

Nutritional Assessment: An ABCD Approach to Practical Evaluation

A Practical Guide for Students



**Anthropometric
Assessment**



**Biochemical
Assessment**



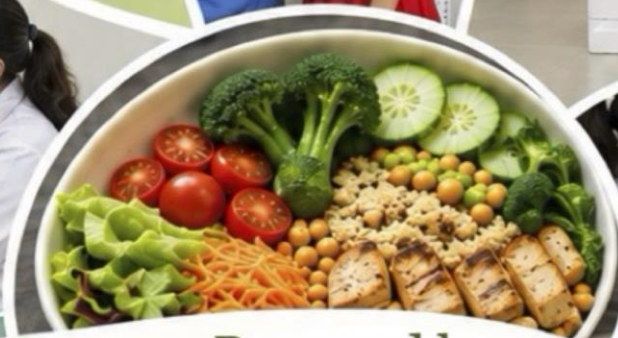
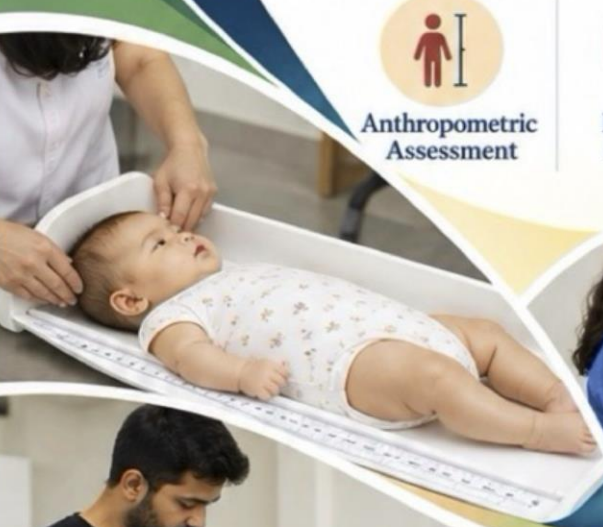
**Clinical
Evaluation**



**Dietary
Assessment**



**Market
Survey**



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Finally, I extend my appreciation to everyone who has directly or indirectly contributed to the development of this manual.

PREFACE

Nutritional assessment is an essential component of nutrition and dietetics practice. It provides a systematic approach to evaluating an individual's nutritional status through the collection, analysis and interpretation of relevant information.

This Practical Manual of Nutritional Assessment has been developed as an academic resource for undergraduate students of Nutrition and Dietetics. It aims to bridge theoretical knowledge and practical application by providing structured procedures for commonly used nutritional assessment techniques.

The manual follows the integrated ABCD approach, covering Anthropometric, Biochemical, Clinical and Dietary assessment. It also incorporates functional and biophysical assessment activities and market survey practicals to provide students with broader exposure to nutritional evaluation and its practical applications.

Each practical is designed to familiarise students with the relevant procedures, equipment, calculations, recording methods and interpretation of results. Emphasis is placed on standardised measurement techniques, accuracy, appropriate documentation and the application of scientific reference standards.

It is hoped that this manual will serve as a useful guide in developing the practical competencies required for nutritional assessment in academic, clinical and community settings.

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ABOUT THE MANUAL

The Practical Manual of Nutritional Assessment is designed to provide students with structured, hands-on learning experiences in the assessment of nutritional status.

The manual integrates the four major components of nutritional assessment:

- Anthropometric Assessment: Measurement and interpretation of body dimensions, circumferences, skinfold thickness and body composition-related indicators.
- Biochemical Assessment: Understanding and assessment of selected biochemical parameters used to evaluate nutritional and metabolic status.
- Clinical Assessment: Identification of clinical signs and application of nutritional screening and assessment tools.
- Dietary Assessment: Application of dietary survey methods to assess food intake, dietary patterns and nutrient consumption.

In addition, the manual includes functional and biophysical assessment activities and market survey practicals involving the evaluation of food products, nutritional labels, product composition and related information.

The practical exercises are organised to encourage students to understand the purpose of each assessment method, perform procedures systematically, record observations accurately and interpret findings using appropriate reference standards.

The manual is intended to complement classroom teaching and laboratory-based practical sessions.

LEARNING OBJECTIVES

1. Familiarize students with the principles and methods of nutritional assessment.
2. Develop practical skills in performing standard anthropometric measurements.
3. Introduce selected biochemical parameters and their relevance to nutritional evaluation.
4. Develop the ability to identify clinical indicators of nutritional status and use appropriate screening tools.
5. Familiarize students with different dietary assessment methods and their applications.
6. Develop skills in recording, calculating and interpreting nutritional assessment data.
7. Introduce functional and biophysical assessment techniques.
8. Develop an understanding of food product evaluation through market survey activities.

EXPECTED LEARNING OUTCOMES

- Perform selected anthropometric measurements using appropriate techniques.
- Calculate and interpret commonly used anthropometric indices.
- Describe the relevance of selected biochemical parameters in nutritional assessment.
- Identify clinical indicators and apply selected nutritional screening tools.
- Conduct dietary assessments using appropriate methods.
- Record and interpret nutritional assessment findings systematically.
- Demonstrate familiarity with selected functional assessment procedures.
- Evaluate food products using nutritional labelling and market survey methods.

INSTRUCTIONS FOR STUDENTS

1. Read the aim, principles and procedure of each practical before beginning the exercise.
2. Understand the purpose and correct use of the instruments and equipment required.
3. Follow standardized procedures while performing measurements and assessments.
4. Ensure that instruments are appropriately calibrated and maintained wherever applicable.
5. Record all observations and measurements accurately in the prescribed recording formats.
6. Use the specified units while recording measurements and calculating nutritional indices.
7. Refer to the recommended standards and reference values while interpreting results.
8. Maintain cleanliness, hygiene and appropriate laboratory practices during practical sessions.
9. Obtain consent and maintain confidentiality whenever assessments involve human participants.
10. Complete practical records systematically and submit them as instructed by the faculty.

Important: Students should not interpret measurements in isolation. Consider findings in the context of the individual's age, sex, physiological status, and relevant clinical or dietary information.

LIST OF ABBREVIATIONS AND SYMBOLS

Abbreviation	Full form
ABW	Adjusted Body Weight
BAZ	BMI-for-Age Z-score
BMI	Body Mass Index
BMR	Basal Metabolic Rate
FAO	Food and Agriculture Organization
Hb	Haemoglobin
HAZ	Height-for-Age Z-score
IBW	Ideal Body Weight
MNA	Mini Nutritional Assessment
MUAC	Mid-Upper Arm Circumference
MUST	Malnutrition Universal Screening Tool
PG-SGA	Patient-Generated Subjective Global Assessment
SGA	Subjective Global Assessment
WAZ	Weight-for-Age Z-score
WHR	Waist-to-Hip Ratio
WHZ	Weight-for-Height Z-score
WHO	World Health Organization

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SECTION 1

ANTHROPOMETRIC MEASUREMENTS

INTRODUCTION

Anthropometric measurements constitute the backbone of nutritional assessment because they provide objective measurements of body structure, proportion, and composition. Anthropometry refers to the systematic measurement of the physical dimensions of the human body and is widely used in clinical, community, and research settings.

These measures are easy to administer, non-invasive, and economical; hence, can be used on subjects of all ages. These measurements assist in evaluating growth trends, nutritional status, and risk factors that predispose individuals to specific diseases.

The current section highlights standardized techniques for measuring anthropometric variables like height, weight, body mass index, circumference, and skinfold thickness. Attention will be paid to proper positioning, accurate localization of body parts, appropriate tool application, and measurement precision. The acquired results will be analyzed using standardized values for determining nutritional status.

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HEIGHT

Aim/Objectives:

To determine the standing height of an individual using standard anthropometric technique.

Instruments Required:

- Stadiometer / wall-mounted measuring scale
- Flat vertical surface
- Headpiece

Method:

- The subject should stand barefoot on a flat surface.
- Heels together, body erect, arms hanging freely by the sides.
- Heels, buttocks, shoulders, and back of head should touch the vertical surface.
- Head positioned in Frankfurt plane (line from lower margin of orbit to upper margin of ear canal horizontal).
- Lower the headpiece gently to touch the crown of the head.
- Record the measurement at eye level to nearest 0.1 cm.

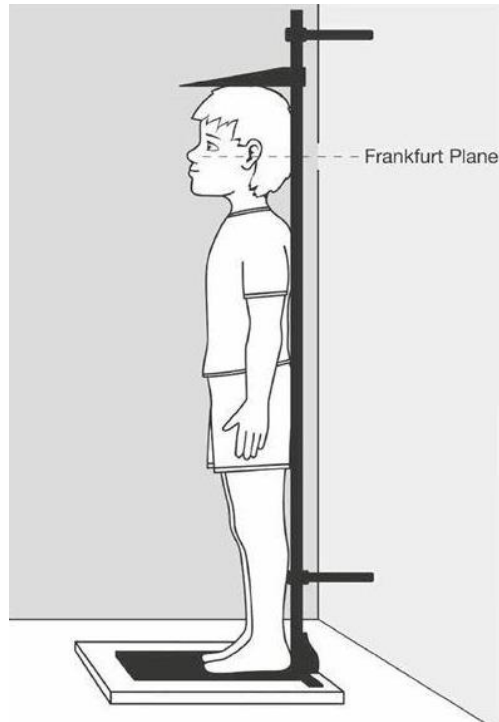


Figure: Standing height measurement using stadiometer (Frankfurt plane alignment)

Source: DHSC (2025). National Child Measurement Programme: Operational Guidance 2025.

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

Compared using age- and sex-specific growth standards (WHO charts for children)

Precautions / Common Errors:

- Ensure subject is not wearing footwear
- Avoid bending of knees or slouching posture
- Head must be in correct Frankfurt plane
- Measurement should be read at eye level to avoid parallax error

In children - LENGTH / HEIGHT

Aim/Objectives:

To measure length (infants) or height (children) accurately for growth assessment.

Instruments Required:

- Infantometer (for <2 years)
- Stadiometer (for ≥ 2 years)

Method:

- Infants: Measure in supine position using infantometer
- Ensure head touches fixed board and legs are fully extended
- Children: Stand erect with head in Frankfurt plane
- Heels, buttocks, shoulders aligned with vertical surface



Figure: Standard procedures for measuring recumbent length (infants) and standing height (children)

Source: Adapted from World Health Organization (WHO). *Training Course on Child Growth Assessment* (2008) and standard anthropometry references.

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

Compared with WHO Height-for-Age growth charts

Precautions / Common Errors:

- Incorrect positioning of head
- Flexed knees in infants
- Child not standing erect

WEIGHT

Aim/Objectives:

To measure body weight accurately using a calibrated weighing scale.

Instruments Required:

- Digital or beam balance weighing scale

Method:

- Ensure the scale is calibrated to zero before use.
- Subject should wear minimal clothing and no footwear.
- Stand still at the center of the platform.
- Weight is recorded once the reading stabilizes.



Figure: Standing weight measurement using digital weighing scale.

Formula Used:

Not applicable

Calculation:

Direct reading in kg

Reference Values:

Interpreted using BMI or age-specific standards

Precautions / Common Errors:

- Do not record weight if scale is not zeroed
- Avoid movement during measurement
- Heavy clothing may affect accuracy

In children

Aim/Objectives:

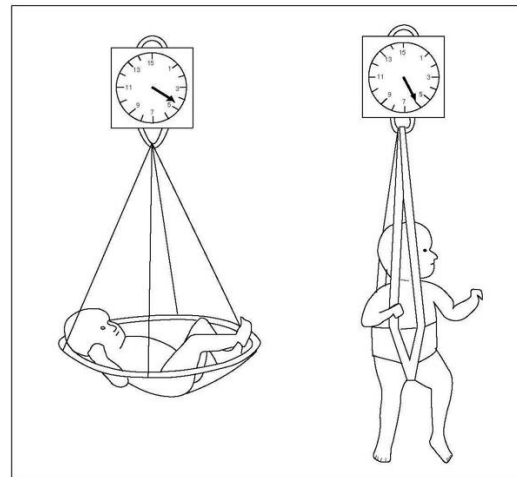
To measure body weight accurately for nutritional assessment.

Instruments Required:

- Infant weighing scale
- Digital weighing scale

Method:

- Infants: Place child gently on scale
- Children: Stand barefoot at center of scale
- Ensure scale is zeroed



Source: WHO Child Growth Standards

Formula Used:

Not applicable

Calculation:

Direct reading in kg

Reference Values:

Compared with WHO Weight-for-Age or BMI-for-Age charts

Precautions / Common Errors:

- Movement during measurement
- Heavy clothing

- Incorrect zeroing

HEAD CIRCUMFERENCE

Aim/Objectives:

To assess brain growth and development in infants.

Instruments Required:

- Non-stretchable measuring tape

Method:

- Place tape above eyebrows (supraorbital ridge)
- Pass around occipital prominence
- Ensure snug fit

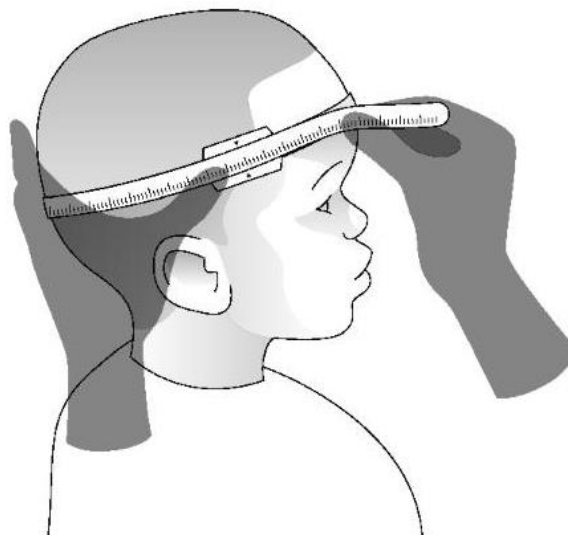


Figure: Head circumference measurement using a measuring tape

Source: Advances in Therapy, 42:1291–1311 (2025).

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

Compared with WHO head circumference charts

Precautions / Common Errors:

- Incorrect placement of tape
- Loose tape
- Child movement

Source: WHO Child Growth Standards

CHEST CIRCUMFERENCE**Aim/Objectives:**

To assess growth and nutritional status in infants.

Instruments Required:

- Measuring tape

Method:

- Measure at nipple line
- Ensure normal breathing
- Tape placed horizontally



Figure: Measurement of chest circumference in infants using a measuring tape

Source: Adapted from standard pediatric anthropometry recommendations and WHO training materials.

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

Compared with age-specific standards

Precautions / Common Errors:

- Tight tape
- Incorrect level
- Measurement during inspiration

BODY MASS INDEX (BMI)

Aim/Objectives:

To determine nutritional status using Body Mass Index.

Instruments Required:

- Height measurement
- Weight measurement

Method:

- Measure height in meters and weight in kilograms.
- Use recorded values for calculation.

Formula Used:

$$\text{BMI} = \text{Weight (kg)} / \text{Height (m}^2\text{)}$$

Calculation:

Substitute measured values into formula

Reference Values:

- $<18.5 \rightarrow$ Underweight
- $18.5\text{--}24.9 \rightarrow$ Normal
- $25\text{--}29.9 \rightarrow$ Overweight
- $\geq 30 \rightarrow$ Obese

Precautions / Common Errors:

- Ensure correct unit conversion (cm to m)
- Avoid rounding errors in height
- BMI does not distinguish between fat and muscle mass

MID-UPPER ARM CIRCUMFERENCE (MUAC)

Aim/Objectives:

To determine nutritional status and muscle mass using mid-upper arm circumference.

Instruments Required:

- Non-stretchable MUAC tape

Method:

- Identify the midpoint between the acromion (shoulder) and olecranon (elbow).
- Mark the midpoint.
- Wrap the tape snugly around the arm at this point.
- Ensure tape is horizontal and not compressing the skin.
- Record the measurement to nearest 0.1 cm.

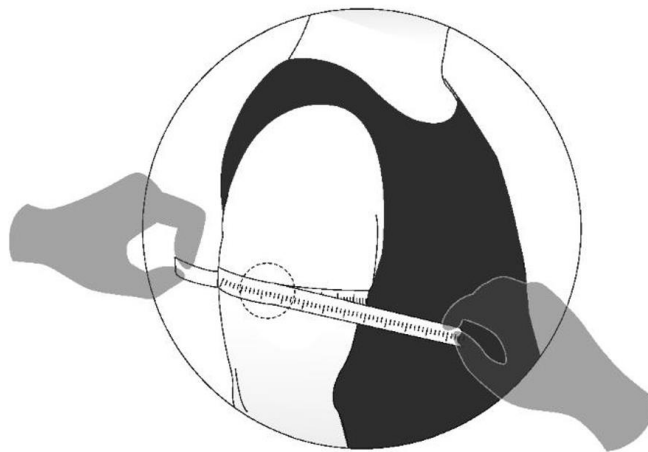


Figure: MUAC measurement at midpoint of upper arm

Source: Advances in Therapy, 42:1291–1311 (2025).

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

- <23 cm → Undernutrition
- 23–32 cm → Normal
- 32 cm → Overnutrition (adults)

Precautions / Common Errors:

- Incorrect identification of midpoint
- Tape too tight or too loose
- Measuring over clothing

WAIST CIRCUMFERENCE**Aim/Objectives:**

To determine central adiposity by measuring waist circumference.

Instruments Required:

- Non-stretchable measuring tape

Method:

- Subject stands erect with feet slightly apart.
- Identify midpoint between lower rib margin and iliac crest.
- Place tape horizontally around abdomen.
- Measurement taken at the end of normal expiration.

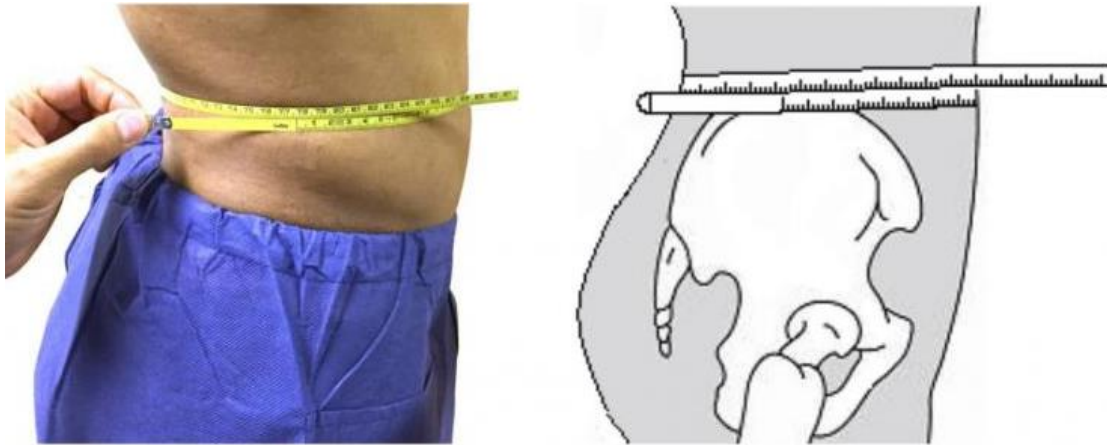


Figure: Waist circumference measurement at anatomical midpoint

Source: Waist measurement location from the 2015-16 NHANES Field Manual

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

- Men: <94 cm (normal), >102 cm (high risk)
- Women: <80 cm (normal), >88 cm (high risk)

Precautions / Common Errors:

- Do not pull tape too tight
- Ensure tape is horizontal
- Avoid measuring after heavy meals

HIP CIRCUMFERENCE

Aim/Objectives:

To determine hip circumference for assessment of fat distribution.

Instruments Required:

- Measuring tape

Method:

- Subject stands upright.
- Measure at the widest portion of buttocks.
- Keep tape horizontal and snug.

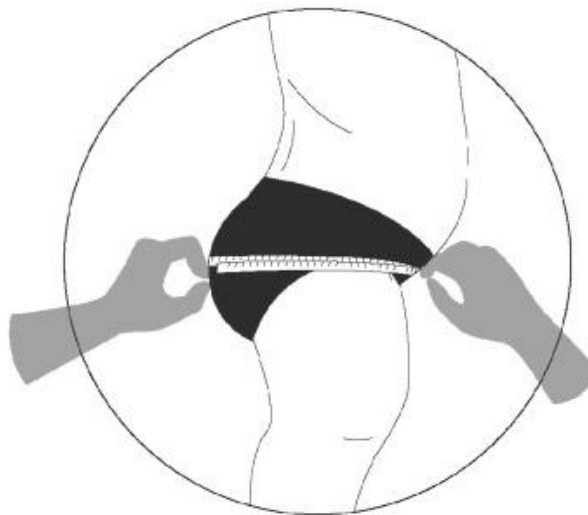


Figure: Hip circumference measurement at maximum protrusion

Source: Adv. Ther., 42(3):1291–1311 (2025). DOI:10.1007/s12325-024-03061-y

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

Used along with waist circumference to calculate WHR

Precautions / Common Errors:

- Tape should not compress clothing
- Ensure correct anatomical landmark

WAIST-HIP RATIO (WHR)**Aim/Objectives:**

To determine body fat distribution using waist and hip measurements.

Instruments Required:

- Measuring tape

Method:

- Measure waist and hip circumference as per standard method.

Formula Used:

$WHR = \text{Waist Circumference} / \text{Hip Circumference}$

Calculation:

Divide waist value by hip value

Reference Values:

- Men: <0.90 (normal)
- Women: <0.85 (normal)

Precautions / Common Errors:

- Ensure both measurements are accurate
- Do not mix units

TRICEPS SKINFOLD THICKNESS

Aim/Objectives:

To estimate subcutaneous fat using triceps skinfold measurement.

Instruments Required:

- Skinfold caliper

Method:

- Locate midpoint of upper arm (posterior).
- Grasp skinfold vertically using thumb and index finger.
- Apply caliper perpendicular to fold.
- Record after 2 seconds.

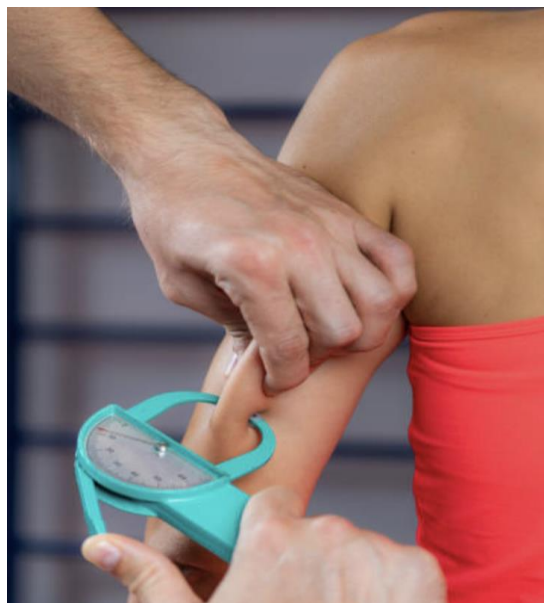


Figure: Triceps skinfold measurement technique

Source: Solo Abadi (2023). *Measuring Skinfold to Calculate Fat Levels*

Formula Used:

Not applicable

Calculation:

Direct reading in mm

Reference Values:

- Men: 10–20 mm (normal)
- Women: 15–25 mm (normal)

Precautions / Common Errors:

- Do not include muscle in fold
- Maintain consistent pressure

HAND GRIP STRENGTH

Aim/Objectives:

To determine muscle strength using handgrip dynamometer.

Instruments Required:

- Handgrip dynamometer

Method:

- Subject holds dynamometer with dominant hand.
- Squeeze maximally for a few seconds.
- Record best of three attempts.



Figure: Hand grip strength measurement using dynamometer

Source: PhenX Toolkit, Ver. 48.3 (RTI International, 2025).

Formula Used:

Not applicable

Calculation:

Record highest value in kg

Reference Values:

- Men: >26 kg (normal)

- Women: >16 kg (normal)

Precautions / Common Errors:

- Ensure correct grip position
- Avoid jerky movements

ARM SPAN

Aim/Objectives:

To determine arm span as an indirect measure of stature.

Instruments Required:

- Measuring tape
- Flat wall surface

Method:

- Subject stands erect against a wall.
- Arms extended horizontally at shoulder level.
- Measure distance between tips of middle fingers of both hands.



Figure: Arm span measurement with arms fully extended

Source: Standards for Anthropometry Assessment - Norton, K. I.

Formula Used:

Arm span (Height cm) = (Arm span in cm x 0.9225) + 7.1668

Calculation:

Direct reading in cm

Reference Values:

Arm span is approximately equal to height in adults

Precautions / Common Errors:

- Ensure arms are fully extended
- Avoid bending at elbows

SITTING HEIGHT

Aim/Objectives:

To determine trunk length using sitting height measurement.

Instruments Required:

- Stadiometer
- Sitting box/stool

Method:

- Subject sits erect on a flat stool.
- Back straight, head in Frankfurt plane.
- Measure from sitting surface to vertex of head.

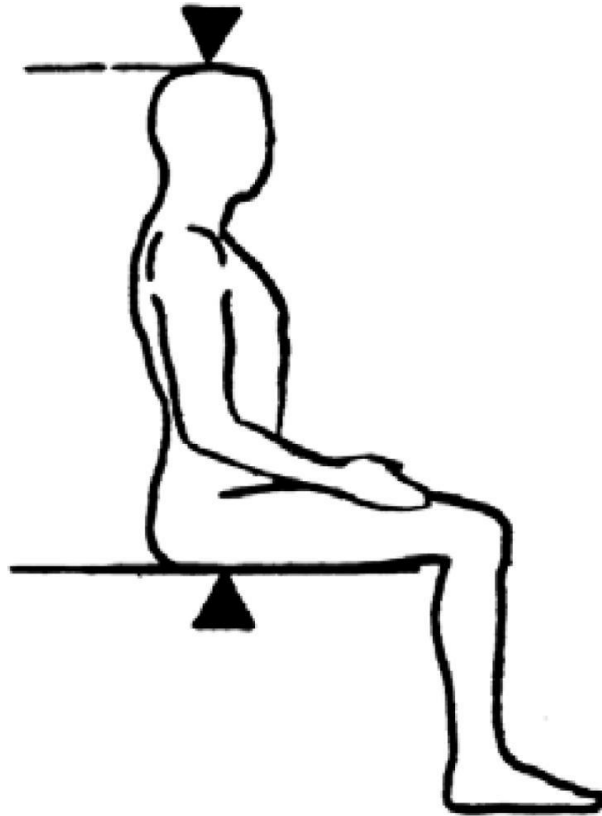


Figure: Sitting height measurement position

Source: Int. J. Environ. Res. Public Health, 7(3), 1047–1075 (2010).

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

Used to assess body proportions

Precautions / Common Errors:

- Ensure upright posture

- Avoid slouching

DEMI-SPAN

Aim/Objectives:

To estimate height using demi-span measurement.

Instruments Required:

- Measuring tape

Method:

- Measure from sternal notch to tip of middle finger (arm extended laterally).

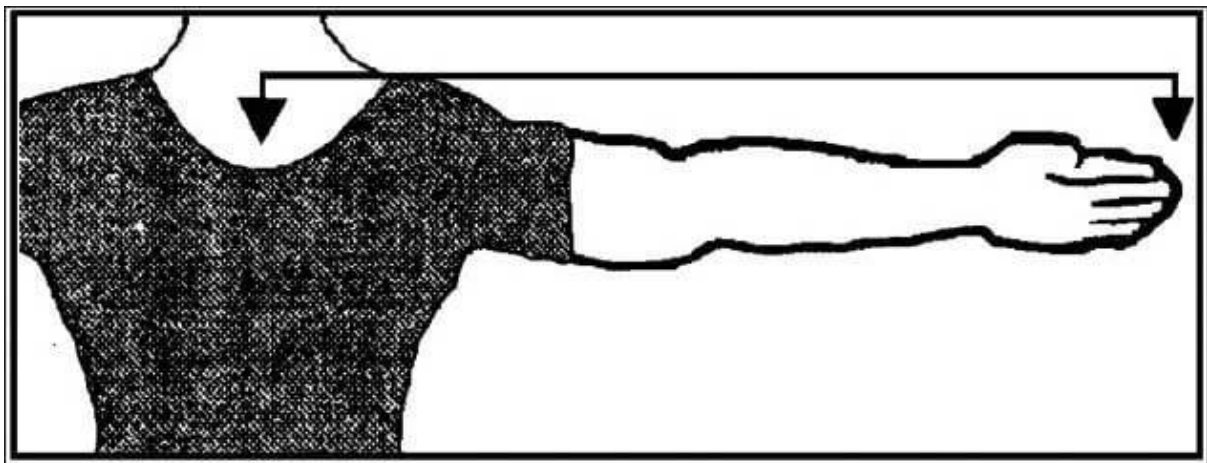


Figure: Demi-span measurement from sternum to fingertip

Source: Adv. Biomed. Res., 3(1):37 (2014). DOI:10.4103/2277-9175.125722

Formula Used:

Equivalent height = $65.8 + (1.33 \times \text{demispan})$

Calculation:

Reference Values:

Used in elderly or bedridden patients

Precautions / Common Errors:

- Ensure correct landmark identification

CALF CIRCUMFERENCE

Aim/Objectives:

To determine muscle mass using calf circumference.

Instruments Required:

- Measuring tape

Method:

- Subject stands with weight evenly distributed.
- Measure at the maximum circumference of calf.

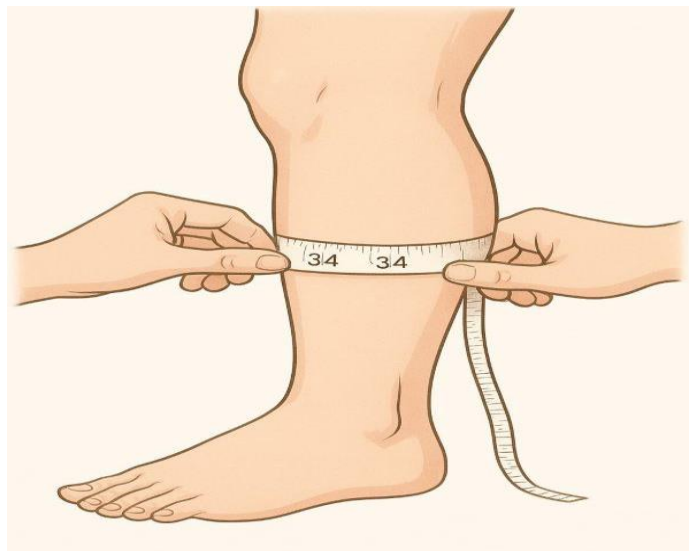


Figure: Calf circumference measurement at widest point

Source: Maeda K. (2025). Lower leg circumference - Muscle mass assessment (GLIM criteria).

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

- <31 cm → risk of muscle wasting (elderly)

Precautions / Common Errors:

- Ensure correct positioning
- Avoid tight compression

BICEPS SKINFOLD THICKNESS

Aim/Objectives:

To estimate subcutaneous fat using biceps skinfold measurement.

Instruments Required:

- Skinfold caliper

Method:

- Locate midpoint of anterior upper arm.
- Grasp skinfold vertically.
- Apply caliper and record reading.



Figure: Biceps skinfold measurement technique

Source: Solo Abadi (2023). *Measuring Skinfold to Calculate Fat Levels*

Formula Used:

Not applicable

Calculation:

Direct reading in mm

Reference Values:

Varies by age and sex

Precautions / Common Errors:

- Do not include muscle
- Maintain consistent technique

ABDOMINAL CIRCUMFERENCE

Aim/Objectives:

To measure abdominal girth for assessment of fat distribution.

Instruments Required:

- Measuring tape

Method:

- Measure at level of umbilicus with subject standing.
- Ensure normal breathing.

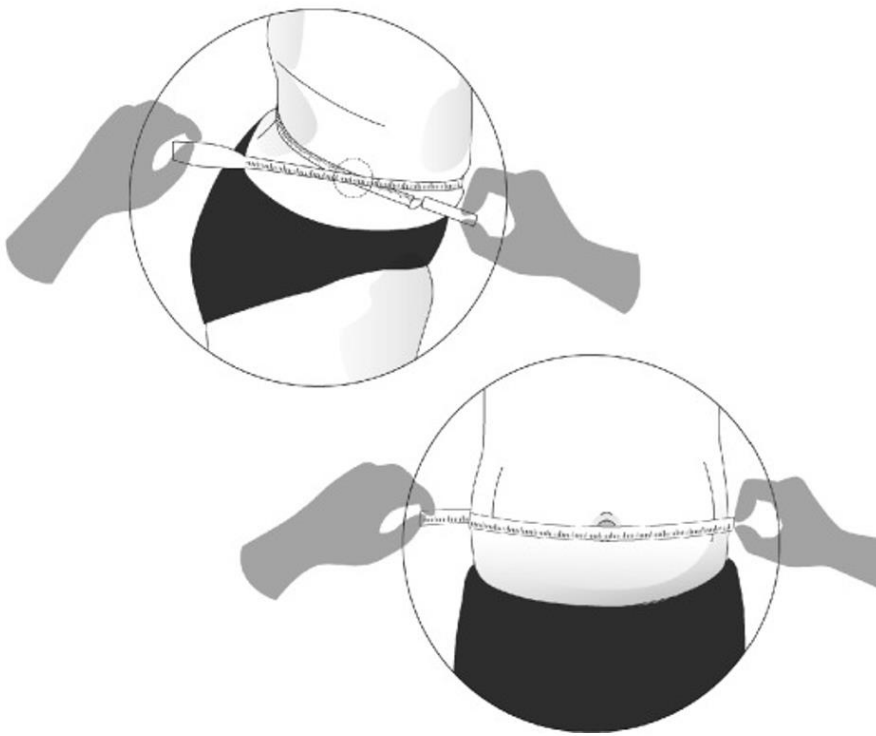


Figure: Abdominal circumference measurement at umbilical level

Source: Adv. Ther., 42(3):1291–1311 (2025). DOI:10.1007/s12325-024-03061-y

Formula Used:

Not applicable

Calculation:

Direct reading in cm

Reference Values:

Used for central obesity assessment

Precautions / Common Errors:

- Avoid tight tape
- Ensure horizontal placement

IDEAL BODY WEIGHT (IBW)**Aim/Objectives:**

To determine ideal body weight using standard predictive equations.

Instruments Required:

- Height measurement

Method:

- Measure height accurately in centimeters.
- Convert height into inches if required for formula.

Formula:

- Men: $IBW = 22.5 \times (Ht)^2 \text{ m}$
- Women: $IBW = 21.5 \times (Ht)^2 \text{ m}$

Calculation:

Substitute height into appropriate formula

Reference Values:

Used as baseline for clinical and nutritional assessment

Precautions / Common Errors:

- Ensure correct unit conversion
- Use appropriate formula for sex

ADJUSTED BODY WEIGHT (ABW)**Aim/Objectives:**

To determine adjusted body weight for individuals with obesity.

Instruments Required:

- Weight
- Ideal Body Weight

Method:

- Calculate IBW first.
- Use actual body weight in formula.

Formula Used:

$$ABW = IBW + 0.25 \times (\text{Actual Body Weight} - IBW)$$

Calculation:

Substitute values into formula

Reference Values:

Used in clinical nutrition for dietary planning

Precautions / Common Errors:

- Ensure IBW is correctly calculated before use
- Avoid calculation errors in subtraction and multiplication

Z-SCORE ASSESSMENT IN CHILD NUTRITION

1. INTRODUCTION

Z-score is a statistical measurement that indicates how far a child's anthropometric value deviates from the median of a reference population in terms of standard deviations (SD).

It is expressed as:

$$\text{Z-score} = (\text{Observed value} - \text{Median reference value}) / \text{Standard deviation}$$

Z-scores are used to compare an individual child's growth with standardized growth references.

2. IMPORTANCE

- Provides standardized comparison across populations
- Detects undernutrition and overnutrition
- Useful in growth monitoring and surveillance
- Helps identify severity of malnutrition
- Recommended for international use in public health

3. INDICATORS OF Z-SCORES

1. Height-for-Age (HAZ)

- Reflects linear growth
- Indicates stunting (chronic malnutrition)

2. Weight-for-Age (WAZ)

- Composite indicator
- Indicates underweight

3. Weight-for-Height (WHZ)

- Reflects body proportion
- Indicates wasting (acute malnutrition)

4. BMI-for-Age (BAZ)

- Reflects body mass relative to height
- Indicates thinness, overweight, or obesity

4. METHOD

Step 1: Data Collection

- Measure age (in months/years)
- Measure height/length accurately
- Measure weight accurately

Step 2: Selection of Appropriate Chart

- Choose correct WHO growth chart
- Ensure correct sex (boys/girls)
- Select appropriate age group

Step 3: Plotting the Value

- Locate age on X-axis
- Locate measurement on Y-axis
- Mark the intersection point clearly

Step 4: Interpretation

- Identify nearest Z-score line (0, ± 1 , ± 2 , ± 3)
- Determine nutritional status based on position

Step 5: Recording

- Note Z-score value
- Record classification

5. CLASSIFICATION OF NUTRITIONAL STATUS

Z-score Range	Interpretation
----------------------	-----------------------

> +2 SD	Overweight / Obese
+1 to +2 SD	Risk of overweight
-2 to +1 SD	Normal
-2 to -3 SD	Moderate malnutrition
< -3 SD	Severe malnutrition

Indicator-Specific Interpretation

- HAZ < -2 → Stunted
- WAZ < -2 → Underweight
- WHZ < -2 → Wasted
- BAZ > +2 → Overweight/Obese

6. RECORDING & OBSERVATION TABLES

Recording Table

Name	Age	Sex	Height (cm)	Weight (kg)

Z-score Observation Table

Indicator	Z-score	Classification
HAZ		
WAZ		
WHZ		
BAZ		

7. STUDENT INTERPRETATION

Students should:

- Analyze plotted values carefully

- Identify deviation from median
- Classify nutritional status correctly
- Provide brief conclusion

Sample Interpretation:

The child has a Height-for-Age Z-score below -2 SD, indicating stunting. Weight-for-Height is within normal range, suggesting no acute malnutrition.

8. WHO GROWTH CHARTS

Instructions

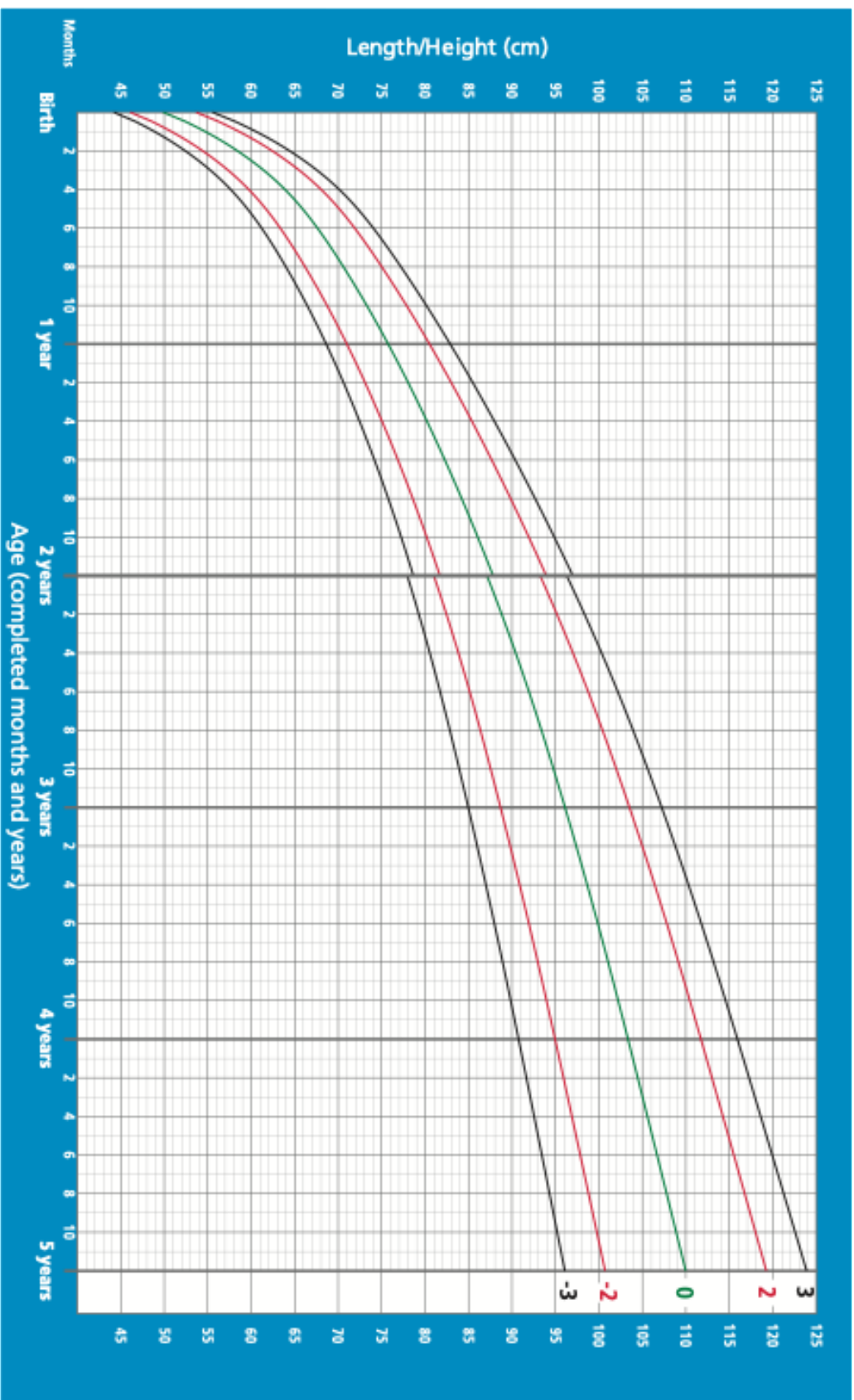
- Paste official WHO growth charts (printouts) in the spaces below.
- Use **separate charts for Boys and Girls**.
- Select correct age group (0–5 years or 5–19 years).
- Label each chart clearly with **Name, Age, Sex, Date**.

8.1 HEIGHT-FOR-AGE (HAZ)

Height-for-age is an anthropometric measure used to determine the linear growth of children. It helps diagnose a condition referred to as stunting that is indicative of chronic malnutrition. Height-for-age measures the length of the body in relation to the median length for a reference group of the same age and sex according to WHO growth standards. Height-for-Age Z-score is defined as being less than -2 as stunting, whereas a score lower than -3 is categorized as severe stunting.

Length/height-for-age BOYS

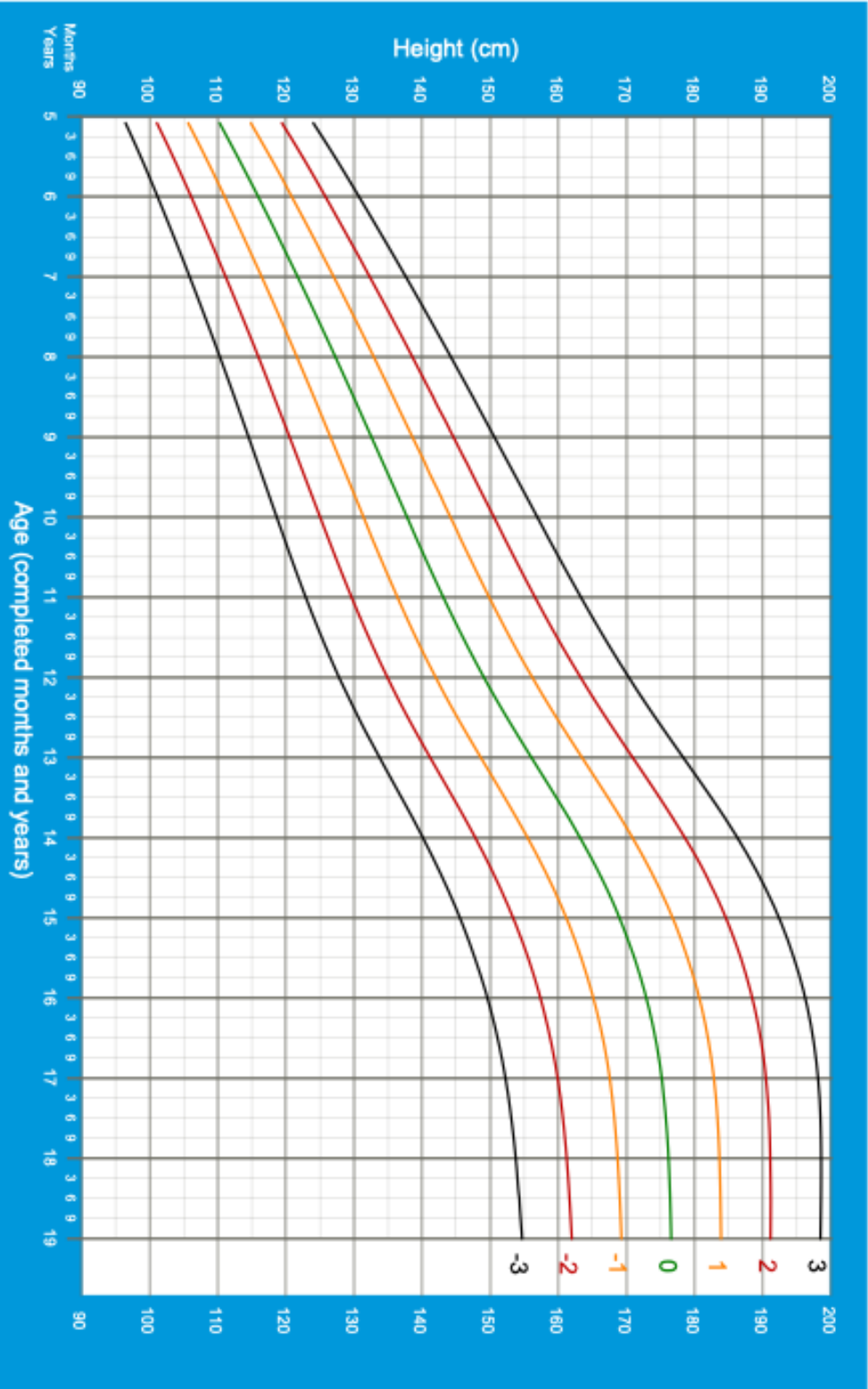
Birth to 5 years (z-scores)



WHO Child Growth Standards

Height-for-age BOYS

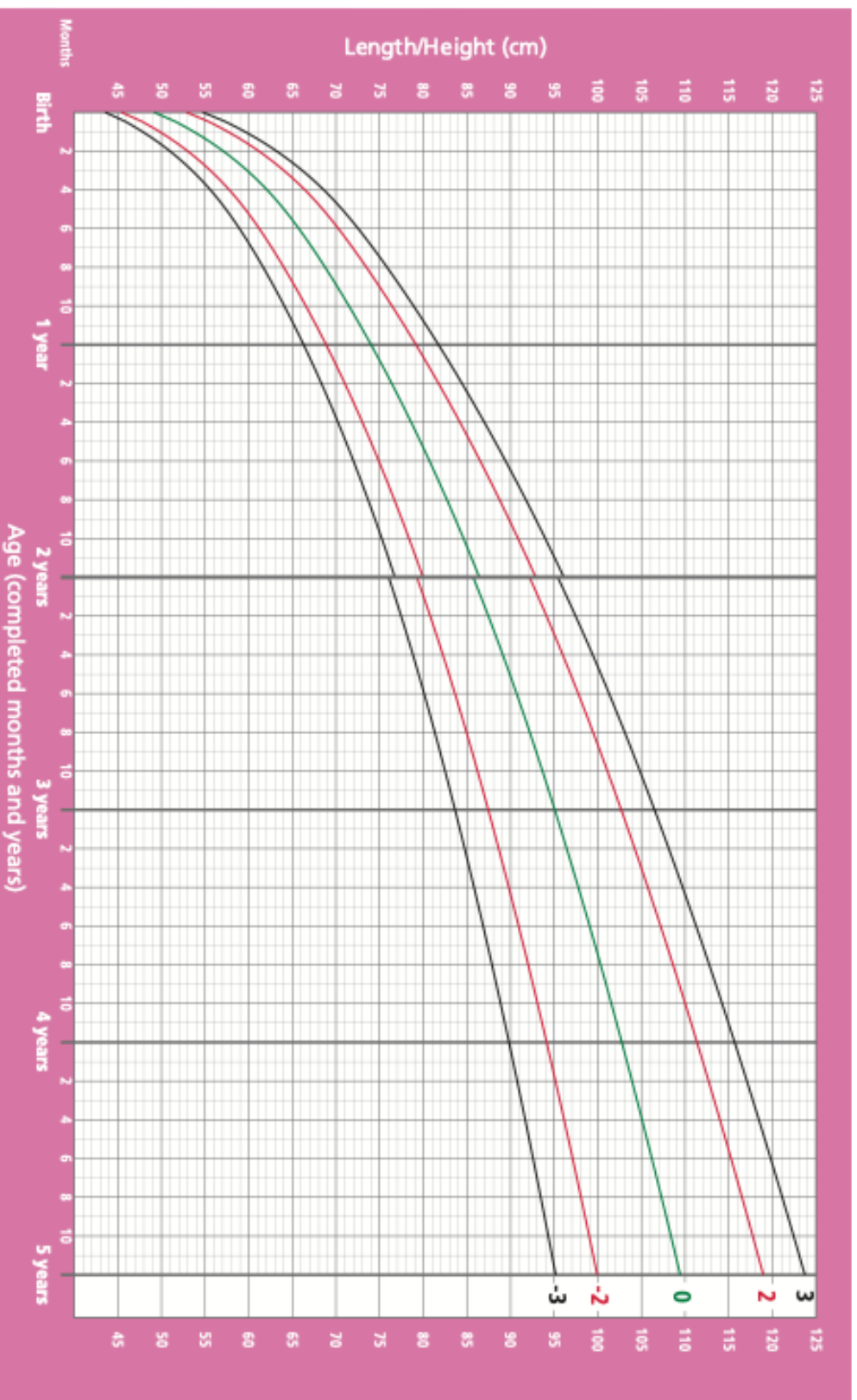
5 to 19 years (z-scores)



2007 WHO Reference

Length/height-for-age GIRLS

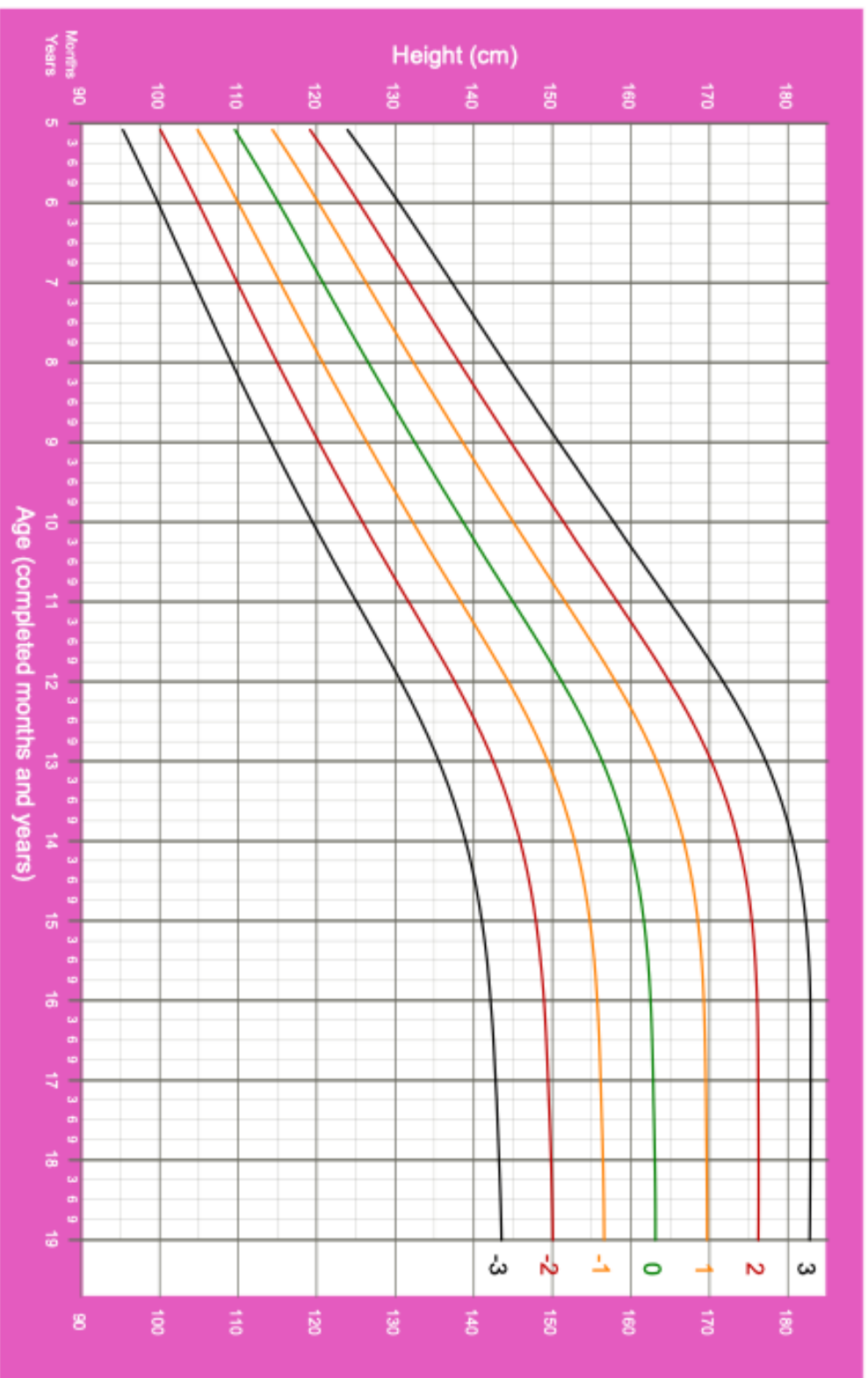
Birth to 5 years (z-scores)



WHO Child Growth Standards

Height-for-age GIRLS

5 to 19 years (z-scores)



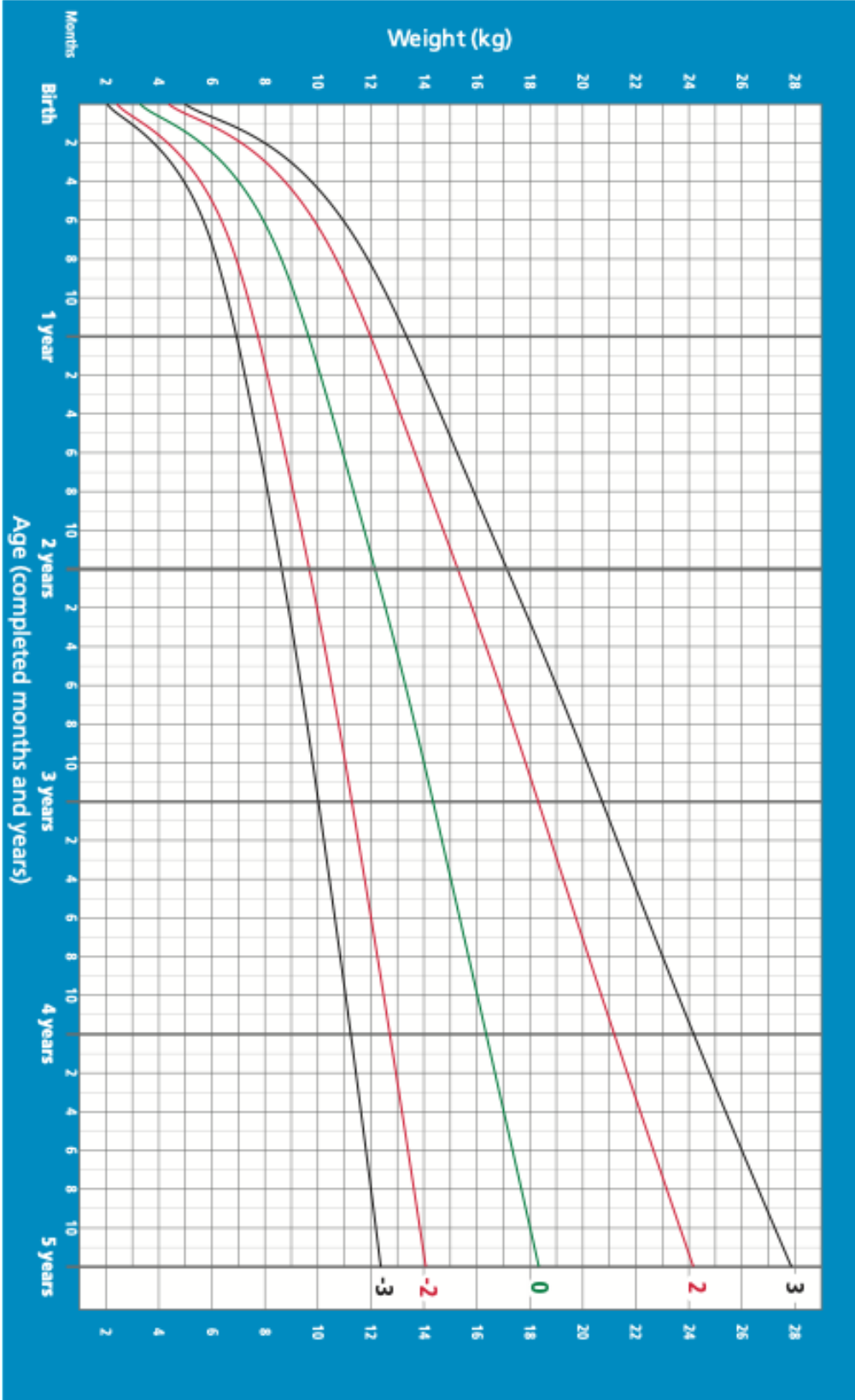
2007 WHO Reference

8.2 WEIGHT-FOR-AGE (WAZ)

Weight-for-age is one of the anthropometric indicators that help in assessing body weight with respect to age. This indicator is usually used in order to detect cases of underweight among children. Weight for age is calculated by comparing the weight of the child with the median weight of a reference population of same age and sex, according to WHO standards. The value below -2 in weight for age Z-scores suggests underweight status, whereas scores less than -3 suggest severe underweight status.

Weight-for-age BOYS

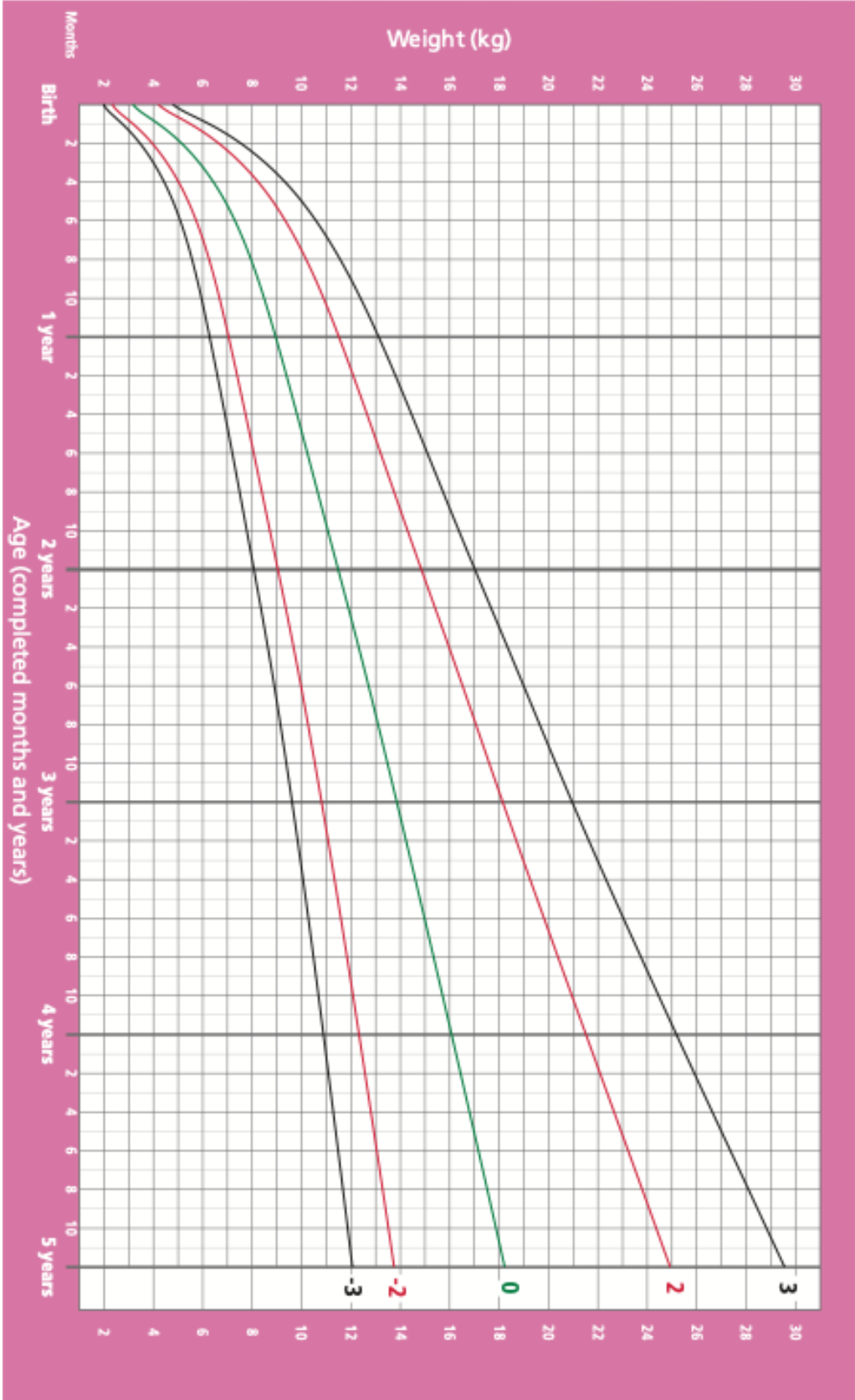
Birth to 5 years (z-scores)



WHO Child Growth Standards

Weight-for-age GIRLS

Birth to 5 years (z-scores)

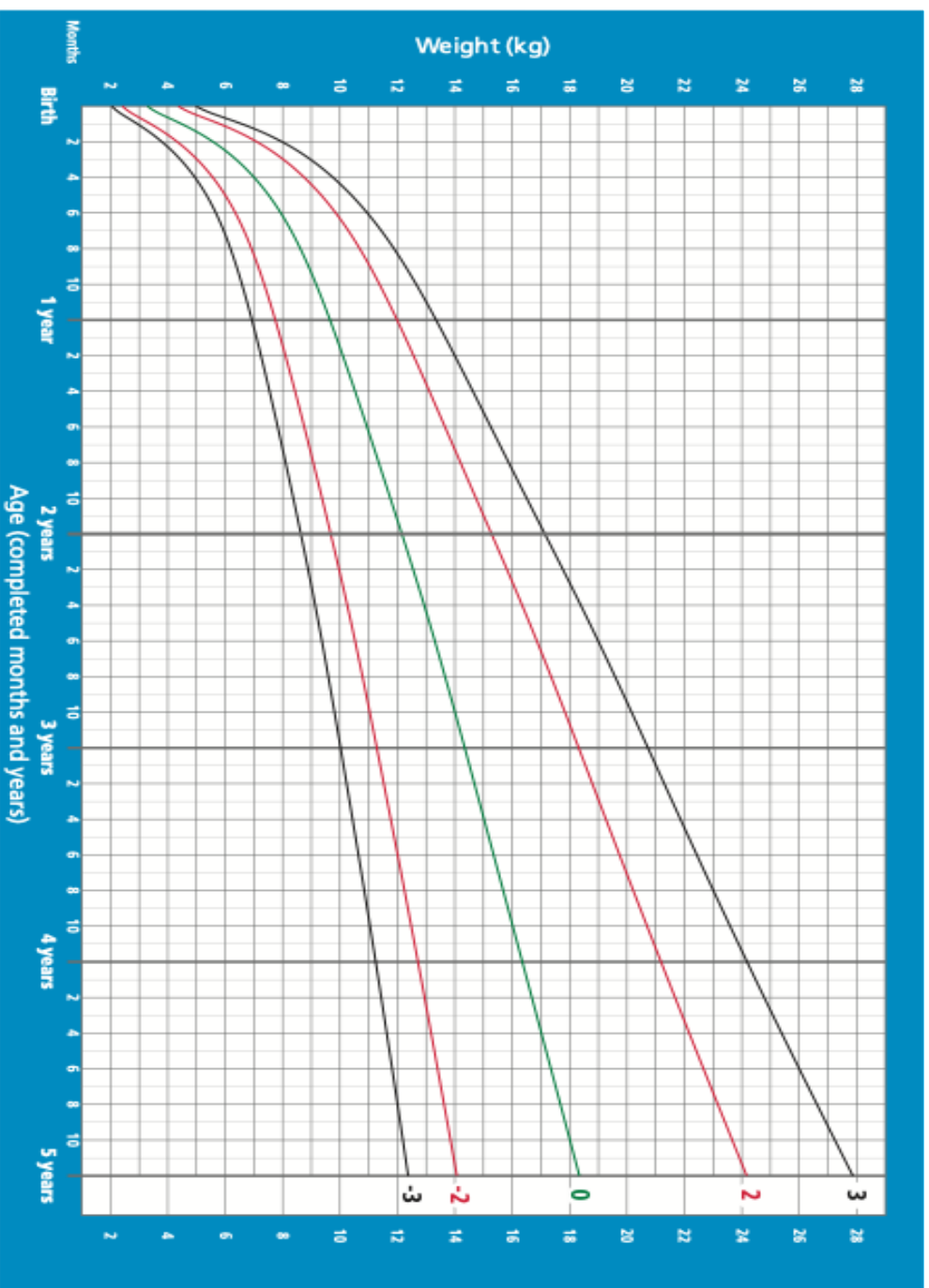


8.3 WEIGHT-FOR-HEIGHT (WHZ)

The weight-for-height measurement is another method of evaluating the relationship between body weight and height and is mostly useful in detecting wasting due to acute malnutrition. The weight-for-height measurement is the comparison between the weight of a particular individual and the median weight of individuals who are the same height and have the same sex, according to WHO growth standards. Values lower than -2 Standard Deviations for Weight-for-Height Z-score denote wasting, while values lower than -3 denote severe wasting.

Weight-for-age BOYS

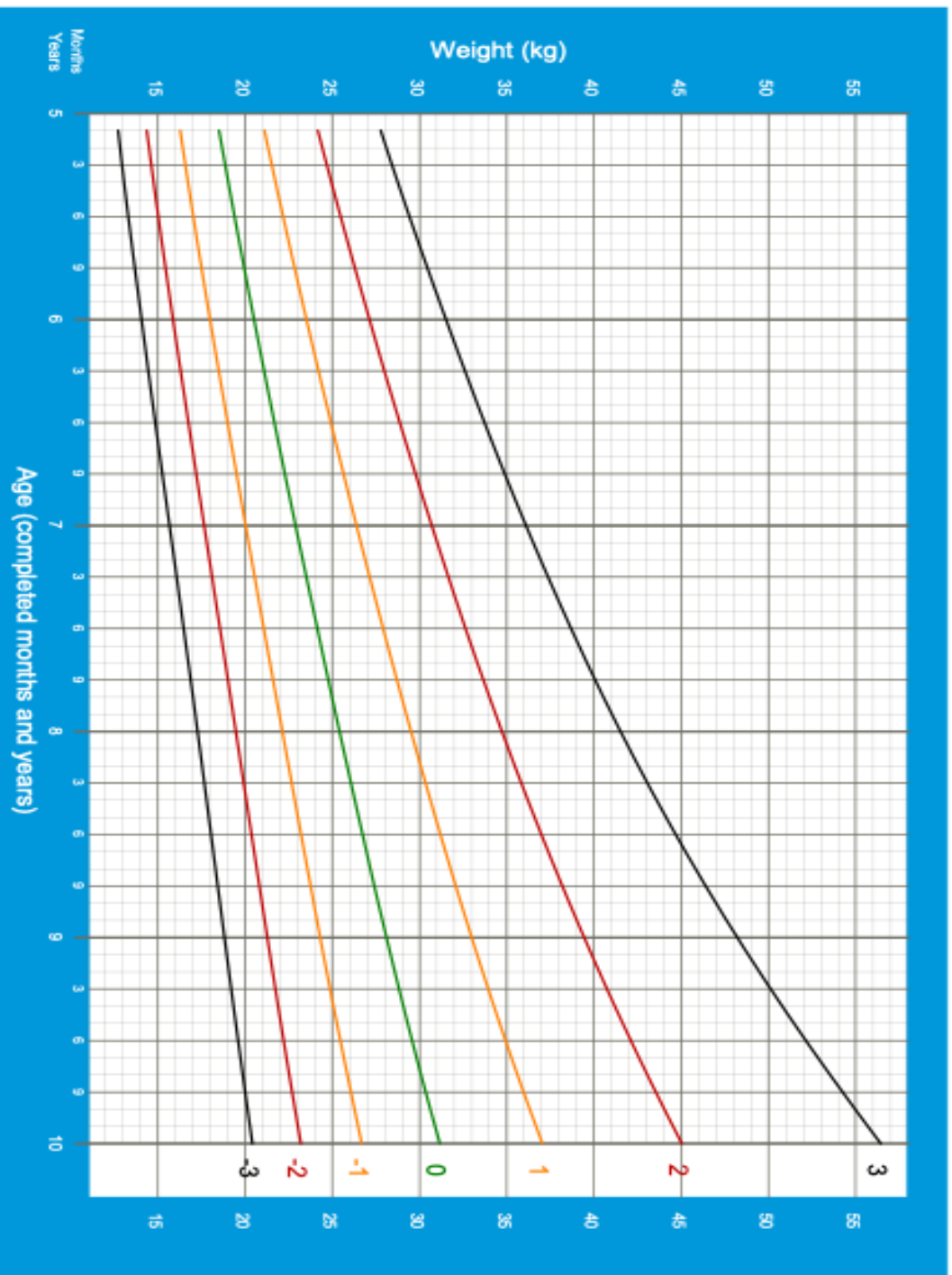
Birth to 5 years (z-scores)



WHO Child Growth Standards

Weight-for-age BOYS

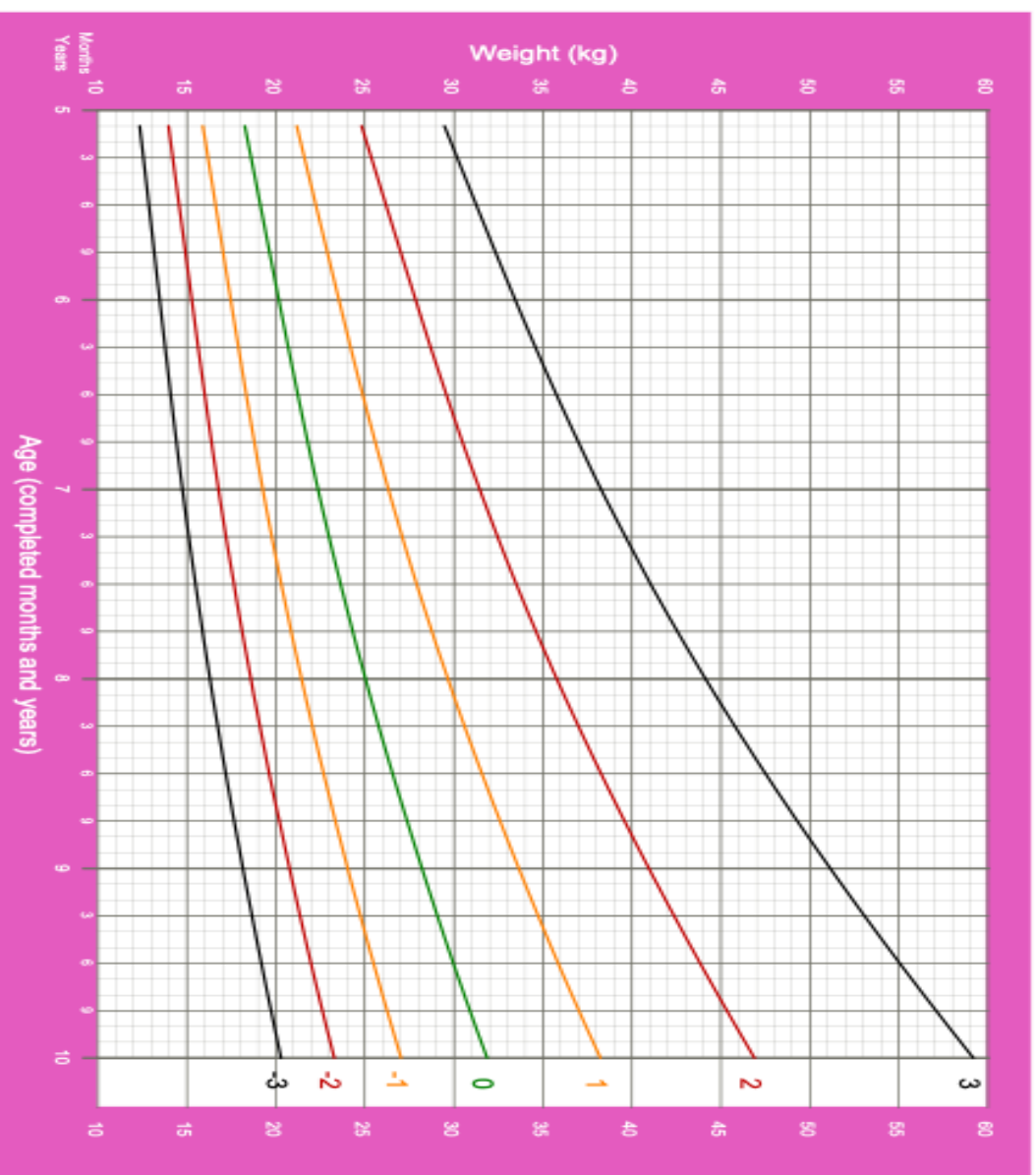
5 to 10 years (z-scores)



2007 WHO Reference

Weight-for-age GIRLS

5 to 10 years (z-scores)



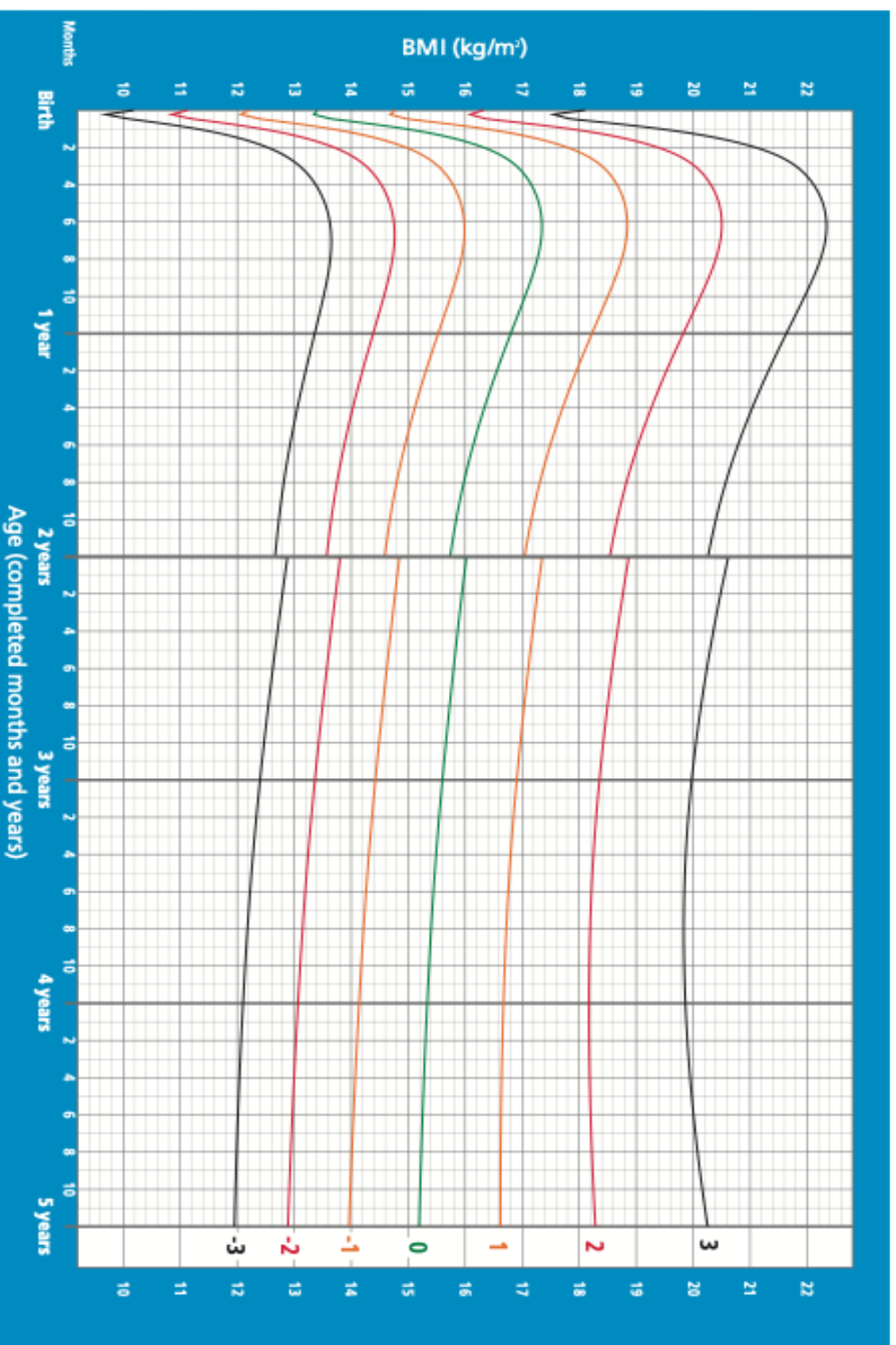
2007 WHO Reference

8.4 BMI-FOR-AGE (BAZ)

BMI-for-Age is one of the anthropometric measures utilized to measure the body mass of individuals in comparison to their heights; this measure helps identify cases of thinness, overweight, and obesity. The BMI-for-Age measure is calculated by comparing the Body Mass Index (BMI) of the individual with that of the median value of a reference group of the same age and sex. Values of -2 standard deviations are considered thinness, while those above +2 are either overweight or obese.

BMI-for-age BOYS

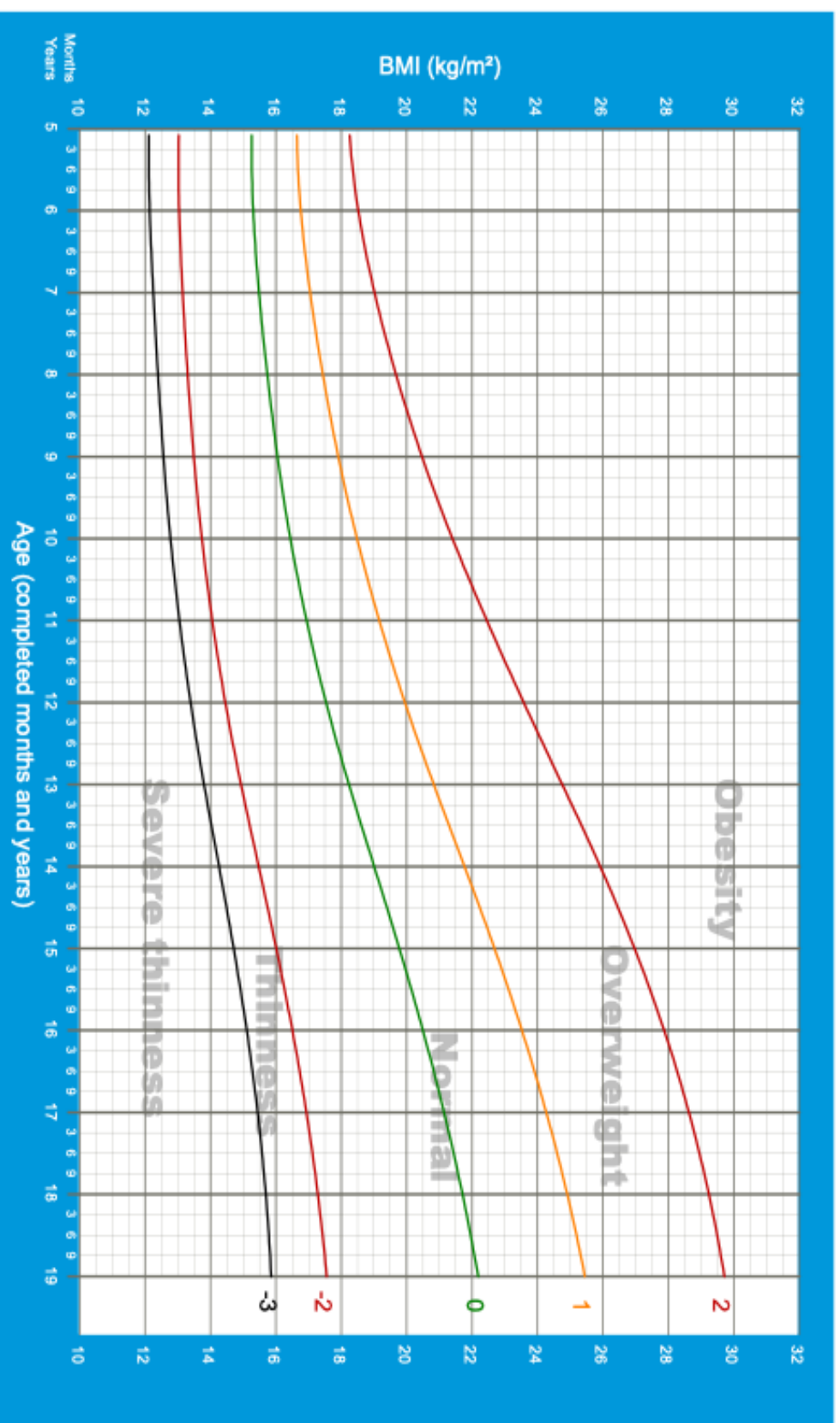
Birth to 5 years (z-scores)



WHO Child Growth Standards

BMI-for-age BOYS

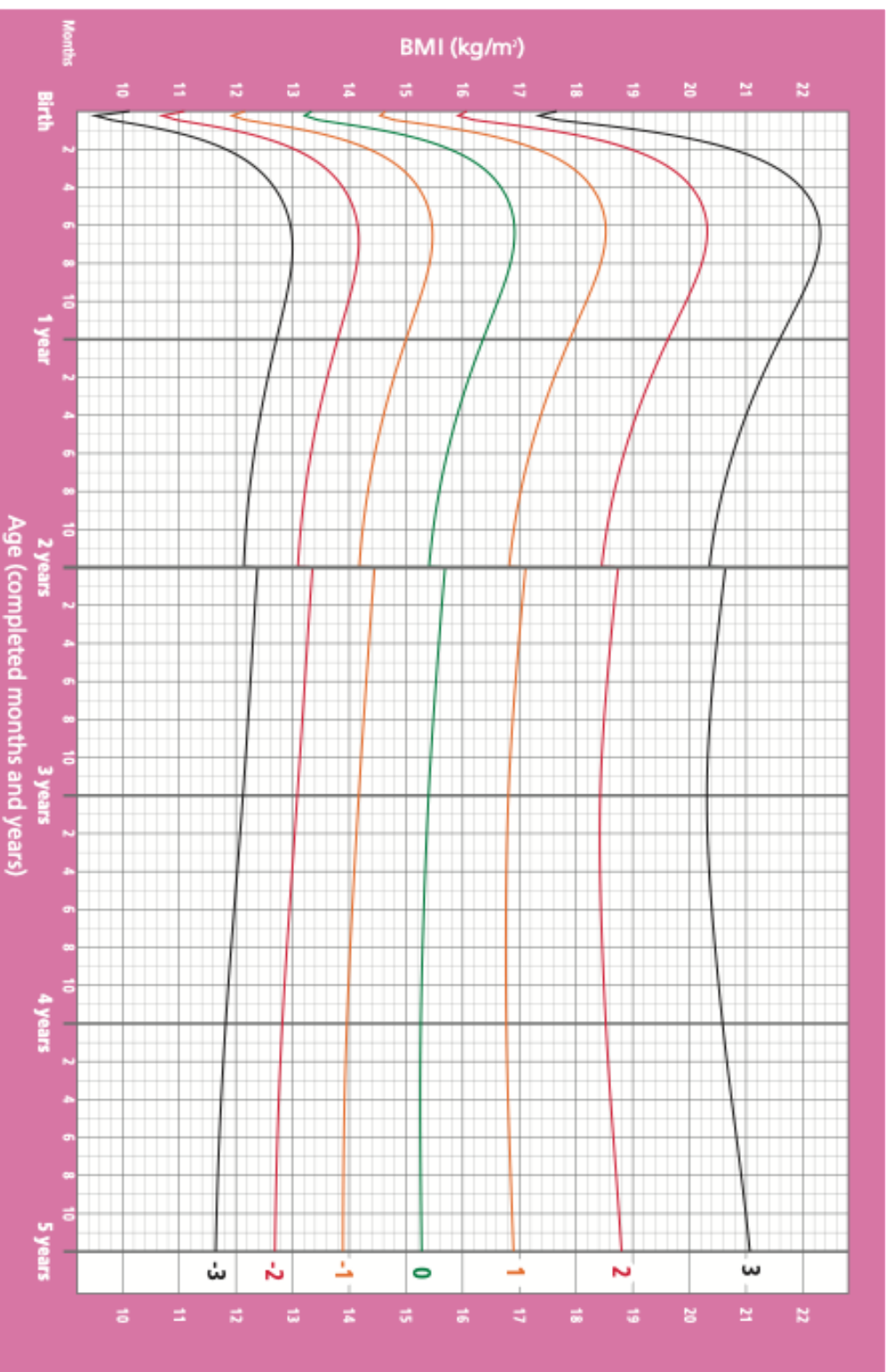
5 to 19 years (z-scores)



2007 WHO Reference

BMI-for-age GIRLS

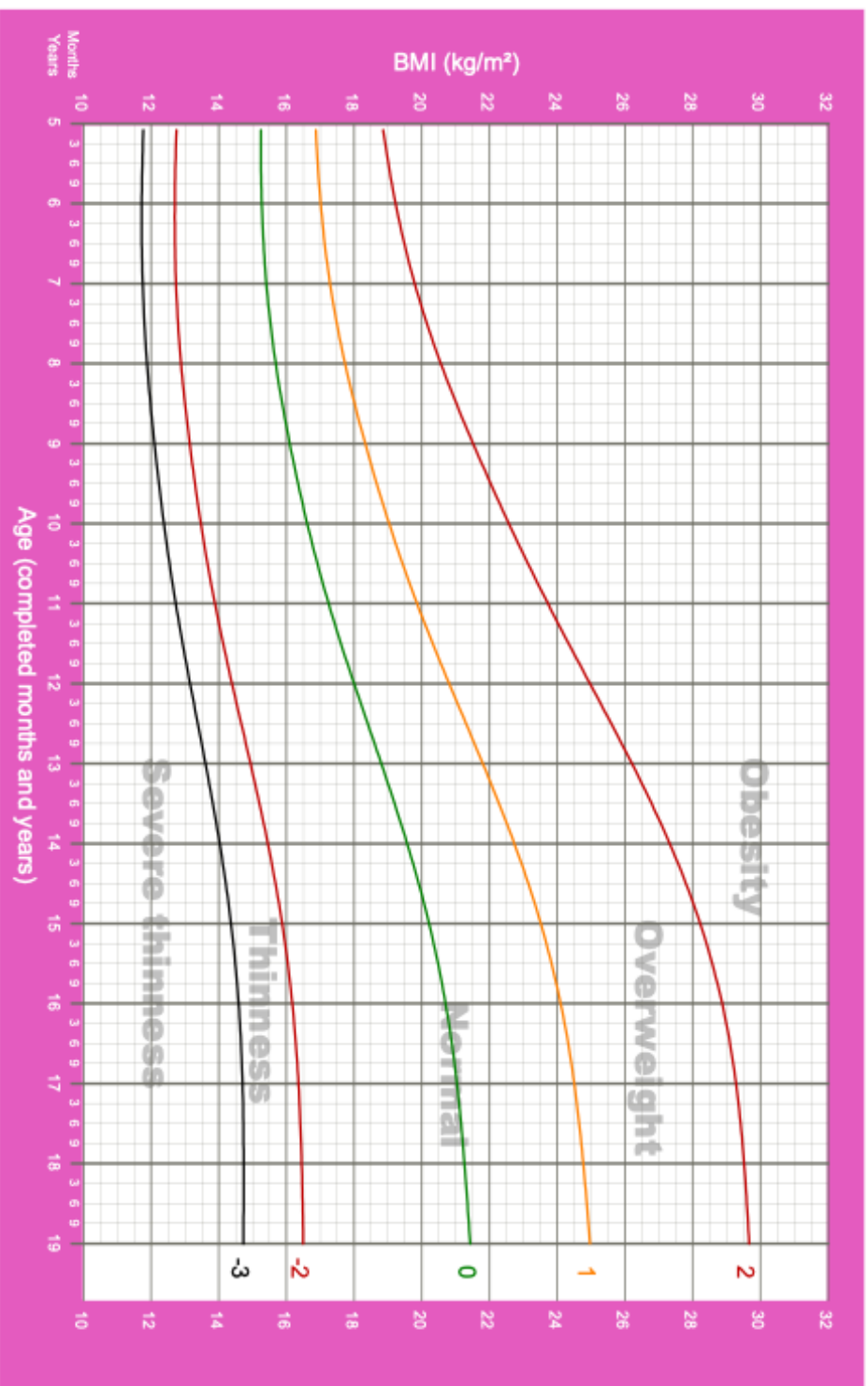
Birth to 5 years (z-scores)



WHO Child Growth Standards

BMI-for-age GIRLS

5 to 19 years (z-scores)



2007 WHO Reference

9. STEP-BY-STEP PLOTTED EXAMPLE (CASE-BASED)

Case Study

- Name: Child A
- Age: 24 months
- Sex: Male
- Height: 82 cm
- Weight: 10.2 kg

Step 1: Select Chart

- Choose **WHO Height-for-Age (Boys, 0–5 years)**

Step 2: Locate Age

- Mark **24 months** on X-axis

Step 3: Locate Measurement

- Mark **82 cm** on Y-axis

Step 4: Plot Point

- Draw a clear dot at the intersection

Step 5: Identify Z-Score

- The plotted point lies between **-2 SD and -1 SD**

Step 6: Interpret

- Classification: **Normal (but approaching risk of stunting)**

Repeat for Other Indicators

- Plot Weight-for-Age and Weight-for-Height similarly

1COMMON PLOTTING MISTAKES

1. Wrong Chart Selection

- Using boys chart for girls or incorrect age group

2. Axis Confusion

- Plotting age on Y-axis instead of X-axis

3. Incorrect Scaling

- Misreading grid lines or skipping intervals

4. Improper Point Marking

- Large circles instead of precise dots

5. Misinterpretation of Z-score Lines

- Confusing +2 with -2 SD

6. Not Using Exact Age

- Rounding age instead of using months

7. Ignoring Units

- Mixing cm and m or kg and g

8. Poor Labelling

- Missing name, age, or indicator on chart

AGE-WISE APPLICATION OF ANTHROPOMETRIC MEASUREMENTS

Measurement techniques remain the same; selection varies by age and clinical applicability.

Children

- Height/Length
- Weight

- WAZ, WHZ (0–5 years)
- BMI-for-age
- MUAC

Adults

- Height, Weight
- BMI, IBW, ABW
- Waist, Hip, WHR
- Skinfolds
- Hand grip strength

Elderly

- Height (or estimated)
- Weight, BMI
- Arm span, Demi-span
- Sitting height
- Calf circumference

SECTION 2: BIOCHEMICAL ASSESSMENT

INTRODUCTION

Biochemical assessment is an essential tool in nutrition assessment where various bodily fluids such as blood and urine are analyzed to evaluate one's nutrition status. Biochemical measurements provide quantitative and objective information about the body's nutrient levels.

In contrast to anthropometric measurements and food records, biochemical measurements measure physiological effects within the body. These assessments are widely used in clinical settings for diagnosis, monitoring, and evaluation of nutritional interventions.

This section focuses on the interpretation of common laboratory parameters and their relationship with nutritional status.

CONTENTS

1. Introduction
2. Aim and Objectives
3. Biochemical Parameters
 - 3.1 Hemoglobin
 - 3.2 Fasting Blood Glucose
 - 3.3 Serum Albumin
 - 3.4 Serum Ferritin
 - 3.5 Lipid Profile
 - 3.6 Vitamin D
4. Method of Assessment
5. Interpretation Guidelines
6. Recording Tables
7. Precautions and Limitations

AIM

To evaluate nutritional status using biochemical parameters and interpret laboratory reports.

OBJECTIVES

- To understand key biochemical indicators of nutritional status
- To interpret laboratory values using standard reference ranges
- To correlate biochemical findings with nutritional deficiencies

METHOD OF ASSESSMENT

- Obtain laboratory reports of the individual.
- Identify the biochemical parameters provided.
- Compare each value with standard reference ranges.
- Note deviations from normal values.
- Interpret findings in relation to nutritional status.

INTERPRETATION GUIDELINES

- Low hemoglobin levels indicate possible iron deficiency anemia.
- Elevated blood glucose levels suggest impaired glucose metabolism or diabetes risk.
- Reduced serum albumin levels reflect poor protein status.
- Low ferritin levels indicate depleted iron stores.
- Abnormal lipid profile indicates risk of cardiovascular diseases.
- Low vitamin D levels suggest poor bone health.

RECORDING TABLE

Parameter	Value	Normal Range	Interpretation
Hemoglobin			
Blood Glucose			
Serum Albumin			
Serum Ferritin			
Lipid Profile			
Vitamin D			

PRECAUTIONS AND LIMITATIONS

- Laboratory values should be interpreted along with clinical and dietary data.

- Temporary conditions such as infection may affect results.
- Ensure use of updated reference ranges.
- Do not rely on a single parameter for diagnosis.

SECTION 3: CLINICAL EVALUATION

INTRODUCTION

Clinical evaluation is a vital component of nutritional assessment that involves systematic physical examination to identify visible signs of nutritional deficiencies, excesses, and metabolic disorders. It relies on observation of external body features and provides rapid, cost-effective insights into an individual's health status.

Unlike biochemical tests, clinical assessment is non-invasive and can be performed in community and clinical settings without specialized equipment. However, findings should always be interpreted in conjunction with anthropometric, dietary, and biochemical data for accurate conclusions.

This section emphasizes head-to-toe examination focusing on key indicators such as eyes, hair, skin, nails, mouth, and neck, which reflect underlying nutritional status.

CONTENTS

1. Introduction
2. Aim and Objectives
3. Method of Examination
4. Clinical Parameters
 - 4.1 Eyes
 - 4.2 Hair
 - 4.3 Skin
 - 4.4 Nails
 - 4.5 Mouth and Lips
 - 4.6 Neck
5. Recording Sheet
6. Interpretation
7. Precautions and Common Errors

AIM

To identify signs of nutritional deficiencies and metabolic disorders through clinical examination.

OBJECTIVES

- To observe physical signs related to nutritional status
- To identify deficiency and excess conditions
- To correlate clinical findings with other assessment methods

METHOD OF EXAMINATION

- Ensure the subject is examined in a well-lit environment.
- Maintain privacy and comfort of the individual.
- Conduct a systematic head-to-toe examination.
- Observe each parameter carefully without causing discomfort.
- Record findings immediately.

CLINICAL PARAMETERS AND SIGNS

1. EYES

Sign	Possible Indication
Pale conjunctiva	Iron deficiency anemia
Conjunctival Xerosis	Vitamin A deficiency
Bitot's spots	Vitamin A deficiency
Night blindness	Vitamin A deficiency
Yellow sclera	Liver disorders (jaundice)

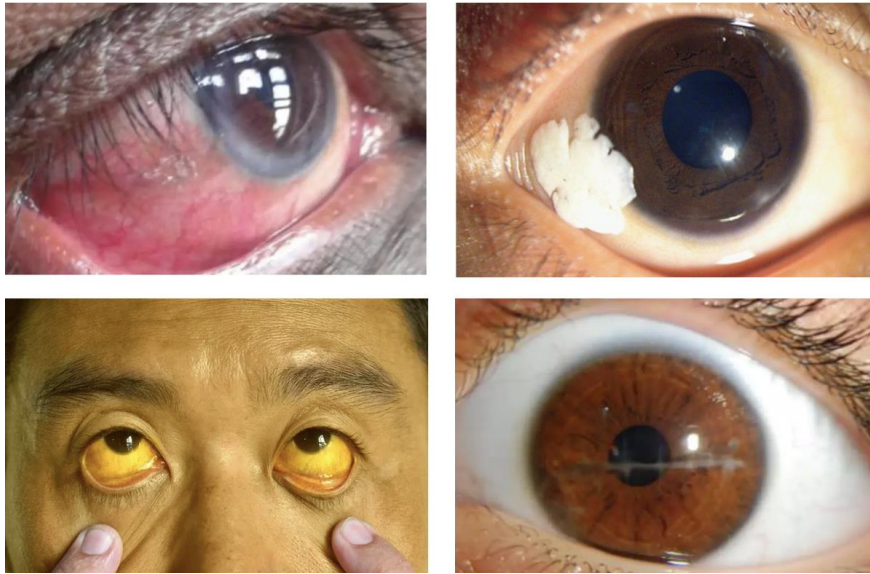


Figure: (A–D) Ocular signs observed during nutritional assessment (conjunctival pallor, Bitot's spots, scleral icterus, and normal eye for comparison)

Source: Adapted from World Health Organization (WHO) recommendations and standard medical books on ophthalmology.

Observation:

2. HAIR

Sign	Possible Indication
Dry, brittle hair	Protein deficiency
Hair fall	Nutrient deficiency (protein, iron)
Loss of pigmentation	Protein-energy malnutrition



Figure: (A–D) Clinical signs of hair associated with nutritional deficiencies

Source: Adapted from World Health Organization (WHO) recommendations and standard clinical and nutrition textbooks.

Observation:

3. NAILS

Sign	Possible Indication
Spoon-shaped nails (Koilonychia)	Iron deficiency anemia
Brittle nails	Nutrient deficiency
Pale nails	Anemia



Figure: (A–C) Nail changes associated with nutritional deficiencies

Source: Adapted from World Health Organization (WHO) recommendations and standard clinical and nutrition textbooks.

Observation:

4. SKIN

Sign	Possible Indication
Dry, rough skin	Vitamin A deficiency
Dermatitis	Vitamin B deficiency
Hyperpigmentation	Nutrient deficiency / metabolic issues
Poor wound healing	Protein deficiency



Figure: (A–D) Skin changes associated with nutritional deficiencies

Source: Adapted from World Health Organization (WHO) recommendations and standard clinical and dermatology textbooks.

Observation:

5. MOUTH AND LIPS

Sign	Possible Indication
Angular stomatitis	Vitamin B2 deficiency
Glossitis (smooth tongue)	Vitamin B deficiency
Bleeding gums	Vitamin C deficiency
Cracked lips	Vitamin deficiency



Figure: Clinical signs observed in the oral cavity indicating possible nutritional deficiencies (angular stomatitis, glossitis, bleeding gums, and cheilosis)

Source: Compiled and adapted from standard clinical nutrition and dental references.

Observation:

6. NECK

Sign	Possible Indication
Darkened skin (Acanthosis nigricans)	Insulin resistance / obesity
Enlarged thyroid (goiter)	Iodine deficiency



Figure: (A–B) Neck changes associated with nutritional and metabolic conditions
(acanthosis nigricans and goiter)

Source: Adapted from World Health Organization (WHO) recommendations and standard clinical medicine and endocrinology textbooks.

Observation:

INTERPRETATION

- Clinical signs should not be used in isolation.
- They must be correlated with anthropometric, dietary, and biochemical data.
- Multiple signs increase the likelihood of nutritional deficiency.

RECORDING SHEET

Parameter	Observation	Possible Deficiency
Eyes		
Hair		
Nails		
Skin		
Mouth		
Neck		

PRECAUTIONS / COMMON ERRORS

- Avoid making diagnosis based on a single sign
- Ensure adequate lighting
- Maintain subject comfort and privacy
- Consider non-nutritional causes of symptoms

2. DIETARY ASSESSMENT METHODS

2.1 Food Balance Sheet images

Aim: Assess food availability at population level.

Method: Use national data to estimate per capita availability.

2.2 Inventory Method

Aim: Assess household consumption.

Method:

- Record opening stock
- Add purchases
- Subtract closing stock

Calculation: Consumption = Opening + Purchase – Closing

2.3 Weighment Method

Aim: Measure actual intake accurately.

Instruments: Weighing scale

Method:

- Weigh raw and cooked food
- Record intake

2.4 Expenditure Method

Aim: Estimate diet from expenditure.

Method: Record food expenses and convert to quantities.

2.5 Diet History

Aim: Assess habitual intake.

Method: Interview subject on usual diet.

2.6 24-Hour Recall

Aim: Assess recent intake.

Method: Record all foods consumed in last 24 hours of 3 days

Two weekdays and one weekend.

2.7 Chemical Analysis

Aim: Determine nutrient composition.

Method: Laboratory analysis of food samples.

3. FUNCTIONAL & BIOPHYSICAL ASSESSMENT

Aim

To assess nutritional status using functional performance and physiological parameters.

Functional Tests

- Hand grip strength
- Physical endurance - formula

Biophysical Tests

- Blood pressure
- Basal metabolic rate

Method

- Conduct tests
- Compare with reference values

4. RECORDING TABLES

Biochemical Assessment Table

Parameter	Value	Normal Range	Interpretation
Hb			
Glucose			
Albumin			

Functional Assessment Table

Parameter	Value	Normal Range	Interpretation
Blood Pressure			
Grip Strength			
Endurance			

1. OBSERVATION SHEETS

Method	Strength	Limitation	Suitability
24-hour Recall			
Weighment			
Diet History			

6. STUDENT SUMMARY

Name:

Age/Sex:

Date:

Findings

- Biochemical Status:
- Dietary Intake:
- Functional Status:

Final Nutritional Assessment

SECTION 4: DIETARY ASSESSMENT

INTRODUCTION

The assessment of diet is a core aspect of nutritional assessment involving an evaluation of an individual's consumption of food, meal pattern, and nutrients. Assessment of the diet offers information regarding the quality and quantity of the diet consumed by the subject being assessed.

In contrast to anthropometric and biochemical approaches to nutritional assessment, the dietary approach is able to provide data on an individual's habitual intake and behavior with regard to nutrition.

This section includes commonly used dietary assessment methods employed in clinical and community settings.

CONTENTS

1. Introduction
2. Aim and Objectives
3. Dietary Assessment Methods
 - 3.1 24-Hour Recall Method
 - 3.2 Diet History Method
 - 3.3 Weighment Method
 - 3.4 Inventory Method
 - 3.5 Food Balance Sheet
 - 3.6 Expenditure Method
4. Accuracy, Precision and Validity of Dietary Assessment
5. Recording Tables
6. Observation Sheet
7. Interpretation
8. Precautions and Limitations

AIM

To evaluate dietary intake using different dietary assessment methods.

OBJECTIVES

- To understand various methods of dietary assessment
- To record and analyze food intake
- To interpret dietary data in relation to nutritional status

DIETARY ASSESSMENT METHODS

1. 24-HOUR RECALL METHOD

Method:

- Record all foods and beverages consumed in the previous 24 hours.
- Include portion sizes, preparation methods, and timing of meals.
- Preferably conduct for three days (two weekdays and one weekend).

2. DIET HISTORY METHOD

Method:

- Conduct a detailed interview regarding usual dietary habits.
- Record meal patterns, frequency, and food preferences.

3. WEIGHMENT METHOD

Instruments Required:

- Weighing scale

Method:

- Weigh raw and cooked food before consumption.
- Record actual intake accurately.

4. INVENTORY METHOD

Method:

- Record opening stock of food items.
- Add purchased quantities.
- Subtract closing stock.

Formula Used:

Consumption = Opening Stock + Purchase – Closing Stock

5. FOOD BALANCE SHEET

Method:

- Use national or regional data to estimate per capita food availability.

OBSERVATION SHEET

Method	Strength	Limitation	Suitability
24-hour Recall			
Weighment			
Diet History			

INTERPRETATION

- Compare dietary intake with recommended dietary allowances (RDA).
- Identify deficiencies or excess intake.

- Analyze meal patterns and dietary habits.

PRECAUTIONS AND LIMITATIONS

- Recall bias may affect accuracy.
- Portion size estimation errors are common.
- Requires cooperation of the subject.
- Results should be interpreted with other assessment methods.

SECTION 5: MARKET SURVEY PRACTICAL

MARKET SURVEY

The market survey gives the students a chance to explore the accessibility, variety, and nutritional value of the food products they consume on a daily basis in the market. This survey serves as an important link between theory and practice, where the students will have to implement the knowledge that they have acquired through classroom sessions in the practical world.

In the following section, the students will be asked to collect and evaluate the various types of cereal products, fruit products, and vegetable products available in the market. The students will be expected to evaluate the label of the products, ingredients of the products, nutritional value of the products, price, and packaging. This will allow the students to have information regarding the various types of food products that are available in the market and the effects of marketing on our food products.

Through this survey, critical evaluation is enabled where students compare products and assess their suitability from a nutritional perspective. By engaging in this activity, students gain practical insights into food systems, consumer behavior, and the role of processed foods in modern diets.

CONTENTS

1. Introduction
2. Objectives of Market Survey
3. Methodology
 - Selection of market area
 - Product selection criteria
 - Data collection procedure
4. Product Categories
 - Cereal-Based Products
 - Fruit-Based Products

- Vegetable-Based Products

5. Product Documentation

- Product name
- Brand
- Ingredients
- Nutritional labeling
- Price
- Packaging

6. Recording Sheets

7. Sample Filled Sheets

8. Critical Analysis of Products

- Nutritional comparison
- Ingredient quality
- Additives and preservatives
- Health claims vs reality

9. Student Interpretation and Conclusion

10. Precautions and Guidelines

1. AIM

To study and critically evaluate locally available cereal-based, fruit-based, and vegetable-based food products in the market.

2. OBJECTIVES

- To identify different food products available in the market
- To analyze food labels and nutritional composition
- To compare cost and nutritional value
- To assess marketing strategies and consumer awareness

- To suggest healthier alternatives

3. SCOPE OF STUDY

Students will visit local markets/supermarkets and collect information on:

- Cereal-based products (e.g., breakfast cereals, biscuits)
- Fruit-based products (e.g., juices, jams)
- Vegetable-based products (e.g., pickles, soups)

Students should document products using photographs and collect label information.

4. METHODOLOGY

Step 1: Market Visit

- Visit a local market/store
- Identify at least 2 products from each category

Step 2: Product Documentation

- Take clear photographs
- Record brand, price, weight

Step 3: Label Analysis

- Note ingredients list
- Record nutritional values
- Identify additives and claims

Step 4: Comparative Analysis

- Compare products based on nutrition and price

Step 5: Evaluation

- Classify products as healthy/moderate/unhealthy

- Suggest improvements

5. RECORDING TABLES

5.1 Product Details Table

Product Name	Type	Brand	Price	Weight	Ingredients

5.2 Nutritional Analysis Table

Product	Energy (kcal)	Protein (g)	Fat (g)	Sugar (g)	Fiber (g)

5.3 Label Analysis Table

Product	Additives	Claims	Processing Level

5.4 Price Comparison Table

Product	Price	Quantity	Cost per 100g	Value for Money

5.5 Evaluation Sheet

Criteria	Observation
Health Value	
Sugar Content	
Additives	
Marketing Strategy	
Overall Rating	

6. SAMPLE FILLED SHEETS

Example 1: Cereal-Based Product

Product Details

Product Name	Type	Brand	Price	Weight	Ingredients
Cornflakes	Cereal	Kellogg's	₹180	500g	Maize, sugar, malt extract

Nutritional Analysis

Product	Energy	Protein	Fat	Sugar	Fiber
Cornflakes	357	7	0.5	8	3

Evaluation

- High sugar content
- Low fiber
- Moderately healthy

Example 2: Fruit-Based Product

Product Details

Product Name	Type	Brand	Price	Weight	Ingredients
Mango Juice	Fruit	Real	₹120	1L	Water, mango pulp, sugar

Nutritional Analysis

Product	Energy	Protein	Fat	Sugar	Fiber
Mango Juice	60	0.5	0	12	0

Evaluation

- High sugar
- No fiber
- Unhealthy compared to fresh fruit

Example 3: Vegetable-Based Product

Product Details

Product Name	Type	Brand	Price	Weight	Ingredients
Tomato Soup	Vegetable	Knorr	₹90	60g	Tomato powder, salt, starch

Nutritional Analysis

Product	Energy	Protein	Fat	Sugar	Fiber
Soup Mix	80	2	1	5	1

Evaluation

- High sodium
- Processed product
- Moderately unhealthy

7. OBSERVATION & INTERPRETATION

Students should conclude:

- Which product is healthiest and why
- Whether cost reflects nutritional value
- Impact of marketing on choices
- Common additives found in products

PRECAUTIONS AND GUIDELINES

- Ensure accurate recording of label information.
- Avoid bias while evaluating products.
- Verify nutritional claims with label data.
- Maintain clarity and neatness in recording.

STUDENT SUMMARY

Name:

Class:

Date:

Findings

- Best Product:
- Least Healthy Product:
- Most Cost-Effective Product:

Final Conclusion

CLINICAL NUTRITIONAL SCREENING TOOLS

INTRODUCTION

In addition to clinical examination, standardized screening tools are used to systematically assess nutritional risk. These tools help in early identification of malnutrition or risk of malnutrition and guide appropriate nutritional intervention.

Two widely used tools in clinical practice are:

- Malnutrition Universal Screening Tool (MUST)
- Subjective Global Assessment (SGA)
- Mini nutritional assessment (MNA)
- Pg-sga

AIM

To assess nutritional risk using standardized clinical screening tools.

OBJECTIVES

- To understand the application of MUST and SGA
- To classify individuals based on nutritional risk
- To interpret findings for clinical decision-making

1. MALNUTRITION UNIVERSAL SCREENING TOOL (MUST)

PURPOSE

MUST is used to identify adults who are malnourished, at risk of malnutrition, or obese.

PARAMETERS USED

1. Body Mass Index (BMI)
2. Unintentional weight loss
3. Acute disease effect

SCORING TABLE

Step 1: BMI Score

BMI (kg/m²)	Score
>20	0
18.5–20	1
<18.5	2

Step 2: Weight Loss Score

Weight Loss (%)	Score
<5%	0
5–10%	1
>10%	2

Step 3: Acute Disease Effect

Condition	Score
No intake >5 days	2
Otherwise	0

OVERALL RISK CATEGORY

Total Score	Risk Level
0	Low Risk
1	Medium Risk
≥2	High Risk

INTERPRETATION

- Low risk → Routine clinical care
- Medium risk → Observe and monitor
- High risk → Immediate nutritional intervention

2. SUBJECTIVE GLOBAL ASSESSMENT (SGA)

PURPOSE

SGA is used to assess nutritional status based on clinical history and physical examination.

COMPONENTS

A. Medical History

- Weight change
- Dietary intake change
- Gastrointestinal symptoms
- Functional capacity

B. Physical Examination

- Loss of subcutaneous fat
- Muscle wasting
- Edema or ascites

CLASSIFICATION

Category	Interpretation
A	Well nourished
B	Moderately malnourished
C	Severely malnourished

INTERPRETATION

- Based on overall clinical judgment

- Combines history and physical findings

CASE STUDY

Patient Details

- Age: 45 years
- Sex: Male
- BMI: 18.0 kg/m²
- Weight loss: 8% in last 3 months
- Reduced dietary intake

MUST Calculation

- BMI Score = 2
- Weight Loss Score = 1
- Acute Disease = 0

Total Score = 3 → **High Risk**

SGA Assessment

- Weight loss present
- Reduced intake
- Mild muscle wasting

Classification → **SGA B (Moderately Malnourished)**

CONCLUSION

The patient is at high nutritional risk and requires immediate nutritional intervention.

PATIENT-GENERATED SUBJECTIVE GLOBAL ASSESSMENT (PG-SGA)

AIM

To assess nutritional status and identify nutritional risk using the PG-SGA tool.

OBJECTIVES

- To collect patient-reported nutritional information
- To assess clinical signs of malnutrition
- To assign scores and determine urgency of intervention

COMPONENTS OF PG-SGA

A. PATIENT-GENERATED SECTION

1. Weight History

- Recent weight loss (1 month and 6 months)
- Current weight and usual weight

2. Food Intake

- Normal intake
- Suboptimal intake
- Minimal intake

3. Nutrition Impact Symptoms

- Nausea, vomiting
- Loss of appetite
- Diarrhea or constipation
- Dry mouth, swallowing difficulty

4. Functional Capacity

- Normal activity
- Reduced activity
- Bedridden

B. CLINICIAN-ASSESSED SECTION

1. Disease and Metabolic Demand

- Stress factors (infection, trauma, cancer)

2. Physical Examination

- Loss of subcutaneous fat
- Muscle wasting
- Edema or ascites

SCORING SYSTEM

Patient-Generated Score

Parameter	Score Range
Weight loss	0–5
Food intake	0–4
Symptoms	0–24
Activity/function	0–3

Clinician Score

Parameter	Score
Disease stress	0–3
Physical examination	0–3

TOTAL PG-SGA SCORE INTERPRETATION

Score	Interpretation	Action
0–1	No intervention required	Routine care
2–3	Patient education needed	Monitor
4–8	Requires intervention	Dietitian referral
≥9	Critical need	Immediate intervention

GLOBAL RATING (SGA CATEGORY)

Category	Interpretation
A	Well nourished
B	Moderately malnourished
C	Severely malnourished

METHOD OF ASSESSMENT

- Collect patient history using PG-SGA questionnaire
- Record weight changes and dietary intake
- Identify nutrition impact symptoms
- Perform physical examination
- Assign scores for each component
- Calculate total score and classify nutritional status

CASE EXAMPLE

Patient Details:

Age: 60 years

Condition: Cancer patient

- Weight loss: 6% (Score = 2)
- Food intake: Reduced (Score = 2)
- Symptoms: Nausea, poor appetite (Score = 4)
- Activity: Reduced (Score = 2)
- Disease stress: Moderate (Score = 2)
- Physical signs: Mild muscle wasting (Score = 2)

Total Score = 14

Interpretation: Severe nutritional risk → Immediate intervention required

SGA Category: B/C (Moderate to severe malnutrition)

IMPORTANCE

- Comprehensive assessment tool
- Combines subjective and objective data
- Widely used in oncology nutrition
- Guides clinical decision-making

PRECAUTIONS AND LIMITATIONS

- Requires trained personnel for accurate scoring
- Subjective elements may introduce variability
- Should be used along with other assessments

3. MINI NUTRITIONAL ASSESSMENT (MNA)

PURPOSE

MNA is specifically designed to assess nutritional status in the elderly (≥ 65 years). It helps identify individuals who are malnourished or at risk of malnutrition in clinical and community settings.

COMPONENTS

A. Screening (MNA-SF)

- Decline in food intake
- Weight loss
- Mobility
- Psychological stress or acute disease
- Neuropsychological problems
- Body Mass Index (BMI) or calf circumference

SCORING (MNA-SF)

Parameter	Score Range
Food intake decline	0–2
Weight loss	0–3

Mobility	0–2
Stress/acute disease	0–2
Neuropsychological problems	0–2
BMI / Calf circumference	0–3

Total Score = 0–14

INTERPRETATION

Score	Nutritional Status
12–14	Normal nutritional status
8–11	At risk of malnutrition
0–7	Malnourished

CASE EXAMPLE

- Age: 72 years
- Reduced food intake: Moderate (1)
- Weight loss: 3 kg (2)
- Mobility: Walks with assistance (1)
- Stress: Yes (0)
- Neuropsychological problem: Mild (1)
- BMI: 21 kg/m² (2)

Total Score = 7 → Malnourished

IMPORTANCE

- Specifically validated for elderly population

- Simple and quick to administer
- Can be used in hospitals, clinics, and community settings
- Enables early detection of malnutrition
- Guides clinical nutrition therapy
- Improves patient outcomes

ACCURACY, PRECISION AND VALIDITY OF DIETARY ASSESSMENT

INTRODUCTION

Dietary assessment methods are used to estimate an individual's food and nutrient intake. However, no dietary assessment method is completely free from error. Concepts such as accuracy, precision, and validity are essential to evaluate the reliability and usefulness of dietary data.

Understanding these concepts helps in selecting appropriate dietary assessment methods and interpreting results correctly in both clinical and research settings.

AIM

To understand the concepts of accuracy, precision, and validity in dietary assessment.

OBJECTIVES

- To define accuracy, precision, and validity
- To understand factors affecting dietary assessment
- To relate these concepts to different dietary methods

1. ACCURACY

Definition:

Accuracy refers to how close the measured dietary intake is to the true or actual intake of an individual.

Explanation:

If the recorded intake closely matches the actual intake, the method is considered accurate.

Factors Affecting Accuracy:

- Recall bias
- Misreporting (under- or over-reporting)
- Portion size estimation errors
- Memory limitations
- Social desirability bias

Example:

If actual intake is 2000 kcal and recorded intake is 1950 kcal → high accuracy

2. PRECISION**Definition:**

Precision refers to the consistency or reproducibility of repeated measurements.

Explanation:

If repeated dietary assessments give similar results, the method is precise.

Key Concept:

A method can be precise but not accurate.

Example:

Repeated recordings of 1800 kcal when actual intake is 2000 kcal → high precision but low accuracy

3. VALIDITY**Definition:**

Validity refers to how well a dietary assessment method measures what it is intended to measure.

Reference Methods (Gold Standards):

- Weighed food records
- Biomarkers (e.g., urinary nitrogen, doubly labeled water)

Types of Validity:

- Relative validity
- Absolute validity

Example:

24-hour recall compared with weighed food record

APPLICATION IN DIETARY METHODS

Method	Accuracy	Precision	Validity
24-hour Recall	Moderate	Low–Moderate	Moderate
Weighment Method	High	High	High
Diet History	Variable	Moderate	Moderate
Food Frequency Questionnaire	Low–Moderate	High	Moderate

IMPORTANCE

- Ensures reliability of dietary data
- Helps in accurate nutritional assessment
- Improves research quality
- Reduces measurement errors

LIMITATIONS

- No method is completely accurate

- Biomarkers are costly and not always feasible
- Human error is unavoidable

CONCLUSION

Accuracy, precision, and validity are fundamental concepts in dietary assessment.

Understanding these principles improves the interpretation of dietary data and enhances the quality of nutritional evaluation.

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