

Prof Dr Najlaa Fawzi
Family and Community Medicine Dept

Nutritional Assessment

Nutritional assessment is the evaluation of nutritional status [as the health condition of an individual is influenced by the food consumption and utilization].

It is the interpretation of anthropometric, biochemical (laboratory), clinical and dietary data to determine whether a person or groups of people are well nourished or malnourished (over-nourished or under-nourished).

Nutritional assessment is the systematic process of collecting and interpreting information in order to make decisions about the nature and cause of nutrition related health issues that affect an individual



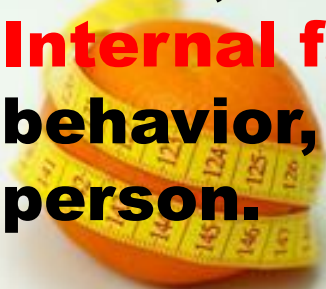
Nutritional Status: is the degree to which an individual's physiological need for nutrients is being met by the foods he/or she is eating.

It is the state of balance in the individual between the nutrient intake and the nutrient expenditure or need.

Nutritional status of an individual is generally dependent on two factors.

External factors such as food safety, cultural, social, economical factors

Internal factors which include age, sex, nutrition, behavior, physical activity and diseases of the person.




Why is nutritional status important?

Recognizing the role of diet at onset of many diseases, and assessing nutritional status of an individual, family and community are important for public health.

It can also be used to identify high-risk groups and to assess the role of different epidemiological factors in nutritional deficiencies.

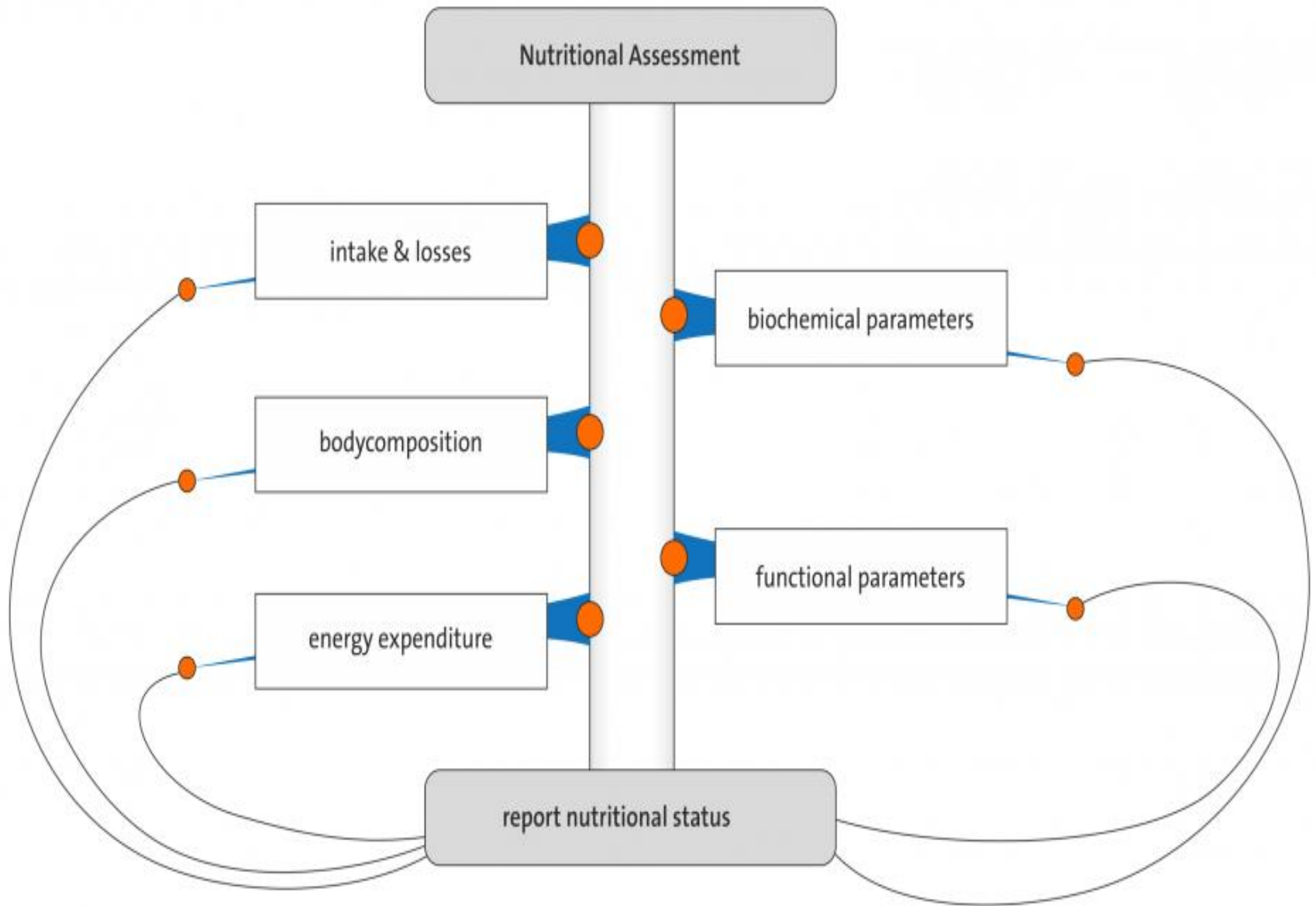
The outcome of nutritional assessment should be a care plan for the patient who identifies the appropriate medical nutrition therapy, both in people requiring only modifications of a normal diet and in those who require aggressive nutritional repletion and support.



Purpose of Nutrition Assessment

- **Estimates functional status, diet intake and body composition compared to normal populations**
- **Body composition reflects calorie and protein needs**
- **Nutritional status predicts hospital morbidity, mortality, length of stay, cost**
- **Baseline body composition and biochemical markers determine if nutrition support is effective**





Proceschart Nutritional Assessment

Assessment of nutritional status is usually undertaken for the following reasons:

- 1. To confirm the diagnoses of malnutrition (under or over nutrition)**
- 2. To identify the reasons for the presence of malnutrition**
- 3. To provide a means of monitoring the effectiveness of nutritional support.**

There is no golden standard for identifying malnourished patients or patients at risk.

Therefore, multiple parameters are used to establish a representation of the nutritional status of a patient.



The assessment of the nutritional status involves two methods: **Direct (- deals with individuals and measures the objective criteria) and **indirect** (- uses community health indices reflecting nutritional influences).**

The evaluation of nutritional status is carried out by using the **A, B, C, D approach (direct methods**

A **Anthropometric measurements**

B **Biochemical tests**

C **Clinical observation**

D **Diet evaluation.**



Nutritional anthropometry has been defined as "measurements of the variations of the physical dimensions and the gross composition of the human body at different age levels and degrees of nutrition

Anthropometric measurements:

is the most frequently used method to assess nutritional status.

1-It is precise and accurate

2-It uses standardized technique

3-It is suitable for large sample sizes

4 -It does not require expensive equipment, and skills can be teach with short period

↓ The measured values reflects the current nutritional status & don't differentiate between acute & chronic changes .

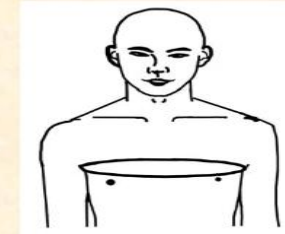


Common indicators

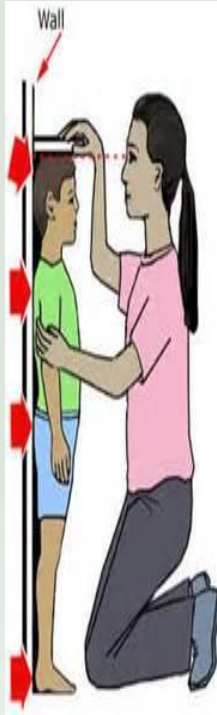
- Wt. for Height (W/H)
- Ht. for Age (H/A)
- Wt. for Age (W/A)
- BMI

Other anthropometric Measurements

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



Height stature [length] is important in evaluating growth and nutritional status in children, in adults the height is needed for assessment of body size.



Weight: body weight is simple, give a gross estimate of body composition. Weight is one of important measurements in assessing nutritional status & is used to predict energy expenditure.



Body Mass Index [BMI]

Is a measure that describes relative weight for height, and is significantly correlated with total body fat content

$$\text{BMI} = \text{WEIGHT [kg]} / \text{HEIGHT [meters}^2 \text{]}$$

The desired BMI for a healthy adult is {18.5- 24.9}, which reflects a healthy weight for height.


Person with BMI of [25-29.9], is at low risk for health problems.

Persons with BMI of (30-39.9) are at high risk, and BMI greater than 40 indicated very high risk for health problems associated with obesity and overweight.

BMI of less than 18.5 is classified as under-weight, and is associated with risk factors as respiratory diseases, TB, digestive diseases and some cancers.

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 |
| | II | 35- 39.9 |
| Extreme obesity | III | more than 40 |



The following table can be used to identify health risk base solely on BMI or to identify the adjusted risk

[based on BMI and the presence of 1 or more co- morbidities].




| BMI CATEGORY | HEALTH RISK | ADJUSTED RISK |
|---------------------|-----------------------|-----------------------|
| <25 | Minimal | Low |
| 25-27 | Low | Moderate |
| 27-30 | Moderate | High |
| 30-35 | High | Very high |
| 35-40 | Very high | Extremely high |
| >40 | Extremely high | Extremely high |

In Iraq the prevalence of over-weight and obesity among adult people is 47-67%, for males BMI, was 27.1, and for females was 28.9.

The rate of over weight among females was 69.6%, while it was 63.6 % for males.

BODY MEASUREMENTS:

SKIN FOLD THICKNESS: are 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.



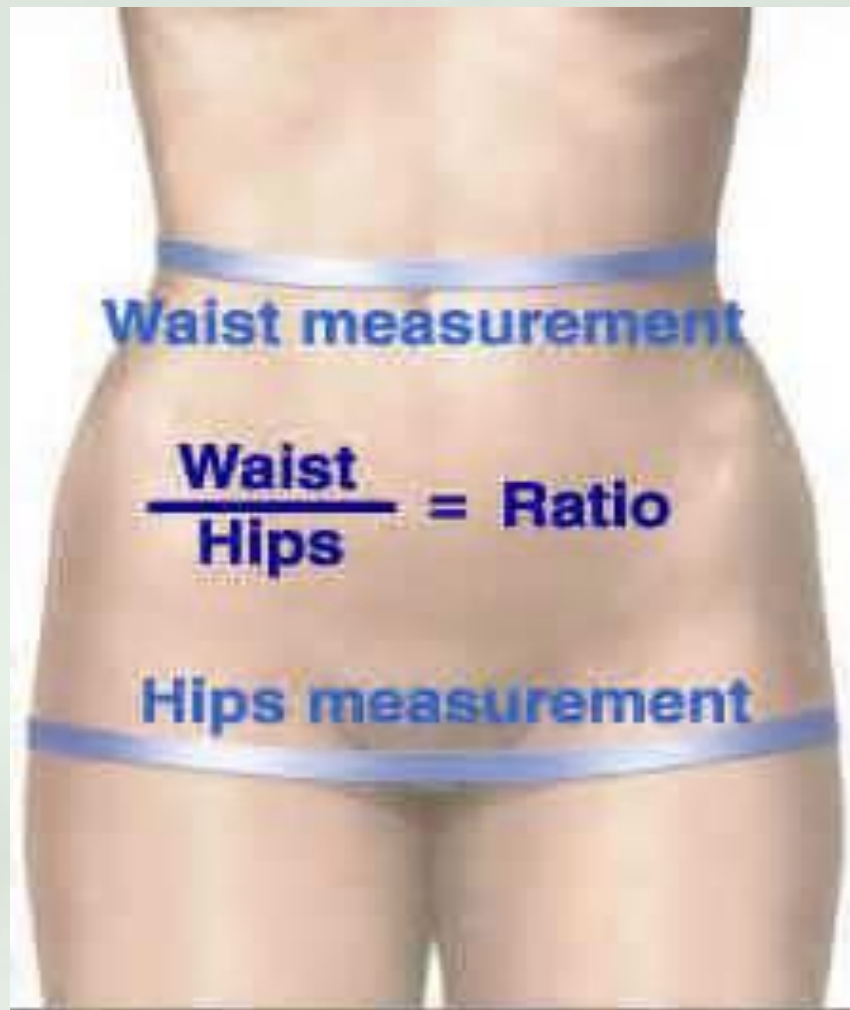
WAIST CIRCUMFERENCE: is a common way to assess abdominal fat content, the presence of excess body fat in the abdomen when out of proportion to the total body fat is considered an independent risk factor for diabetes ,cardiovascular diseases and breast cancer.



Man who have a waist measurement greater than **[102cm]** and a woman with waist measurement greater than **[88cm]** are identified to have substantially increased risk of metabolic complications associated with obesity.

In Iraq, women exceeded standard measurements [91.9cm], while the men are within the acceptable standard [93.3cm].

WAIST-to HIP ratio {WHR} : is the ratio of a person waist circumference to hip circumference.



The WHR has been used as an indicator or measure of the health of a person, and the risk of developing serious health conditions.

WHR has been found to be a more efficient predictor of mortality in older people than waist circumference or BMI.

If obesity is redefined using WHR instead of BMI, the proportion of people categorized as at risk of heart attack worldwide increases threefold.

WHR have been shown to be a better predictor of cardiovascular disease than waist circumference and body-mass index.



A WHR of 0.7 for women and 0.9 for men has been shown to correlate strongly with general health and fertility.

Women within the 0.7 range have optimal levels of estrogen and are less susceptible to major diseases such as diabetes, cardiovascular disorders and ovarian cancers.

Women with high WHR (0.80 or higher) have significantly lower pregnancy rates than women with lower WHRs (0.70–0.79), independent of their BMIs.

Men with WHRs around 0.9, similarly, have been shown to be healthier and more fertile with less prostate cancer and testicular cancer

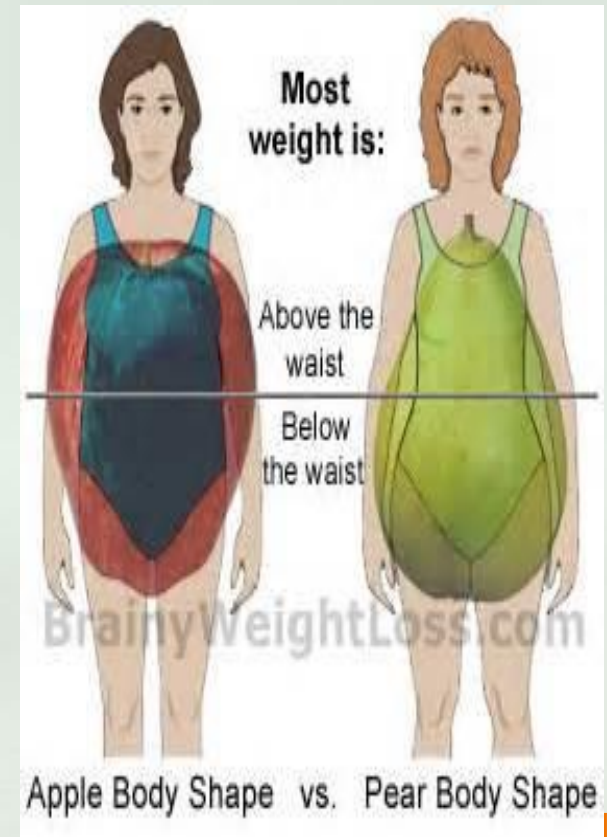
In Iraq the [WHR] for both sexes within the standard, [0.7 for females], and [0.8 for males].



Research shows that people with "apple-shaped" bodies (with more weight around the waist) face more health risks than those with "pear-shaped" bodies who carry more weight around the hips.

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

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



Biochemical Assessment: laboratory evaluation can identify specific nutrition-related abnormalities such as anemia, iron deficiency, or protein deficiency.

The test results of biochemical assessment provide useful information to determine the effects of nutritional factors and /or of medical conditions on the health status of patients.

- Interference – drugs, sampling
- Nutrient-nutrient interactions, drug-nutrient interactions
- Be aware of hydration status
- Must interpret lab results with other nutritional parameters



Initial Laboratory Assessment

- **Hemoglobin estimation is the most important test, & useful index of the overall state of nutrition.**
- **Beside anemia it also tells about protein & trace element nutrition.**
- **Stool examination for the presence of ova and/or intestinal parasites**
- **Urine dipstick & microscopy for albumin, sugar and blood**

Specific Lab Tests

Measurement of individual nutrient in body fluids (e.g. serum retinol, serum iron, urinary iodine, vitamin D)

Advantages of Biochemical Method

- It is useful in detecting early changes in body metabolism & nutrition before the appearance of overt clinical signs.
- It is precise, accurate and reproducible.
- Test result may reflect immediate intake (e.g. glucose) or long term status (HbA1c)

➤ Limitations of Biochemical Method

- Time consuming
- Expensive
- They cannot be applied on large scale
- Needs trained personnel & facilities



Clinical Assessment

includes collection data from several sources: medical history, social history, and physical examination.

Social or family factors may also affect nutrient intake and past or present medical conditions that may influence nutrient utilization.

Clinical issues to consider:

- **Medical history, treatment and medications**
- **Significant factors affecting nutritional intake**
- **Fluid balance – input and output, Bowel habits**
- **Physical assessment of nutritional status**
- **Clinical signs and symptoms**



Features associated with nutritional deficiency:

Face; pallor--- iron

Nails, spoon-shaped, brittle, ridged--- iron



Eyes: dry cornea, Bitot's spots--- Vit A deficiency



Bleeding, spongy gums--- vit C deficiency



From "Fundamentals of Clinical Nutrition" by R. L. Matarazzo copyright 1993 by Health Year Books Inc. N.Y.
Fig. 2-5. Periodontal disease seen in scurvy.



Goiter --- iodine deficiency



Bones [bow legs]--- vit D

Many physical signs and symptoms are also act as integral part of assessing nutritional status.

Clinical Signs and Symptoms

Signs

- Subjective, impression
- Descriptive, observation
- Appearance
- Visual examination
- Needs clinical judgement
- E .g. muscle wasting, malnutrition

Symptoms

- Recall, report by subjects
- Descriptive
- E.g. nausea, itchiness, diarrhea, anorexia

Historical findings: may include: **alcohol abuse** →
Calories, protein vit B1, B3, B6 and folate deficiencies.

Smoking → **vit C, Folic acid**

Malabsorption [diarrhea, weight loss, steatorrhea]
→ **vitamins A,D,K; calories, protein ,Ca, magnesium, electrolytes.**

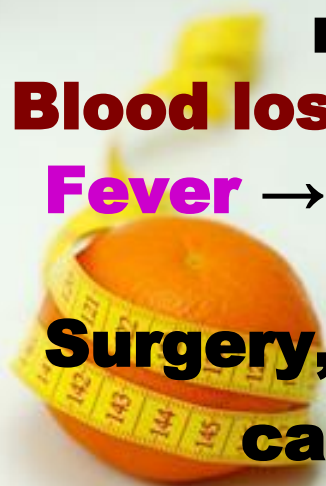
Isolation, poverty and dental diseases → **various nutrients**

Blood loss → **iron**

Fever → **calories**

Surgery, trauma, burns, infections →
calories, protein, vit C, zinc

Drugs → **various nutrients**



Dietary Intake Assessment: dietary evaluation is an important adjunct to the other three assessments since it provides the description of dietary intake back ground which may help explain any observed clinical or biochemical abnormalities, and may suggest proper remedial steps.

There are several methods for collecting information regarding actual and habitual dietary intake.



What are the elements of a diet history ?

The diet history is specialized and focused medical history , it must include the following elements

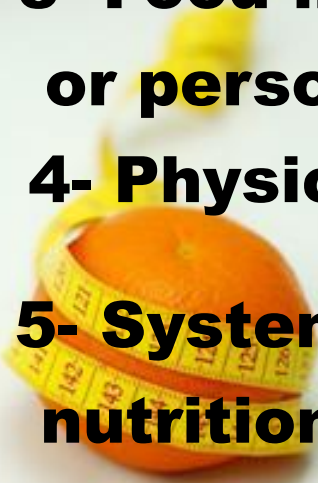
1- Weight history , emphasizing recent changes

2- Eating habits and food intake , emphasizing recent changes

3- Food intolerance , allergic ,and specific religious or personal exclusion

4- Physical activity and exercise

5- Systematic and endocrine diseases related to nutrition , such as diabetes



6- Gastrointestinal diseases

7- Evidence of poor nutrition , such as pressure sores and poor wound healing

8- Concurrent drug therapy , including nonprescription drugs and nutritional supplements

While not always necessary , a 3-day or 1-week food record can be helpful in dealing with particularly difficult problems.



24-hours Diet Recall

In this method, the patient is asked to report all foods and beverages consumed during the past 24 hours.

Detailed description of all foods, beverages, cooking methods, and supplements, along with portion size in common household measures are included. Food models, measuring cups, life-size pictures, or abstract shapes [square, circle] are used to assist the patient in estimating correct portion sizes of food consumed.



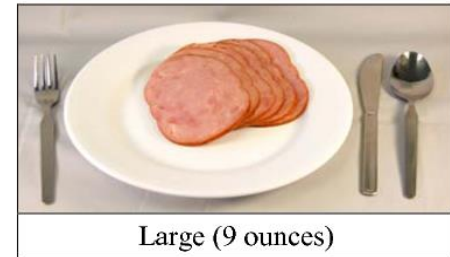
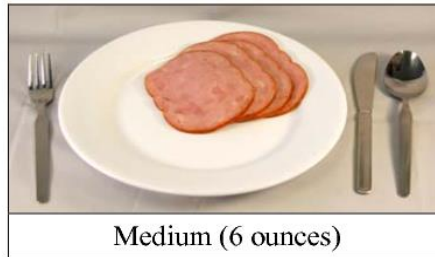
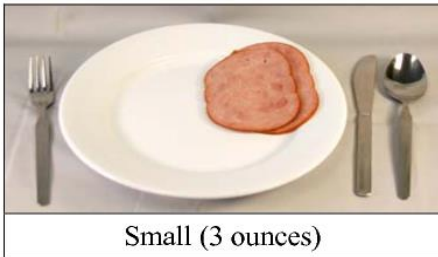
Food Questionnaire Serving Size Pictures

English MSEL FFQ

Please use these pictures to help estimate your usual serving sizes.

- Medium serving sizes are given on the Food Questionnaire.
- A small serving is about one-half (1/2) the medium serving size or less.
- A large serving is about one-and-a-half (1 1/2) times the medium serving size or more.

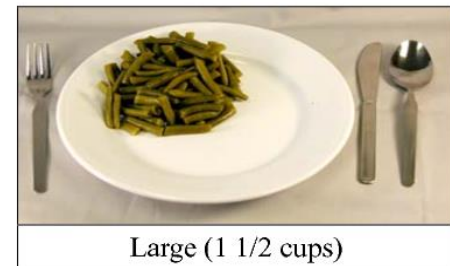
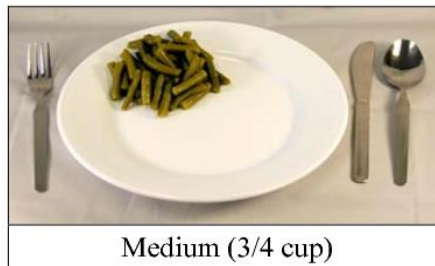
Beef, pork, chicken and fish as a main dish



Spaghetti and casseroles



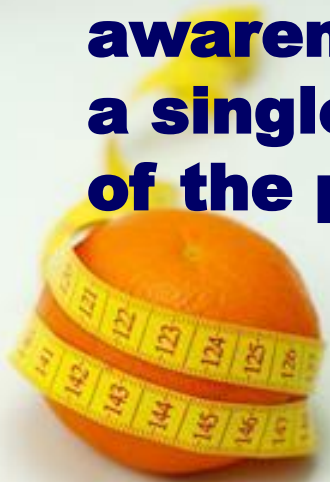
Vegetables such as green beans, corn, and potatoes



This method is useful in screening or during follow-up to evaluate adaptation of or compliance with dietary recommendations.

The advantages of this method are that is quick [only 15-20 mints] are needed and it can be used with the most age groups.

Some of the drawbacks of this method are that it does rely on the memory, motivation, and awareness of the patient, because this is the only a single day's intake, may not be representative of the patient actual diet.



Food Records: estimated and /or measured food records can provide a more realistic picture of a patient's usual intake, all food, beverages snacks, and supplements are recorded by the patient, usually over a period of 1-7days, using a house hold measures.

To assure accuracy, the patient must trained with the food models, measuring cups, or other measuring devices that will help ensure recording of proper or actual portion sizes.

Cooking methods, recipe ingredients and descriptions need to be recorded as completely and accurately as possible.

A 3 days record [including two week days and one week end day] can be acceptable.



Obviously for this method of dietary data collection, patient must be literate, numerate, and well motivated.

The collection of data by any method provide information regarding intake, of calories, protein, CHO, fat, vitamins, minerals and fluid, which can be calculated manually using food composition tables or analyzed by computer soft ware.

This will allow medical professional to identify nutrient deficiencies, imbalances and excesses.



Nutrition Assessment

5 lbs
 in

Basal Metabolic Rate cal/day

Protein Requirement g/day

Physical Signs and Symptoms of Malnutrition

- Involuntary Weight Loss - 5% in 30 days
- Involuntary Weight Loss - 10% in 180 days
- Wasting of Fat and Muscle Tissue
- Flaking Dermatitis
- Sparse, thin hair that is easy to pull out
- Transverse Lines on Nails
- Abdominal Distension
- Hepatomegaly
- Parotid Gland Enlargement
- Anorexia
- Depression
- 25% of meals left uneaten at two thirds of n

BMI

Body Fat %

Total Protein (g/dL)

Magnesium (mg/dL)

Calcium (mg/dL)

Blood Urea Nitrogen (mg/dL)

Urine Urea Nitrogen

Creatinine (mg/dL)

Nutrition Riskmed

Medications Increasing Malnutrition Risk

- Amiodipine - Norvasc
- Ciprofloxin - Cipro
- Cisapride - Propulsid
- Conjugated Estrogen - Premarin
- Digoxin - Lanoxin
- Enalapril Maleate - Vasotec
- Famotidine - Pepcid
- Fentanyl Transdermal - Duragesic
- Furosemide - Lasix
- Levothyroxine Sodium - Synthroid
- Narcotic Analgesic - Porpacet
- Nifedipine - Procardia XL
- Nizatidine - Axid
- Omeprazole - Prilosec
- Peroxetine - Paxil
- Phenytoin - Dilantin
- Potassium Replacement - K-Dur
- Rantidine HCl - Zantac
- Risperidone - Risperidal
- Sertraline HCl - Zoloft
- Warfarin - Coumadin

Assessment of nutritional status

Methodology in clinical practice

First Stage Assessment

Nutrient intake

Compared to estimated requirements

Clinical Signs

External signs- skin, hair, eyes..

Anthropometry

Height, weight, circumference, skinfold

Second Stage Assessment

Biochemistry and Haematology

Blood and/or urine tests for protein status, vitamin, mineral and trace element status

Third Stage or Research protocols

Body Composition

Distribution of fat, lean, water and minerals

Functional Tests

Neurological function
Developmental tests

Assessment of the Nutritional Status of the Community

- **The nutritional assessment is done to obtain information about the prevalence and geographic distribution of nutritional disorders within a community or a specified population group.**
- **It can also be used to identify high-risk groups and to assess the role of different epidemiological factors in nutritional deficiencies.**

The indirect methods use community health indices that reflect nutritional influences These include the following categories:



1- Ecological variables including crop production.

2- Economic factors e.g. per capita income, population density & social habits.

3- Vital health statistics particularly infant, under five mortality & fertility index.

4-Morbidity data:

**Hospital or community morbidity surveys
PEM, Anemia, Xerophthalmia,
Measles, Diarrhea, Parasitic infestations**



Purpose of nutritional assessment

In community

- Identify individuals or population groups at risk of becoming malnourished
- Identify individuals or population groups who are malnourished
- To develop health care programs that meet the community needs which are defined by the assessment
- To measure the effectiveness of the nutritional programs & interventions once initiated

The indicators collected depend on the situation ; some examples are

- * Predicted and actual crop yields and food supplies**
- * Income and food prices**
- * Consumption of key foods(iodized salt)**
- * Indicators of micronutrient deficiencies (Hb, night blindness)**
- * Anthropometric indicators such as BMI , birth weight and growth rates of young children**



Three basic methods are employed to assess community nutritional status :

* **Dietary studies** compare nutrient intake with accepted standards and help explain possible reasons for clinical and laboratory findings.

* **Clinical studies** evaluate the physical signs of nutritional health or disease.

* **Laboratory investigations** provide, in varying degrees and precision, biochemical measurement of nutrients within the body.



In summary identifying nutritional problems of a population in a clear and measurable way will help to:

1-Define needs, opportunities and limitations , and prioritize solutions.

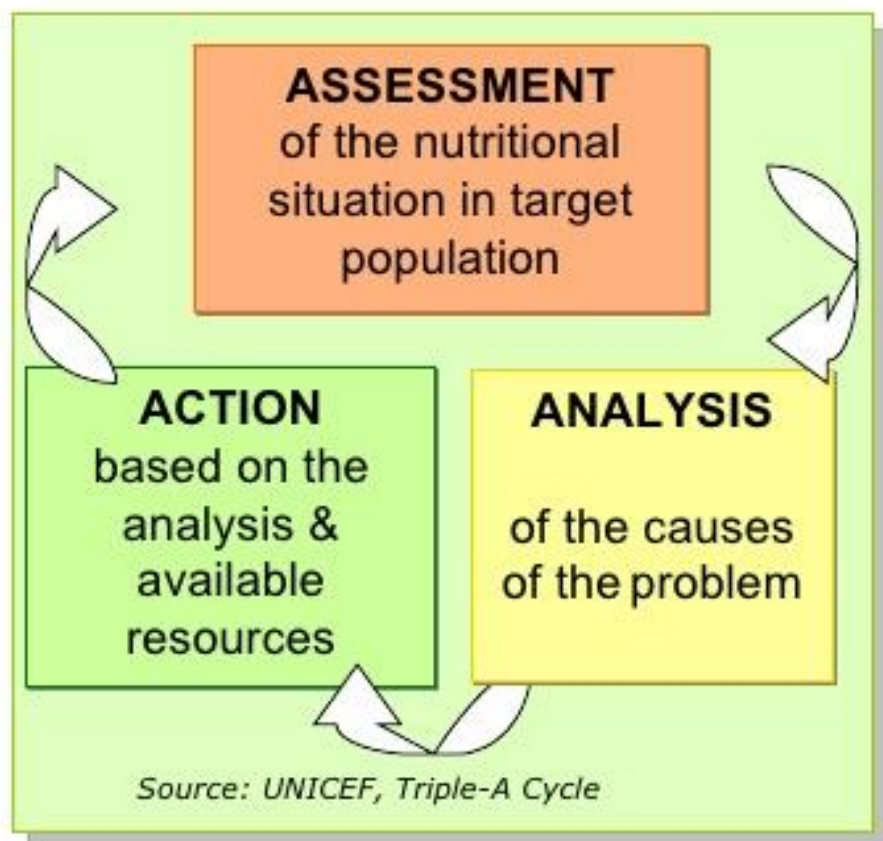
2-Evaluate programme impact and improve efficiency.

3-Influence decision making in strategic planning, policy formulation and resource allocation.

4-Raise community awareness and participation to maximize long-term impact.



Introduction



To define the nutritional problem of the targeted population, it is necessary to **measure** its **nutritional status**.

Nutritional status assessments enable to determine whether the individual is well-nourished or undernourished.