Growth monitoring

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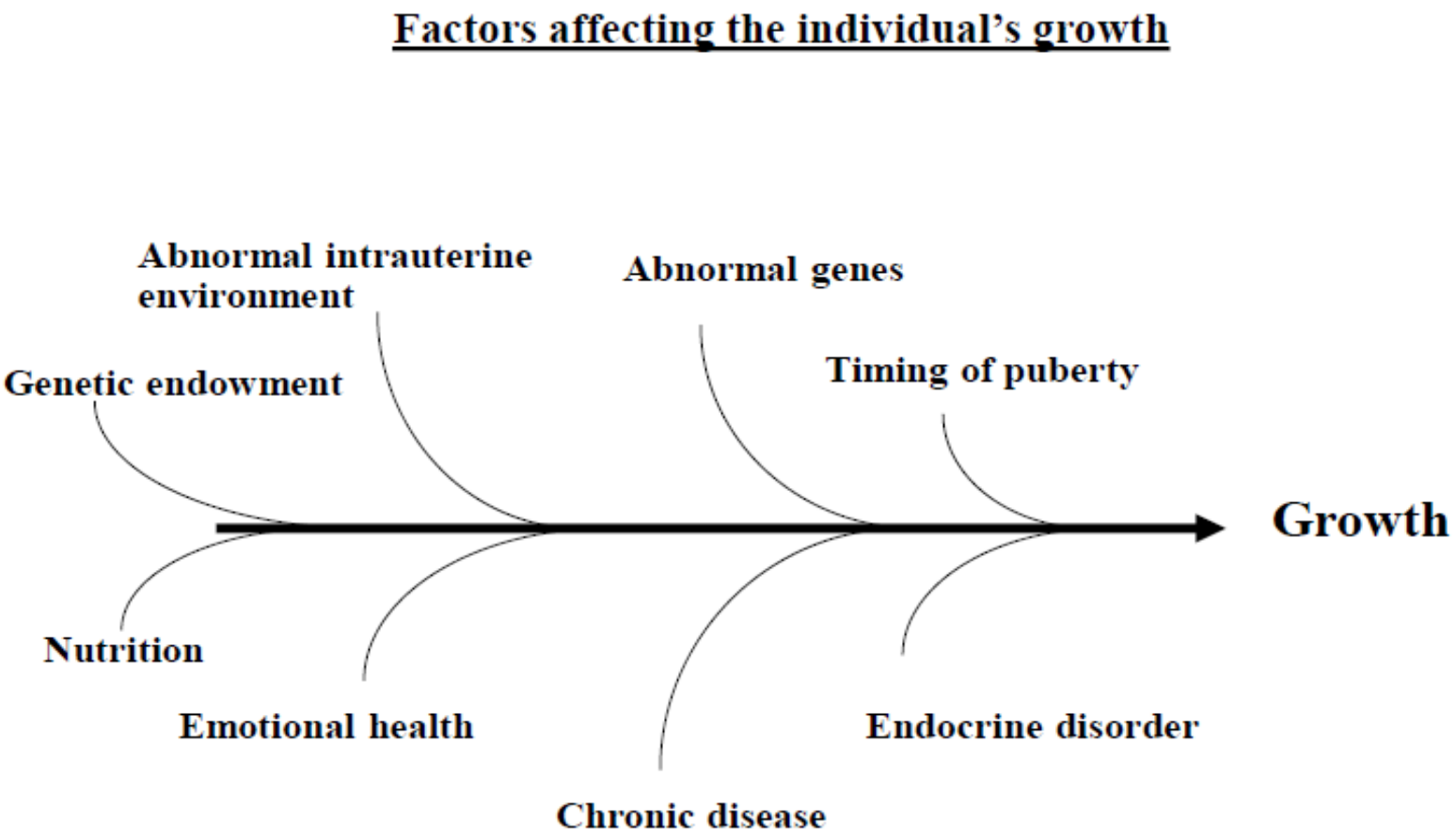
Growth and Development

- **Growth** refers to increase in the physical size of the body and **Development** refers to increase in skills and functions.
- Both are considered together. because a child grows and develops as a whole.
- Include not only physical aspect but also intellectual, emotional and social aspects.
- Take place only in the presence of optimal nutrition, freedom from recurrent infections, freedom from adverse genetic and environmental influences.

Cont.....

- When growth slows or stops, we say growth "falters". This is a sign that something is wrong with the child and must be discovered at the earliest and set right.
- It can be said that "A GROWING CHILD IS A HEALTHY CHILD", and equally true that, "A CHILD WHO IS NOT GROWING IS NOT HEALTHY".
- THE MOST ACCURATE AND SENSITIVE MEASURE OF GROWTH IS WEIGHT GAIN.


Factors affecting the individual's growth
Abnormal intrauterine environment
Abnormal genes
Genetic endowment
Timing of puberty
Growth
Nutrition
Emotional health
Endocrine disorder
Chronic disease

Growth monitoring definition

- Refers to the process of tracking child growth by regularly measuring the child and comparing his or her growth (i.e., height or weight) to a standard, assessing growth adequacy, and linking the growth trend with a target action through tailored counseling and referral.

Why Monitor Growth?

- Growth is the **most sensitive indicator of child's health**
  - normal growth only occurs if a child is healthy
- Growth assessment is an **essential** part of the examination or investigation of any child.
- Allows **objective detection of growth disorders** at population level at earliest opportunity
- It helps in early identification and treatment of the growth disorder which improves outcome.
- It identifies under or over nutrition

STEPS IN GROWTH MONITORING

- **Five steps :-**
  - Step 1: Determining correct age of the child
  - Step 2: Accurate weighing of the child
  - Step 3: Plotting the weight accurately on a growth chart of appropriate gender
  - Step 4: Interpreting the direction of the growth curve and recognising if the child is growing properly
  - Step 5: Discussing the child's growth and follow-up action needed with the mother

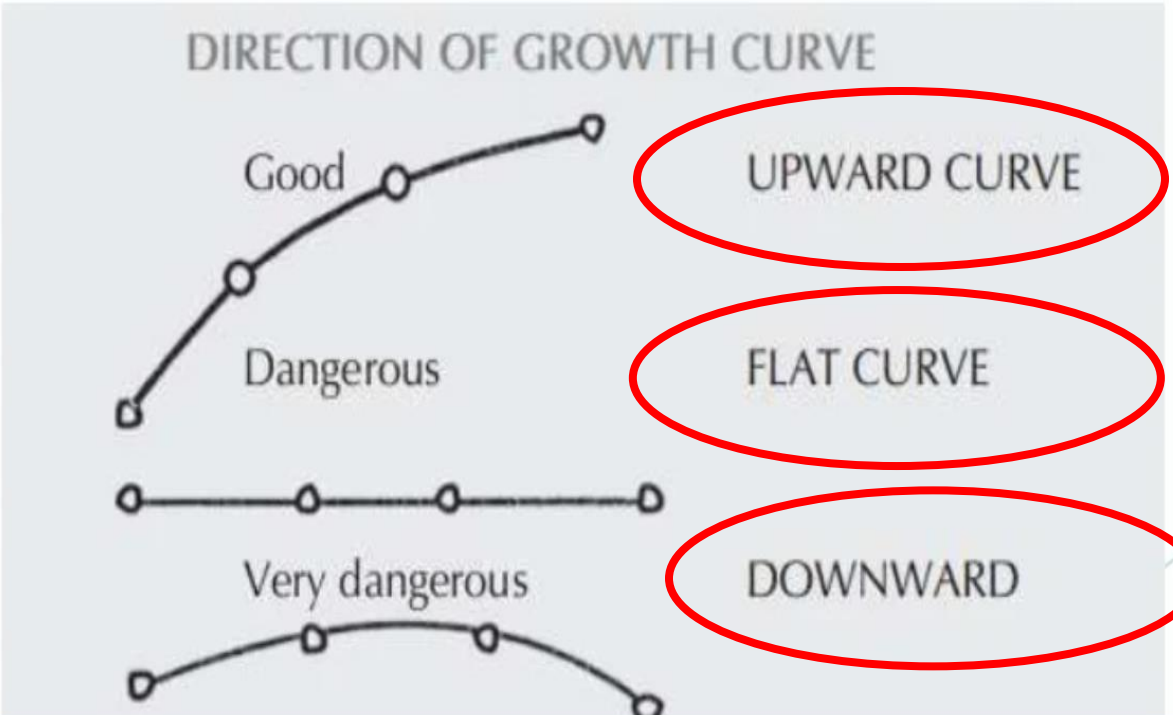
GROWTH CURVE

- Formed by joining the plotted points on a growth chart
- Direction of the growth curve indicates whether the child is growing or not
- Helps in determining the growth pattern of a child.
- It is very important to consider the child's whole situation while assessing the growth pattern

DIRECTION OF CHILD'S GROWTH CURVE

- The growth curve of a normally growing child usually follows a track that is roughly parallel to the 1ST or 2nd printed curve lines.

- The direction of the growth curve of the child can be upward, flat or downward

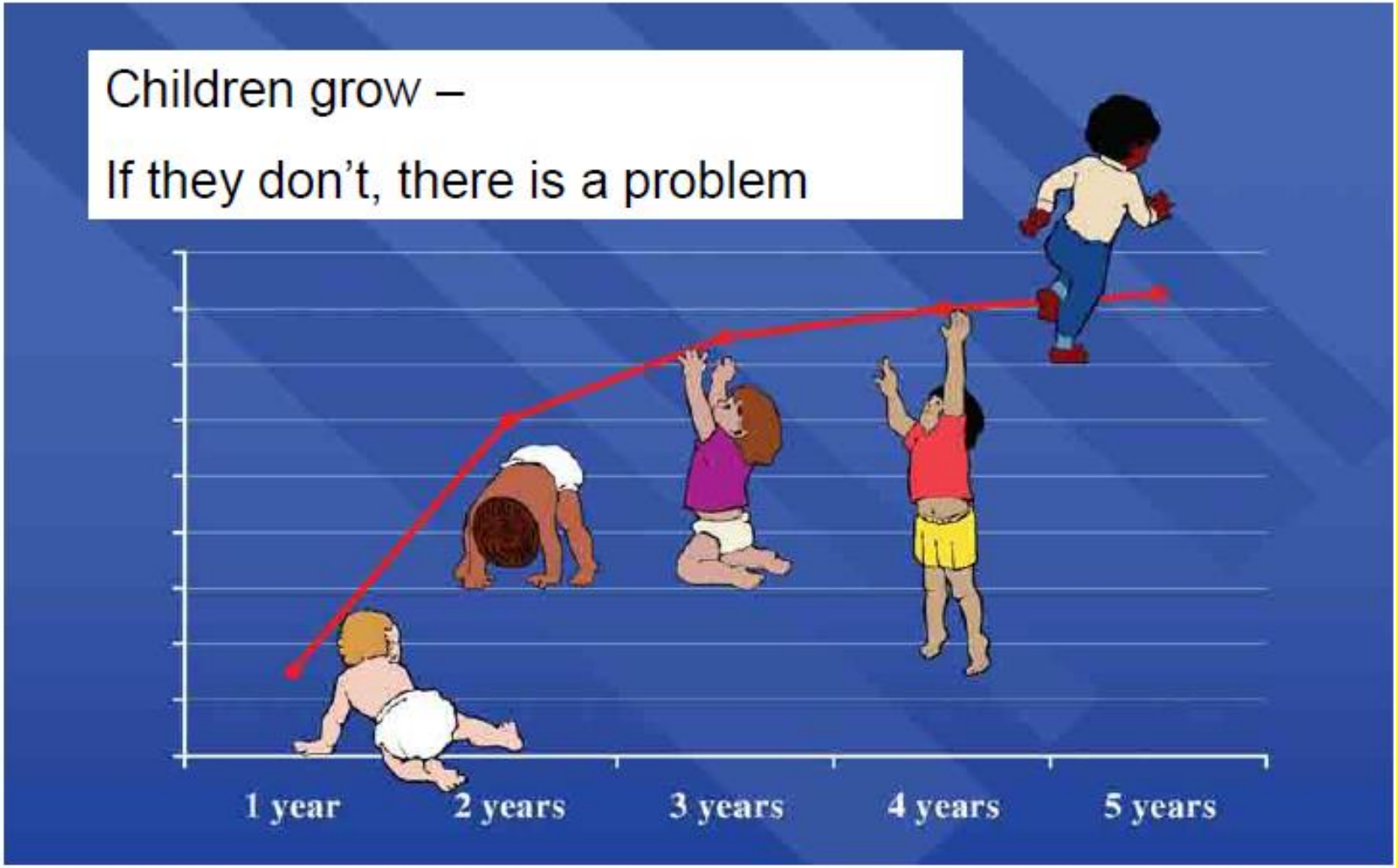


Measuring and Plotting

Direction of Growth Curves	Growth Pattern
Upward Growth Curve	**Good** Indicates adequate weight gain for the age of the child. The child is growing well and is healthy.
Flat Growth Curve	**Dangerous** Indicates that the child has not gained weight and is not growing adequately. This is called stagnation. The child needs attention by the mother and the health worker
Downward Growth Curve	**Very dangerous** Indicates loss of weight. The child requires immediate referral and health care.

Child Growth = marker of health and development

- Quick, non-invasive techniques
- Plotting serial measurements on charts
- Abnormal growth can indicate underlying health or developmental problems



Standardized tables or charts are used to assess weight, length or height, skull circumference, and growth velocity

Main influence on growth

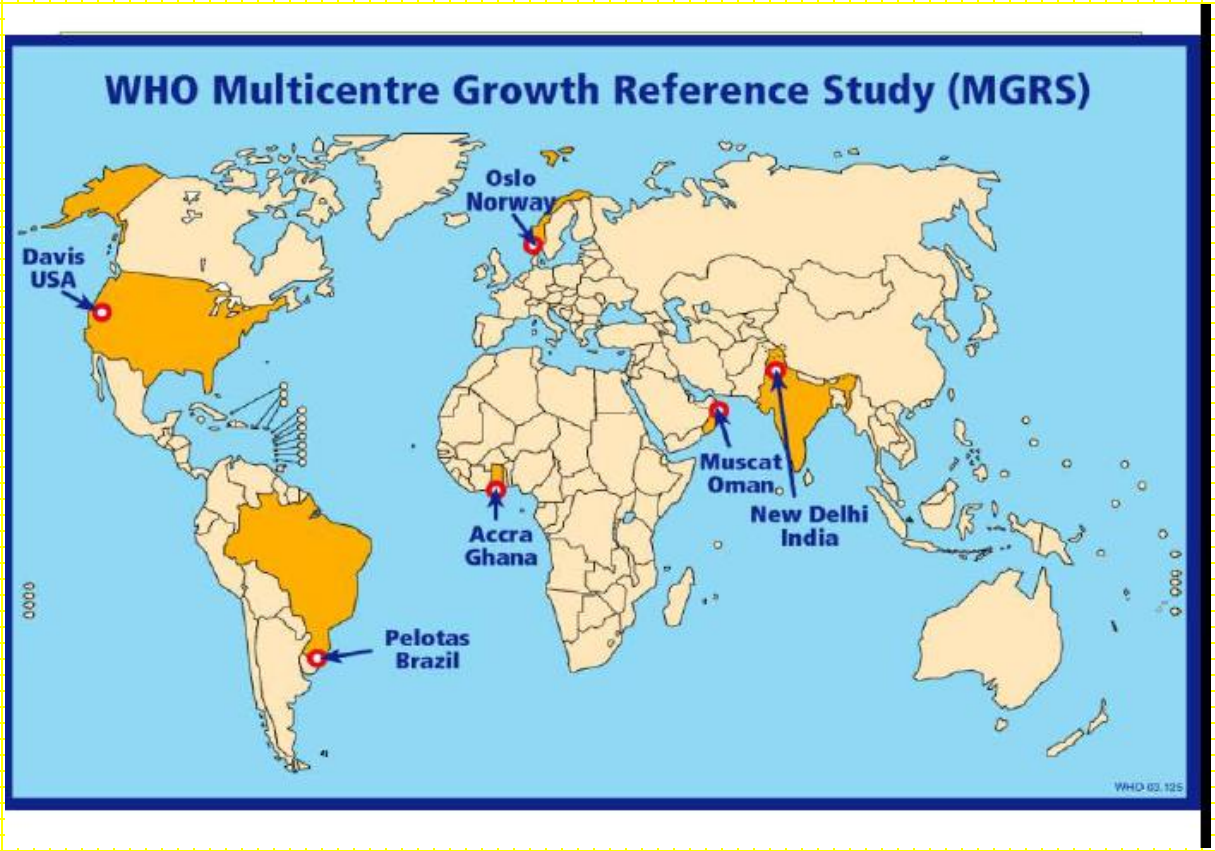
- Infancy : (up to 2 years)
  - Food/ nutrition
  - Chronic disease
- Childhood
  - Genes
  - Growth Hormones
  - Chronic disease
- Puberty
  - Sex hormones

NCHS(National Center for Health Statistics USA) or WHO charts

- •Growth charts are established on large populations of normal children living under near-optimal conditions and therefore representing the range of normal growth for children at different ages.
- •NCHS : USA population, cross-sectional
- •New growth standards have been developed by the World Health Organization (WHO) based on the growth of normal breast fed infants in various regions of the world. **International growth reference standard**

Measuring and Plotting

In response WHO undertook the Multicentre Growth Reference Study (MGRS) between 1997 and 2003 to generate new curves for assessing the growth and development of children the world over.



For the assessment WHO has provided

- charts for both boys and girls.
- to assess growth considering a child‘s age and measurements together.
  - ➢ length/height-for-age
  - ➢ weight-for-age
  - ➢ weight-for-length/height
  - ➢ BMI (body mass index)-for-age
  - ➢HC(head circumference)-for-age

What are growth charts?

- Growth charts are a series of percentile curves that show the distribution of body measurements in children over time.
- Growth charts are not diagnostic instruments. They are screening tools that help you form an overall clinical impression for the child being measured.
- The positions of the individual points on the graph are less important than the overall trajectory of the growth curve over time.

How to use a growth chart

- Accurately determine age .
- Accurately measure weight and recumbent length
- Plot measurements on appropriate chart
- Use the percentile lines to assess body size and growth, and ***monitor growth over time***
- Gather additional history, exam as needed
- Discuss growth pattern with parent and agree on subsequent action if required

USES OF THE GROWTH CHART

1. For growth monitoring **which is of great value in child health care**
2. Diagnostic tool: for identifying "high risk" children.
3. Planning and policy making: by grading malnutrition, it provides an objective basis for planning and policy making in relation to child health care.
4. Educational tool: for mothers.
5. Tool for action : helps health worker on the type of intervention needed
6. Evaluation: of the effectiveness of corrective measures and the impact of the programme or of special intervention

Measuring and Plotting

Birth to 2 years

Weight to nearest 10g

To nearest 0.1cm

purpose‘infantometer’ to nearest 0.1cm

2 & 3 ½ years

Portable or fixed

'for purpose'

To 100g / 0.1cm

Measuring Weight

Babies should be weighed without any clothes or nappy

Children older than two years can be weighed in vest and pants, but no shoes, footwear, and dolls or teddies in hand

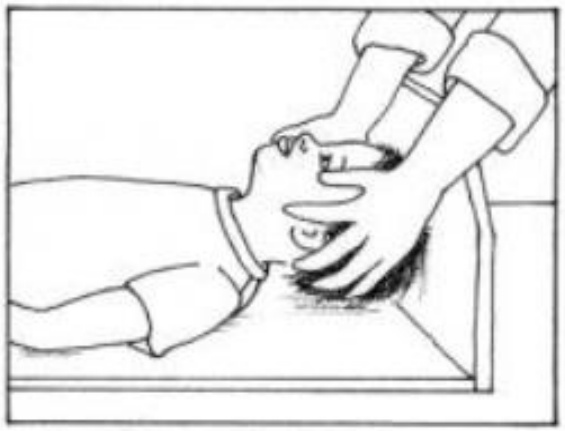
Only grade 3 clinical electronic scales in metric setting should be used -green sticker with background letter M (which means approved for medical use). Scales should be calibrated and maintained annually.

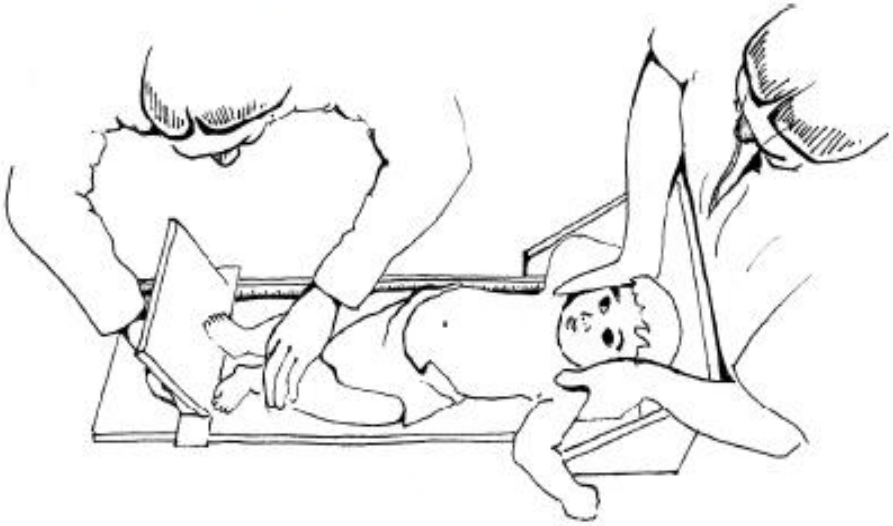
Measuring Head Circumference

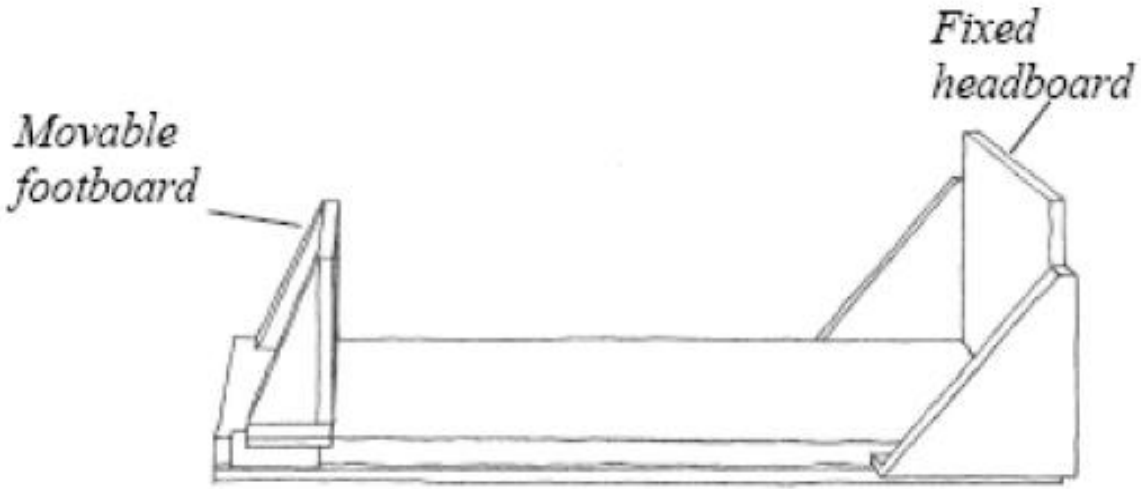
Head circumference should be measured using a narrow non-stretchable plastic or disposable lasso tape. Clean tape with antiseptic wipes [or soapy water] between child use

Measurement should be taken at the maximum occipito-frontal circumference taking the largest of 3 consecutive measurements

Length vs height







Measurement of stature

Feet flat together against the wall

Buttocks, Back against the wall

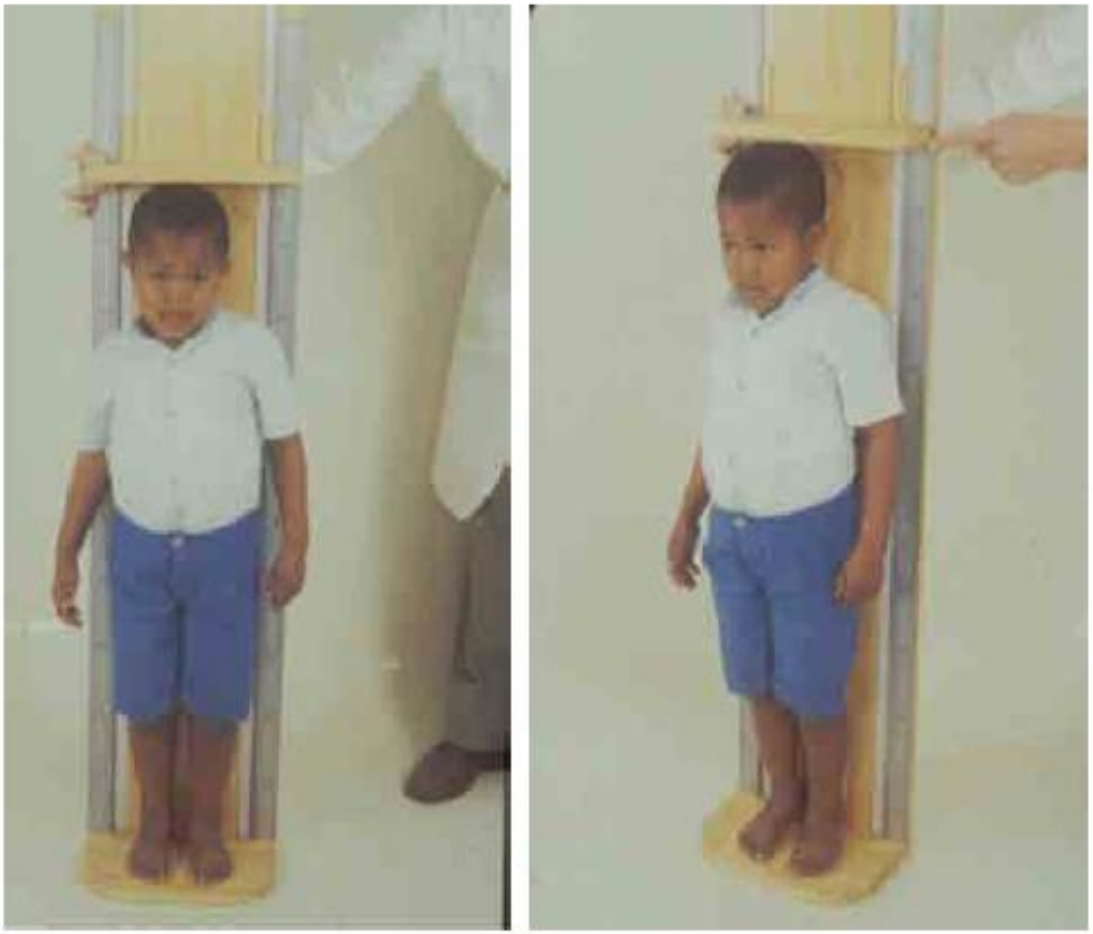
Stand straight!

Horizontal mark opposite top of head

Measure against the wall

Is this boy really 6 years old?

Measurement is the only way to recognize whether growth is normal or not

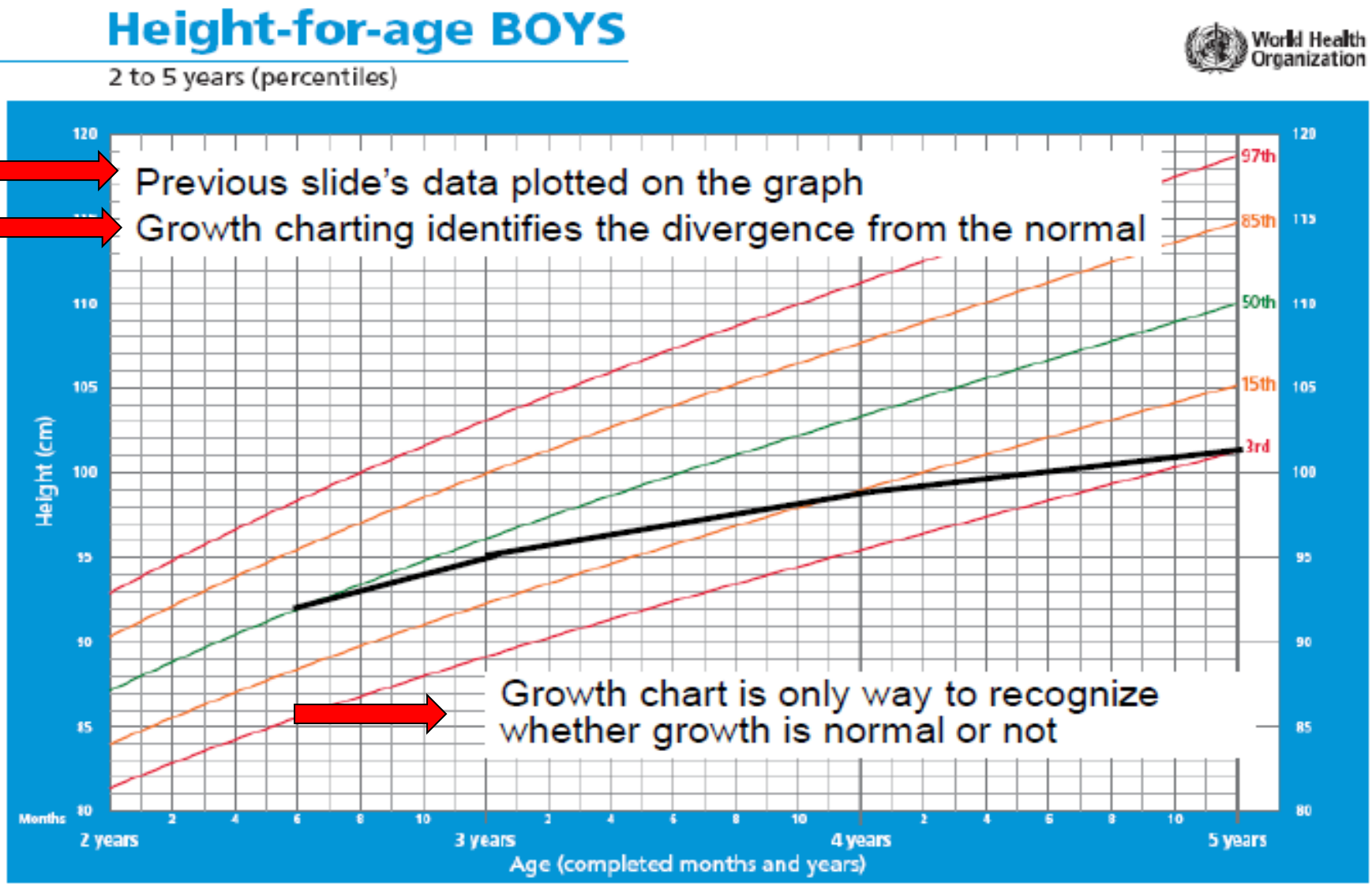


Measurement of growth

- Length or height measurement
- Example of a little boy's data:

eg	Age	Ht
	2.5 yrs	92 cm
	3.0 yrs	95 cm
	3.5 yrs	97 cm
	4.0 yrs	99 cm
	5.0 yrs	101 cm

Measuring and Plotting

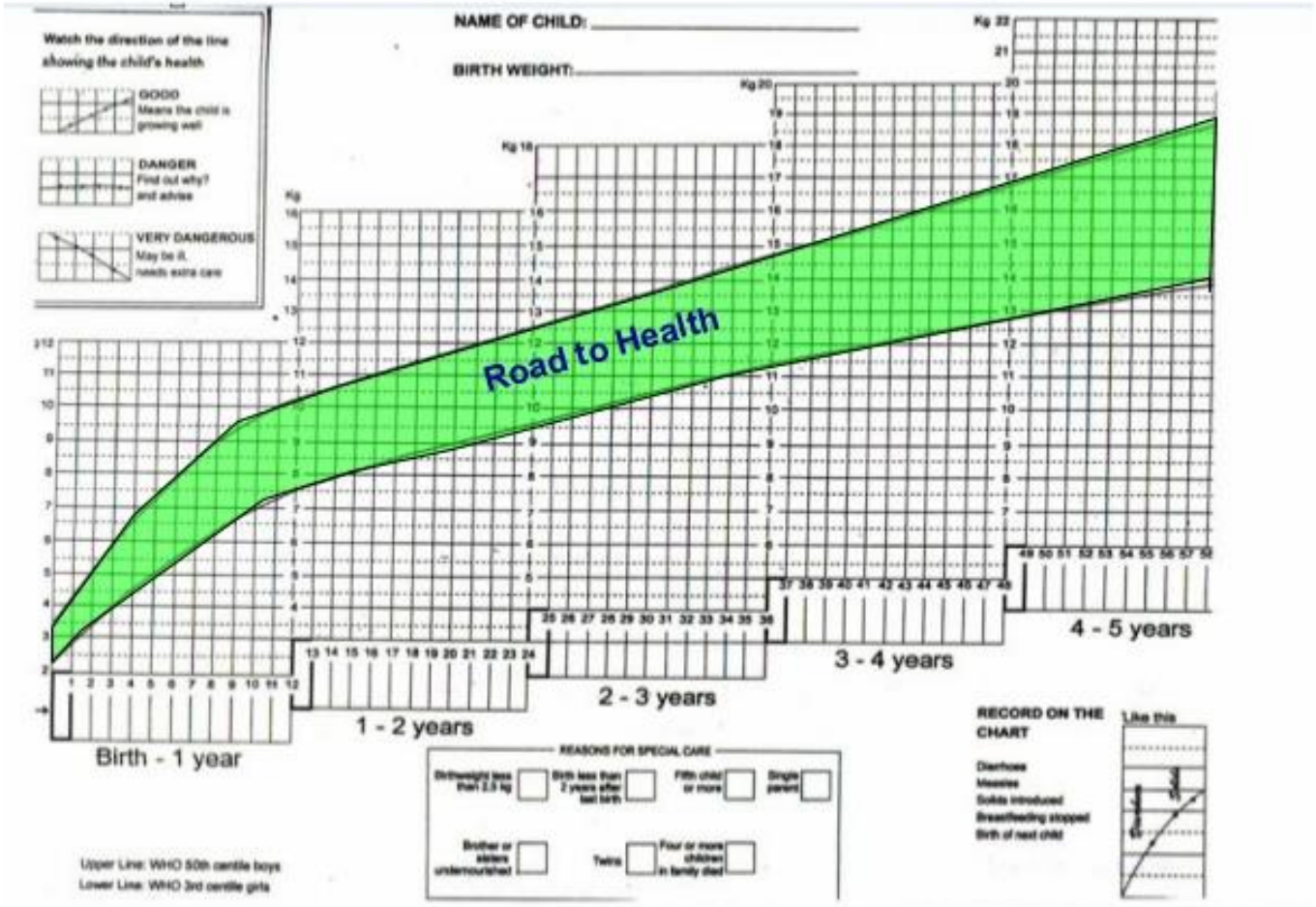


The most important feature of growth charts

- A measure to compare and monitor the physical status of an individual child with the childhood population on an ongoing basis.

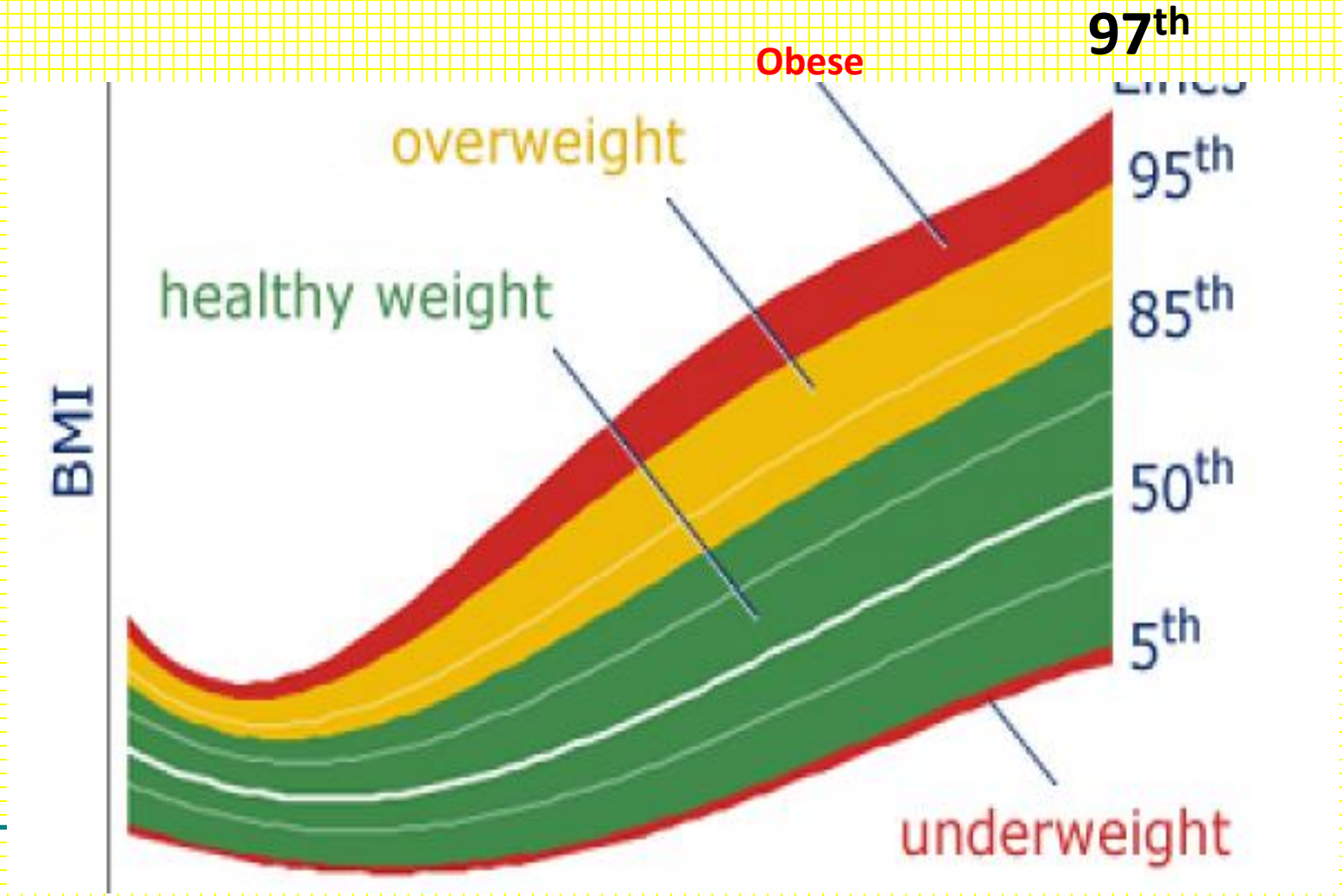
- **Different types of growth charts**
  - Road-to-Health Chart :
    - mainly a weight for age chart
  - Longitudinal growth charts
    - Percentile graphs
    - Z score graphs
  - BMI charts
  - Weight for length/height charts

Measuring and Plotting

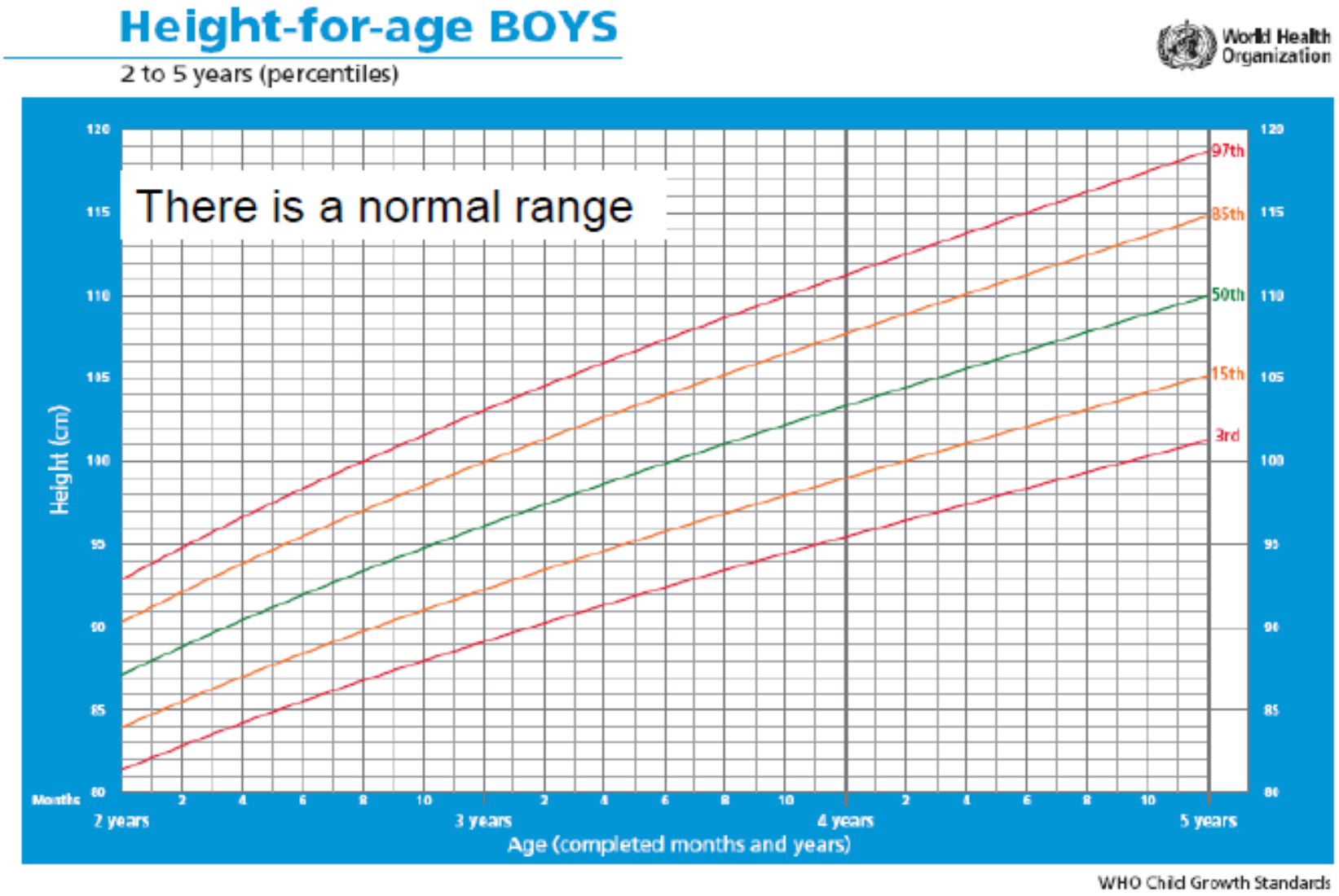


Growth chart 'Road to Health chart'

Measuring and Plotting



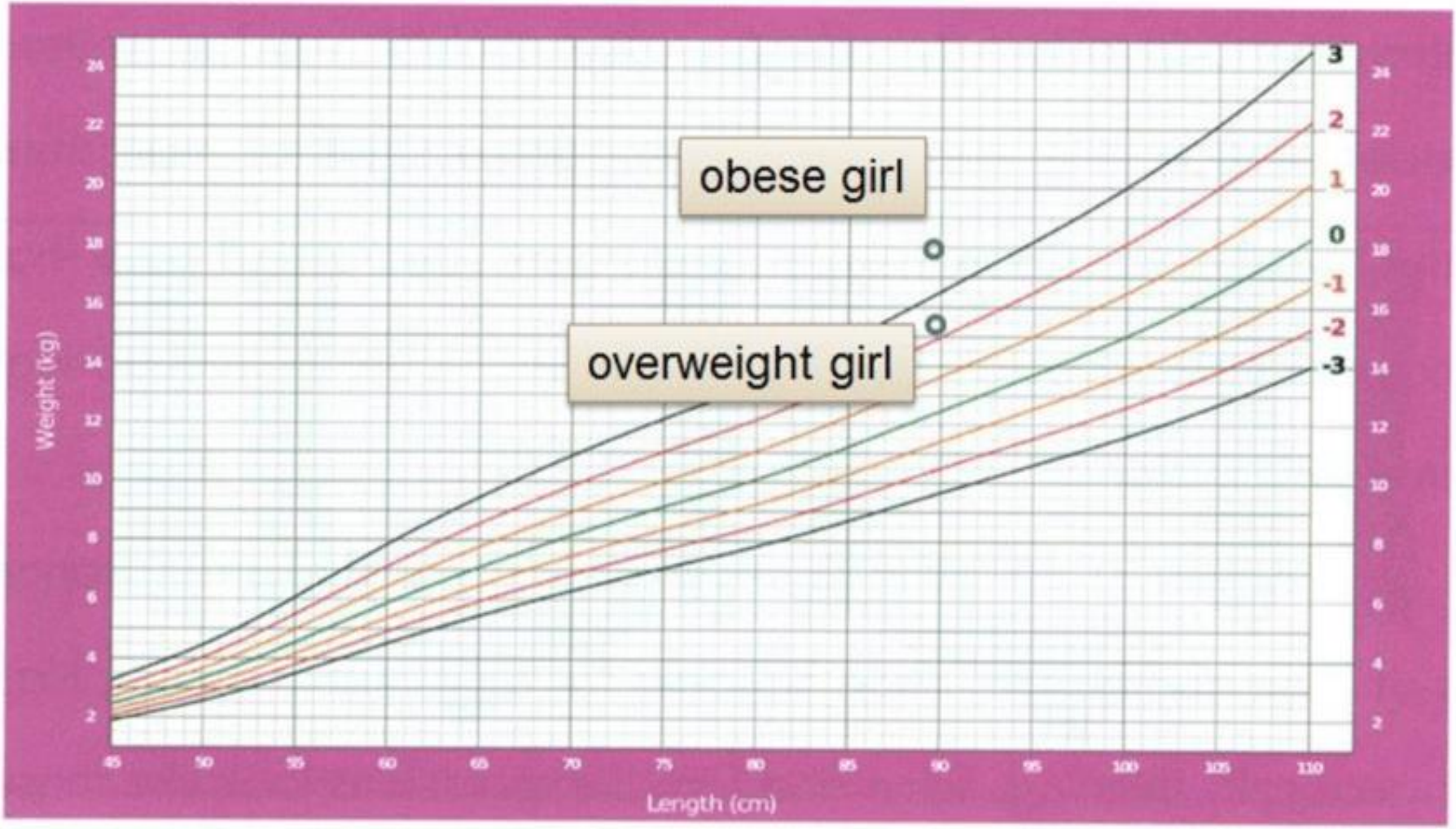
Measuring and Plotting



Weight-for-length GIRLS

Birth to 2 years (z-scores)

World Health Organization

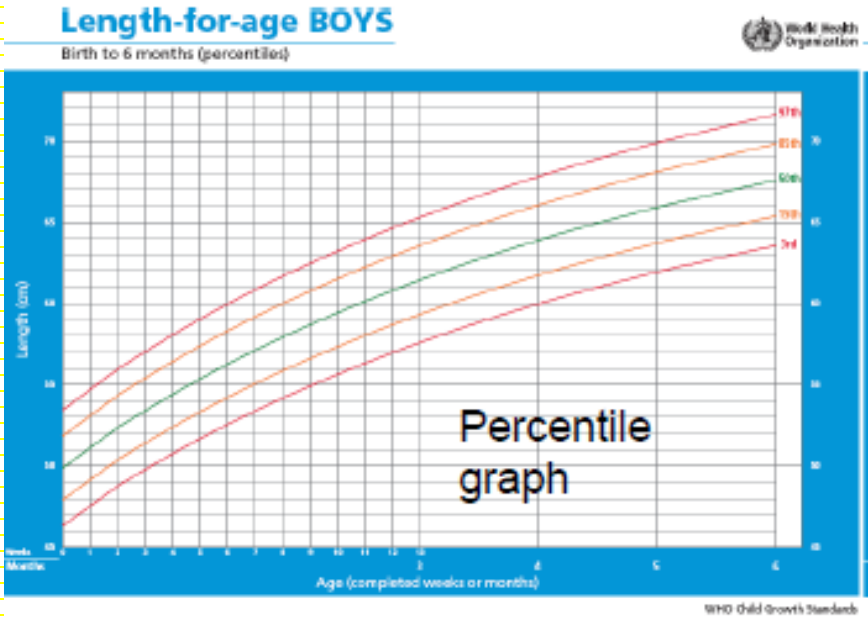


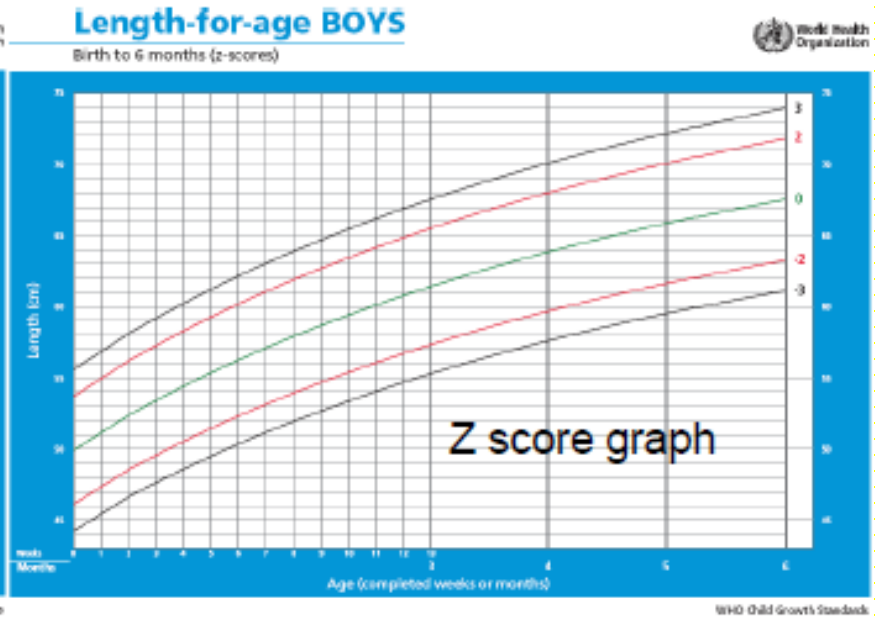
WHO Child Growth Standards

Z-score graphs

- **0** correspond to the mean and median
- **Z-scores or SD scores** are used to describe mathematically how far a measurement is from the median (average).
- **Z score=x` ± SD**
- The mean (median) is the same in both types of graph

Comparison of growth charts

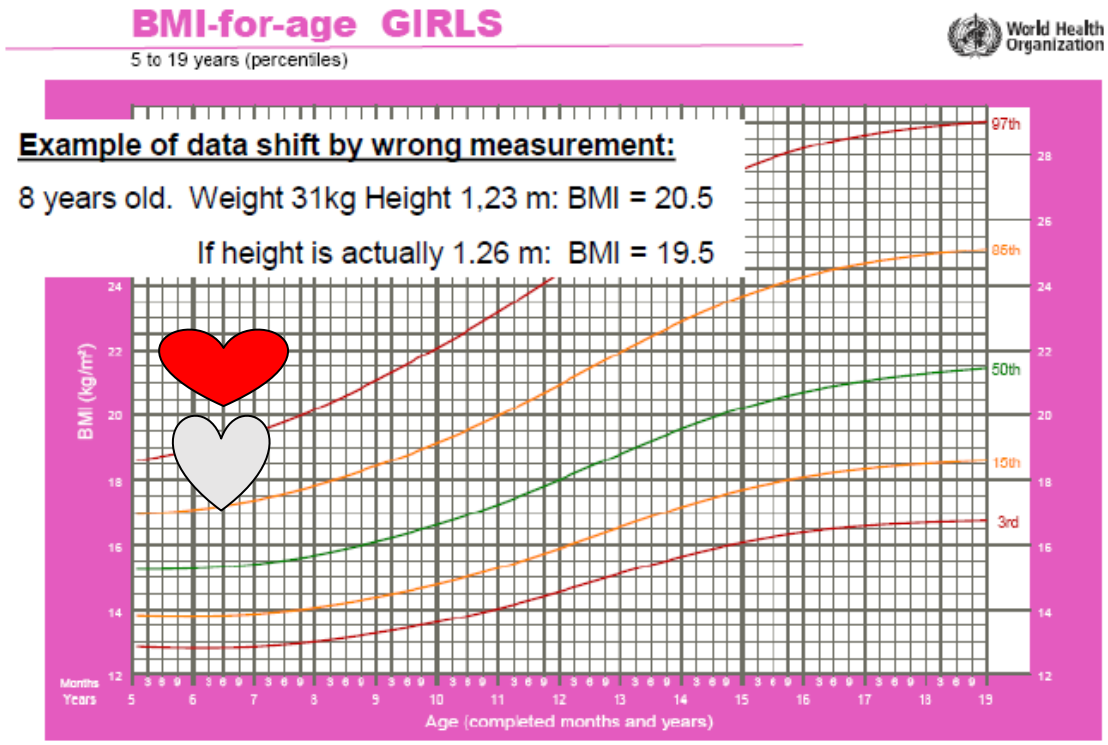




Percentile graphs have a narrower range, because the 97th centile corresponds approximately to a Z score +2

A Z-score of +3 or -3 is more likely to be definitely abnormal

Measuring and Plotting



Remember influence of measurement on derived numbers

After measurement, what next?

- •Measurement does not improve growth
- •Interpret the graph
- •Action must follow:

- Any child with Z score < -3
- Any child crossing the lines
- Weight/height discrepancy
- Consider wasting

To interpret the plotted graph

Z-score	Growth indicators			
	Length/height-for-age	Weight-for-age	Weight-for-length/height	BMI-for-age
Above 3	*See note 1*	*See note 2*	*Obese*	*Obese*
Above 2			*Overweight*	*Overweight*
Above 1			*Possible risk of overweight (See note 3)*	*Possible risk of overweight (See note 3)*
0 (median)				
Below −1				
Below −2	*Stunted (See note 4)*	*Underweight*	*Wasted*	*Wasted*
Below −3	*Severely stunted (See note 4)*	*Severely underweight (See note 5)*	*Severely wasted*	*Severely wasted*

Measurements in the shaded boxes are in the normal range.

High concern :

- **Any sharp decline in growth line:**
  - This is a very significant change in the child's growth.
  - A sharp decline in a normal or undernourished child indicates a growth disturbance.
  - Changes in weight or length should be investigated before a child crosses two major percentile lines.

High concern :

- **A flat growth line:**
  - Child is not growing consistently.
  - When growth rate is rapid during first six months of life, even a one month flat line in growth represents a possible concern.

High concern :

- **Any sharp incline in the growth line:**
  - This is a very significant change in the child's growth.
  - Changes in weight or length should be investigated **before** a child crosses two major percentile lines.
  - An unexplained sharp incline may signal a change in feeding practices - may lead to overweight/obesity.
  - A sharp incline in a previously ill or undernourished child may be "catch-up" growth expected in the re-feeding period.

Measuring and Plotting

It is important to correct for various factors in plotting and interpreting growth charts.

For premature infants, over diagnosis of growth failure can be avoided by using growth charts developed specifically for this population.

A cruder method, subtracting the weeks of prematurity from the postnatal age when plotting growth parameters.

Measuring and Plotting

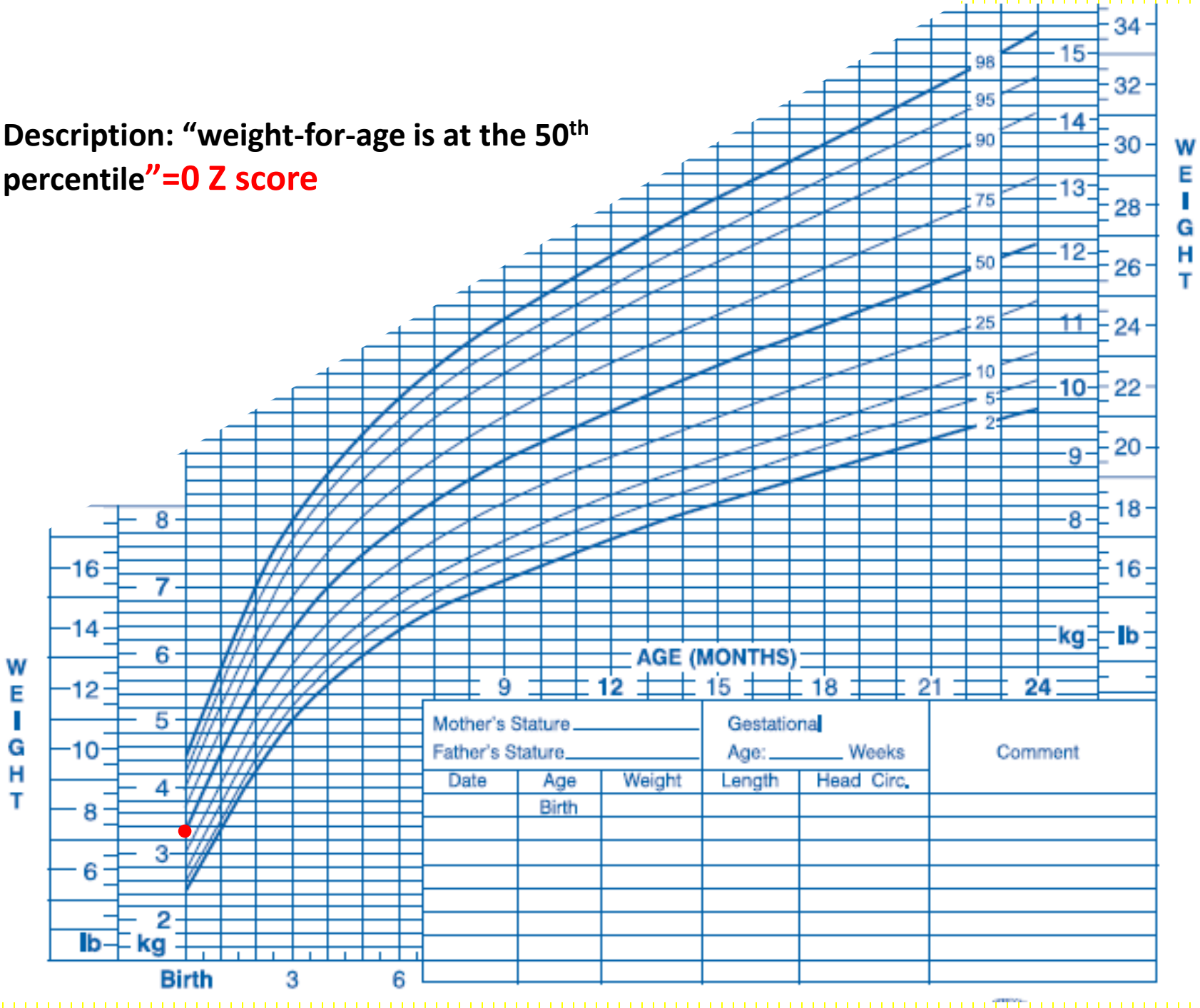
While VLBW infants may continue to show catch-up growth through early school age, most achieve weight catch-up during the 2nd yr and height catch-up by 2.5 yr.

For children with particularly tall or short parents, there is a risk of over diagnosing growth disorders if parental height is not taken into account.

Practice Scenario - Birth

- **Omar is a 1 day old breastfed male infant:**
  - **Birth date: 15 APR 2023**
  - **Birth weight: 3.41 kg**
  - **Gestational age: 38 weeks**
- Plot the point and describe his weight-for-age percentile

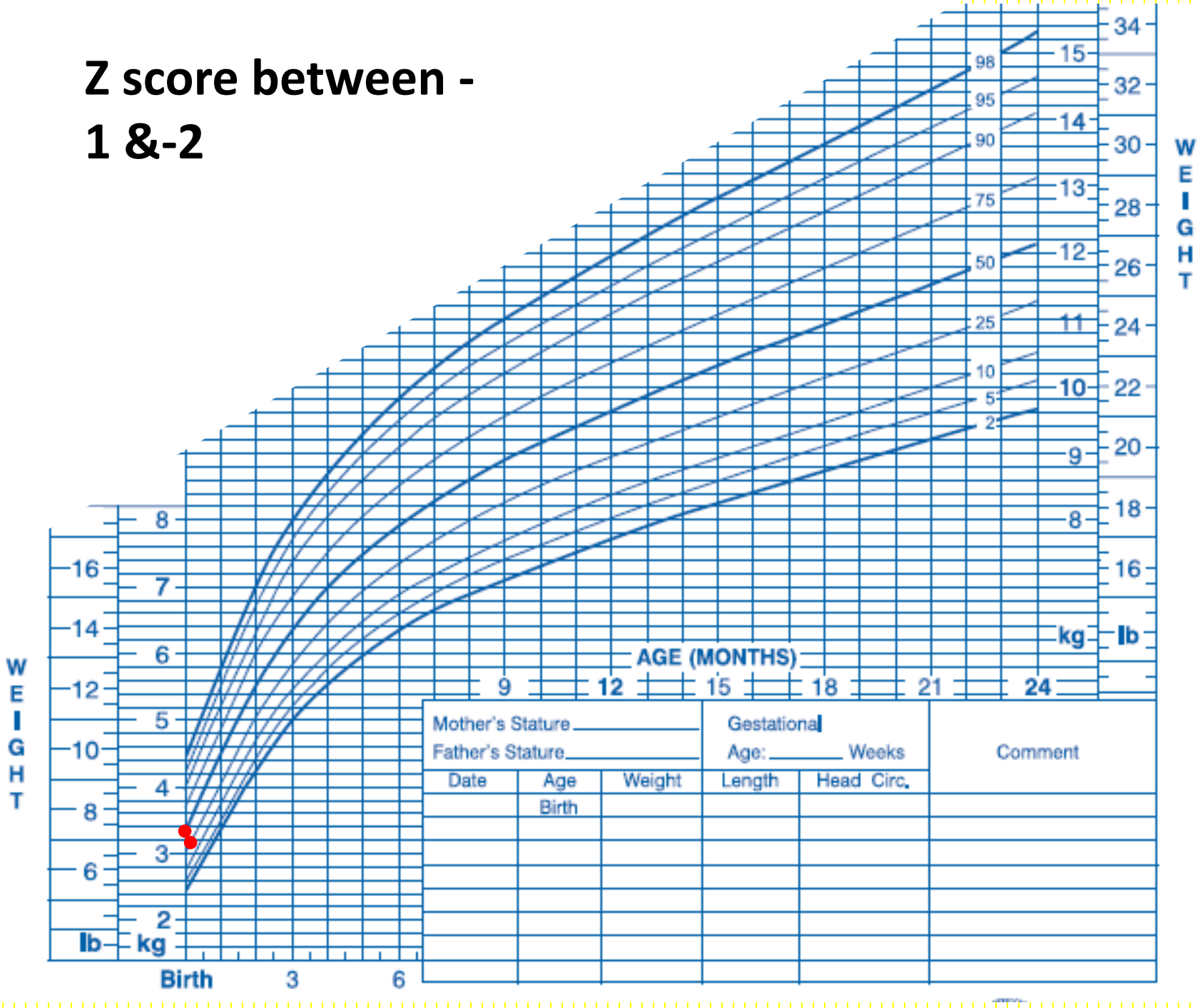
Description: "weight-for-age is at the 50th percentile"=0 Z score



Practice Scenario – Week 1 Visit

- **At Omar's first study visit his mother is concerned that she does not have enough breast milk.**
  - **Visit date: 24 APR 2023**
  - **Visit weight: 3.21 kg**
  - **Age: 9 days**
- Plot the point and describe his weight-for-age percentile
- Is this expected?
- What else would you do at this visit?

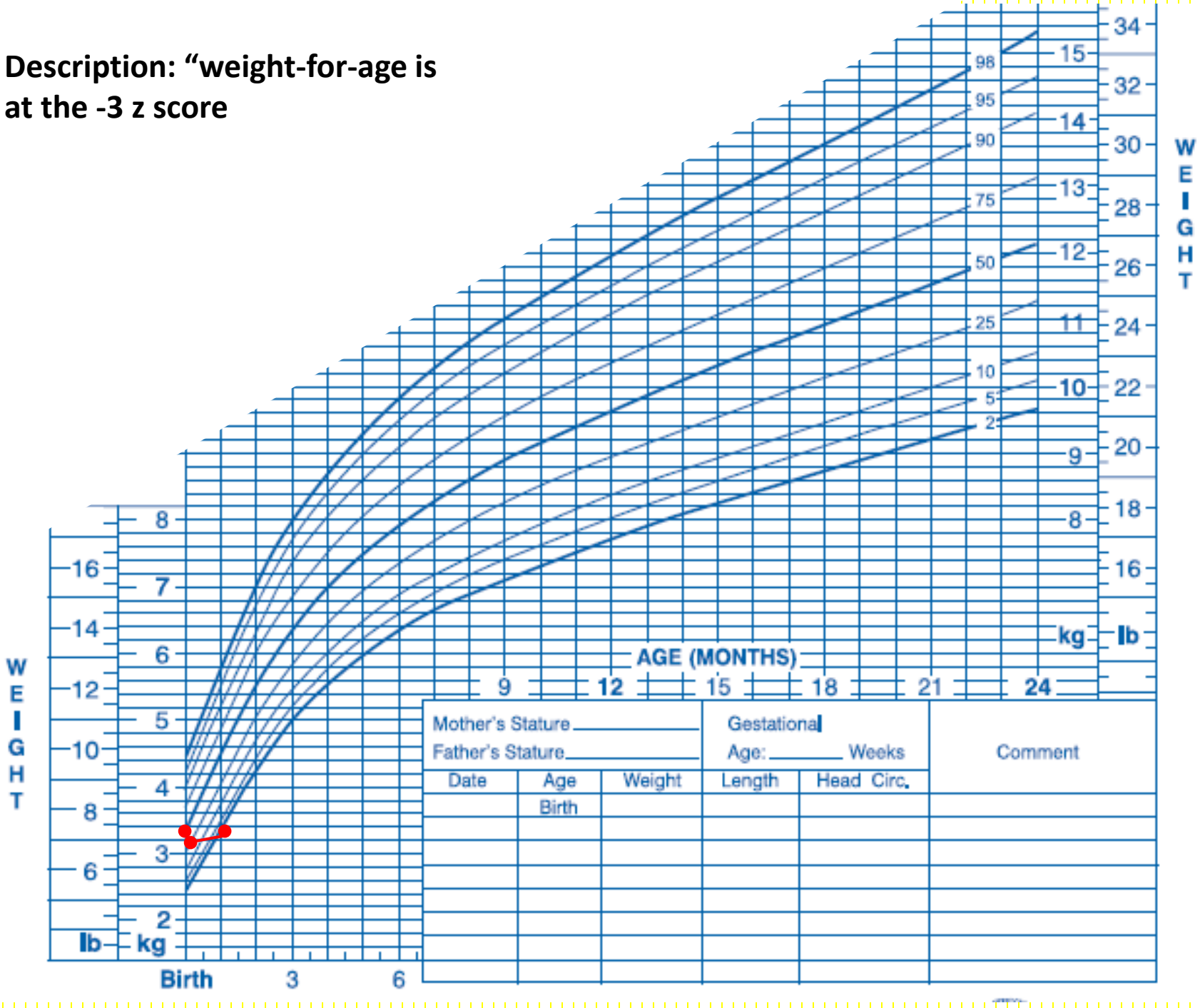
Z score between -1 &-2

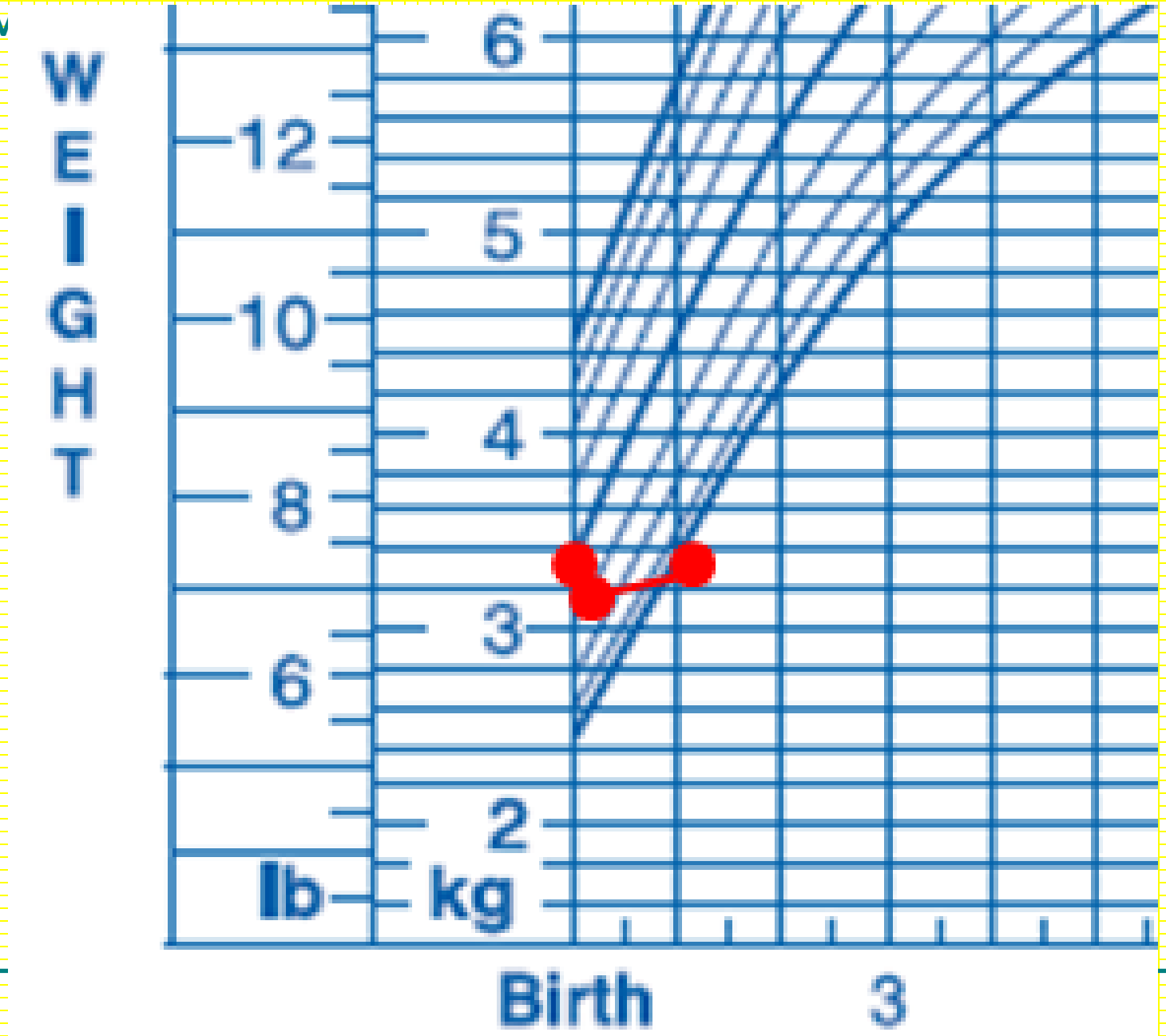


Practice Scenario – Month 1 visit

- At the Month 1 visit, Omar has not yet regained his birth weight:
  - **Visit date: 15 May 2023**
  - **Visit weight: 3.35 kg**
  - **Age: 1 month**
- Plot the point and describe his weight-for-age percentile
- Is this expected?
- What else would you do at this visit?

Description: “weight-for-age is at the -3 z score

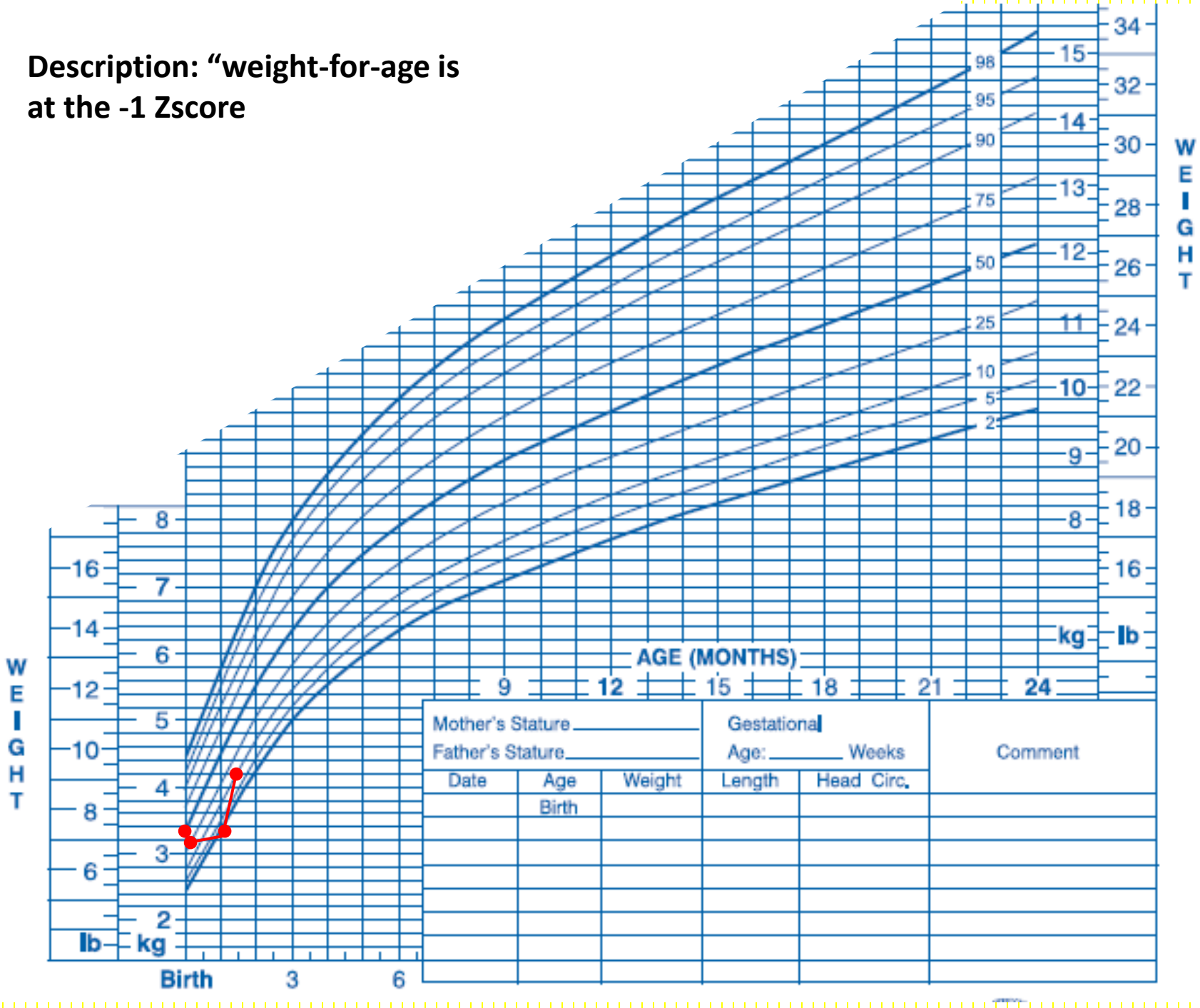



WEIGHT
12
10
8
6
lb
6
5
4
3
2
kg
Birth
3

Practice Scenario – Interim visit 1

- Omar returns for an interim weight check two weeks after his Month 1 visit:
  - **Visit date: 30 May 2023**
  - **Visit weight: 4.21 kg**
  - **Age: 1.5 months**
- Plot the point and describe his weight-for-age percentile
- Is this expected?
- What else would you do at this visit?

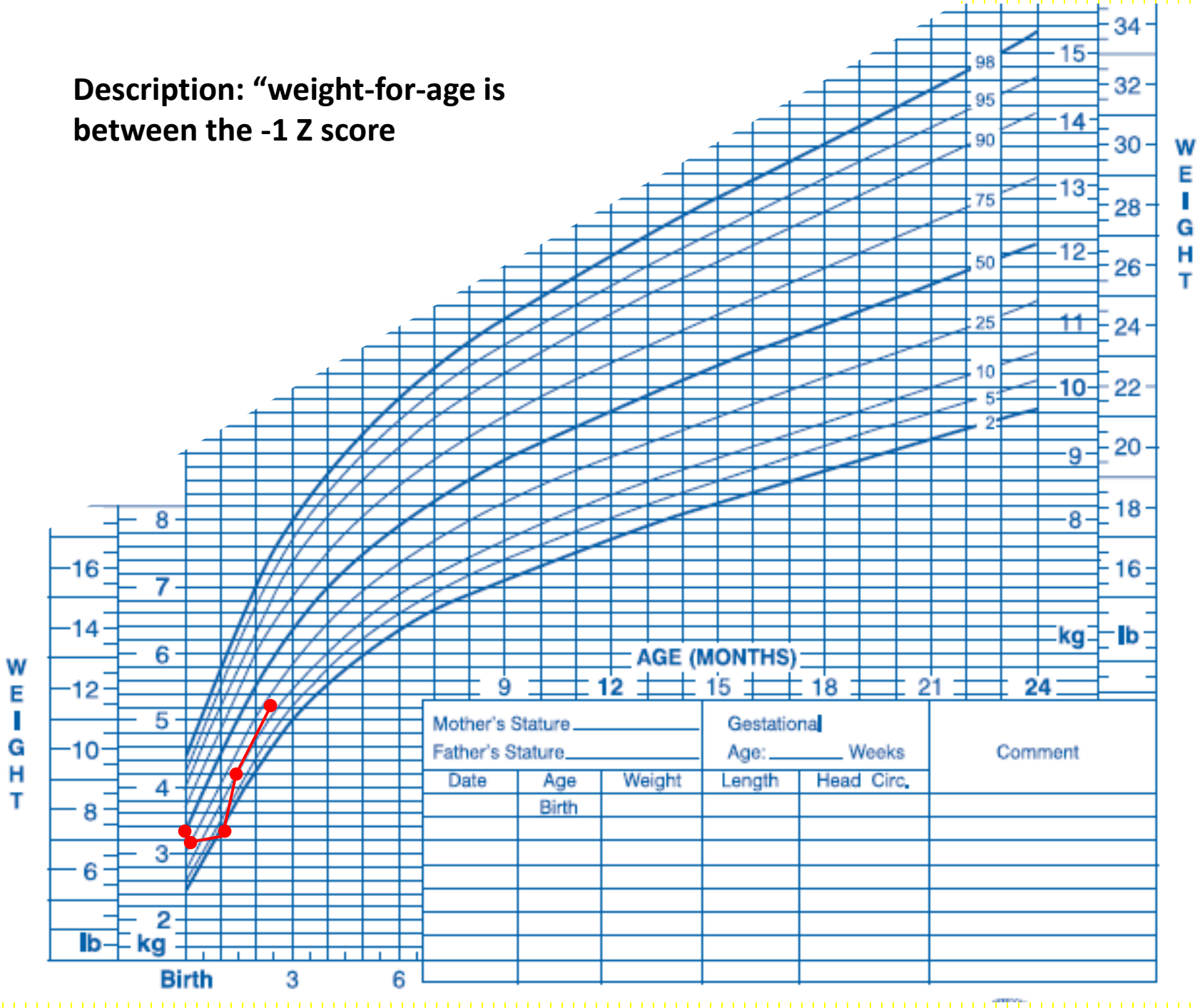
Description: “weight-for-age is at the -1 Zscore



Practice Scenario – Interim visit 2

- Omar returns for an interim weight check one month after his last interim visit:
  - **Visit date: 01 July 2023**
  - **Visit weight: 5.23 kg**
  - **Age: 2.5 months**
- Plot the point and describe his weight-for-age percentile
- Is this expected?
- What else would you do at this visit?

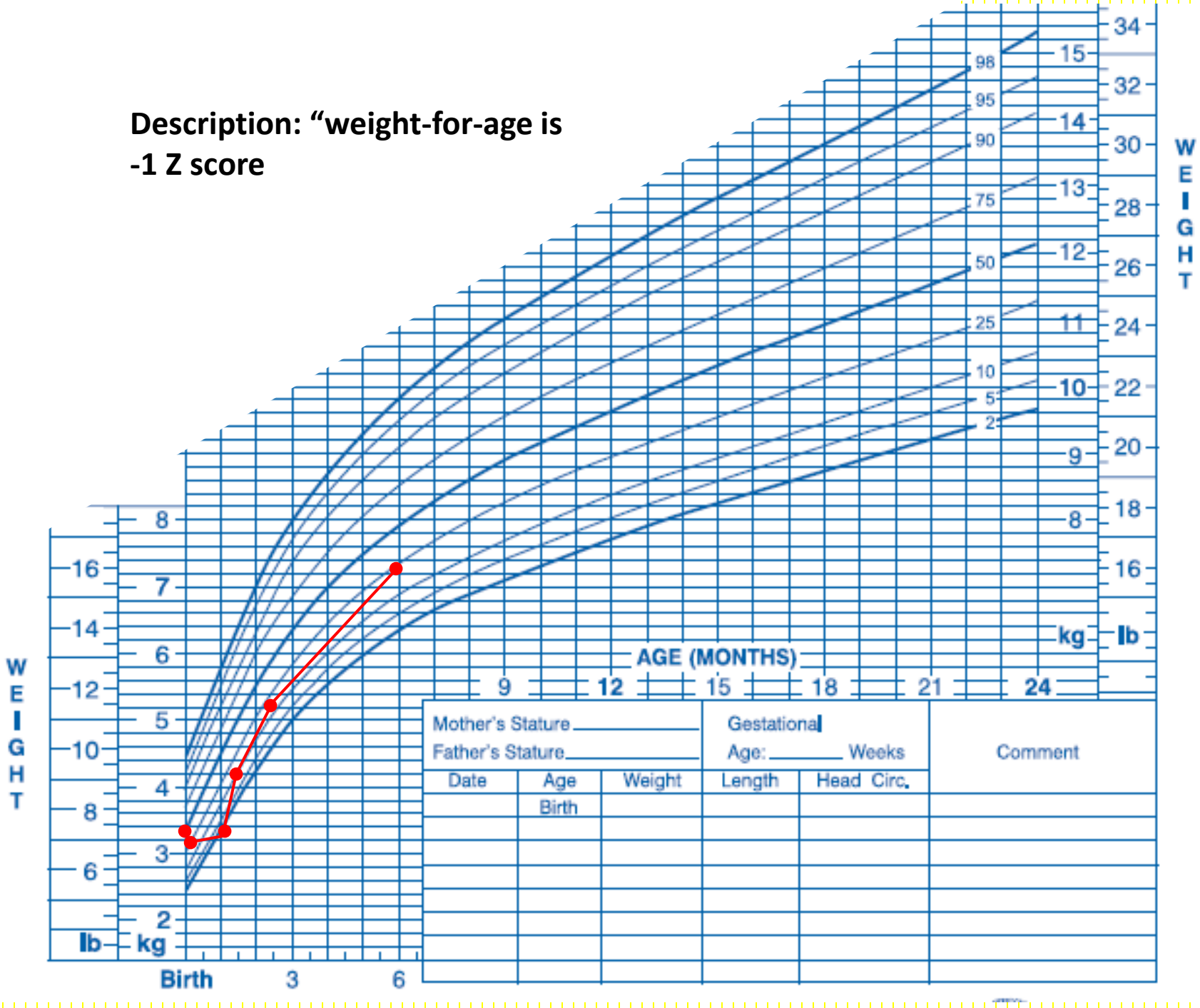
Description: “weight-for-age is between the -1 Z score



Practice Scenario – Month 6 visit

- Omar returns for his Month 6 visit:
  - **Visit date: 12 OCT 2018**
  - **Visit weight: 7.26 kg**
  - **Age: 6 months**
- Plot the point and describe his weight-for-age percentile
- Is this expected?
- What else would you do at this visit?

Description: “weight-for-age is -1 Z score



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