Assessing the Nutritional Health of Populations
Dietary Status

- The condition of a population’s or an individual’s intake of foods and food components, especially nutrients.
Why study nations health and nutritional status?

• Nations monitor health and nutrition status
  - to decide how to allocate scarce resources
  - to enhance the quality of life
  - to improve productivity

• Nutrition monitoring is a term that includes:
  – Nutrition assessment
  – Nutrition monitoring
  – Nutrition surveillance
  – Nutrition screening
1- Nutrition Monitoring

• Assessment of dietary or nutrition status at intermittent times with the aim of detecting changes in the dietary or nutritional status of a population
Goals of nutritional monitoring

• Provide foundations for improvement of nutritional status and quality and healthfulness of food supply

• Collect, analyze, and disseminate timely data on nutrition and dietary status, quality of food supply, food consumption patterns, consumer knowledge and attitudes
• Identify high risk groups and geographic areas and trends

• Establish national baseline data and develop standards for monitoring

• Provide data for evaluating implications of changes in agricultural policy
2-Nutrition Assessment

- Measurement of indicators of dietary status and nutrition related health status to identify the possible occurrence, nature, and extent of impaired nutritional status.
The nutritional status of an individual is often the result of many inter-related factors. It is influenced by food intake, quantity & quality, & physical health. The spectrum of nutritional status spread from obesity to severe malnutrition.
Nutritional Assessment Why?

The purpose of nutritional assessment is to:

🌟 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 & intervention once initiated.
Methods of Nutritional Assessment

Nutrition is assessed by two types of methods:

- The direct methods deal with the individual and measure objective criteria.
- Indirect methods use community health indices that reflects nutritional influences.
Direct Methods of Nutritional Assessment

These are summarized as ABCD

A. Anthropometric methods
B. Biochemical, laboratory methods
C. Clinical methods
D. Dietary evaluation methods
Indirect Methods of Nutritional Assessment

These include three categories:

- **Ecological variables including crop production**

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

- **Vital health statistics particularly infant & under 5 mortality & fertility index**
A. Clinical Assessment

It is an essential features of all nutritional surveys.

It is the simplest & most practical method of ascertaining the nutritional status of a group of individuals.

It utilizes a number of physical signs, (specific & non specific), that are known to be associated with malnutrition and deficiency of vitamins & micronutrients.
Good nutritional history should be obtained

General clinical examination, with special attention to organs like hair, angles of the mouth, gums, nails, skin, eyes, tongue, muscles, bones, & thyroid gland.

Detection of relevant signs helps in establishing the nutritional diagnosis
Clinical assessment

- **Advantages**
  - Fast & Easy to perform
  - Inexpensive
  - Non-invasive

- **Limitations**
  - Did not detect early cases
B. Anthropometric Methods

Anthropometry is the measurement of body height, weight & proportions.

It is an essential component of clinical examination of infants, children & pregnant women.

It is used to evaluate both under & over nutrition.

The measured values reflects the current nutritional status & don’t differentiate between acute & chronic changes.
Nutritional Indices in Adults

- Height
- Weight

The international standard for assessing body size in adults is the body mass index (BMI).

- BMI is computed using the following formula: $\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m}^2\text{)}}$
BMI (WHO - Classification)

- BMI $< 18.5$ = Under Weight
- BMI $18.5 - 24.5$ = Healthy weight range
- BMI $25 - 30$ = Overweight (grade 1 obesity)
- BMI $> 30 - 40$ = Obese (grade 2 obesity)
- BMI $> 40$ = Very obese (morbid grade 3 obesity)
Other anthropometric Measurements

- Mid-arm circumference
- Skin fold thickness
- Waist circumference
- Hip circumference
- Hip/waist ratio
Waist circumference predicts mortality better than any other anthropometric measurement.

It has been proposed that waist measurement alone can be used to assess obesity, and two levels of risk have been identified:

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>MALES</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&gt; 94cm</td>
<td>&gt; 80cm</td>
</tr>
<tr>
<td>2</td>
<td>&gt; 102cm</td>
<td>&gt; 88cm</td>
</tr>
</tbody>
</table>
Level 1 is the maximum acceptable waist circumference irrespective of the adult age and there should be no further weight gain.

Level 2 denotes obesity and requires weight management to reduce the risk of type 2 diabetes & CVS complications.
Hip Circumference

- Is measured at the point of greatest circumference around hips & buttocks to the nearest 0.5 cm.

- The subject should be standing and the measurer should squat beside him.

- Both measurement should taken with a flexible, non-stretchable tape in close contact with the skin, but without indenting the soft tissue.
Waist/Hip Ratio

Waist circumference is measured at the level of the umbilicus to the nearest 0.5 cm.

- The subject stands erect with relaxed abdominal muscles, arms at the side, and feet together.
- The measurement should be taken at the end of a normal expiration.
Interpretation of WHR

- High risk WHR$= >0.80$ for females & $>0.95$ for males i.e. waist measurement $>80\%$ of hip measurement for women and $>95\%$ for men indicates central (upper body) obesity and is considered high risk for diabetes & CVS disorders.

- A WHR below these cut-off levels is considered low risk.
Anthropometry for children

Accurate measurement of height and weight is essential. The results can then be used to evaluate the physical growth of the child.

For growth monitoring the data are plotted on growth charts over a period of time that is enough to calculate growth velocity, which can then be compared to international standards.
Growth Monitoring Chart
Percentile chart
# Nutritional status indicators

There are three primary anthropometric indices for children under five years of age: Wasting; Stunting, and Underweight.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>what it measures /what it is used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low weight for height</td>
<td>Wasting (acute malnutrition)</td>
</tr>
<tr>
<td>Low height- for -age</td>
<td>Stunting (chronic malnutrition)</td>
</tr>
<tr>
<td>Low length- for -age</td>
<td></td>
</tr>
<tr>
<td>Low weight -for -age</td>
<td>Underweight Acute or chronic malnutrition</td>
</tr>
</tbody>
</table>
Advantages of anthropometry

- Objective with high specificity & sensitivity
- Measures many variables of nutritional significance (Ht, Wt, MAC, HC, skin fold thickness, waist & hip ratio & BMI).
- Readings are numerical & gradable on standard growth charts
- Readings are reproducible.

- Non-expensive & need minimal training
Limitations of Anthropometry

- Inter-observers errors in measurement
- Limited nutritional diagnosis
- Problems with reference standards, i.e. local versus international standards.
- Arbitrary statistical cut-off levels for what considered as abnormal values.
C. 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
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.

- Useful to validate data obtained from dietary methods e.g. comparing salt intake with 24-hour urinary excretion.
Limitations of Biochemical Method

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

• Nutritional intake of humans is assessed by five different methods. These are:
  – 24 hours dietary recall
  – Food frequency questionnaire
  – Dietary history since early life
  – Food dairy technique
  – Observed food consumption
24 Hours Dietary Recall

- A trained interviewer asks the subject to recall all food & drink taken in the previous 24 hours.

- It is quick, easy, & depends on short-term memory, but may not be truly representative of the person’s usual intake.
Food Frequency Questionnaire

In this method the subject is given a list of around 100 food items to indicate his or her intake (frequency & quantity) per day, per week & per month.

inexpensive, more representative & easy to use.
Limitations of food frequency questionnaire:

- Long Questionnaire
- Errors with estimating serving size.
- Needs updating with new commercial food products to keep pace with changing dietary habits.
DIETARY HISTORY

- It is an accurate method for assessing the nutritional status.
- The information should be collected by a trained interviewer.
- Details about usual intake, types, amount, frequency & timing needs to be obtained.
- Cross-checking to verify data is important.
Food dairy

- Food intake (types & amounts) should be recorded by the subject at the time of consumption.
- The length of the collection period range between 1-7 days.
- Reliable but difficult to maintain.
Observed Food Consumption

- The most unused method in clinical practice, but it is recommended for research purposes.
- The meal eaten by the individual is weighed and contents are exactly calculated.
- The method is characterized by having a high degree of accuracy but expensive & needs time & efforts.
Interpretation of Dietary Data

1. Qualitative Method

• using the food pyramid & the basic food groups method.

• Different nutrients are classified into 5 groups (fat & oils, bread & cereals, milk products, meat-fish-poultry, vegetables & fruits)

• determine the number of serving from each group & compare it with minimum requirement.
2. Quantitative Method

• The amount of energy & specific nutrients in each food consumed can be calculated using food composition tables & then compare it with the recommended daily intake.

• Evaluation by this method is expensive & time consuming, unless computing facilities are available.
Nutrition Surveillance

- Continuous assessment of nutritional status for the purpose of detecting changes in trend or distribution in order to initiate corrective measures
Major Surveys with Nutrition Content in Iraq
- MICS 4
-I WISH
- national survey for non-communicable diseases risk factors
- IRAQ National Micronutrient Survey 2007
Table. Malnutrition among children in Iraq under-5 years

<table>
<thead>
<tr>
<th>Year</th>
<th>Acute malnutrition (Wasting)</th>
<th>Underweight (General malnutrition)</th>
<th>Chronic malnutrition (Stunting)</th>
<th>Acute malnutrition (Wasting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>4.7</td>
<td>9.1</td>
<td>21.8</td>
<td>4.7</td>
</tr>
<tr>
<td>2002</td>
<td>4.0</td>
<td>9.4</td>
<td>20.1</td>
<td>4.0</td>
</tr>
<tr>
<td>2000</td>
<td>7.8</td>
<td>19.5</td>
<td>30.0</td>
<td>7.8</td>
</tr>
<tr>
<td>1995</td>
<td>11.0</td>
<td>23.4</td>
<td>32.0</td>
<td>11.0</td>
</tr>
<tr>
<td>1991</td>
<td>3.0</td>
<td>9.0</td>
<td>18.7</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Source: Various reports and studies.
In Iraq, there is evidence of improvements in children's nutritional status. The percentage of underweight children is estimated to have declined from 9% to 8%. In spite of this improvement, more than one in five children aged under five years (21%) suffer from stunned growth and 5% suffer from wasting.

The recently analyzed results of the national survey for \textit{non-communicable diseases risk factors} conducted in Iraq in 2006 refer to an alarming situation, where over 66% of the sample study of adults between 25 and 65 were obese or overweight.
Low-birth weight infants and stunted children may be a greater risk of chronic diseases such as diabetes and heart disease than children who start out well-nourished. This “double burden” is the result of various factors.

Progress in improving community infrastructure and development of sound public health systems has been slow, thwarting efforts to reduce under-nutrition; while the adoption of Western diets high in refined carbohydrates, saturated fats and sugars, as well as more sedentary lifestyle (often rising from unemployment and security concerns) are common cited as the major contributors to the increase of overweight and chronic diseases.