Introduction to Community Medicine Course (31505201)

Unit 2 Nutrition and Nutrition Assessment and Diet

Assessment of Nutritional Status. Anthropometric Assessment.

By

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MD MPH JBCM PhD

4-10-2017
Attention!!!!!!!

- **Sun 25-9** Introduction and Terminology used in nutrition
- **Tue 27-9** The Nutrients & their Categories
- **Thu 2-10** Spectrum of public nutrition problems: Malnutrition & its Ecology and Common nutritional disorders in Jordan
- **Tue 4-10** Assessment of Nutritional Status. Anthropometric Assessment.
- **Thu 9-10** Breast feeding & Breast milk. Formula feeding ???? **Wed 11-10– from 8:00-10:00am**
## Presentation outline

<table>
<thead>
<tr>
<th>Topic</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional Status in Jordan</td>
<td>08:00 to 08:10</td>
</tr>
<tr>
<td>What is Nutritional assessment and Why?</td>
<td>08:10 to 08:40</td>
</tr>
<tr>
<td>Tools and Methods of Nutritional Assessments</td>
<td>08:40 to 09:00</td>
</tr>
<tr>
<td>Anthropometric Assessment : Obesity</td>
<td>09:00 to 09:15</td>
</tr>
</tbody>
</table>
انتباه ؟؟؟؟؟؟
الحضور والغياب؟؟؟؟؟
التحضير اليومي
للامتحان النصفي
2017-11-15
ما تيجي تحدد النقاط المهمة
طالب في كلية طب
Quiz 2 minutes

• Main difference between

<table>
<thead>
<tr>
<th>Marasmus</th>
<th>kwashiorkor</th>
</tr>
</thead>
</table>

Figure 7: Distribution of causes of deaths among children under 5 years of age

Figure 7: Causes of deaths among underfive children

- Prematurity: 35%
- Congenital abnormalities: 19%
- Other diseases: 18%
- Pneumonia: 11%
- Birth asphyxia: 6%
- Injuries: 5%
- Diarrhoea: 4%
- Neonatal sepsis: 2%

Source: WHO, 2010a (reference period 2008)
# Nutritional Status in Jordan

## Child Anthropometry

### Number of children under 5 affected (000)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunting</td>
<td>71</td>
<td>2012</td>
</tr>
<tr>
<td>Wasting</td>
<td>22</td>
<td>2012</td>
</tr>
<tr>
<td>Overweight</td>
<td>43</td>
<td>2012</td>
</tr>
</tbody>
</table>

### Percentage of children under 5 affected

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wasting</td>
<td>2</td>
<td>2012</td>
</tr>
<tr>
<td>Severe wasting</td>
<td>1</td>
<td>2012</td>
</tr>
<tr>
<td>Overweight</td>
<td>5</td>
<td>2012</td>
</tr>
<tr>
<td>Low birth weight</td>
<td>13</td>
<td>2007</td>
</tr>
</tbody>
</table>


### Prevalence of Under-5 Stunting (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Stunting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>21</td>
</tr>
<tr>
<td>1997</td>
<td>11</td>
</tr>
<tr>
<td>2002</td>
<td>12</td>
</tr>
<tr>
<td>2009</td>
<td>8</td>
</tr>
<tr>
<td>2012</td>
<td>8</td>
</tr>
</tbody>
</table>

### Changes in Stunting Prevalence over time, by wealth quintile

- **Wealthiest**
- **Second wealthiest**
- **Middle**
- **Second poorest**
- **Poorest**

Source: DHS surveys 1990–2011 adapted from Bredenkamp et al. 2014.
# Adolescent and Adult Nutrition Status

## Adolescent and Adult Anthropometry (% Population)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent overweight&lt;sup&gt;a&lt;/sup&gt;</td>
<td>21</td>
<td>2007</td>
</tr>
<tr>
<td>Adolescent obesity&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5</td>
<td>2007</td>
</tr>
<tr>
<td>Women of reproductive age, thinness&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2</td>
<td>2012</td>
</tr>
<tr>
<td>Women of reproductive age, short stature&lt;sup&gt;d&lt;/sup&gt;</td>
<td>1</td>
<td>2012</td>
</tr>
</tbody>
</table>

Sources: <sup>a</sup>WHO 2014; <sup>b</sup>DHS 2014.

## Micronutrient Status of Population

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women of reproductive age with anemia&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total population affected (000)</td>
<td>456</td>
<td>2011</td>
</tr>
<tr>
<td>Total population affected (%)</td>
<td>28</td>
<td>2011</td>
</tr>
<tr>
<td>Vitamin A deficiency in preschool-age children (%)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15</td>
<td>2002</td>
</tr>
<tr>
<td>Population classification of iodine nutrition (age group 6–12)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Optimal iodine nutrition</td>
<td>2000</td>
</tr>
</tbody>
</table>

Sources: <sup>a</sup>Sievens et al. 2013; <sup>b</sup>WHO 2009; <sup>c</sup>WHO 2004.

## Metabolic Risk Factors for Diet-Related Noncommunicable Diseases, 2008 (%)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
<th>Year</th>
</tr>
</thead>
</table>
METABOLIC RISK FACTORS FOR DIET-RELATED NONCOMMUNICABLE DISEASES, 2008 (%)

- Raised blood pressure
- Raised blood glucose
- Raised blood cholesterol

Both sexes: 35%Raised blood pressure, 18%Raised blood glucose, 50%Raised blood cholesterol

Male: 49%Raised blood pressure, 17%Raised blood glucose, 32%Raised blood cholesterol

Female: 38%Raised blood pressure, 18%Raised blood glucose, 50%Raised blood cholesterol

Source: WHO 2014.

PREVALENCE OF ADULT OVERWEIGHT AND OBESITY, 2008 (%)

- Overweight (BMI ≥ 25): 71%
- Obesity (BMI ≥ 30): 42%

Female: Overweight 67%, Obesity 27%

Male: Overweight 71%, Obesity 42%

Both sexes: Overweight 69%, Obesity 34%


Note: BMI = body mass index.
UNDERLYING DETERMINANTS

FOOD SUPPLY

- Available calories from nonstaples (%): data for 1991, 2000, 2009

GENDER-RELATED DETERMINANTS

<table>
<thead>
<tr>
<th>Early childbearing: births by age 18 (%)</th>
<th>4</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender Inequality Index (score)*</td>
<td>0.488</td>
<td>2013</td>
</tr>
<tr>
<td>Gender Inequality Index (country rank)*</td>
<td>101</td>
<td>2013</td>
</tr>
</tbody>
</table>

Sources: *UNICEF 2014; UNDP 2014.
Note: *0—low inequality, 1—high inequality.

POPULATION DENSITY OF HEALTH WORKERS PER 1,000 PEOPLE

<table>
<thead>
<tr>
<th>Health Worker Category</th>
<th>Density (per 1,000)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicians</td>
<td>2.558</td>
<td>2010</td>
</tr>
<tr>
<td>Nurses and midwives</td>
<td>4.049</td>
<td>2010</td>
</tr>
<tr>
<td>Community health workers</td>
<td>0.178</td>
<td>2004</td>
</tr>
</tbody>
</table>

Source: WHO 2014.

FEMALE SECONDARY EDUCATION ENROLLMENT (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Enrollment (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>78</td>
</tr>
<tr>
<td>2000</td>
<td>88</td>
</tr>
<tr>
<td>2010</td>
<td>92</td>
</tr>
<tr>
<td>2012</td>
<td>89</td>
</tr>
</tbody>
</table>

## Improved Drinking Water Coverage (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Piped on premises</th>
<th>Unimproved</th>
<th>Other improved</th>
<th>Surface water</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>32</td>
<td>34</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Source**: WHO/UNICEF JMP 2014.

## Improved Sanitation Coverage (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Improved facilities</th>
<th>Unimproved facilities</th>
<th>Shared facilities</th>
<th>Open defecation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Source**: WHO/UNICEF JMP 2014.

## Government Expenditures (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Health</th>
<th>Social protection</th>
<th>Education</th>
<th>Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>2.4</td>
<td>14.7</td>
<td>14.9</td>
<td>5.0</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td>16.7</td>
<td>15.9</td>
<td>10.4</td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td>11.2</td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td>10.9</td>
</tr>
</tbody>
</table>

- **Source**: IFPRI 2014.
Figure 3: Dietary energy supply (DES) by food group

Figure 3: Percentage of DES by food groups, in 2005-2007

- Cereals: 46%
- Vegetable oils: 14%
- Sweeteners: 15%
- Meat/offals: 6%
- Milk/milk products: 5%
- Fruit/vegetables: 5%
- Pulses/nuts/oilcrops: 5%
- Starchy roots: 2%
- Eggs: 1%
- Other: 1%

Note: values <1% (animal fats and fish/shellfish) are not shown.

Source: FAOSTAT
Figure 6: Trends in the prevalence of stunting among children under five years of age (urban/rural areas)

Sources: JPFHS 1990; JPFHS 1997; JPFHS 2002; JPFHS 2009
Figure 2.0: Share of Proteins, Fats and Carbohydrates in DES 1962 - 2002

Source: FAO Food Balance Sheets.
Figure 4.0: Prevalence of Stunted Children in North Jordan (%).
Trends in Per Capita Supply of Proteins (g) 1962-2002

Source: FAO Food Balance Sheets.
Trends in Per Capita Supply of Calories 1962-2002

Source: FAO Food Balance Sheets.
Trends in Per Capita Supply of Fats (g) 1962-2002

Figure 2.4: Trends in Per Capita Supply of Fats (g) 1962-2002

Source: FAO Food Balance Sheets.
The 2007 Jordan Population and Family Health Survey (JPFHS)
Figure 11.1
Nutritional status of children by age

Percentage

Age (months)

- Stunted
- Wasted
- Underweight

Note: Stunting reflects chronic malnutrition; wasting reflects acute malnutrition; underweight reflects chronic or acute malnutrition or a combination of both. Plotted values are smoothed by a five-month moving average.

JPFHS 2012
Figure 11.2

Percentage

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2009</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunting (height-for-age)</td>
<td>12</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Wasting (weight-for-height)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Underweight (weight-for-age)</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: The data for all three surveys are based on the WHO Child Growth Standards adopted in 2007.

JPFHS 2012
Figure 11.4
Trends in anemia status among children 6-59 months

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2009</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any anemia</td>
<td>34</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>Mild anemia</td>
<td>21</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>Moderate anemia</td>
<td>13</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Severe</td>
<td>&lt;1</td>
<td>0</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>
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.
What is **Nutritional Assessment**?

“the evaluation of nutrition needs of individuals based upon appropriate biochemical, anthropometric, physical, and dietary data to determine nutrient needs and recommended appropriate nutrition intake including enteral and parenteral nutrition”

- American Dietetic Association
The purpose of nutritional assessment

- Identify individuals or population groups at risk of becoming malnourished
- To obtain *precise information* about the prevalence and geographic distribution of nutritional problems of a community
- To develop *health care programs* that meet the community needs
- To measure the *effectiveness* of the nutritional programs & intervention once initiated
How to measure malnutrition

1. Anthropometry
   a. Weight
   b. Length or height
   c. Middle upper arm circumference

2. Weight and height must be compared to age or to each other and therefore are turned into indices
   a. Weight for age called ‘underweight’. Includes both wasting and stunting
   b. Weight for length or body mass index, measure of ‘wasting’ and ‘obesity’
   c. Height for age, measure of ‘stunting’

3. Other signs or measures
   a. Oedema (water retention) of feet, hands, face
   b. Blood test for anemia (iron deficiency in particular)
   c. Blood test for certain micronutrients: Vitamin A or zinc
Anthropometry

- Height
- Weight
- Weight history / pattern (% weight change)
- Weight for Height
- BMI
- Growth Pattern, head circumference (paediatrics)

- MAMC
- TSF
- Waist circumference
- Hip circumference
- WHR

Be aware of fluid status, presence of oedema.
Nutritional Assessment Tools
Nutritional Assessment Tools

• No single / standard way of assessing nutritional status

• Various validated assessment tools developed
  – some disease specific
  – some age specific

• 2 examples
  – Mini Nutritional Assessment (MNA)
  – Subjective Global Assessment (SGA)
Mini Nutritional Assessment (MNA)

• Screening and Assessment tool for the identification of malnutrition in the elderly

• Considers:
  – Dietary Intake – foods, patterns
  – Weight change, BMI, Muscle circumferences
  – Functional impairment, Independence, Living arrangements
  – Psychological issues, Self assessment
Subjective Global Assessment

- Valid assessment tool
- Strong correlation with other subjective and objective measures of nutrition
- Highly predictive of nutritional status in a number of different patient groups
- Quick, simple and reliable
Subjective Global Assessment...features

• Medical History
  – Weight change
  – Dietary intake
  – GI symptoms
  – Functional impairment

• Physical Examination
  – Loss of subcutaneous fat
  – Muscle wasting
  – Oedema and ascites
Subjective Global Assessment

...Classifications

A  Well nourished

B  Moderately malnourished or suspected of malnutrition

C  Severely malnourished
Full Nutrition Assessment
Step ...Data collection

Systematic Approach
• Assessment based on clinical/psychosocial/physical information
  – Dietary
  – Anthropometric
  – Biochemical
  – Physical
• Including
  – Subjective (eg. signs/symptoms of nutritional problem, appetite)
  – Objective (eg. Lab results)
Data Collection...
An Example... A B C D E

A  Anthropometry
B  Biochemical Data
C  Clinical signs and symptoms, medical condition
D  Dietary Intake
E  Exercise (Energy balance – expenditure)

Consider current level, history and changes
Methods of Nutritional Assessment
Methods of Nutritional Assessment

Nutrition is assessed by two types of methods; *direct and indirect*.

- The **direct** methods deal with the **individual** and **measure objective** criteria,
- while **indirect** methods use community health indices that **reflects** **nutritional** influences.
Direct Methods

These are ABCDE

- Anthropometric methods
- Biochemical, laboratory methods
- Clinical methods
- Dietary evaluation methods
- Exercise (Energy balance – expenditure)
Indirect Methods

These include three categories:

- **Economic factors** e.g. per capita income, population density & social habits
- **Vital health statistics** particularly infant & under 5 mortality & fertility index
- **Ecological variables** including crop production
Anthropometric Methods
(from Greek ἄνθρωπος anthropos, "human", and μέτρον metron, "measure"
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.
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.
Other anthropometric Measurements

• Mid-arm circumference
• Skin fold thickness
• Head circumference
• Head/chest ratio
• Hip/waist ratio
WHO Child Growth Standards

Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age

Methods and development
Length-for-age BOYS
Birth to 2 years (z-scores)

WHO Child Growth Standards
Length-for-age GIRLS
Birth to 2 years (percentiles)
Measurements for adults

**Height:**

The subject stands erect & bare footed on a stadiometer with a movable head piece. The head piece is leveled with skull vault & height is recorded to the nearest 0.5 cm.
WEIGHT MEASUREMENT

- Use a regularly calibrated electronic or balanced-beam scale. Spring scales are less reliable.
- Weigh in light clothes, no shoes
- Read to the nearest 100 gm (0.1kg)
Nutritional Indices in Adults

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

• BMI is computed using the following formula:

\[ \text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m}^2)} \]

• Evidence shows that high BMI (obesity level) is associated with type 2 diabetes & high risk of cardiovascular morbidity & mortality
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 or grade 3 obesity)
Waist circumference

- **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.
Waist circumference

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></th>
<th>MALES</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVEL 1</td>
<td>&gt; 94cm</td>
<td>&gt; 80cm</td>
</tr>
<tr>
<td>LEVEL 2</td>
<td>&gt; 102cm</td>
<td>&gt; 88cm</td>
</tr>
</tbody>
</table>
Waist circumference/2

❖ 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

<table>
<thead>
<tr>
<th>Waist-to-Hip Ratio (WHR) Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Males</td>
</tr>
<tr>
<td>Females</td>
</tr>
</tbody>
</table>

Waist to Hip Ratio (WHR)

- Waist to Hip Ratio is an effective way to examine regional fat distribution.

<table>
<thead>
<tr>
<th>HEALTH RISK</th>
<th>MEN</th>
<th>WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Risk</td>
<td>&gt; 1.0</td>
<td>&gt; .85</td>
</tr>
<tr>
<td>Moderate Risk</td>
<td>.90 -1.0</td>
<td>.80-.85</td>
</tr>
<tr>
<td>Low Risk</td>
<td>&lt; .90</td>
<td>&lt; .80</td>
</tr>
</tbody>
</table>

- WHR is not considered to be as valid for
  - Children.....
  - People who are under five feet tall or.....
  - Who have a body mass index (BMI) of 35 or above.
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 – Body Composition

Muscle, Fat, Bone, Water

**Body Mass:**
- **LBM** – Body mass that contains small % (~3%) essential fat
  
  [Essential fat + Muscle + Water + Bone]
- **Fat Free Mass (FFM)**

**Fat Store:**
- **Essential Fat** for physiological function, eg. fat stored in muscle, liver, heart
- **Storage fat** in adipose tissue – visceral fat and subcutaneous fat
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.
DIETARY ASSESSMENT
Nutritional intake of humans is assessed by five different methods. These are:

1. 24 hours dietary recall
2. Food frequency questionnaire
3. Dietary history since early life
4. Food dairy technique
5. 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:

- **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.
Biochemical-Laboratory Assessment
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)
- Detection of abnormal amount of metabolites in the urine (e.g. urinary creatinine/hydroxyproline ratio)
- Analysis of hair, nails & skin for micro-nutrients.
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
CLINICAL ASSESSMENT

HANDS
Cold hands: Magnesium deficiency, hypothyroidism, chronic fatigue with low cardiac output.

SKIN
Stretch marks: zinc deficiency.
Follicular hyperkeratosis: vitamin A deficiency.
Spontaneous bleeds: vitamins C or K or platelet deficiency
Dry scaly skin with hair follicles plugged with coiled distorted hairs and a red halo: vitamin C deficiency
Yellow palms: excessive beta carotene intake
Pimply rough skin at the back of the upper arms “chicken skin”: essential fatty acid deficiency

LEGS
Tender calf muscles: magnesium deficiency
Brisk knee reflexes: magnesium deficiency

HEART
Irregular beat, high blood pressure, cardiomegaly: magnesium and Co Q10 deficiencies or sensitivity to caffeine.

THROAT
Thyroid swelling: iodine deficiency, hypothyroidism

NAILS
White spots: Mineral deficiency but often low zinc
Ridges: Zinc deficiency
Soft or brittle nails: Magnesium deficiency
Bitten nails: General mineral deficiency

FACE SKIN
Greasy red scaly skin of face & sides of nose: vitamin B2 deficiency
Seborrheic dermatitis around nose and an acne like forehead rash: vitamin B6 deficiency

EYES
Cataracts: chromium deficiency or excess free radicals
Bags or dark rings under eyes: allergies or food intolerances
Blue eyes & premature grey hair: vitamin B12 deficiency a feature of pernicious anemia

MOUTH
Pale fissured tongue: iron deficiency.
Sore painful fissured tongue: vitamin B3 deficiency.
Sore burning tongue & peeling of lips: vitamin B2 deficiency.
Swollen tongue with lateral teeth indentations: food intolerance.
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)* associated with malnutrition deficiency of vitamins & micronutrients.
CLINICAL ASSESSMENT

- **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
Clinical **signs** of nutritional deficiency

**HAIR**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare &amp; thin</td>
<td>Protein, zinc, biotin deficiency</td>
</tr>
<tr>
<td>Easy to pull out</td>
<td>Protein deficiency</td>
</tr>
<tr>
<td>Corkscrew Coiled hair</td>
<td>Vit C &amp; Vit A deficiency</td>
</tr>
</tbody>
</table>
Clinical signs of nutritional deficiency

**MOUTH**

<table>
<thead>
<tr>
<th>Clinical Sign</th>
<th>Nutritional Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glossitis</td>
<td>Riboflavin, niacin, folic acid, B12, pr.</td>
</tr>
<tr>
<td><strong>Bleeding &amp; spongy gums</strong></td>
<td>Vit. C, A, K, folic acid &amp; niacin</td>
</tr>
<tr>
<td><strong>Angular stomatitis, cheilosis &amp; fissured tongue</strong></td>
<td>B 2, 6, &amp; niacin</td>
</tr>
<tr>
<td><strong>leukoplakia</strong></td>
<td>Vit. A, B12, B-complex, folic acid &amp; niacin</td>
</tr>
<tr>
<td><strong>Sore mouth &amp; tongue</strong></td>
<td>Vit B12, 6, c, niacin, folic acid &amp; iron</td>
</tr>
</tbody>
</table>
Clinical signs of nutritional deficiency

**EYES**

<table>
<thead>
<tr>
<th>Night blindness, exophthalmia</th>
<th>Vitamin A deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photophobia-blurring, conjunctival inflammation</td>
<td>Vit B2 &amp; vit A deficiencies</td>
</tr>
</tbody>
</table>

Vitamin B<sub>12</sub> = Cyanocobalamin
- Pale conjunctiva
- Nutritional amblyopia
- Tobacco-alcohol amblyopia
- Nutritional optic neuropathy
- Eye movements disorder: nystagmus
Clinical signs of nutritional deficiency

**NAILS**

<table>
<thead>
<tr>
<th>Spooning</th>
<th>Iron deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transverse lines</th>
<th>Protein deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Clinical signs of nutritional deficiency

<table>
<thead>
<tr>
<th>SKIN</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pallor</strong></td>
<td><strong>Folic acid, iron, B12</strong></td>
</tr>
<tr>
<td><strong>Follicular hyperkeratosis</strong></td>
<td><strong>Vitamin B &amp; Vitamin C</strong></td>
</tr>
<tr>
<td><strong>Flaking dermatitis</strong></td>
<td><strong>PEM, Vit B2, Vitamin A, Zinc &amp; Niacin</strong></td>
</tr>
<tr>
<td><strong>Pigmentation, desquamation</strong></td>
<td><strong>Niacin &amp; PEM</strong></td>
</tr>
<tr>
<td><strong>Bruising, purpura</strong></td>
<td><strong>Vit K, Vit C &amp; folic acid</strong></td>
</tr>
</tbody>
</table>
Clinical **signs** of nutritional deficiency

**Thyroid gland**

- in mountainous areas and far from sea places **Goiter** is a reliable sign of iodine deficiency.
Clinical **signs** of nutritional deficiency

**Joins & bones**
- Help detect signs of vitamin D deficiency (Rickets) & vitamin C deficiency (Scurvy)
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
Clinical Signs and Symptoms

**Signs**
- Subjective, impression
- Descriptive, observation
- Appearance
- Visual examination
- Needs clinical judgment
- Eg muscle wasting, malnutrition

**Symptoms**
- Recall, report by subjects
- Descriptive
- Eg nausea, itchiness, diarrhea, anorexia
Obesity
Potential Negative Health Effects of Overweight and Obesity

**MENTAL HEALTH**
- Increased rates of depression and anxiety disorders

**CARDIOVASCULAR SYSTEM**
- High blood pressure
- Higher triglyceride levels and decreased HDL levels, both factors in the development of cardiovascular disease

**ENDOCRINE SYSTEM**
- A weight gain of 11–18 pounds doubles a person’s risk of type 2 diabetes

**REPRODUCTIVE SYSTEM**
- Higher rates of sexual dysfunction
- Increased risks for endometrial, prostate, and uterine cancer
- Increased risk of breast cancer in women
- In pregnant women, increased risk of fetal and maternal death, labor and delivery complications, and birth defects

** IMMUNE SYSTEM**
- Tendency toward more infectious diseases
- Reduced wound healing

**HEART**
- Dramatically increased risk for all forms of heart disease

**RESPIRATORY SYSTEM**
- Increased risk of sleep apnea and asthma

**DIGESTIVE SYSTEM**
- Increased risks for colon, gallbladder, and kidney cancer
- Increased risks of gallbladder disease

**BONES AND JOINTS**
- For every 2 pound increase in weight, the risk of arthritis increases 9%–13%
- Increased risk of osteoarthritis, especially in weight-bearing joints like knees and hips
Assessment of obesity

• Relative Weight (RW)
• Body Mass Index (BMI)
• Waist Circumference (WC)
• Mid Upper Arm Circumference (MAC)
• Triceps Skin Fold Thickness (TSF)
• Growth Monitoring Chart – infants and young children.
Assessing Body Weight and Body Composition

• **Body Mass Index (BMI)**
  • Index of the relationship between height and weight
  • \( \text{BMI} = \frac{\text{weight (kg)}}{\text{height squared (m}^2\text{)}} \)
  • BMI of 18.5 to 25 kg/m\(^2\) indicates healthy weight

• **Youth and BMI**
  • Labeled differently, as “at risk of overweight” and “overweight”
Body Mass Index (BMI)

<table>
<thead>
<tr>
<th>Height</th>
<th>Weight in pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'10&quot;</td>
<td>91  96  100  105 110 115</td>
</tr>
<tr>
<td>5'</td>
<td>97  102 107 112 118 123</td>
</tr>
<tr>
<td>5'1&quot;</td>
<td>100 106 111 116 122 127</td>
</tr>
<tr>
<td>5'2&quot;</td>
<td>104 109 115 120 126 131</td>
</tr>
<tr>
<td>5'3&quot;</td>
<td>107 113 118 124 130 135</td>
</tr>
<tr>
<td>5'4&quot;</td>
<td>110 116 122 128 134 140</td>
</tr>
<tr>
<td>5'5&quot;</td>
<td>114 120 126 132 138 144</td>
</tr>
<tr>
<td>5'6&quot;</td>
<td>118 124 130 136 142 148</td>
</tr>
<tr>
<td>5'7&quot;</td>
<td>121 127 134 140 146 153</td>
</tr>
<tr>
<td>5'8&quot;</td>
<td>125 131 138 144 151 158</td>
</tr>
<tr>
<td>5'9&quot;</td>
<td>128 135 142 149 155 162</td>
</tr>
<tr>
<td>5'10&quot;</td>
<td>132 139 146 153 160 167</td>
</tr>
<tr>
<td>5'11&quot;</td>
<td>136 143 150 157 165 172</td>
</tr>
<tr>
<td>6'</td>
<td>140 147 154 162 169 177</td>
</tr>
<tr>
<td>6'1&quot;</td>
<td>144 151 159 166 174 182</td>
</tr>
<tr>
<td>6'2&quot;</td>
<td>148 155 163 171 179 186</td>
</tr>
<tr>
<td>6'3&quot;</td>
<td>152 160 168 176 184 193</td>
</tr>
<tr>
<td>6'4&quot;</td>
<td>156 164 172 180 189 197</td>
</tr>
</tbody>
</table>

Healthy weight
BMI 18.5–24.9

Overweight
BMI 25–29.9

Obese
BMI 30–39.9

Morbidly obese
BMI ≥40
THANK YOU!