Nutrition in Infants and Children

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Nutrition in Infants and Children

We will talk about:

I. Breast feeding

II. Milk formulas

III. Complementary feeding

IV. Nutritional disorders

This topic is important for the course and your life. Parents will always ask you about feeding their children, especially if the mother is a new mother

Nutrition in Infants and Children

Importance of nutrition in infancy and early childhood.

Adequate nutrition is essential:

for Normal health

for Normal growth and development to full potential.

Because of Inadequate nutrition:

Failure to grow normally (FTT).

Poor health with increased morbidity and mortality. It increase the incidence of diseases mainly infections

Overweight and obesity with all related complications Because of excess nutrition

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I. Breast feeding

Breast feeding is the standard way for infants and children nutrition

Recommendations (WHO).

Advantages.

Composition of breast milk.

Contraindication to breastfeeding.

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Breast feeding

Recommendations (WHO):

1. Exclusive breastfeeding from birth to 6 months of age.
2. Complementary feeding starting from the age of 6 months. Will talk about complementary feeding later on
3. Continue breast feeding up to 2 years of age or beyond.

وهذا يؤكد ما جاء في القرآن الكريم: ﴿وَالْوَالِدَاتُ يُرْضِعْنَ أَوْلَادَهُنَّ حَوْلَيْنِ كَامِلَيْنِ ۖ لِمَنْ أَرَادَ أَن يُتِمَّ الرَّضَاعَةَ﴾

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Breast feeding

Advantages of breast milk

1. Contains all nutrients needed by the infant during the first 6 months of life.
   (including fat, carbohydrates, proteins, vitamins, minerals and water).

2. Contains bioactive immunologic factors to support the immature immune system.

3. Contains factors that enhance digestion, absorption of nutrients.

4. Readily available and free.

Nutrition in Infants and Children **Breast fe**

Composition of breast milk In comparison to formula milk

1. Fat:

- Quantity: 3.5 g of fat per 100 ml of milk (about 50% of the energy content).
- Quality: contains long chain polyunsaturated fatty acids (docosahexaenoic acid (DHA), and arachidonic acid (ARA), *not available in animal milks*. *important for the neurological development*. This is one of the major advantages

2. Carbohydrates: 7 g/100 ml (higher than others), mainly lactose + oligosaccharides.

3. Proteins: Compared to formula, the protein is lower than formula and it's easy digestible by the immature digestive system of the infant

- Quantity: 0.9 g/100 ml (lower than animal milks), less protein load to the kidneys.
- Quality: Less casein (large curds) and more whey proteins (smaller, softer curds). more lactalbumin and no lactoglobulins (cow's milk intolerance).

Lactoglobulins have been implicated as a cause of cow's milk protein allergy or intolerance

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Breast feeding

Composition of breast milk (continued)

4. Vitamins: adequate *except vitamin D*. We need to provide Vit D supplements to babies when they are discharged from nurseries.

5. Minerals: Iron and zinc smaller quantity but good bioavailability sufficient for the first 6 m.

It's sufficient foe the first 6 months, and after that the babies will start take complementary as we said before

6. Immunologic factors: These can't be found in other formula's milk

Immunoglobulins (mainly secretory IgA). Secretory IgA have an essential role in protecting against infection

Whey proteins (lysosomes, lactoferrins).

Epidermal Growth Factors.

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II. Milk Formulas.

General introduction

Types of infant formulas

Fluid and caloric requirements (milk formula)

Guidelines for bottle milk formula feeding preparation

Volume and number of formula feedings

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II. Milk Formulas.

General introduction

1. **These are nonhuman breast milk preparations.** Could be from gouts, cow's or camels, these are the three main sources.
2. **They are indicated only when the mother cannot breast feed.** It's not the standard feeding
3. **Quantitative composition approximates human breast milk.**
4. **However, fails to provide other qualities of human milk such as immunologic factors.**

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Types of infant formulas:

We have two types of cows milk

1. **Regular cows-milk based formulas: most common (normal children):** Regular formulas for infants till 12 months. whole milk afterwards.
2. **Follow on formulas (cow-milk based),** designed for **6 to 12 months old** contain more proteins, Ca, Ph, Fe, and vitamin C may be used. Follow on formulas designed **for 1 to 3 years** are not indicated in children eating balanced diet.

Other sources:

2. **Soy-based formulas (CMPA, lactose intolerance).** Used to treat diseases caused by cow's milk (lactose intolerance)
3. **Other animal-milk formula such as goats and camels (CMPA).** Sometimes we use camels mils to treat resistance cases of cow milk
4. **Special formulas:** Hydrolyzed proteins: there is no longer lactoglobulin, they are hydrolyzed to smaller competent.

- Hydrolyzed proteins (oligopeptides and amino-acids): CMPA, intestinal injury.
- Specialized formulation for specific diseases (phenylketonuria).

Type one is used by most mothers, and it's for normal children while type two is used for those who don't take other sources of nutrition other than milk after 6 months

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II. Milk Formulae.

Fluid and caloric requirements (milk formula):

Usually, in breastfeeding we feed the normal baby as long as they are hungry without calculating the calorie and we don't need to be worry about calculating for them. But in formula you should be careful not to give more than what they need

- **The first 6 months:**

Fluid requirement:150-130 ml/Kg/24h.

Make sure that in your history taking you ask the mother about day and night (24h) intake of milk not only during the day

Caloric requirement: 120- 110 Kcal/kg/24h

- **Regular milk formulas provide 20 Kcal/ounce (0.67 Kcal/ml).** Important

Guidelines for bottle milk formula feeding preparation

These are found on the can, the mother need to read It before preparing the milk

1. Clean the bottle and teat in hot soapy water as soon as after a feed using a bottle brush.
2. Rinse before sterilizing.
3. Sterilize using cold water or steam apparatus according to manufacturer instructions.
4. Boil water and allow to cool for about half an hour.
5. Put the water in the bottle before the milk powder.
6. Fill the scoop with milk powder then level it. Do not compact the milk powder.
7. Follow the recommended ratio (1 scoop of powder to 30ml (1oz) water.
8. Close the teat and shake gently until the powder is dissolved.
9. Make fresh feed each time. Refrigeration risks bacterial contamination.
10. The feed should be warm not hot . Test temperature by allowing a few drops to fall on the inside of the wrist.
11. When feeding, the baby should lie comfortably in the crook of the arm,

and the bottle be held at an angle so that the teat is always full of milk;
this stops excessive ingestion of air during the feed.

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II. Milk Formulas.

Volume and number of formula feedings: Total 150-140 ml/kg/24H

Age	Volume of feed (ml)	Number of feed/24 hours
0 – 2 weeks	50-70	7-8
2 – 6 weeks	70-110	6-7
2 months	110-180	5-6
3 months	180-220	5
6 months	220-240	4

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III. Complementary feedings:

Purpose: the objective

Age at introduction

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III. Complementary feedings:

Purpose: the objectives The basic reason to use it is that the breast or formula milk both of them are not sufficient after 6 months

Breast or formula milk are *insufficient* for growth after 6 months of age.

Therefore, the purpose of complementary feedings is to provide *additional nutritional factors to meet growth requirements beyond the age of 6 months.*

III. Complementary feeding

Age at introduction:

1. General rules:

- Continue breast feeding till 2 years and beyond
- Start with small amount and increase gradually as tolerated. To test that the baby can tolerate it because they are not used to it
- Start with one food item at a time. Do not start with mixtures

  Because if there is intolerance or allergy we will not be able to know which is the cause, once the baby can tolerate all types, know you can give them mixtures

2. **At 6 months of age:** Iron- fortified cereals (rice cereals), and mashed or ground fruits (apples, banana, etc).
3. **Around 8 months:** may introduce other items such as corn cereals, boiled pumpkin, carrots and potatoes.
4. **Around 10 months**: may introduce other food such as rice, pasta, ground animal meat and egg yolk.
5. **From 12- 24 months**: Balanced family food.

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IV. Nutritional disorders

1. Assessment of nutritional status

2. Nutritional clinical disorders

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1. Assessment of nutritional status

1. **History:** dietary history for quantity and quality of nutrition.
   Objective: determine whether children are taking adequate calories and nutrients:
2. **Physical examination:**

General signs of malnutrition: Pallor (Fe), signs of vitamin and mineral deficiencies skin and mucosal lesions (zinc), eye lesions (vit A), or skeletal (vit D)

Eye lesions because of Vit A deficiency are rare and need a long time to develop

3. **Growth charts:** The weight is affected very early in malnutrition

   Underweight: weight for age < 3rd percentile.

   Thinness: BMI for age < 3rd percentile.

If we use the weight, we call them underweight and if we use the BMI we call them thinner

   Overweight: BMI for age > 85th and < 95th percentile.

   Obesity: BMI for age > 95th percentile.

   Short stature: length/height for age < 3rd percentile.

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2. Nutritional clinical disorders

A. Malnutrition (Failure to thrive)

Underweight: weight for age < 3rd percentile.

Thinness: BMI for age < 3rd percentiles

Short stature: length/height for age < 3rd percentile.

If we use the weight, we call them underweight and if we use the BMI we call them thinner

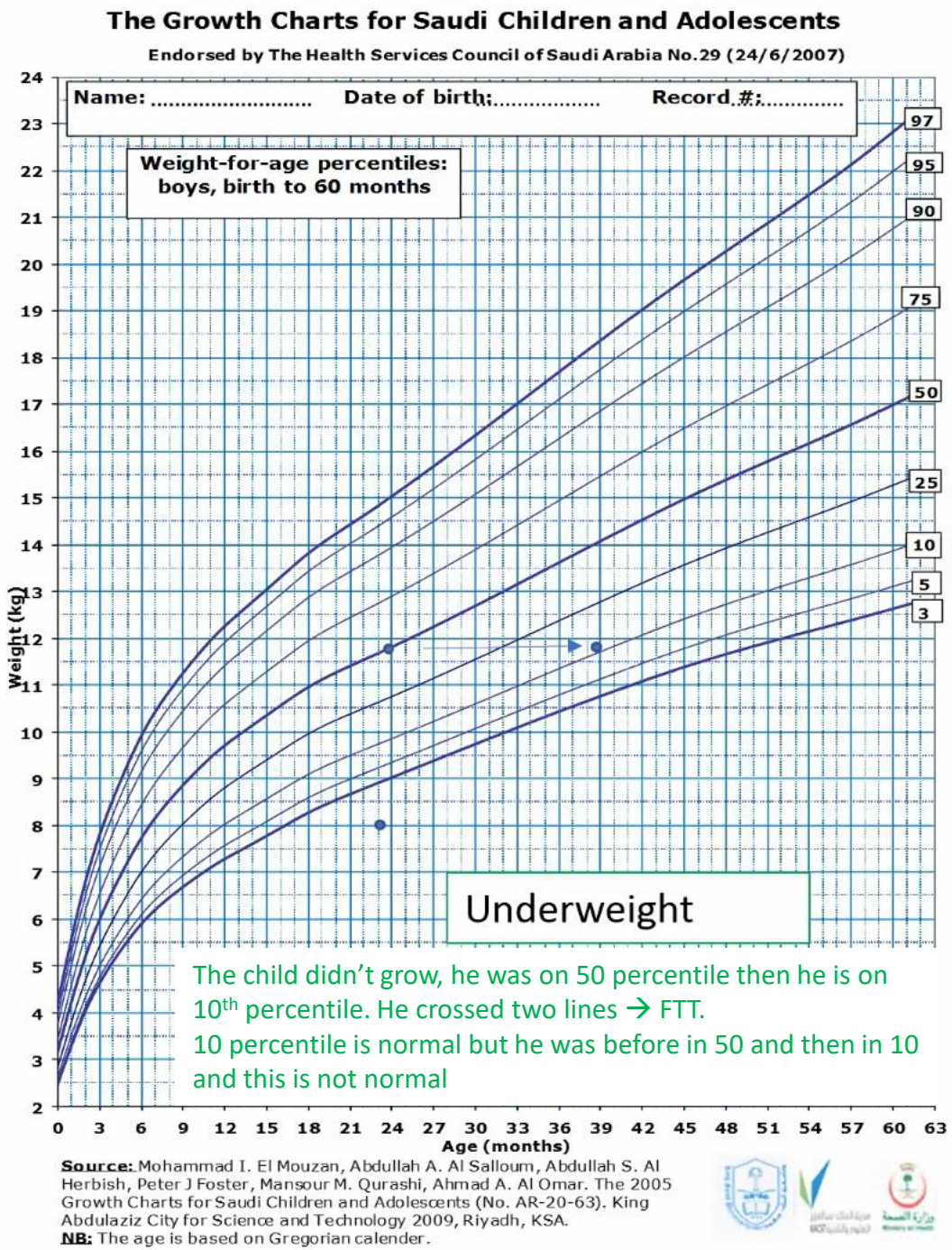
B. Overnutrition:

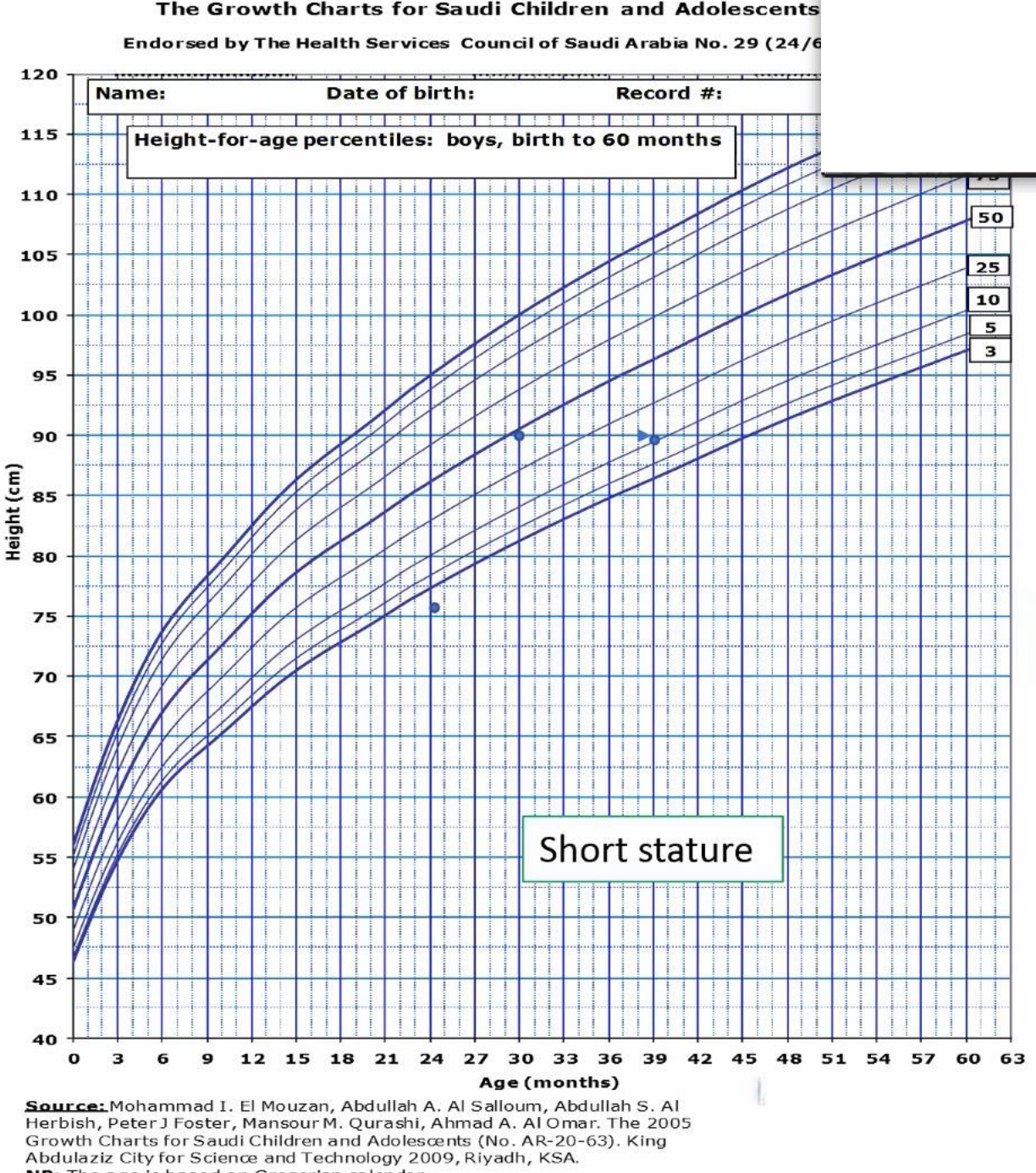
What is the difference between length/height? Children under 2 years → length and we measure it in supine position with no gravity affect. While in >2 years old → height and we measure it while they are standing

Overweight: BMI for age > 85th and < 95th percentile.

Obesity: BMI for age > 95th percentile.

C. Clinical forms: Marasmus and Kwashiorkor


The Growth Charts for Saudi Children and Adolescents
Endorsed by The Health Services Council of Saudi Arabia No.29 (24/6/2007)
Name: ..... Date of birth: ..... Record #: .....
Weight-for-age percentiles: boys, birth to 60 months
97
95
90
75
50
25
10
5
3
Weight (kg)
Age (months)
Underweight
The child didn't grow, he was on 50 percentile then he is on 10th percentile. He crossed two lines → FTT.
10 percentile is normal but he was before in 50 and then in 10 and this is not normal
Source: Mohammad I. El Mouzan, Abdullah A. Al Salloum, Abdullah S. Al Herbish, Peter J Foster, Mansour M. Qurashi, Ahmad A. Al Omar. The 2005 Growth Charts for Saudi Children and Adolescents (No. AR-20-63). King Abdulaziz City for Science and Technology 2009, Riyadh, KSA.
NB: The age is based on Gregorian calender.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50
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Height (cm)
Age (months)
Short stature
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The Saudi Growth Charts

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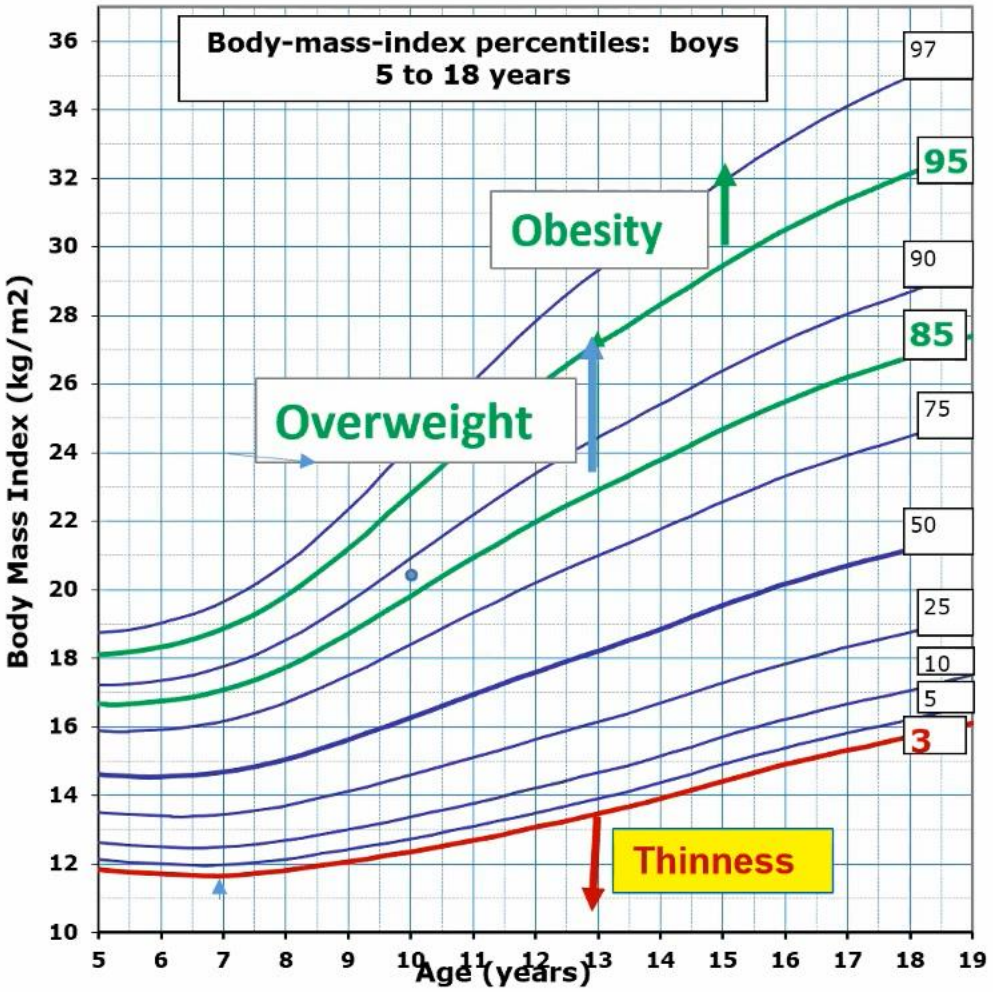

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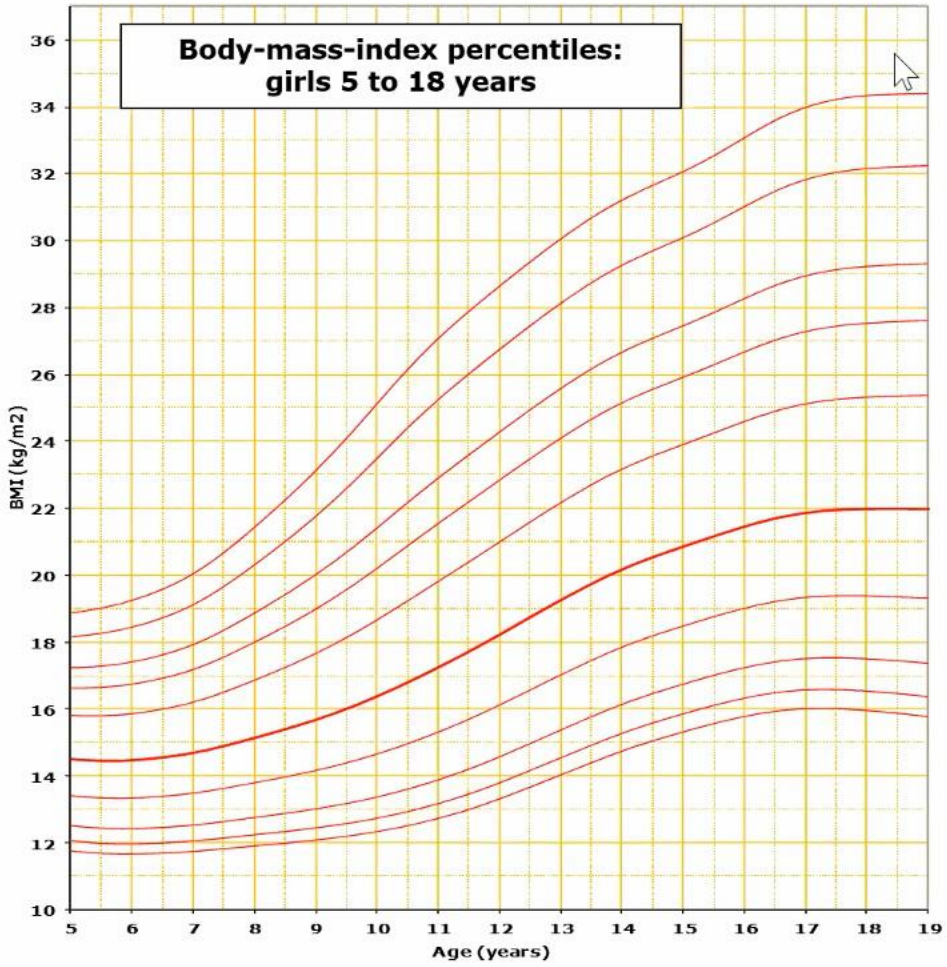

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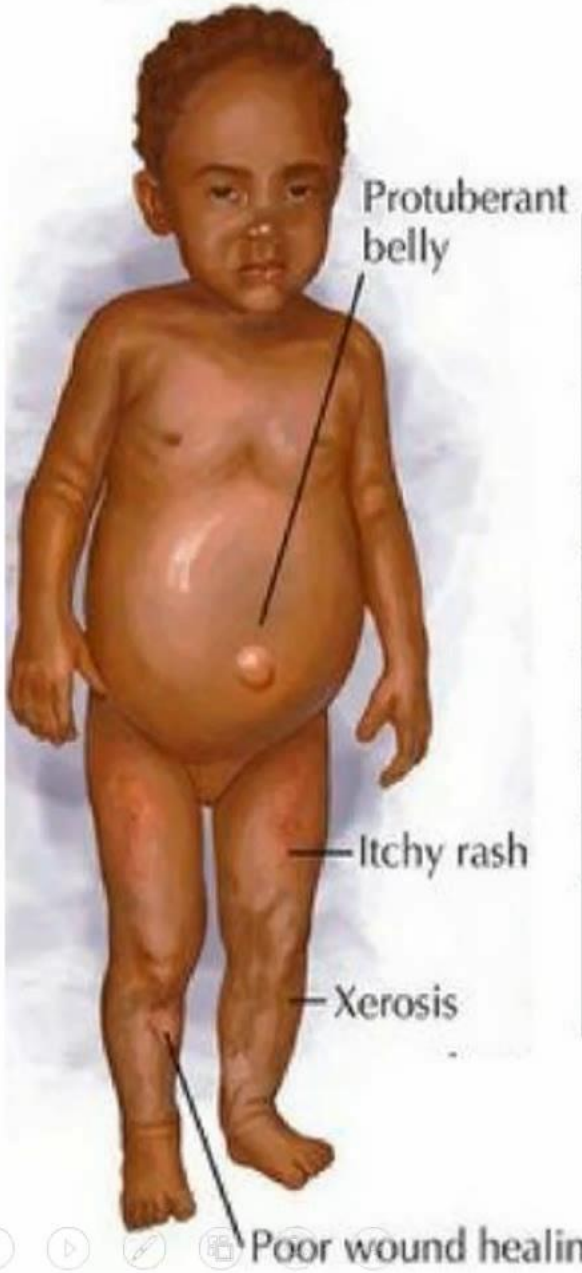
Overweight area is the window of opportunity to help the child before reaching obese

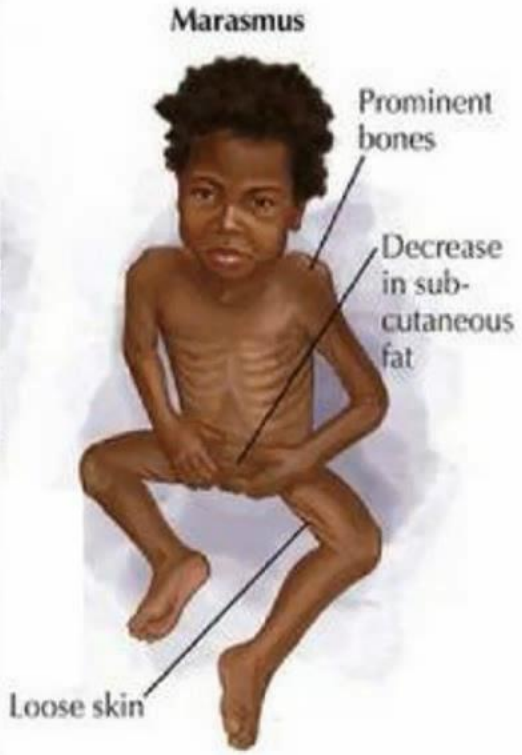
10 Differences between Kwashiorkor and Marasmus

www.majordifferences.com



Comparison Table

Kwashiorkor	Marasmus
It develops in children whose diets are deficient of protein.	It is due to deficiency of proteins and calories.
It occurs in children between 6 months and 3 years of age.	It is common in infants under 1 year of age.
Subcutaneous fat is preserved.	Subcutaneous fat is not preserved.
Oedema is present.	Oedema is absent
Enlarged fatty liver.	No fatty liver.
Ribs are not very prominent.	Ribs become very prominent.
Lethargic	Alert and irritable.
Muscle wasting mild or absent.	Severe muscle wasting
Poor appetite.	Voracious feeder.
The person suffering from Kwashiorkor needs adequate amounts of proteins.	The person suffering from Marasmus needs adequate amount of protein, fats and carbohydrates.



Kwashiorkor vs Marasmus

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THANK YOU