

Feb 8/13

> 3600 calories per person available right now
but not distributed equally

4. MALNUTRITION

Learning Outcomes

1. To learn the causes and consequences of energy and nutrient deficiencies.
2. To identify the symptoms of nutritional deficiencies.
3. To understand the impact of chronic undernutrition on growth, health and productivity.
4. To recognize the characteristics that disadvantage households and put populations at risk of malnutrition and famine.

Def: A condition that develops from over or underconsumption of energy / nutrients

MALNUTRITION

(overview of where, who, when and why)

- Where?
 - Under 5 child mortality Friday ques
 - weight for age India, Pakistan, Bangladesh
 - Life expectancy at birth 50% children underweight
- Who? 11% of world's popⁿ is undernourished "Bottom Billion"
 - 1.) Children most vulnerable when their diet goes from 100% breast milk to 100% other foods
 - protein & energy needs high
 - diet based on roots, plantains or grains
 - 2.) Pregnant and lactating women - energy & protein needs high
 - 3.) Older women - cultural reasons
- When?
 - hunger follows the rhythm of the seasons
 - Seasonality in food production, price and availability

Why?

- Politics of hunger
- moved away

Unequal distribution: geography, discrimination, politics, gender & culture
- drought, flooding, tsunami, earthquakes, hurricane

TYPES OF MALNUTRITION

1. Overnutrition

- energy intake > energy requirement
- diet typically high in fat particularly saturated fat, refined sugar, salt, low in complex carbohydrates
- diet related illnesses – *obesity, type 2 diabetes, cardiovascular disease, certain cancers*

Why is overnutrition no longer a condition of the economically developed nations?

2. Secondary malnutrition

- not resulting directly from the diet – *'anorexia'; associated to many illnesses & deficiencies*
- mechanisms:
 - loss of appetite – *anorexia*
 - malabsorption – *eg diarrhoea, parasites (worms eat well fed but food not absorbed)*

3. Micronutrient malnutrition

- diet lacks one or more micronutrients
- 'hidden hunger'

4. Protein/energy malnutrition (PEM) or Acute Malnutrition

- PEM - deficiency of protein and/or energy, affects 1/4 world's children
- inadequate intake needed for growth, health and physical activity

1-2% protein → 9 essential amino acids
 1st child gets Cassava along with breast feed after 1 year or so. 2nd child is born. Mother
 now stops breast feeding 1st child so 2nd can be fed. immediate drop from breast milk
 to cassava. Energy needs may be met.

* **KWASHIORKOR AND MARASMUS**

2 severe clinical forms of PEM (or acute malnutrition)

↳ translates to: the evil spirit that infects the first child when the second child is born

1. **Kwashiorkor** - very low protein
 (SAM)

disease of protein deficiency

- maybe adequate energy

- age: 1-3 years.

- clinical symptoms: - edema - swelling caused by accumulation of watery fluid in the tissues of the body

- weakness, skin infections, rash, changes in hair color, apathy, anorexia (lack of appetite)

- ~~pathway~~ Primarily in young children when the mother stops breast feeding & begins feeding low protein foods (eg cassava, plantains, green bananas, potatoes). Sufficient energy may be present, but not protein.

PATHWAY: Dietary protein is low: the body begins to digest its own tissues to supply the amino acids needed to build proteins necessary for life (eg heart & lungs). Priority system: less vital systems are shut down first (eg melanin which makes hair & skin pigments) *see the attached pg. for more! Sheet 1

2. **Marasmus** - "to waste away" - very low energy

complete lack of food

(SAM)

- very low protein

- age: typically 0-18 months but can occur at any age

- clinical symptoms:

→ Appearance: like wizened little old people, skin & bones, heart weak, muscle wasted, metabolism slow

→ Little or no fat to insulate against cold, body temp. low

→ apathy, but they do have an appetite.

→ Normal adaptation to severe deprivation see sheet 2

Why don't adults show symptoms of kwashiorkor?

- adults have a lower protein requirement than children

the disease of starvation
 severe protein & energy depletion

MICRONUTRIENT DEFICIENCIES

1. Vitamin A *family of compounds including retinol, beta-carotene*

The WHO estimates 14 million children have some visual loss related to VAD

- deficiency is a major cause of blindness in children and the elderly in developing countries
- widespread economic and social implications
- increases risk of disease and death from infection

3rd world country { *often die as no support from family*
don't go to school, less help programs

Functions

a. key role in the development of mucous secreting epithelial cells

Epithelial cells line the respiratory, gastrointestinal, uro-genital tracts and eyes produce mucus

b. key role in vision (2 mechanisms)

1. combines with the protein opsin in the retina to form a photo-sensitive pigment - *Rhodopsin*
- this breaks down in the presence of light releasing a signal to the brain
- abnormalities of the eye are the first signs of deficiency

→ reversible
- night blindness: *in ability to see in dim light*

2. when deficient, mucous secreting cells are replaced by keratin producing cells

cut off for MT...

buta ayon: chicken blind or chicken eyes

- Skin maintenance ceases in a life and death situation
 - sores fail to heal
 - infections are common
 - 'Kwashi' rash eg scabies from ethiopian video.
- Antibodies are degraded for use as building blocks for heart, lung and brain tissue.
 - resistance to infection is lowered
 - diarrhea → loss of any nutrients consumed including amino acids, vitamins.
- Blood proteins are low
 - osmotic balance is upset
 - fluid leaks out of blood into surrounding tissues (edema)
 - spleen is highly vascularized ∴ edema is just leaking of fluid from that vascularized system.
- Reversible with proper treatment
- Fat metabolism is affected (LDL and HDL transport fat)
 - helps to transport fat out of liver ∴ their synthesis requires protein. No protein = no transporters ∴ fat stays in liver.
 - the liver clogs with fat → liver cells atrophy and die
- Death frequently results from liver failure.
- For each condition:
 - What nutritional assessment method(s) would be appropriate?
 - What dietary factors are causal?
 - What cultural factors may have played a role?
 - Has acculturation been positive or negative? What aspects

Cassava grows well in poor soil. It is not native to W. Africa.

Kwashiorkor (SAM)

Nutritional Assessment

- Anthropometry - ? weigh / height / age ?
Won't Work! ∴ energy needs may have been met!
- have fluid adding to weight.
- MUAC ? → NO! ∴ of fluid (won't show skinny arms)
- Biochemical (can't draw blood in field for each individual child)
↳ but if did do, then would find low blood protein.
- ✓ • Dietary - ? diet chart... breast fed, staple diet ? works!
- ✓ • Clinical ? → useful eg loss of pigment
Sometimes does not work eg a mother put shoe-polish on her daughter
∴ of which no symptoms were visible.

Cultural factors / acculturation

- dietary changes?
- gender?

⇒ Therefore, we ∴ check for edema (both feet)

continued. Marasmus

(2)

- Common among orphans; areas where high prevalence of HIV/AIDS, maternal mortality.
- Impairs brain development, may have a permanent effect on learning ability.

Also occurs in adults where energy deficiency is present
eg student assessment

- ht 5' 6" wt 127 lbs
- BMI 14.7

Child with Kwashiorkor has more risk than Marasmus

↳ blood proteins are very low

↓
no calories

- ∴ breaking down muscle
but maintaining osmotic balance
as amino acids

Nutritional Assessment

- ✓ • Anthropometry - ?
6-59 months
MUAC
wt for ht. (-3 SD away)
edema check won't work
- Dietary - ?
for adult BMI
list the diet
- Biochemical ? NO!
- Clinical - ?
see severe wasting
- no edema
- no hair color change

Symptoms differ

Treatment of SAM: Community vs Hospital based

• Hospital if there are complications:

- Anorexia (no appetite)
- Fever, diarrhea or vomiting
- HIV +

Plumpy Nut

- 25% peanut butter
- 25% oil
- 25% sugar
- 25% milk powder
- + micronutrients