

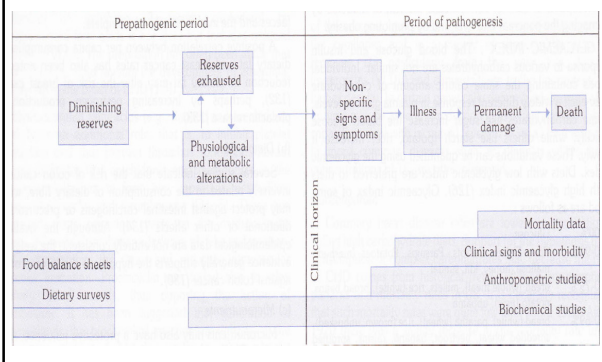
Assessment of nutritional status

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Introduction

- Nutritional status of a community is the sum of the nutritional status of the individuals who form that community
- main objective of a "comprehensive" nutritional survey is to obtain precise information on the prevalence and geographic distribution of nutritional problems of a given community, and identification of individuals or population groups "at risk" or in greatest need of assistance
- purpose of nutritional assessment is to develop a health care programme that meets the needs defined by that assessment, including evaluation of the effectiveness of such programmes

Methods of nutritional assessment and relationship to the natural history of disease



Assessment of nutritional status

- Clinical examination
- Anthropometry
- Biochemical evaluation
- Functional assessment
- Assessment of dietary intake
- Vital and health statistics
- Ecological studies

Clinical Examination

- simplest and the most practical method of ascertaining the nutritional status of a group of individuals
- a number of physical signs, some specific and many non-specific known to be associated with states of malnutrition
- Classified signs used in nutritional surveys into three categories as those:
 - Not related to nutrition, e.g., alopecia, pterygium
 - Need further investigation, e.g., malar pigmentation, corneal vascularisation, geographic tongue
 - known to be of value, e.g., Angular stomatitis, Bitot's spots, calf tenderness, absence of knee or ankle jerks (beri-beri), enlargement of the thyroid gland (endemic goitre) etc.
- clinical signs have the following drawbacks :
 - malnutrition cannot be quantified on the basis of clinical sign
 - many deficiencies are unaccompanied by physical signs
 - lack of specificity and subjective nature of most of the physical signs

Anthropometry

- Height, weight, skin fold thickness and arm circumference are valuable indicators
- In young children- head and chest circumference are also made
- If anthropometric measurements are recorded over a period of time, they reflect the patterns of growth and development, and how individuals deviate from the average at various ages in body size, build and nutritional status
- Anthropometric data can be collected by non-medical personnel, given sufficient training

Laboratory and biochemical assessment

- LABORATORY TESTS:
 - Haemoglobin estimation : most important laboratory test that is carried out in nutrition surveys
 - Stool/s and urine: Stools should be examined for intestinal parasites. History of parasitic infestation, Chronic dysentery and diarrhoea provides useful background information about the nutritional status of persons
 - Urine should also be examined for albumin and sugar

Laboratory and biochemical assessment

- BIOCHEMICAL TESTS
 - applied to measure individual nutrient concentration
 - body fluids : serum retinol, serum iron
 - abnormal amounts of metabolites in urine (e.g., urinary iodine)
 - measurement of enzymes in which the vitamin is a known cofactor (for example in riboflavin deficiency) to help establish malnutrition in its preclinical stages
- Biochemical tests are time - consuming and expensive, cannot be applied on a large scale
- Often carried out on a subsample of the population
- Most biochemical tests reveal only current nutritional status
- useful to quantify mild deficiencies

Some biochemical tests used in nutritional survey

Nutrient	Method	Normal value
Vitamin A	Serum retinol	20 mcg/dl
Thiamine	Thiamine pyrophosphate (TPP) stimulation of RBC transketolase activity	1.00-1.23 (ratio)
Riboflavin	RBC glutathione reductase activity stimulated by flavine adenine dinucleotide	1.0-1.2 (ratio)
Niacin	Urine N-methyl nicotinamide	(not very reliable)
Folate	Serum folate	6.0 mcg/ml
	Red cell folate	160 mcg/ml
Vitamin B ₁₂	Serum vitamin B12 concentration	160 mg/L
Vitamin C	Leucocyte ascorbic acid	15 mcg/10 ⁸ cells
Vitamin K	Prothrombin time	11-16 seconds
Protein	Serum albumin (g/L)	35
	Transferrin (g/L)	20
	Thyroid-binding pre-albumin (mg/L)	250

Functional Indicators

System	Nutrients
1. <i>Structural integrity</i>	
Erythrocyte fragility	Vit.E,Se
Capillary fragility	Vit.C
Tensile strength	Cu
2. <i>Host defence</i>	
Leucocyte chemotaxis	P/E, Zn
Leucocyte phagocytic capacity	P/E, Fe
Leucocyte bactericidal capacity	P/E, Fe, Se
T cell blastogenesis	P/E, Zn
Delayed cutaneous hypersensitivity	P/E, Zn
3. <i>Hemostasis</i>	
Prothrombin time	Vit.K
4. <i>Reproduction</i>	
Sperm count	Energy, Zn
5. <i>Nerve function</i>	
Nerve conduction	P/E, Vit B ₁ , B ₁₂
Dark adaptation	Vit A, Zn
EEG	P/E
6. <i>Work capacity</i>	
Heart rate	P/E, Fe
Vasopressor response	Vit.C

Assessment of dietary intake

- Direct assessment of food consumption involves dietary surveys which may be household inquiries or individual food consumption surveys
- WEIGHMENT OF RAW FOODS
 - duration of the survey may vary from 7 to 27 days.
 - commonly 7 days called "one dietary cycle"
 - WEIGHMENT OF COOKED FOODS
 - ORAL QUESTIONNAIRE METHOD
 - carrying out a diet survey of a large number of people in a short time
 - Inquiries are made retrospectively about the nature and quantity of foods eaten during previous 24 or 48 hour
 - diet survey provides information about dietary intake patterns, specific foods consumed and estimated nutrient intakes

Vital statistics

- Mortality and Morbidity Data - will identify groups at high risk and indicate the extent of risk to the community
- Mortality in the age group 1 to 4 years is particularly related to malnutrition
- In developing countries, it may be as much as 20 times that in countries such as Australia, Denmark or France
- infant mortality rate, second-year mortality rate, rate of low birth-weight babies and life expectancy
- Data on morbidity related to PEM, anaemia, xerophthalmia and other vitamin deficiencies, endemic goitre, diarrhoea, measles and parasitic infestations can be of value in providing nutritional status of the community

Assessment of ecological factors

- collect ecological information of the given community in order to make the nutrition assessment complete
- **FOOD BALANCE SHEET:** indirect method of assessing food consumption, in which supplies are related to census population to derive levels of food consumption in terms of per capita supply availability
- **SOCIO-ECONOMIC FACTORS:** Family size, occupation, income, education, customs, cultural patterns in relation to feeding practices of children and mothers, influence food consumption pattern
- **HEALTH AND EDUCATIONAL SERVICES :** Primary health care services, feeding and immunization programmes
- **CONDITIONING INFLUENCES :** include parasitic, bacterial and viral infections which precipitate malnutrition

Nutritional surveillance

“Keeping a watch over nutrition, in order to make decisions that will lead to improvement in nutrition of population”

- **Main strategy:** detection of malnutrition (nutritional survey)
- **Approach:** diagnostic –interventional
- **Sample:** representative, 50-100 size group
- **Objective:**
 - To aid health & development
 - To provide input for program management & evaluation (to policy makers)
 - To give timely warning & intervention (to prevent short term food crises)