Assessment of Nutritional Status

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Learning objectives:

- To define nutritional status.
- To discuss essential components and purposes of nutritional assessment.
- To know the different methods for assessing the nutritional status.
- To understand the basic anthropometric techniques, applications, & reference standards.

Defining nutritional status:

- **Refers to the degree of balance between nutrient intake and nutrient requirement.**
- **This balance is affected by many factors , including physiological, psychological, developmental, cultural, and economic.**

Nutritional Status Assessment:

is the evaluation of nutritional status (i.e. the health condition of an individual as influenced by food consumption & utilization of the nutrients).

Nutritional Assessment Why?

- **The purpose of nutritional assessment is to:**

- **Identify individuals or population groups at risk of becoming malnourished**

- **Identify individuals or population groups who are malnourished**

Nutritional Assessment Why?

- To develop health care programs that meet the community needs which are defined by the assessment

- To measure the effectiveness of the nutritional programs & intervention once initiated

"Nutritional Disorders"

*Nutritional disorders result from an imbalance between the body's requirements for nutrients & energy & the supply of these substrates of metabolism (either deficiency or excess of particular nutrients).

*The risk of clinical complications can be minimized & the loss of nutrients can be prevented or reversed by **Nutritional therapy.**

Factors Influencing Nutritional Status

It can be affected by many factors:

1-Disease

2-Cultural patterns

3-Eating behavior or habits

4-Psychological stress

5-Economic

6-Nutrient absorption

Methods of Nutritional Assessment

- Nutrition is assessed by two types of methods; **direct** and **indirect**.
- The **direct** methods deal with the individual and measure objective criteria, while **indirect** methods use community health indices that reflects nutritional influences.

Direct Methods of Nutritional Assessment

The evaluation of nutritional status (like other aspects of clinical medicine) utilize history, physical examination, &lab. tests to provide diagnosis.

Direct Methods of Nutritional Assessment

These are summarized as ABCD

- Anthropometric methods
- Biochemical, laboratory methods
- Clinical methods
- Dietary evaluation methods

Each component has important strengths &limitations, & no single technique will provide a thorough assessment of nutritional status.

I-Anthropometric Measurements:

It is the simplest, & most quantitative measure of nutritional status, by using the measurements of the body thickness to estimate fat & lean tissue mass. It is widely used in clinical practice.

Anthropometric Methods

- **Anthropometry is the measurement of body height, weight & proportions.**

Common indicators:

- **Wt. for Height (W/H)**
- **Ht. for Age (H/A)**
- **Wt. for Age (W/A)**
- **BMI**

Anthropometric Methods

Other anthropometric Measurements:

- Mid-arm circumference
- Skin fold thickness
- Head circumference
- Head/chest ratio
- Waist / hip ratio

Uses of Anthropometric methods

- It is an essential component of clinical examination of infants, children & pregnant women.
- It is used to evaluate both under & over nutrition.
- The measured values reflects the current nutritional status & don't differentiate between acute & chronic changes .

Advantages:

It is accurate ,simple, safe, not expensive, & can be applied at the bed side.

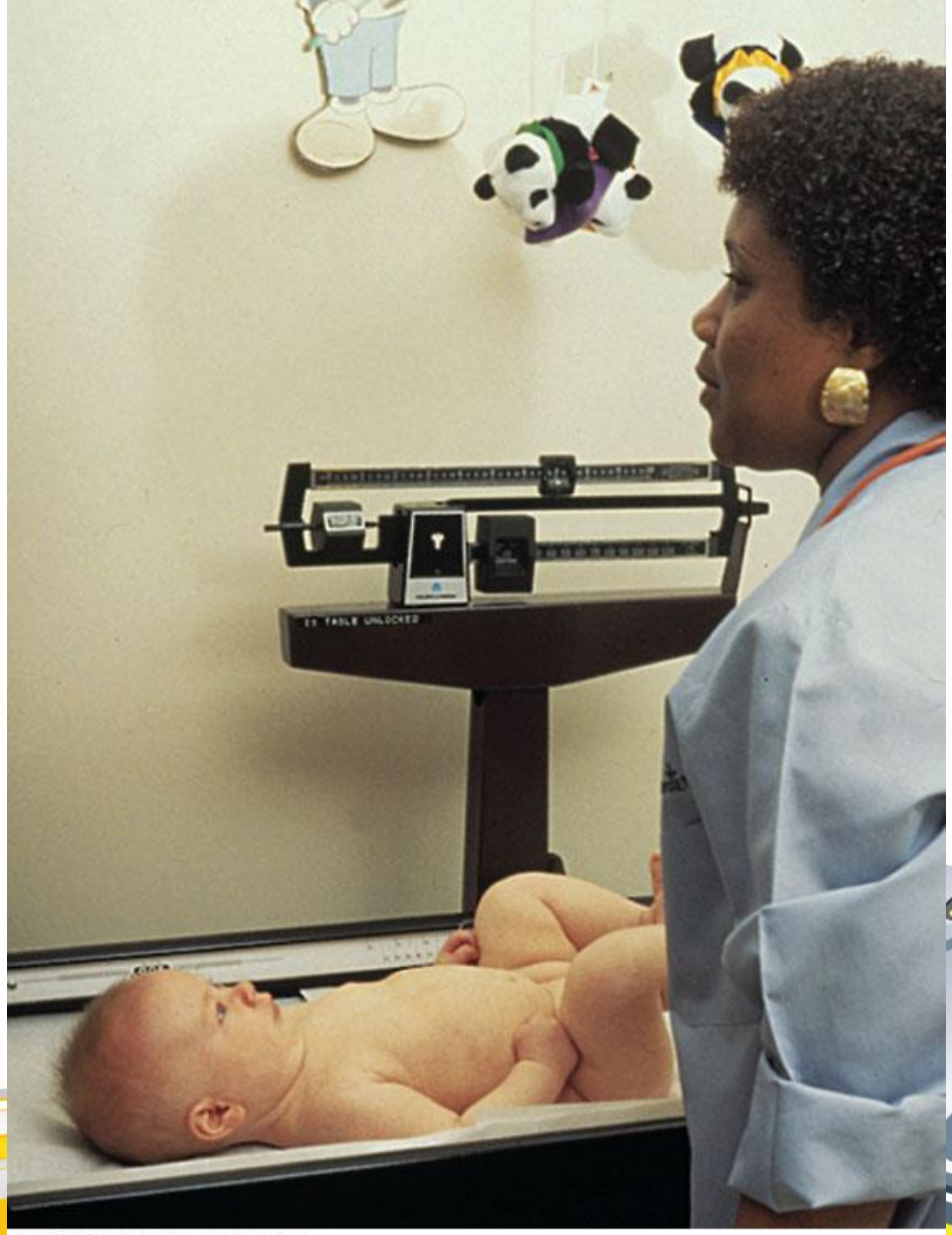
Limitations:

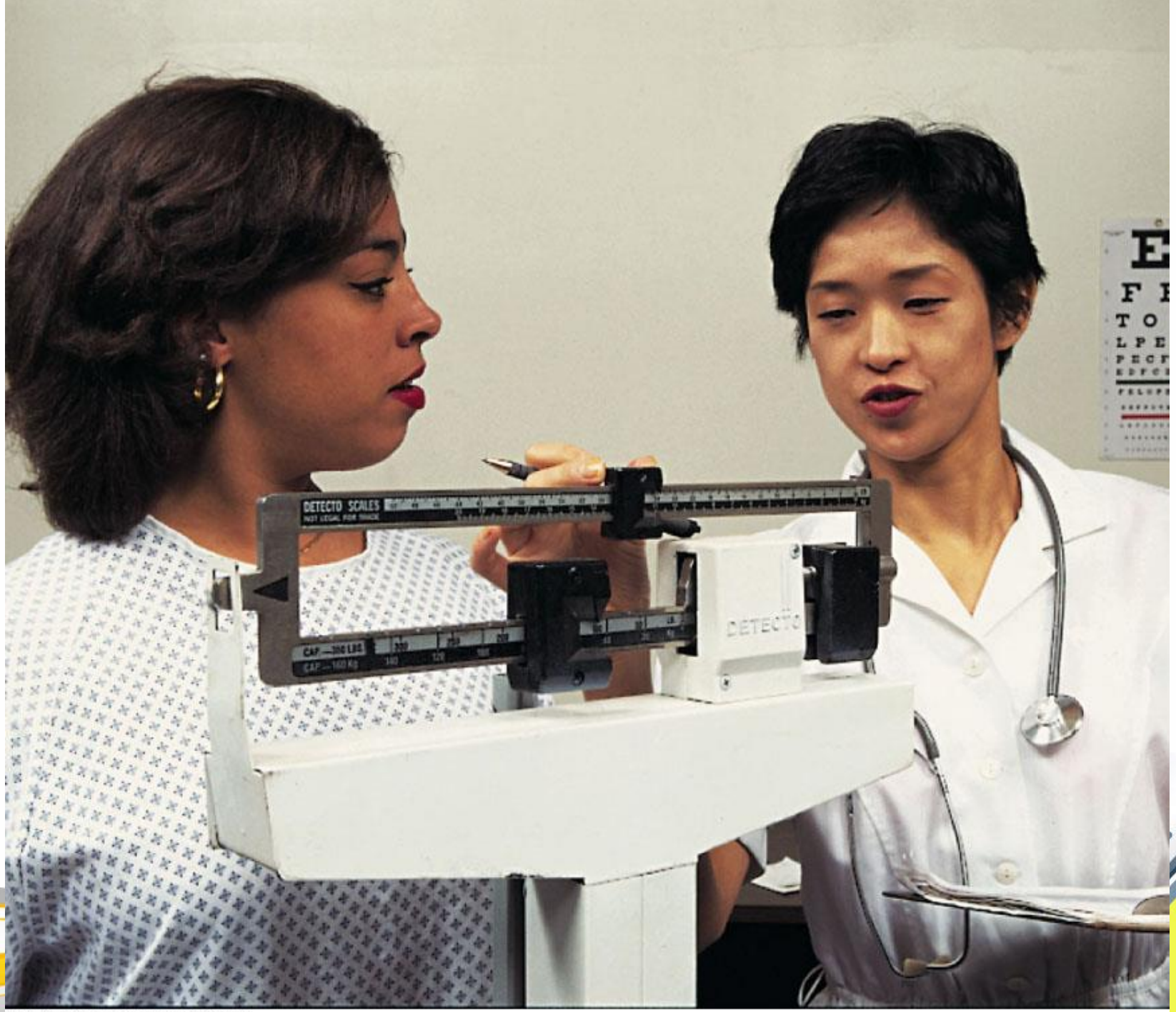
- It can detect only those nutrients abnormalities that result in measurable changes in body size or proportion

Body Wt.:

It is convenient & useful indicators for the nutritional status.

- The wt. should be measured by using a lever balance- type of scale.
- Reference tables provide standard wt. based on Ht., age &sex.
- If the patient has edema at the time of weighing, the wt. may be falsely high.





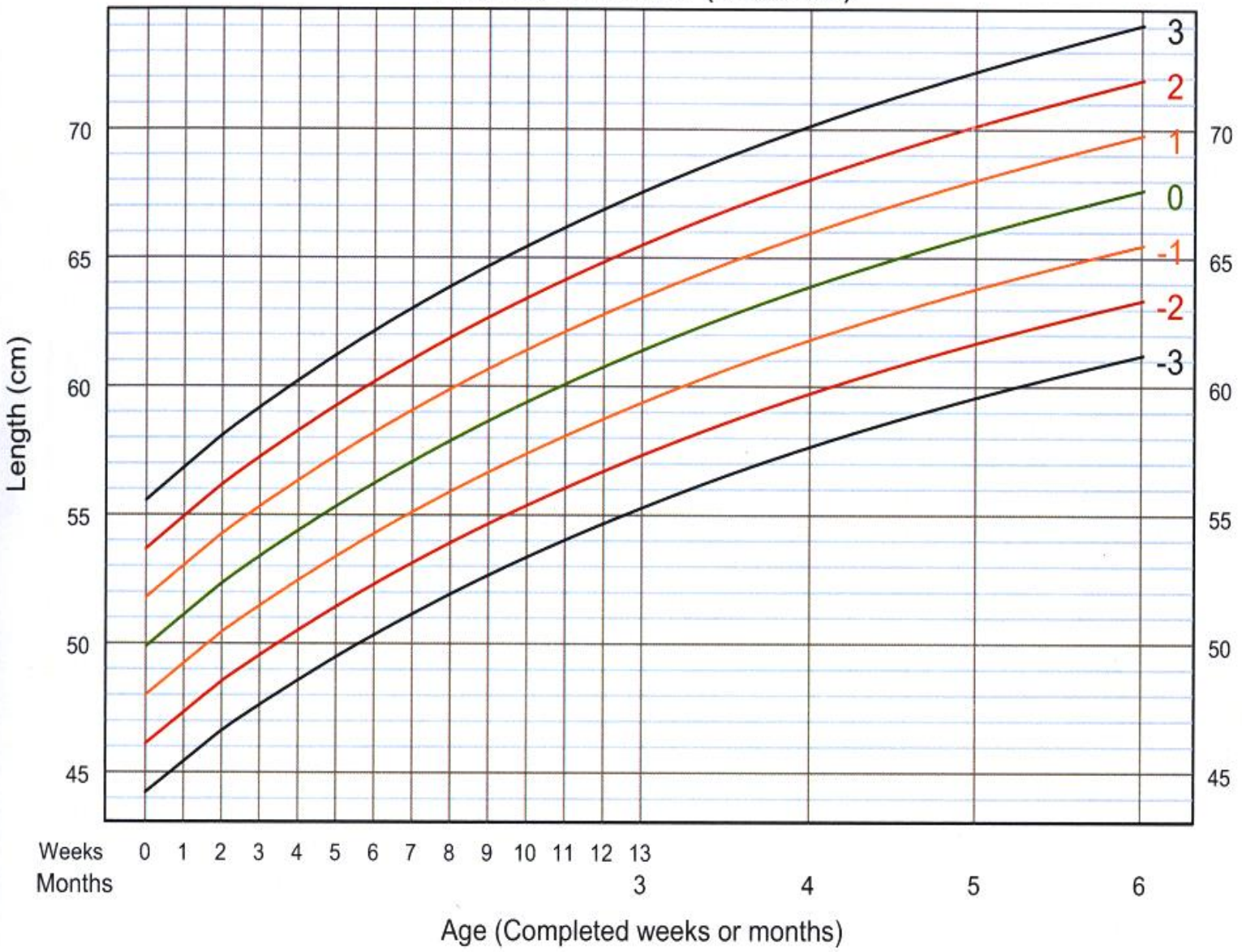

0.0
kg
seca
This scale was manufactured for unicef using technology developed in Australia and donated to unicef by the people of Australia

Length & Height:

- In infants & toddlers (<2y), the length is measured in **supine** position with a fixed headboard & a sliding foot board.
- In older children & adults the height is measured by using a horizontal arm that moves vertically on a calibrated scale.
- The patient should be without shoes, heels together, against a straight surface with the head level & standing.

Length-for-age BOYS

Birth to 6 months (z-scores)



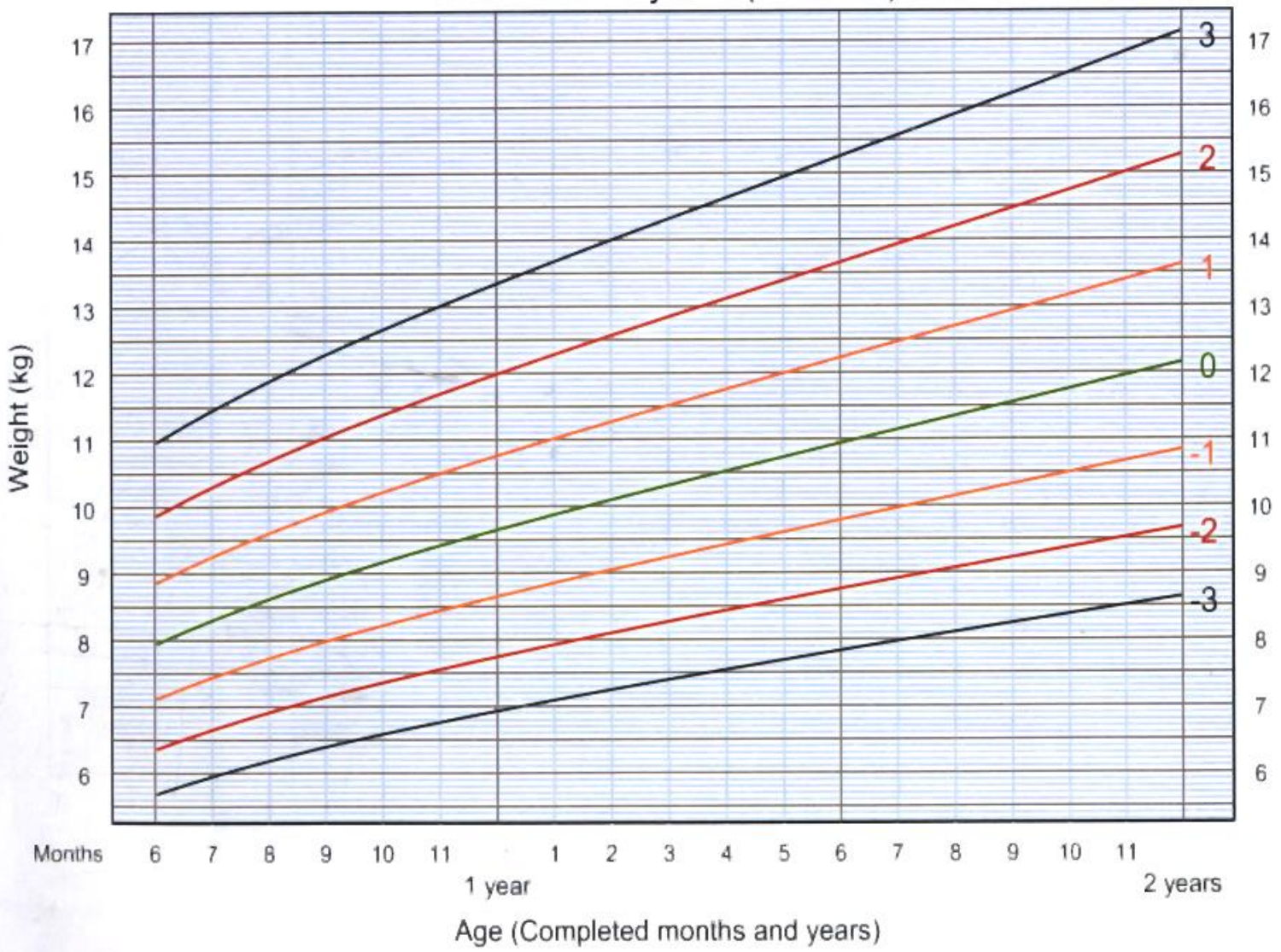
This **Length-for-age** chart shows attained length relative to age in comparison to the median (0 line).

- A child whose length-for-age is below the line –2 is **stunted.**
- Below –3 is **severely stunted.**

Birth to 6 months

Weight-for-age BOYS

6 months to 2 years (z-scores)

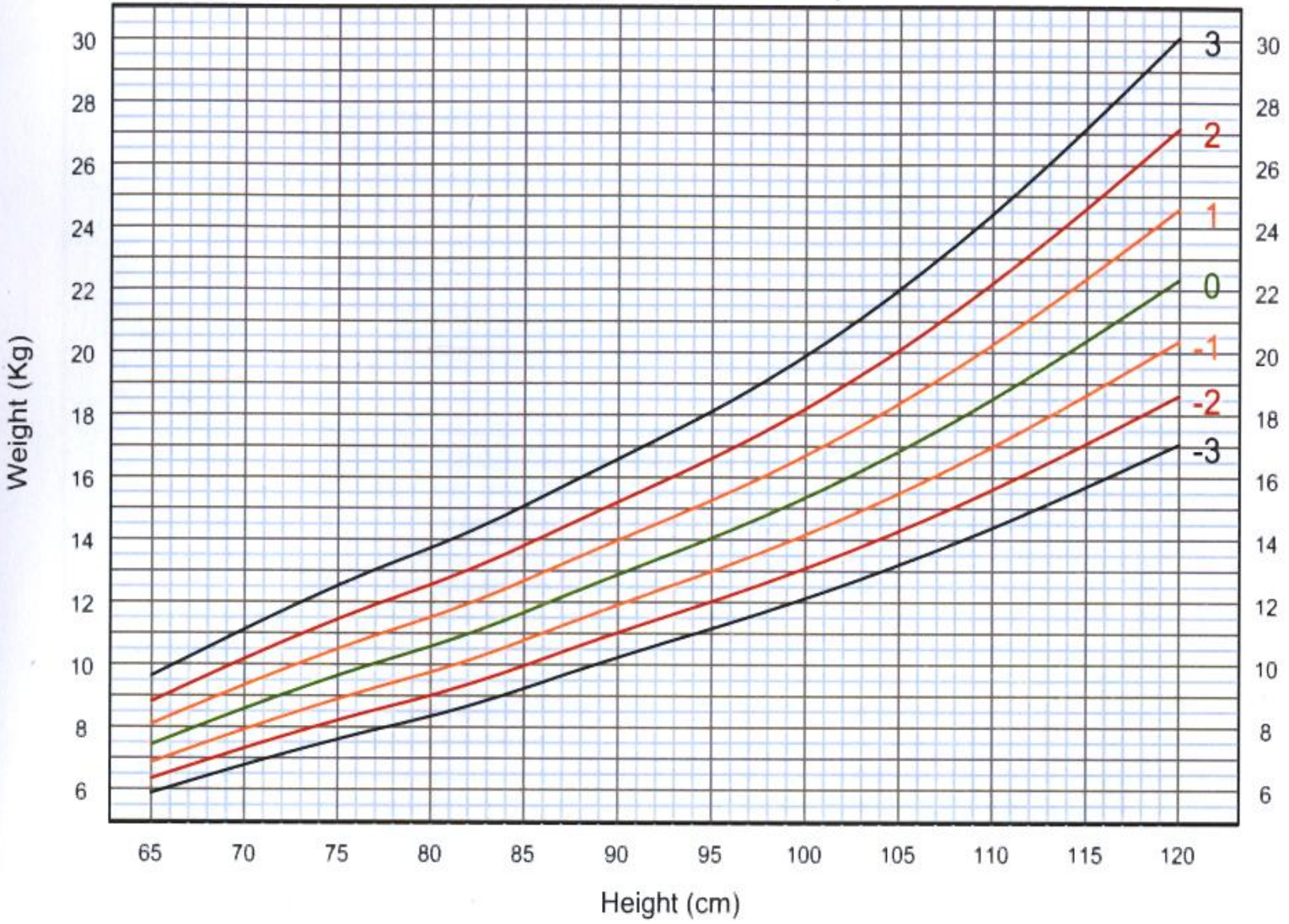


This **Weight-for-age** chart shows body weight relative to age in comparison to the median (0 line).

- A child whose weight-for-age is below the line -2 is **underweight.**
- Below -3 is **severely underweight. Clinical signs of marasmus or kwashiorkor may be observed.**

Weight-for-height BOYS

2 to 5 years (z-scores)



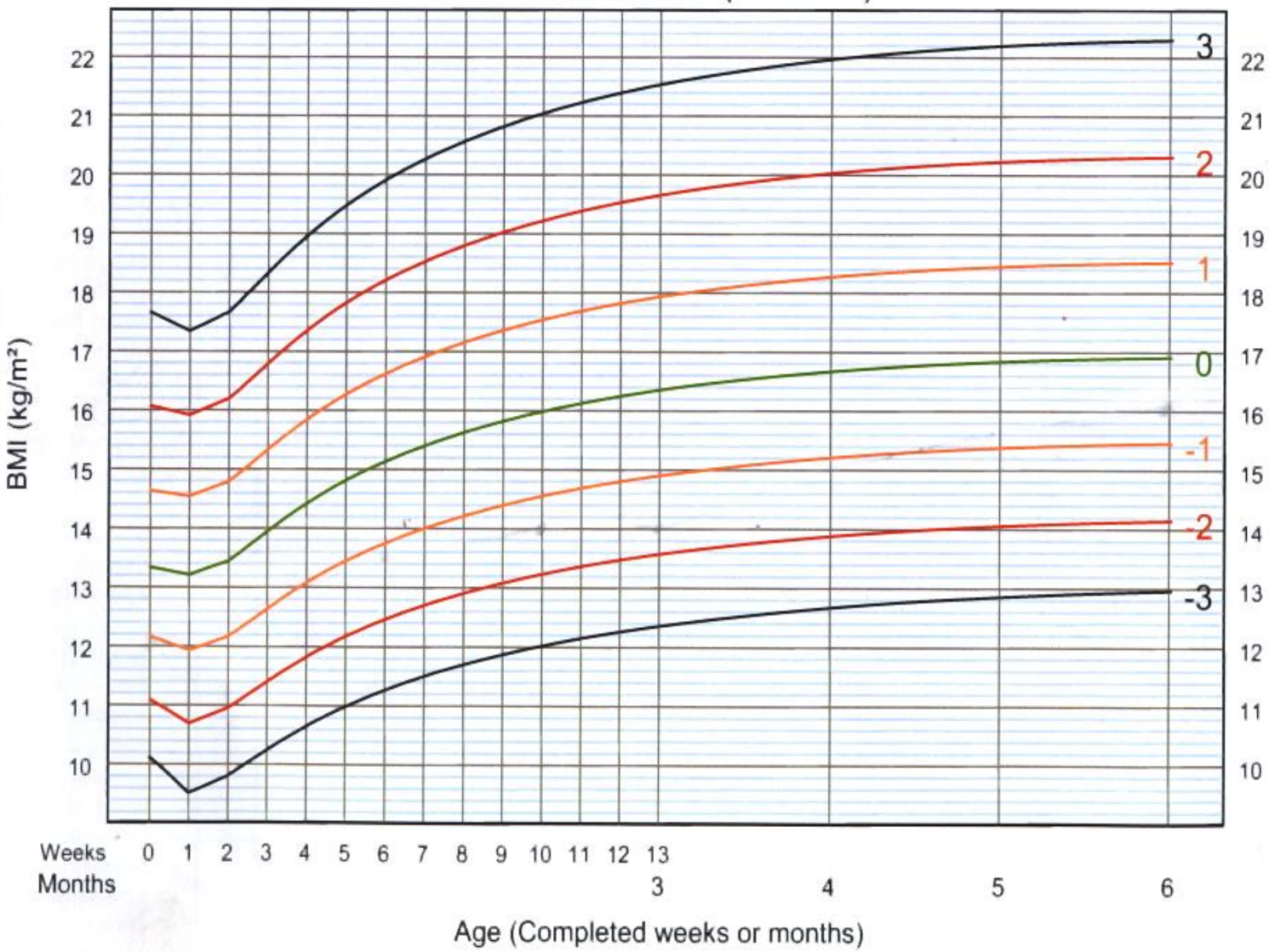
This **Weight-for-height** chart shows body weight relative to height in comparison to the median (0 line).

- A child whose weight-for-height is above the line 3 is **obese**.
- Above 2 is **overweight**.
- Above 1 shows possible **risk of overweight**.
- Below the line –2 is **wasted.**
- Below –3 is **severely wasted. Refer for urgent specialized care.**

2 to 5 years

BMI-for-age GIRLS

Birth to 6 months (z-scores)



This **BMI-for-age** chart shows Body Mass Index (BMI, a ratio of body weight to length) for the child's age in comparison to the median (0 line). BMI-for-age is especially useful for screening for overweight.

- A child whose BMI-for-age is above the line 3 is **obese**.
- Above 2 is **overweight**.
- Above 1 shows possible **risk of overweight**.

BMI:

Is the ratio of weight in kilogram (with minimal clothing) to height (without shoes) in squared meter. For both male &female.

It is significantly correlated with total body fat content.

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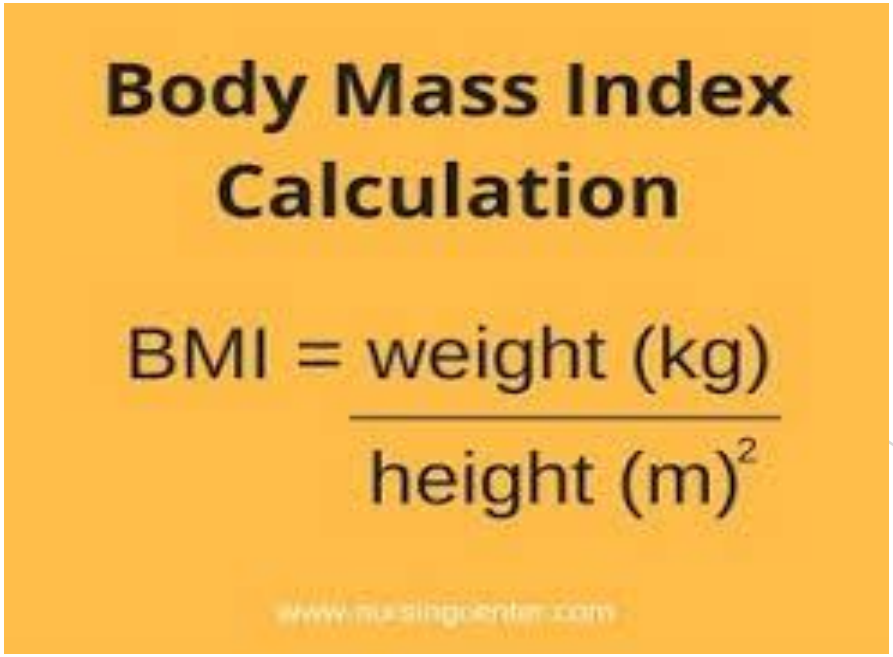
B. Body mass index:

Practical marker of optimal weight for height and indicator of obesity or under nutrition.

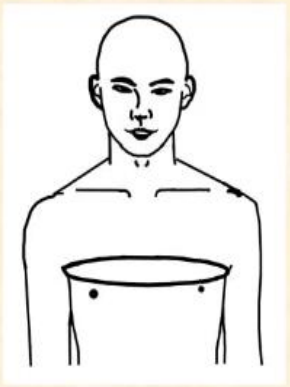


Classification of over –weight and obesity

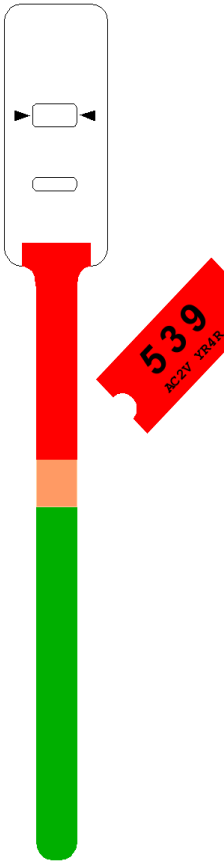
	Obesity Class	BMI kg/m²
Under-weight		less than 18.5
Normal		18.5-24.9
Over-weight		25-29.9
Obesity	I	30-34.9
	I I	35- 39.9
Extreme obesity	I I I	more than 40

Other anthropometric Measurements

- Mid-arm circumference
- Skin fold thickness
- Head circumference
- Head/chest ratio
- Hip/waist ratio



MID- ARM MUSCLE CIRCUMFERENCE (MAC):



It can serve as a **general index** of nutritional status (reflect both **caloric adequacy** & **muscle mass**).

MAC is measured at the **midpoint of the left upper arm** by a fiberglass flexible tape

The value can be compared with reference graphs available for both sexes & all ages.

In case of **protein energy malnutrition** ,patient presented with **muscle wasting** & **decrease muscle circumference**.

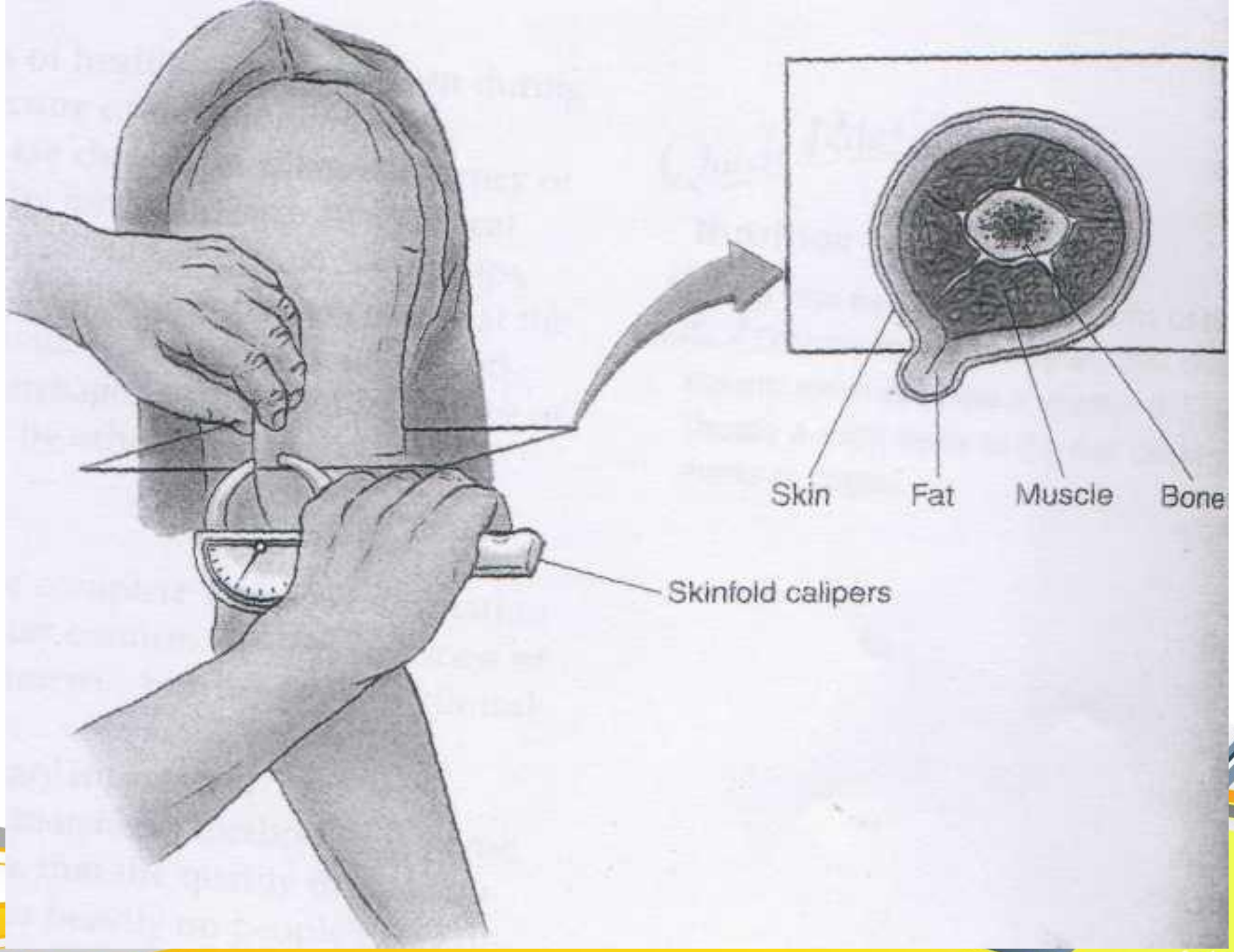
SKIN FOLD THICKNESS:

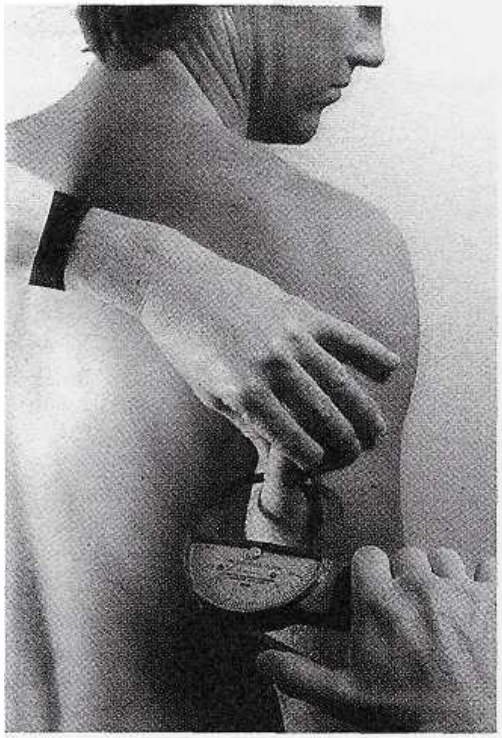
Often used to estimate **subcutaneous fat stores** or the pattern of **fat distribution**.

- This information can be used to help determine nutritional status.
- **Skin fold sites** typically measured are the: **triceps, biceps, below the scapula and above the iliac crest.**

- In men, values of thickness **less** than **[12.5mm]** suggest **under nutrition**, and values **over [20mm]** suggest excess fat and **over nutrition**.

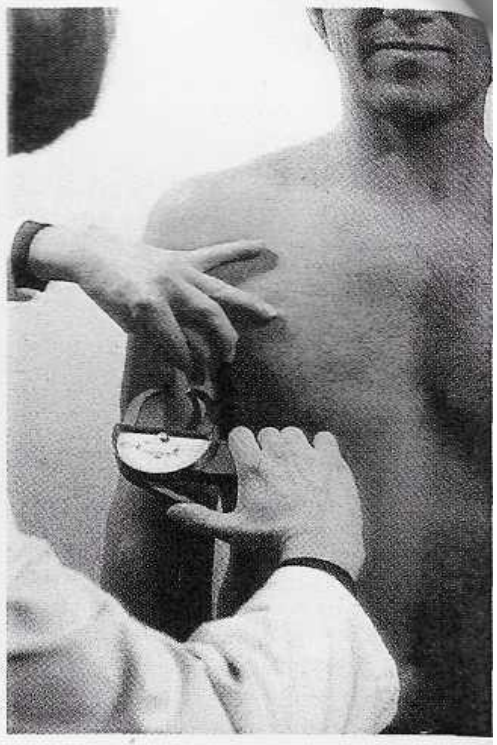
- In women values **less** than **[16.5mm]** and values **greater** than **[25mm]**, indicate under and over nutrition respectively.


Skin
Fat
Muscle
Bone
Skinfold calipers



A

B



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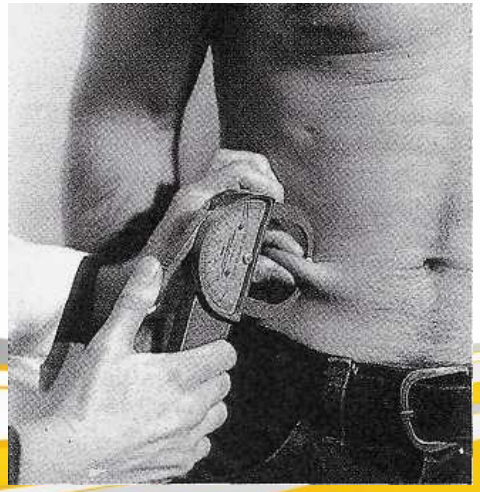
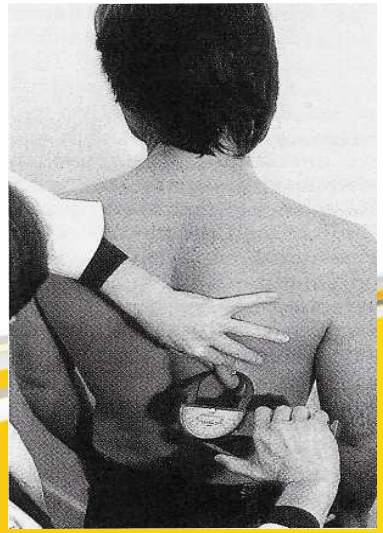




WAIST CIRCUMFERENCE:

Is a common way to assess abdominal fat content, the presence of excess body fat in the abdomen when out of proportion to the total body fat is considered an independent risk factor for **diabetes, cardiovascular** diseases and **breast cancer.**

- **Waist circumference predicts mortality better** than any other anthropometric measurement.
- It has been recommended that waist measurement alone can be used to assess obesity, and two levels of risk have been identified

	MALES	FEMALE
LEVEL 1	**> 94cm**	**> 80cm**
LEVEL 2	**> 102cm**	**> 88cm**

- **Level 1** is the **maximum** acceptable waist circumference and there should be **no further weight gain.**

- **Level 2** indicates **obesity** and requires <u>weight management to reduce the risk of type 2 diabetes & CVS complications</u>**.**

WAIST-to HIP ratio {WHR} :

Is the ratio of a person waist circumference to hip circumference. The WHR has been used as a measure of the health of a person and the risk of developing serious health conditions

Women with waist–hip ratios of more than 0.8, and men with more than 1.0, are at increased health risk because of their fat distribution.

In Iraq the [WHR] for both sexes within the standard, [0.7 for females], and [0.8 for males].


Most weight is:
Above the waist
Below the waist
BrainyWeightLoss.com
Apple Body Shape vs. Pear Body Shape

Those with apple shaped bodies have a greater risk of **heart disease, breast cancer, diabetes, gallbladder problems, high blood pressure and colorectal cancer.**

Pear shaped individuals are more likely to have **osteoporosis, varicose veins and menopausal symptoms.**

2. Clinical evaluation:

General malnutrition may result from;

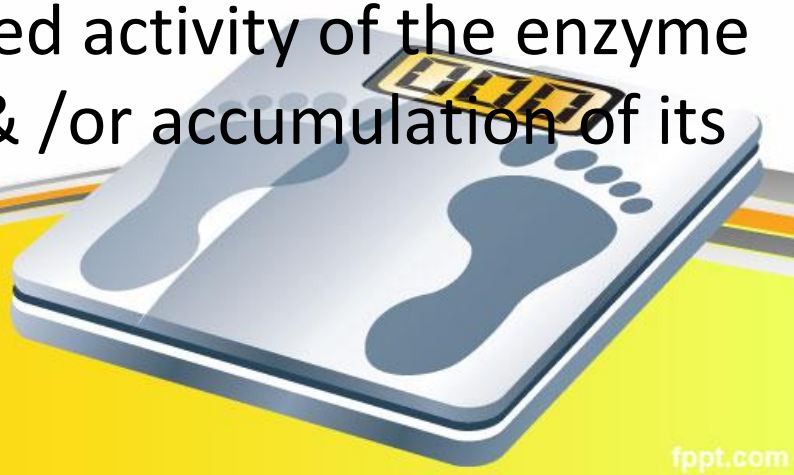
a-Primary factors (deficient dietary intake) take dietary history.

b-Secondary factors (defect in nutrients utilization) ,e.g. GI disorders, metabolic disorders take clinical history.

Prolong malnutrition may cause the following sequence of events;

1-A general decrease in tissue levels of deficient nutrients.

2-A biochemical lesion such as altered activity of the enzyme dependent on a specific nutrient & /or accumulation of its metabolite by time.



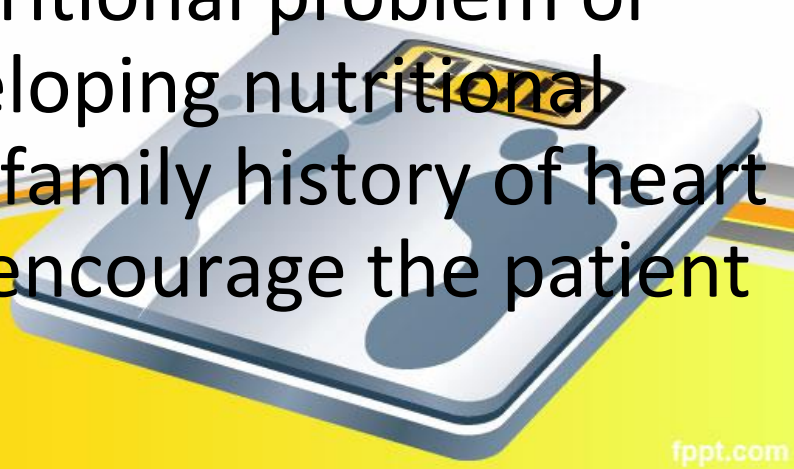
3-Anatomical lesion.

4-Finally cellular disease.

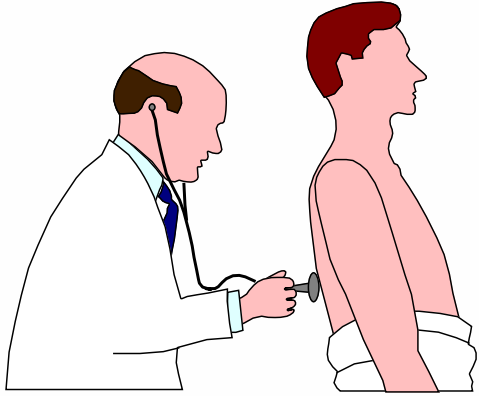
Many of clinical S&S of malnutrition appear later (after weeks or months), sometimes there is sub clinical or marginal malnutrition but still the clinical examination provides overall impression of nutritional health.

A-Medical History:

Like history of chronic illness, wt. loss or wt. gain, the physician can detect nutritional problem or assess the likelihood of developing nutritional defect in the future (strong family history of heart disease check lipid level, & encourage the patient to decrease body weight).



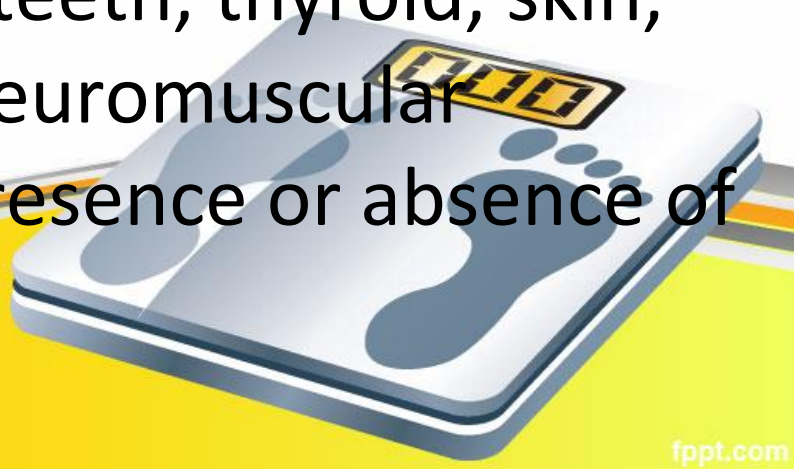
B-Physical Examination:



The physician looks for clinical features (from nutritional point of view) but require confirmation of biochemical testing & dietary data.

- Physical appearance: pallor, emaciation &hair changes indicate long term energy deficit.
- loose clothes indicate recent weight loss, xanthoma or corneal arcus in some types of hyperlipidaemia.
- Oedema: following protein depletion & or Vit.B1 deficiency.
- Breathlessness: result from anemia

- Taste abnormality: in zinc deficiency (also it is decrease with the age, drugs, smoking).
- Dermatitis: due to zinc deficiency & Vit.B def.
- Mood changes: apathy & depression, patient with eating disorders& under nutrition.
- Obesity, wasting , can be observed easily.
- Special attention is given to the areas where signs of nutritional def. appears; hair, eyes, mouth, mucous membrane, tongue, teeth, thyroid, skin, skeleton, tendon reflexes, &neuromuscular excitability provide clues of presence or absence of nutritional defects.



3. Laboratory Assessments:

*Protein status:

-In **Marasmus** patient (caloric deprived) normal serum protein.

-In **Kwashiorkor** patient (protein deprived) decrease serum protein.

*Vitamin& mineral status: assess the circulatory level (deficiency must be prolonged before blood level are affected

It can identify specific nutritional related abnormalities, e.g. anemia, (iron def.), protein def., biochemical tests, provide the 1st indication of nutritional abnormalities before clinical anthropometric changes occur.

4. Dietary assessment:

Describe the dietary intake background which help to explain any observed clinical or biochemical abnormalities.

*Twenty- four hour recall :

(one of the most common methods of dietary assessment).

- ***Advantages:*** it is easy & require little effort from the patient to recall the intake.
- ***Disadvantages:***

1-The consumption in a single 24h. period may be not representative of current weekly or monthly intake.

2-Inaccurate data due to faulty memory &quantitative errors in assessing how much has been eaten.

*One-week dietary record :

All food & beverages ingested recorded with approximate quantities(assumptions of portion size) & actual time of consumption.

Advantages: more accurate & used for consumption patterns which allow the medical professional to **identify deficiencies, imbalances or excesses of nutrient intake.**

*Weighed inventory:

The subjects weigh & record all food prepared & food composition tables are used to estimate the nutrient intake from the records.

Advantage:

It does not rely on assumption of portion size.

- **Food frequency** questionnaire **:**

Printed questionnaires are used & the subjects or interviewer tick the category that approximates to their usual consumption of a list of foods. Eg. never eaten, eaten once a month , once a week, daily intake.

Used to assessing food groups. It is used usually in large surveys.

Thank you for your attention!

And don`t forget to eat right.