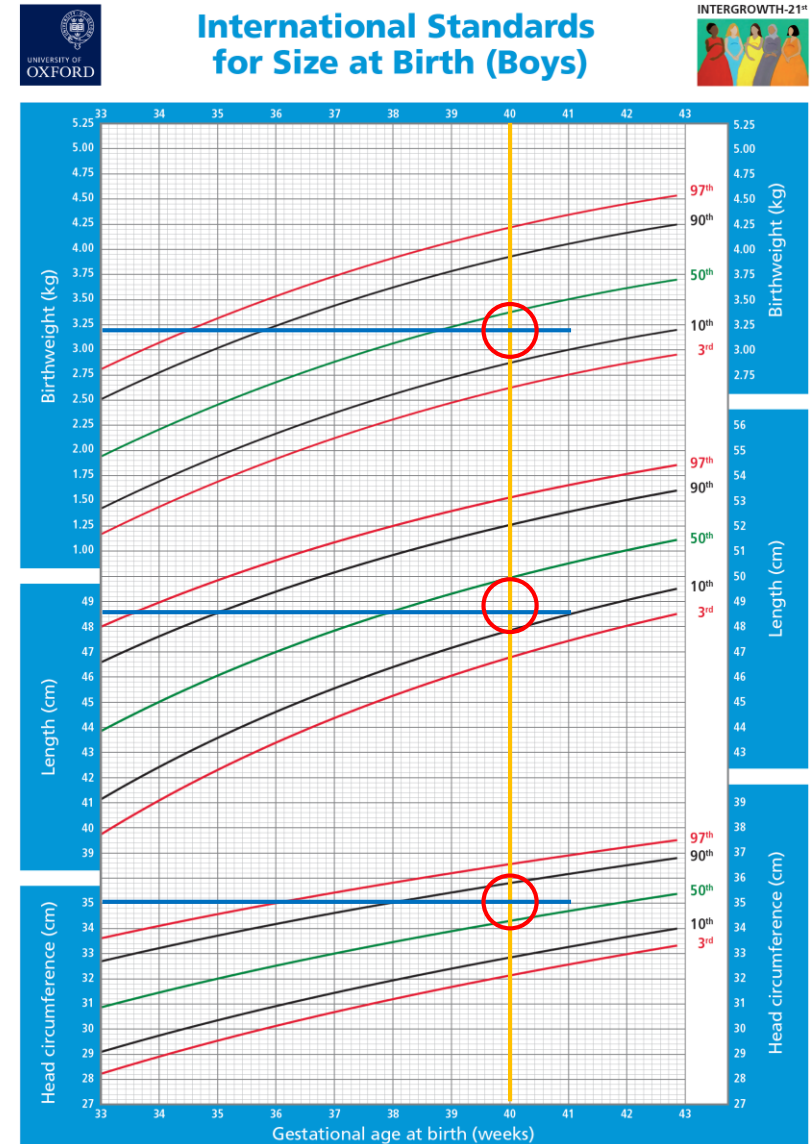


Example: A newborn male, gestational age (GA) 40 weeks, length 48.6cm, weight 3.2kg and head circumference 35.0cm.

Using the INTERGROWTH-21st Newborn Size at Birth chart :

Approximately, the newborn's:

- Birthweight is between the 10th and 50th centiles,
- Length between the 10th and 50th centiles and
- HC between the 50th and 90th centiles





The International Newborn Standards

Using the same example, a newborn male, gestational age (GA) 40 weeks, length 48.6cm, weight 3.2kg and head circumference 35.0cm.

Using the INTERGROWTH-21st Newborn Birth Length, Head Circumference and Weight Standards:

- Choose the appropriate **weight**, length, and head circumference standard for boys.
- Look for the newborn's GA in the GA column and
- Check for the centile that corresponds to the newborn's weight, length or head circumference



Birth weight (Boys)

INTERGROWTH-21st

Gestational age (weeks+days)	Centiles						
	3 rd	5 th	10 th	50 th	90 th	95 th	97 th
38+4	2.42	2.52	2.67	3.17	3.72	3.90	4.02
38+5	2.44	2.54	2.69	3.19	3.75	3.92	4.04
38+6	2.46	2.56	2.71	3.22	3.77	3.94	4.06
39+0	2.49	2.59	2.73	3.24	3.79	3.96	4.08
39+1	2.51	2.61	2.76	3.26	3.81	3.99	4.10
39+2	2.53	2.63	2.78	3.28	3.83	4.01	4.12
39+3	2.55	2.65	2.80	3.30	3.86	4.03	4.15
39+4	2.57	2.67	2.82	3.32	3.88	4.05	4.17
39+5	2.59	2.69	2.84	3.34	3.90	4.07	4.19
39+6	2.61	2.71	2.86	3.36	3.92	4.09	4.21
40+0	2.63	2.73	2.88	3.38	3.94	4.11	4.22
40+1	2.65	2.75	2.90	3.40	3.95	4.13	4.24
40+2	2.67	2.77	2.92	3.42	3.97	4.15	4.26
40+3	2.69	2.79	2.94	3.44	3.99	4.16	4.28
40+4	2.71	2.81	2.96	3.46	4.01	4.18	4.30
40+5	2.73	2.83	2.98	3.48	4.03	4.20	4.32
40+6	2.75	2.85	2.99	3.49	4.04	4.22	4.33
41+0	2.76	2.86	3.01	3.51	4.06	4.23	4.35
41+1	2.78	2.88	3.03	3.53	4.08	4.25	4.37
41+2	2.80	2.90	3.05	3.55	4.09	4.27	4.38
41+3	2.82	2.91	3.06	3.56	4.11	4.28	4.40
41+4	2.83	2.93	3.08	3.58	4.13	4.30	4.42
41+5	2.85	2.95	3.09	3.59	4.14	4.31	4.43
41+6	2.86	2.96	3.11	3.61	4.16	4.33	4.45
42+0	2.88	2.98	3.12	3.62	4.17	4.34	4.46
42+1	2.89	2.99	3.14	3.64	4.19	4.36	4.47
42+2	2.91	3.01	3.15	3.65	4.20	4.37	4.49
42+3	2.92	3.02	3.17	3.67	4.21	4.39	4.50
42+4	2.94	3.04	3.18	3.68	4.23	4.40	4.52
42+5	2.95	3.05	3.20	3.69	4.24	4.41	4.53
42+6	2.96	3.06	3.21	3.71	4.25	4.43	4.54



The International Newborn Standards

Using the INTERGROWTH-21st
Newborn Birth Length, Head
Circumference and Weight
Standards:

- Repeat the same procedure for length and head circumference

In this example the newborn's

- Weight fell between the 10th and 50th centiles
- Length between the 10th and 50th centiles, and
- HC between the 50th and 90th centiles

which agrees with the Newborn Size at Birth chart.



Length (Boys)

INTERGROWTH-21st

Gestational age (weeks+days)	Centiles						
	3 rd	5 th	10 th	50 th	90 th	95 th	97 th
38+4	45.69	46.15	46.82	49.00	51.20	51.88	52.34
38+5	45.80	46.26	46.92	49.10	51.29	51.96	52.42
38+6	45.92	46.37	47.03	49.19	51.38	52.05	52.51
39+0	46.02	46.47	47.13	49.29	51.46	52.13	52.59
39+1	46.13	46.58	47.24	49.38	51.55	52.21	52.67
39+2	46.24	46.69	47.34	49.48	51.63	52.29	52.75
39+3	46.35	46.79	47.44	49.57	51.71	52.37	52.82
39+4	46.45	46.89	47.54	49.66	51.80	52.45	52.90
39+5	46.55	46.99	47.64	49.75	51.88	52.53	52.98
39+6	46.65	47.09	47.73	49.84	51.96	52.61	53.05
40+0	46.75	47.19	47.83	49.92	52.03	52.68	53.13
40+1	46.85	47.28	47.92	50.01	52.11	52.76	53.20
40+2	46.95	47.38	48.02	50.09	52.19	52.83	53.27
40+3	47.04	47.47	48.11	50.18	52.26	52.91	53.34
40+4	47.14	47.57	48.20	50.26	52.34	52.98	53.41
40+5	47.23	47.66	48.29	50.34	52.41	53.05	53.48
40+6	47.32	47.75	48.37	50.42	52.48	53.12	53.55
41+0	47.41	47.84	48.46	50.50	52.56	53.19	53.62
41+1	47.50	47.93	48.55	50.58	52.63	53.26	53.68
41+2	47.59	48.01	48.63	50.66	52.70	53.32	53.75
41+3	47.68	48.10	48.72	50.73	52.76	53.39	53.82
41+4	47.76	48.18	48.80	50.81	52.83	53.46	53.88
41+5	47.85	48.27	48.88	50.88	52.90	53.52	53.94
41+6	47.93	48.35	48.96	50.95	52.96	53.58	54.01
42+0	48.01	48.43	49.04	51.03	53.03	53.65	54.07
42+1	48.10	48.51	49.12	51.10	53.09	53.71	54.13
42+2	48.18	48.59	49.19	51.17	53.16	53.77	54.19



Using the INTERGROWTH-21st Newborn Birth Length, Head Circumference and Weight Standards:



The International Newborn Standards

Head circumference (Boys)

INTERGROWTH-21st

Gestational age (weeks+days)	Centiles						
	3 rd	5 th	10 th	50 th	90 th	95 th	97 th
38+4	31.49	31.78	32.22	33.72	35.27	35.73	36.04
38+5	31.56	31.85	32.29	33.78	35.33	35.79	36.10
38+6	31.62	31.92	32.35	33.84	35.38	35.84	36.15
39+0	31.69	31.98	32.42	33.90	35.44	35.90	36.20
39+1	31.76	32.05	32.48	33.96	35.49	35.95	36.26
39+2	31.82	32.11	32.55	34.02	35.54	36.00	36.31
39+3	31.89	32.18	32.61	34.08	35.60	36.05	36.36
39+4	31.95	32.24	32.67	34.14	35.65	36.11	36.41
39+5	32.02	32.31	32.73	34.20	35.71	36.16	36.46
39+6	32.08	32.37	32.80	34.25	35.76	36.21	36.51
40+0	32.15	32.43	32.86	34.31	35.81	36.26	36.56
40+1	32.21	32.49	32.92	34.37	35.86	36.31	36.61
40+2	32.27	32.56	32.98	34.42	35.92	36.36	36.66
40+3	32.33	32.62	33.04	34.48	35.97	36.41	36.71
40+4	32.40	32.68	33.10	34.54	36.02	36.46	36.76
40+5	32.46	32.74	33.16	34.59	36.07	36.51	36.81
40+6	32.52	32.80	33.22	34.65	36.12	36.56	36.86
41+0	32.58	32.86	33.28	34.70	36.17	36.61	36.91
41+1	32.64	32.92	33.33	34.75	36.22	36.66	36.96
41+2	32.70	32.98	33.39	34.81	36.27	36.71	37.00
41+3	32.76	33.04	33.45	34.86	36.32	36.76	37.05
41+4	32.82	33.09	33.51	34.92	36.37	36.81	37.10
41+5	32.88	33.15	33.56	34.97	36.42	36.85	37.15
41+6	32.93	33.21	33.62	35.02	36.47	36.90	37.19
42+0	32.99	33.27	33.68	35.07	36.52	36.95	37.24

INTERGROWTH-21st

Module 1

Assessing newborn size by anthropometry



OXFORD MATERNAL
AND PERINATAL
HEALTH INSTITUTE



Maternal Health Task Force



THE
GLOBAL
HEALTH
NETWORK
Enabling research by sharing knowledge

Compare your newborn biometry to Intergrowth standards:

Manual Entry or **Upload**

INTERGROWTH-21st [Home](#) **Manual Entry** [Upload](#)

Newborn Sex:
Boy **Girl**

Gestational age (weeks + days):
33 34 35 36 37 38 39
40 41 42
0 1 2 3 4 5 6

Length: 48.6

Weight: 3.2

Head circumference: 35

Compare to standards >

INTERGROWTH-21st Newborn Size Application Tool: Interface

Using the online, browser version of the INTERGROWTH-21st Newborn Size Application Tool:

1. Access the web version of the application at <http://intergrowth21.ndog.ox.ac.uk/>.
2. Click on manual entry.
3. Enter the newborn's details.
4. Then click on Compare to standards.

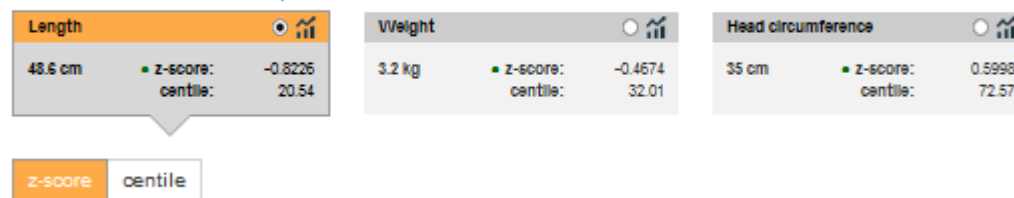


Using the online, browser version of the INTERGROWTH-21st Newborn Size Application Tool (cont'd):

The z-scores and centiles of the newborn's length, weight and head circumference are displayed.

Click on the radio buttons with the  icon to change the biometry shown on the graph for length, weight or head circumference.

Boy 280 days old



Use the radio buttons on top of the chart to highlight either the z-scores or centiles.



Read the centiles or
z-score for the
newborn

The newborn's length
is on the 20th centile
for its GA, the weight
on the 32nd centile
and head
circumference on the
72nd centile, agreeing
with the newborn
charts and
standards.

Newborn Sex:

Boy

Girl

Gestational age (weeks + days):

33

34

35

36

37

38

39

40

41

42

0

1

2

3

4

5

6

Length:

48.6

Weight:

3.2

Head circumference:

35

Compare to standards

Boy 280 days old

Length

48.6 cm

z-score: -0.8226
centile: 20.54

z-score

centile

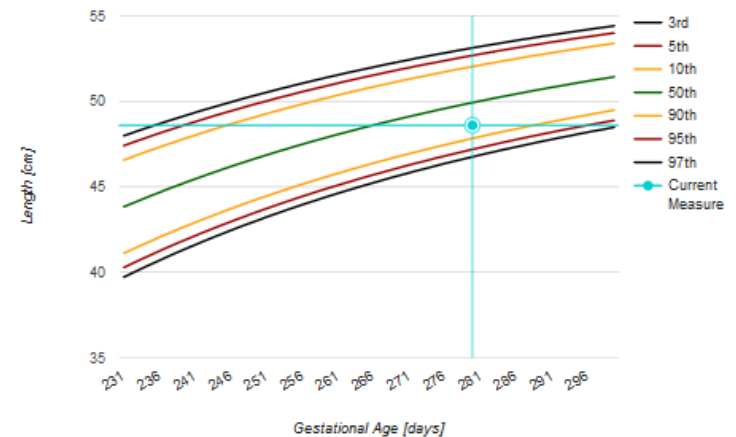
Weight

3.2 kg

z-score: -0.4674
centile: 32.01

Head circumference

35 cm

z-score: 0.5998
centile: 72.57



You have completed the module Assessing newborn size by anthropometry and you should now be able to:

- List the instruments used for neonatal anthropometry.
- Accurately measure newborn weight, length and head circumference.
- Use the INTERGROWTH-21st standards for newborn size at birth and INTERGROWTH-21st Newborn Size Application Tool.



References

- Bhutta Z, for the International Fetal and Newborn Growth Consortium for the 21st Century (INTERGROWTH-21st). Introduction. BJOG: An International Journal of Obstetrics & Gynaecology. 2013 Sep;120:1-2. <http://dx.doi.org/10.1111/1471-0528.12032>
- INTERGROWTH-21st. International Fetal and Newborn Growth Standards for the 21st Century: Anthropometry handbook. The International Fetal and Newborn Growth Consortium; 2012. Available from: https://intergrowth21.tghn.org/site_media/media/articles/Anthropometry_Handbook_April_2012.pdf
- INTERGROWTH-21st Newborn Size Application Tool. INTERGROWTH-21st; 2015. Available from: <https://intergrowth21.tghn.org/global-perinatal-package/intergrowth-21st-comparison-application/>
- The International Fetal and Newborn Growth Consortium for the 21st Century. INTERGROWTH-21st Newborn Size at Birth Chart. INTERGROWTH-21st; 2015. Available from: <https://intergrowth21.tghn.org/articles/intergrowth-21st-newborn-size-birth-chart/>
- The International Fetal and Newborn Growth Consortium for the 21st Century. INTERGROWTH-21st Newborn Birth Length Standards and Z Scores. INTERGROWTH-21st; 2015. Available from: <https://intergrowth21.tghn.org/articles/intergrowth-21st-length-standards/>
- The International Fetal and Newborn Growth Consortium for the 21st Century. INTERGROWTH-21st Newborn Head Circumference Standards and Z Scores. INTERGROWTH-21st; 2015. Available from: <https://intergrowth21.tghn.org/articles/intergrowth-21st-head-circumference-standards-boys/>
- The International Fetal and Newborn Growth Consortium for the 21st Century. INTERGROWTH-21st Newborn Birth Weight Standards and Z Scores. INTERGROWTH-21st; 2015. Available from: <https://intergrowth21.tghn.org/articles/intergrowth-21st-birth-weight-standards-boys/>



References

- Villar J, Ismail LC, Victora CG, et al. International standards for newborn weight, length, and head circumference by gestational age and sex: the Newborn Cross-Sectional Study of the INTERGROWTH-21st Project. The Lancet. 2014;384(9946):857-68. Available from: <http://www.sciencedirect.com/science/article/pii/S0140673614609326>
- Villar J, Papageorgiou AT, Pang R, et al. Monitoring human growth and development: a continuum from the womb to the classroom. American Journal of Obstetrics & Gynecology. 2015 Oct 1;213(4):494-9. <http://dx.doi.org/10.1016/j.ajog.2015.07.002>