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Protein Energy Malnutrition

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Specific Learning Objectives

- At the end of session, the learner shall be able to:
- ➢ Understand the concept of PEM.
- ➢ Describe factors associated with PEM.
- ➢ Classify PEM.
- ➢ Take preventive measures for PEM.

Introduction

- Malnutrition is a range of conditions occurring when intake of one or more nutrients doesn't meet the requirements.

- PEM is an important nutritional problem among preschool age children.

- The main cause of PEM is food inadequacy.

- PEM was earlier attributed to the concept of 'protein gap' (deficiency of proteins in diet).

- 'Food gap' is the chief cause of PEM
➢ it is not only the deficiency of proteins but inappropriate food (low in energy density, protein and micronutrients - Vitamin A, Iron, Zinc)
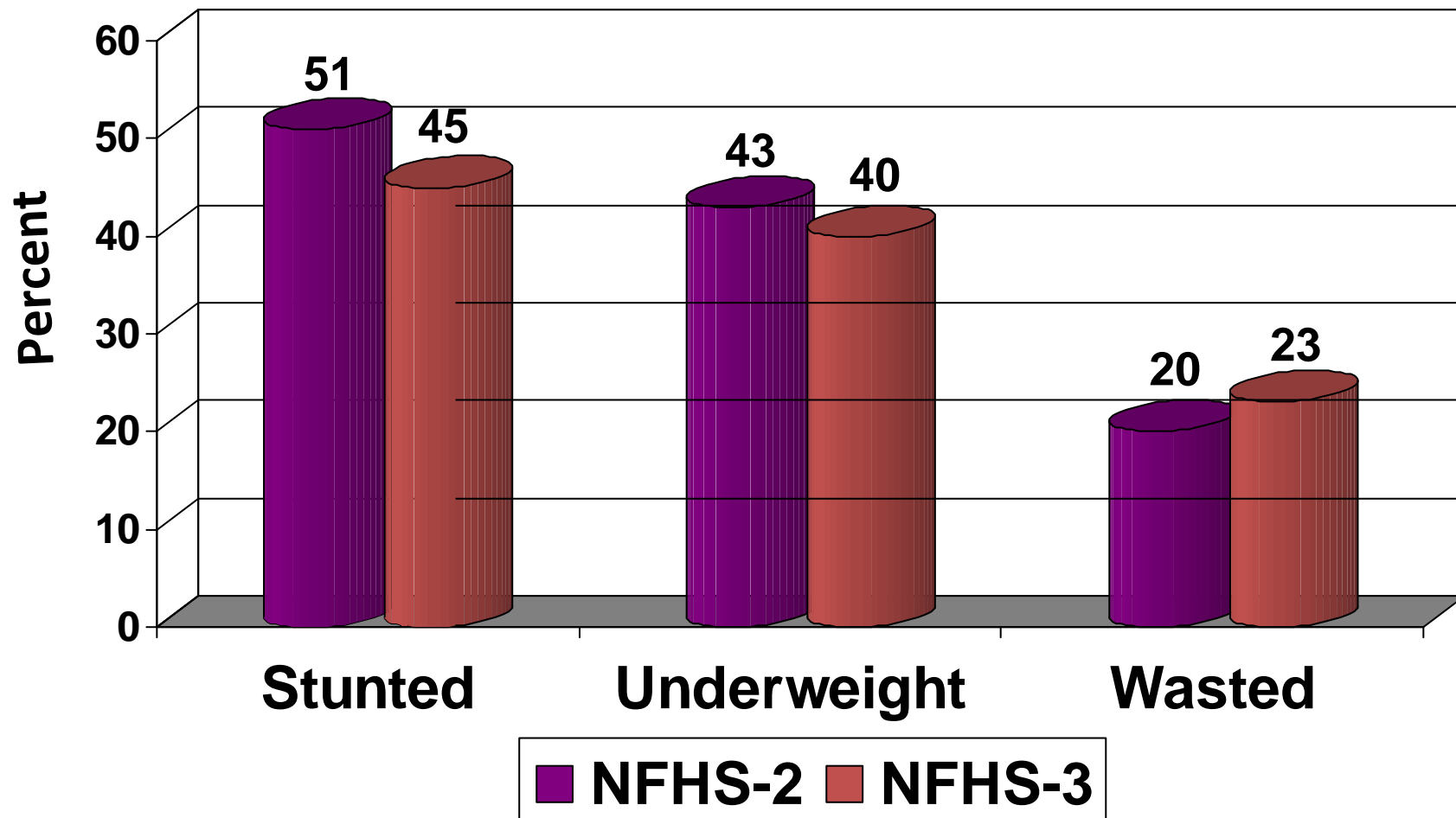➢ poor both quantitatively and qualitatively.

Undernutrition

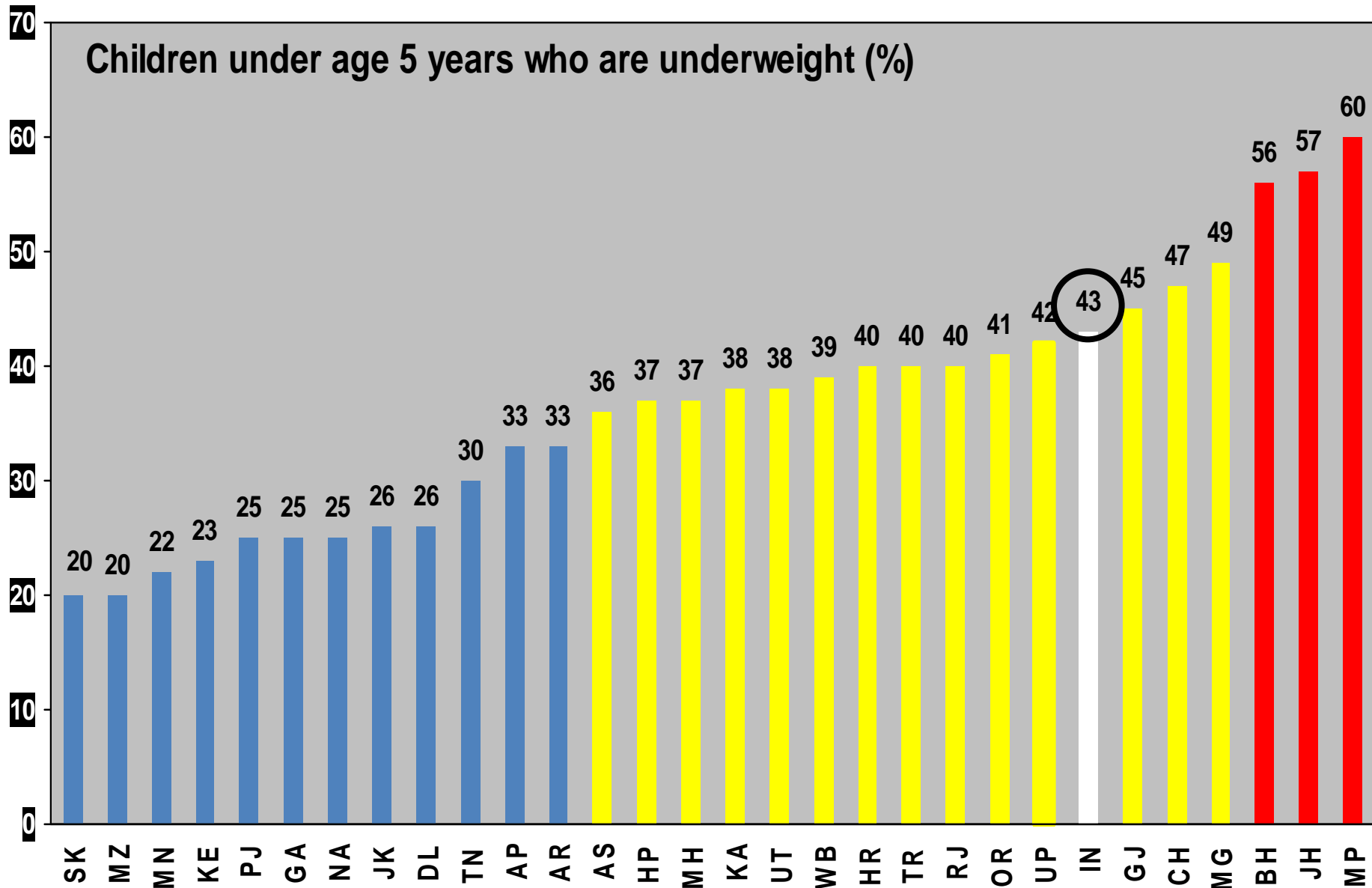|	
Underweight	being underweight for one's age (**Weight for age**)
Stunted	being too short for one's age (**Height for age**)
Wasted	being dangerously thin (**Weight for height**)
Micronutrient malnutrition	being deficient in vitamins and minerals (**Hidden Hunger**)

Magnitude of the Problem

- **World**

➢ More than 1/3 of the world's population.

➢ For all indicators of PEM, a total of 80% of the children affected live in Asia (mainly in southern Asia).

➢ 43% of children in developing countries are stunted.

➢ 50% of child deaths in developing countries are related to malnutrition

Undernutrition in Children under age 3 years in INDIA

Bar chart showing Percent on the y-axis (0 to 60) across three categories: Stunted, Underweight, and Wasted. NFHS-2 (purple) and NFHS-3 (red) values:
- Stunted: NFHS-2 = 51, NFHS-3 = 45
- Underweight: NFHS-2 = 43, NFHS-3 = 40
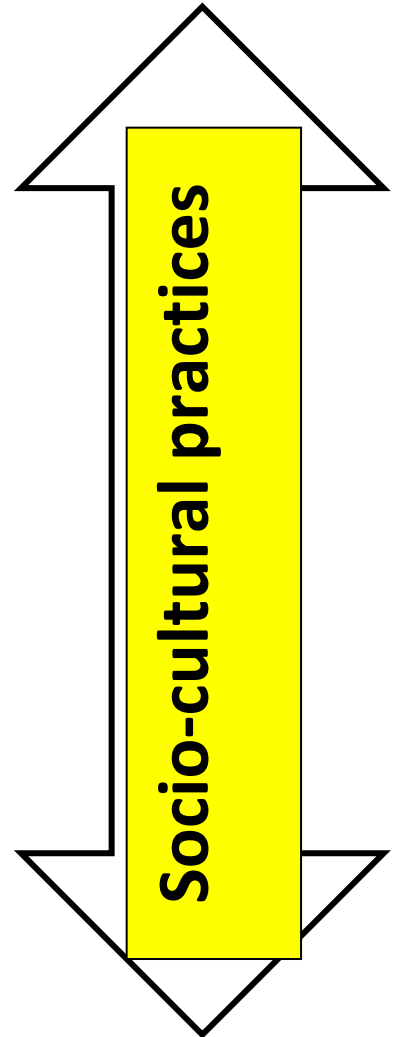- Wasted: NFHS-2 = 20, NFHS-3 = 23

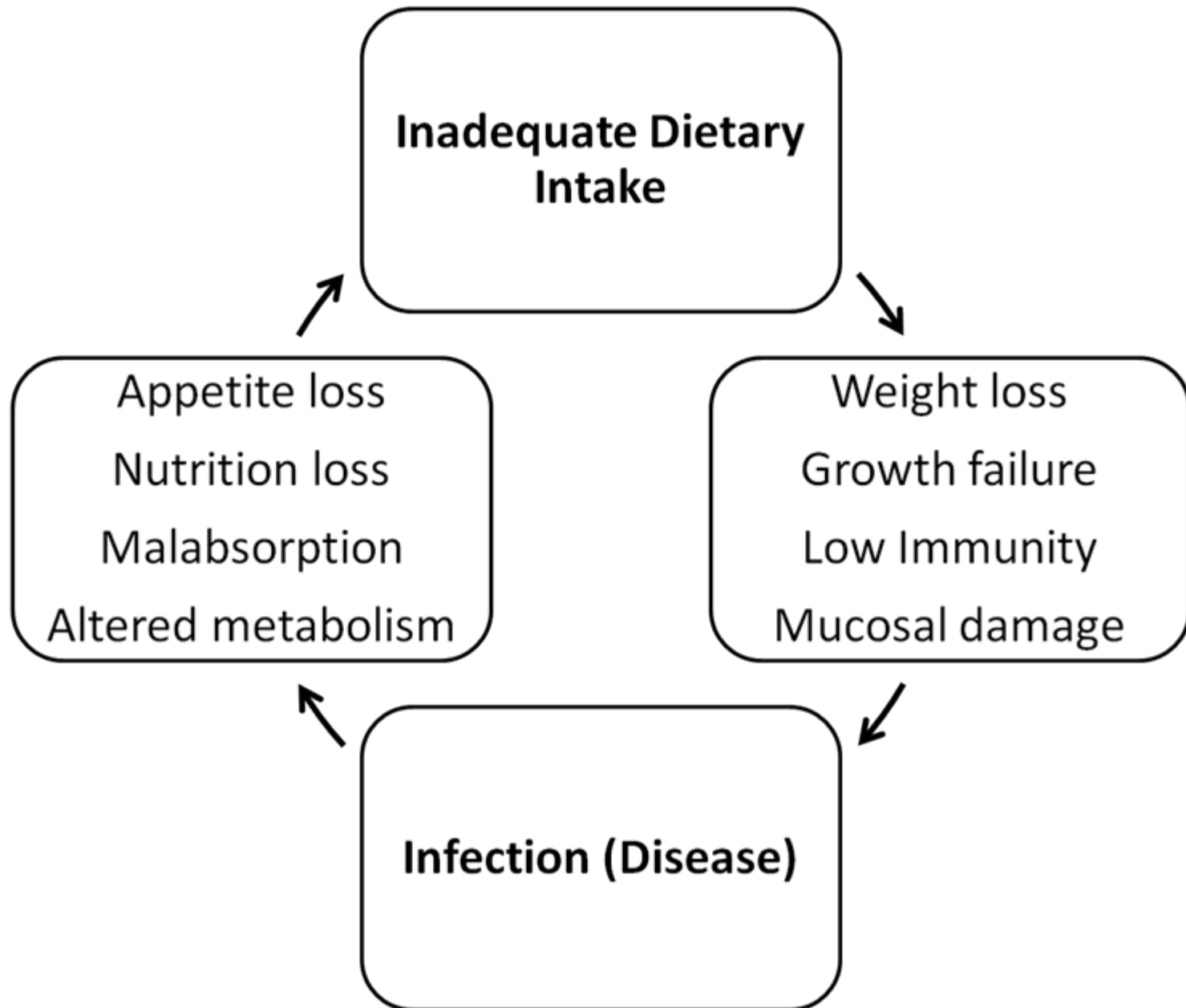Children's Nutritional Status in INDIA

Factors associated with PEM

- Ante natal and post natal care
- Low birth spacing
- Feeding practices
- Rural Urban distribution
- Gender and PEM
- Infections & environment
- Literacy
- Socioeconomic status of family

Socio-cultural practices

Malnutrition – Infection Vicious cycle

Inadequate Dietary Intake

Weight loss

Growth failure

Low Immunity

Mucosal damage

Infection (Disease)

Appetite loss

Nutrition loss

Malabsorption

Altered metabolism

Classification of PEM

- PEM is a spectrum of conditions ranging from growth failure to overt marasmus or kwashiorkor.

- Various classifications are given
  - Gomez classification
  - IAP classification
  - NCHS (WHO) classification
  - Waterlow's classification
  - Welcomes classification

Gomez classification

- Based on Weight for age.

- **In this system the normal reference child is the 50th centile of the Boston standard.**

- Weight for age (%) =

  (Weight of the child / Weight of the normal child of same age) X100

Stage of Malnutrition	Weight for age (%)
Normal	> 90 %
Grade I	75 – 90 %
Grade II	60 – 75 %
Grade III	< 60 %

- Gomez classification is easy to use because weight is very easy to measure

- **Disadvantages are :**
- ➢ A cut of point of 90 % is high (80 % is equivalent to – 2SD or 3rd percentile) so some normal children are classified as grade I malnutrition.

- ➢ Only weight is measured so it is difficult to know that if the low weight is due to an acute malnutrition or long standing chronic malnutrition.

- ➢ Boston standard used in above classification is no longer an international reference data.

IAP classification(1972)

Also based on Weight for age.

Stage of Malnutrition	Weight for age (%)	
Normal	> 80 %	
Grade I	70 – 80 %	
Grade II	60 – 70 %	
Grade III	50 - 60 %	Severe
Grade IV	< 50 %	

WHO classification (based on NCHS data)

Weight below Median minus 2SD (M - 2SD)	Moderate malnutrition
Weight below Median minus 3SD (M – 3 SD)	Severe Malnutrition

Median used here is the Median weight of NCHS reference population.

Waterlow's classification

Based on Weight and Height

W/H ·····H/A	> m − 2 SD	< m − 2 SD
> m − 2SD	Normal	Wasted
< m − 2SD	Stunted	Wasted And Stunted

|	
Drop in Height for age (< 90%)	Stunted
Drop in Weight for Height (<80%)	Wasting
Drop in Weight for Age (<80%)	Under weight

Wellcome's classification

- Parameter: Weight for age $\pm$ oedema
- Reference standard (50th percentile)
- Grades:
  - 80-60 % without oedema is under weight
  - 80-60% with oedema is Kwashiorkor
  - < 60 % with oedema is Marasmus-Kwash
  - < 60 % without oedema is Marasmus

Mid-arm circumference

MAC does not vary much between age of 1 – 5 years.

MAC > 13. 5 cm	Satisfactory nutritional status
MAC 12.5 – 13.5 cm	
MAC < 12.5 cm	Severe malnutrition
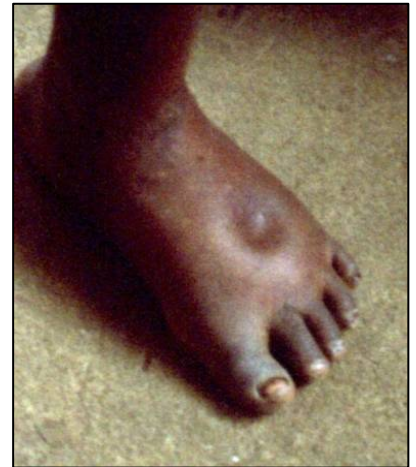
Grossly underweight

No body fat

Gross muscle wasting

Old man's face

No oedema
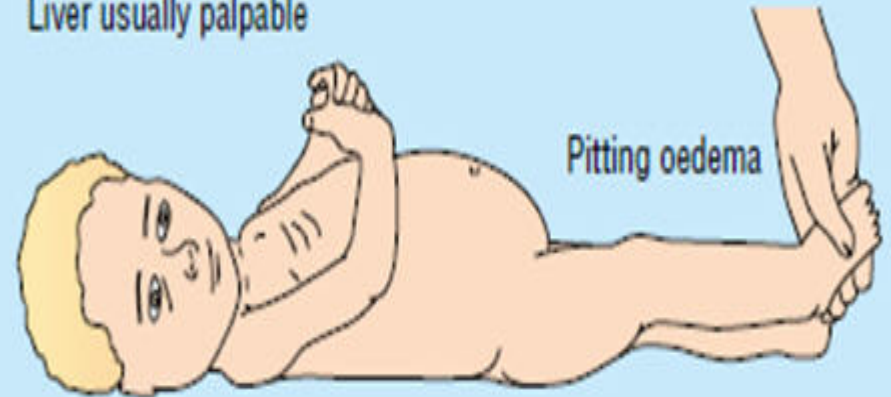
Normal hair

Marasmus

V2

Oedema

Will not eat

Skin: patches of pigmentation and desquamation

Hair pale and thinned

Miserable and apathetic

Moon face

Liver usually palpable

Pitting oedema

Kwashiorkor

Complications of PEM

- Water, electrolyte and mineral imbalance
- Hypothermia
- Hypoglycemia
- Superadded infections
- Vitamin deficiency
- Lactose intolerance
- Cardiac failure
- Bleeding tendency
- Renal impairment
- Long term – Growth retardation, mental retardation

Preventive measures

Think – Pair – Share

A) Health Promotion:

- Measure direct to pregnant and lactating women (education, supplements)
- Promotion of breastfeeding
- Development of low cost weaning food
- Family planning
- Home economics
- Family environment

B) Specific protection:

1.   Protein energy rich food (e.g. milk, egg, fresh fruits)
2.   Immunization
3.   Food fortification

C) Early diagnosis and treatment:

1.   History taking
2.   Clinical features
3.   Anthropometry
4.   Biochemical and laboratory investigations.
5.   Proper and effective management.

D) Rehabilitation:

1. Hospital treatment
2. Nutritional rehabilitation services (NRC i.e. Nutritional Rehabilitation Centres)
3. Follow-up care

Success Stories...

Take Home Message!

- Malnutrition does not mean undernutrition.

- There are various classifications for PEM.

- PEM is preventable and curable.