Chapter five
Dietary Assessment Method

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Presentation outline

- Introduction
- Food consumption at the national, household & individual level
  - Measuring food consumption at the national level
  - Measuring food consumption at the household level
  - Measuring food consumption at the individual level

Introduction

Dietary assessment Methods :

- Assessment of food available/consumption at national and household level
- Past and current intake of nutrients by household and individuals levels to know food availability

Introduction

- Food consumption can be assessed by
  - national, household, or individual level
  - the resulting data expressed in terms of nutrients and or foods

5.1.1 Measuring food consumption at the national level

A. Food balance sheet

- Are the most commonly used; provide data on the available food for consumption: food supply within a country
- Terms to describe food balance sheet are:-
  - National food count
  - Food moving into consumption
  - Food consumption statistics
  - Food disappearance data
  - Consumption level estimate
  - National Market data bases

Measuring food consumption at the national level……..

- FAO describes food balance sheet as providing
  - Provide data on food available for consumption
  - FAO publishes FBS for 176 countries annually for 95 food commodities
  - A comprehensive picture of the pattern of a country's food supply during a specified reference period, calculated from:-
    - annual production of food,
    - changes in stocks,
    - imports & exports, &
    - distribution of food over various uses within the country

Measuring food consumption at the national level……..

- The FAO food balance sheet
  - Presented data in terms of energy (Kcal/day), protein (g/day), & fat (g/day) availability per capita
  - Foods are grouped into 15 food groups
  - Cereals, roots & tubers, sugar & honey, pulses, nuts & oil seeds, vegetables, fruits, meat, eggs, fish, & seafood, milk, oils & fats, spices, stimulants & alcoholics

Measuring food consumption at the national level……..

- Uses of food balance sheet
  - To formulate agricultural policies
  - To make inter-country comparison of food supplies
  - To examine association b/n nutrition & mortality
  - Trends in food consumption & changes in nutrient intake
  - Insight into the countries & regions that are most likely to be at greatest risk for low intake of some nutrients

Measuring food consumption at the national level……..

- Food balance sheets
  - do not measure the food actually ingested by the population or
  - provide information of food consumption in relation to regional, economic, demographic, seasonal or socioeconomic differences within a country
- Factors that affect validity
  - Under recording

- Food Balance Sheet
- Imports; food taken from stocks + Domestic food production Export; food added to stocks
- Nonfood uses; predictable waste Total food available or Gross national supply
- Net food supply
- Manufacturing, storage And Distribution losses
- Waste
- Manufacture, storage and distribution
- Commercial + institutional + Household food purchases
- Food consumed

Measuring food consumption at the national level.....

B. Total diet studies

- Designed to establish by chemical analysis of the dietary intake of food contaminants by a person consuming a typical diet
- Collection of large number of representative foods from a particular region or country
  - E.g. dietary exposure for Al, As, Cr, Cu, Hg, Ni, Se, Sn, & Zn done in U.K
- Can also be used to monitor & evaluate intake of macronutrients & vitamins in population
- Can be done by using:-
  - Market basket studies
  - Individual food items
  - Duplicate portion studies

5.1.2 Measuring food consumption at the household level

Household(hh) food consumption is

- The total amount of food available for consumption in the hh, excluding food eaten away from home unless taken from home
- Provide no information on the consumption of food by specific individuals within the hh
- Food consumption per capita is calculated

- Can be done by using
  - **Food account method**
  - **Household food record method**
  - **Household 24-h recall method**

5.1.2 Measuring food consumption at the household level…

- Food account method- daily record of all food entering the household, either purchased , received as gifts, or produced for HH use during the specified period (e.g 7ds)
- Household food record method- emphasizes the food actually consumed by the household members rather than purchased or obtained
  - Arbitrary wastage factor of 10% is considered
  - A weighted value (" man value") assigned for each individual based on age, sex
- Household 24-hr recall method
  - The household member responsible for the food preparation is interviewed to obtain information on both household composition and HH food consumption over the previous 24 hr period
  - Provides data on number of eating times in a day
  - Type of food groups consumed (index of dietary diversity)
  - Percentage getting min. energy requirement
  - Important for monitoring of household food security

5.2 Methods for measuring food consumption of individuals

- **Quantitative**
  - 24-hr recalls
  - Weighed food records
  - Estimated food records
- Records or recall of food consumed is done over a 1day periods
- By increasing the no. of measurement days, quantitative estimates of the **usual intakes** of individuals be obtained
  - Needed to estimate prevalence of inadequate intake

5.2 Methods for measuring food consumption of individuals…..

Qualitative

- Semi-quantitative food frequency questionnaire (FFQ) or diet history
  - retrospective information over longer time frame
  - assess usual intake of foods or specific classes of foods
  - can assess usual intake of nutrients

5.2 Methods for measuring food consumption of individuals…..

5.2.1 Twenty-four hour recall method

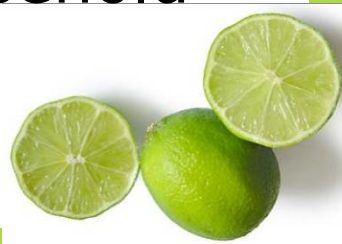
A. Important considerations

- Subjects & their parents or caretakers are asked by nutritionists to recall the subject's exact food intake during the previous 24-h period
  - What they ate ;
  - What amount: for estimation ordinary hh measures or shapes and dimensions used
- Recall interviews can be conducted on adults & older children (e.g., > 8 y old)
- Younger children (e.g., 4- 8 y) interviewed along with their primary caretaker(s): i.e., consensus recall

5.2 Methods for measuring food consumption of individuals…..

Important consid. cont….

- Assess actual intake of individuals
- Single recall is not sufficient to describe an individual's usual intake of food & nutrients
  - Multiple 24-hr recalls on the same individual over several days required to achieve this objective
  - Multiple single day recalls on different individuals give a valid measure of the intake of a group or population
- Preferable to conduct interviews in subject's home
  - encourages participation
  - improves accuracy of recall
  - facilitates calibration of local household utensils



5.2 Methods for measuring food consumption of individuals…..

Important consid. cont….

- Interviewer must be trained & be:
  - friendly; mature; nonjudgmental; sensitive
  - female interviewers preferred
- When 24-h recalls are used to characterize the average usual intake of a population group
  - The subjects should be representative of the population under study
  - All days of the week should be equally represented
    - Avoids any day of-the-week-effect on food & nutrient intakes

5.2 Methods for measuring food consumption of individuals…..

- **Data sheet for 24hr recall**

  Subject Name_____Subject ID # ___ Sex: M / F (circle)
  Respondent name _____Interview date mm / dd/ yyyy
  Day of week food eaten _____
  Food eaten by: Mother/ Child (circle one)
  Name of Interviewer _____City/town:_____

5.2 Methods for measuring food consumption of individuals…..

Place eaten	Time	Food or drink	Details (brand)	Preparation or cooking method	Amount

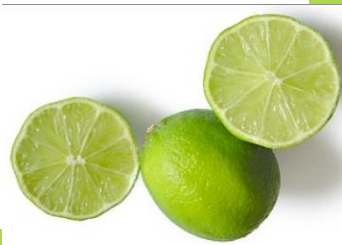
5.2 Methods for measuring food consumption of individuals…..

Data sheet for 24hr recall cont…

Additional questions

- Was intake unusual in any ways?

  Yes No
- If yes, in what way?
- Do you take vitamin or mineral supplement?
  Yes No
- If yes, how many per day? ……. Per week…….
- If yes, what kind? Give brand name if possible
  - Multivitamin, Iron, Ascorbic acid, Other (list)



B. Advantages & limitations of recalls

Advantages 24-h recall	Limitations 24-hr recall
•Quick, cheap (4-6 interviews/d) •Large coverage; Low respondent burden •High response rate; non-threatening •Used for illiterate subjects •Surprise so less likely to alter diet	•Relies on memory & motivation •Inaccuracies in portion size estimates •Inaccuracies when eating from common pot & for mixed dishes •Relies on skill of interviewer •May omit foods consumed infrequently; Under-reporting occurs •Need to convert portion-sizes to weight equivalents: time consuming: prone to errors

Different forms of 24 Hr recalls

1. Multiple-pass 24-hr recall

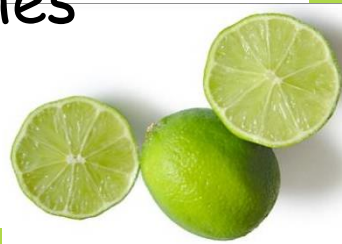
- Help retrieval of food memory
- It has 4 steps

Step 1:

- List all foods and drinks consumed sequentially during the previous 24-hrs starting at the time of waking

Step 2:

- Describe in detail each food listed (i.e., cooking method; brand names etc) by using list of specific food probes & prompts
- Recall information on ingredients of mixed dishes



Different forms of 24 Hr recalls ……

Multiple-pass 24-hr recall cont…..

Step 3:

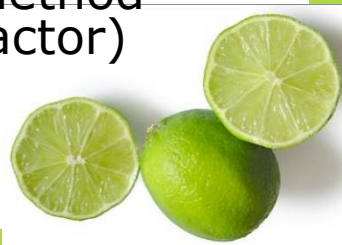
- Estimate portion size of each food item consumed

Step 4:

- Review recall to check all items are recorded correctly
- Check foods listed against picture chart; check recipes
- Check whether recall was a ``usual" day

❑ **Examples of food probes for obtaining detailed descriptions of specific food items**

- **Cereal, pasta, rice**: Type of grain; enriched/fortified or not, brand name, cooking method
- **Milk products:** Kind of dairy product, brand name, % fat (as butter fat or milk fat)
- **Meat:** Kind, description of cut, raw or cooked weight, method of cooking, lean or lean plus fat, bone in or not (waste factor)



Different forms of 24 Hr recalls ……

2. Interactive' 24-hr recall

- A modification of 24-h recall
- To collect information on rural population in developing countries

❑ **Suggested modifications for 'interactive' 24-hr recall protocol**

- Train respondents in 24-hr recall procedure, especially in estimation of portion sizes
- Give respondents a picture chart of local staple foods on day before recall & instruct them to tick each food item (& amounts) as consumed

Different forms of 24 Hr recalls ……

- Provide bowels & plates for use on the recall days to help the respondents visualize the amount of food consumed.
- Ask respondents to serve the actual portion size of each staple food consumed into their own dishes; weigh portions.

❑ **Advantages of ``interactive" 24-hr recall for rural populations**

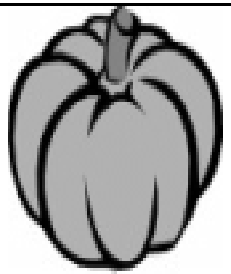
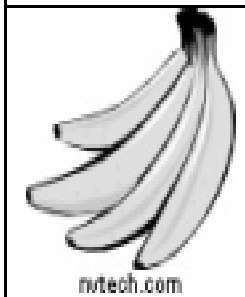
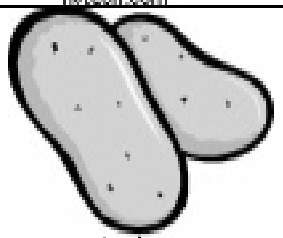
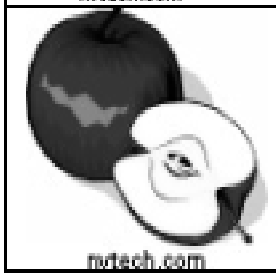
- Enhances recall of foods consumed
- Reduces number of memory lapses
- Improves portion size estimates

Picture chart of local staple foods

CIGNIS Diet Calender - Infants

Subject ID _____ Address _____

Mother's Name _____ Date _____ Age of baby _____ months

	¼, ½, ¾ whole orange			Feeding spoons of mashed pumpkin	
	¼, ½, ¾ whole banana			Feeding spoons of mashed potatoe	
	¼, ½, ¾ whole apple			Feeding spoons of boiled cabbage	

Different forms of 24 Hr recalls ……

Measurement aids to quantify portion sizes in 24-hr recalls

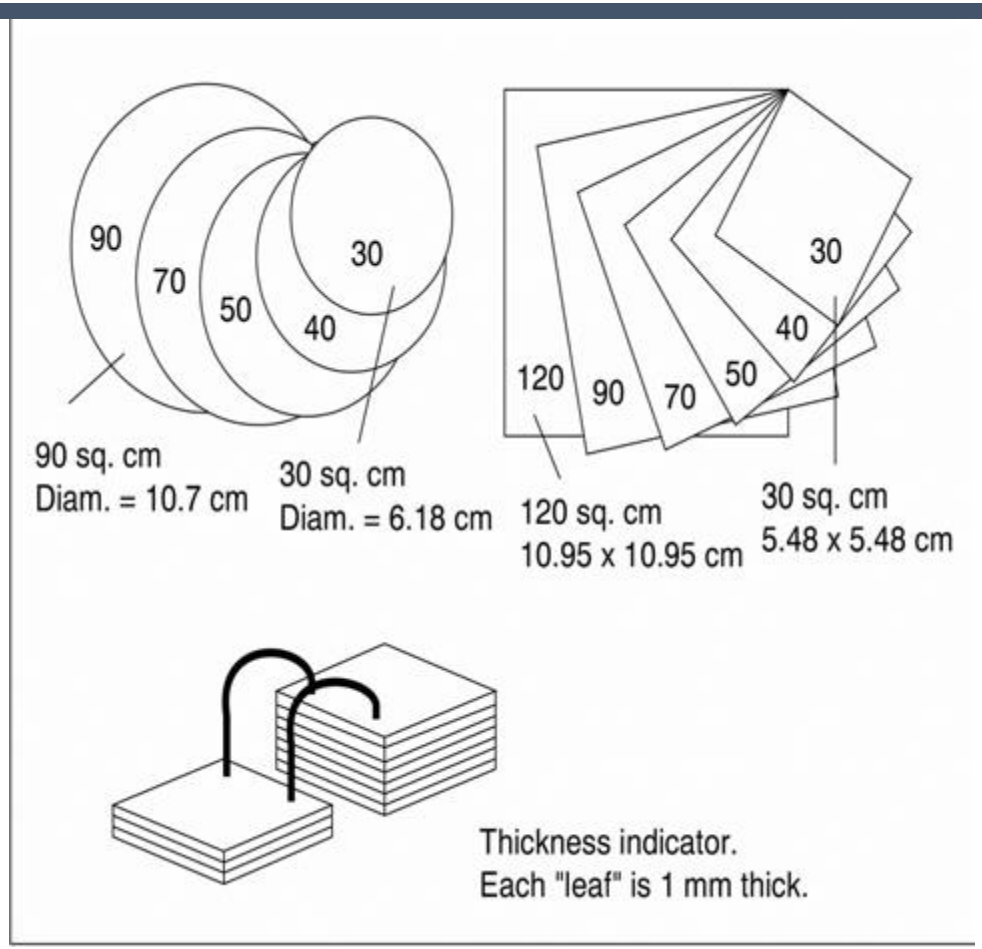
Two-dimensional measurement aids

- Drawings of real foods, abstract shapes, household measures
- Photographs of graduated portion sizes of foods
- Computer graphics
- Food package labels

Three-dimensional measurement aids

- Household measures: cups; spoons; ruler
- Real food samples: salted for preservation
- Simulated foods in graduated portion sizes
- Graduated food models (abstract shapes & geometrical models)

Measurement aids: graduated abstract food models



Different forms of 24 Hr recalls ……

3. Repeated 24-h recalls

- Used to estimate usual food intake
- The number of 24-h recalls depends on
  - Day to day variation in food intake within one individual: within-subject variation
    - In turn affected by: nutrient under study, the study population, seasonal variations in intake
- Non-consecutive days should be selected, when possible
- Repetition on subsample
  - If it is not possible to carry out on all respondents

Lesson 3

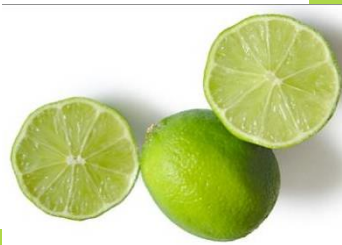
Objectives

- By the end of this session students will be able to discuss about the dietary assessment methods:-
  - Weighed food record
  - Estimated food record (food dairy method)
  - Food frequency questionnaire
  - Dietary history

5.2.2 Weighed food records

A. Important considerations

- Most precise method for assessing food intakes of individuals
- Respondent or research assistant weighs *ALL foods* & drinks (including snacks) consumed during a specified time period using dietary scales provided by the investigator
- Details of methods of food preparation also recorded



5.2.2 Weighed food records……

Important considerations cont…

- Detailed description of each food item including brand names (if known) also recorded
- For occasional meals eaten away from home:
  - Subject records amount & description of food eaten

  Or
  - Research assistant accompanies subject & weighs foods consumed by subject

NB: Observed weighed method

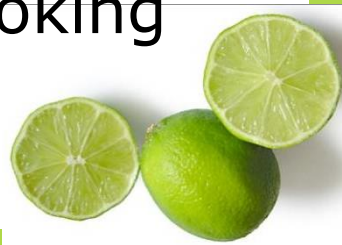
- Among disabled persons, elderly, children....

B. Advantages & limitations of records

Advantages of weighed record	Limitations of weighed record
•Does not rely on memory •Easier method for research assistants ; less training •Accurate data on portion sizes & mixed dishes •Research assistants in home can obtain accurate data on hygiene, sanitation, infant motor skills etc	•Invasive; respondent burden may be high; labor intensive; expensive •Recording may change eating pattern •Under-reporting may occur •Only literate subjects can complete record

5.2.3 Estimated food records

- The respondent records all foods & beverages eaten in the hh measures for a specified time period
  - The subjects, parents or care takers complete records
  - In developing countries: local food investigator
- Detailed description of all foods & beverages will be recorded
  - Brand names, method of preparation, cooking



5.2.3 Estimated food records……

- House hold measures are used for food amount
  - Cups, spoons, rulers (meat), number (egg)
- Errors may arise
  - To quantify portion size correctly
  - Conversion of volumes to weights
    - Usually completed by investigators

5.2.3 Estimated food records……

- The number of days included varies depending on the objective of the study
    - All days of the week should be equally represented
- Day-of-the-week-effect on food and nutrient intake
    - Weekend days should be proportionately considered to account it

5.2.4 Food Frequency Questionnaires

Important considerations

- Assess the frequency with which food items or food groups are consumed during a specified time period
- Frequency-of-use
  - Daily, weekly, monthly, yearly
- Avoid open-ended questions; preformatted lists best
  - Should feature simple, well-defined foods & food categories

5.2.4 Food Frequency Questionnaires…

Important considerations cont…

- Uses a standardized interview, a self administered machine-readable printed questionnaire or a computer administered questionnaire
- Designed to provide descriptive qualitative information about usual food consumption pattern
- Specific combination of foods as predictors for intakes of certain nutrients or non-nutrients
  - Dietary components concentrate on small number of foods or food groups
  - Fresh fruits & fruit juice as predictor of vit. C intake
  - Green leafy vegetables & carrot: caroteinoids

5.2.4 Food Frequency Questionnaires……

Important considerations cont…

- List of nutrients
  - Specific: vitamin C, A, Calcium, Dietary Fibre, sweetners, contaminants
  - Extensive: validity not equal for all nutrients

5.2.4.1 Semi-quantitative Food Frequency Questionnaires

- Quantify portion sizes:
  - Preferably based on age & sex-specific national survey data
  - Small ; medium; large
  - Average portion only

** Advantages & limitations of a semi-quantitative FFQs

Advantages of SQ-FFQ	Limitations of SQ-FFQ
Quick: several interviews/day Interviews can be automated	**Relies on memory: difficult for elderly, children, those eating from common pot**
Large coverage; low respondent burden and high response rate	**Need source of valid data for portion sizes: may overestimate nutrient intakes (Vit A)**
FFQ is standardized: reduces between- interviewer variation	**Respondents may have difficulty with concept of "usual" frequency and "usual" portion sizes**
Provides data on *usual intakes* over longer time frame	**Single SQ-FFQ rarely valid for multiple micronutrients: specific for each setting; must confirm validity and reproducibility**

For each food item, indicate with a checkmark the category that best describes the frequency with which you usually eat that particular food item.

Food item	More than once/day	Once per day	3-6times per week	Once or twice/ week	Once or twice/week	Twice/ month or less	Never
Beef,							
Pork							
Poultry							
Eggs							
Dried peas/ beans							
……							
Enter other foods not listed that are eaten regularly:							
1……							
2……							

5.2.5 Dietary History

**** Important considerations**

- Designed to determine usual intake over a specified time period
- Includes several techniques

1. Interview about usual overall eating patterns: meal times & snacks
   - Description of foods
   - Frequency of consumption
   - Usual portion sizes in household measures
2. FFQ on consumption of specific food items used to verify and clarify information from part 1
3. Three day estimated record
   - Portion sizes via household measures
   - Maximum time period for dietary history
     - over one month

5.2.5 Dietary History….

5.2.5.1. Modified Dietary History

- Three-day estimated record
  - 1- weekday; Saturday; Sunday
- Usual portion sizes of most commonly consumed foods on 3 days weighed by a dietician
- Weighted daily average intake calculated:
  - ((5 x weekday) + Saturday + Sunday) / 7

** Advantages and limitations of a Dietary History

Advantages of DH	Limitations of DH
Used for counseling patients	**Time consuming: up to 2 hours; no standardized method**
Provides data on *usual intakes at* the individual level that may be more representative	**Relies on household measures for portion size estimates; Tends to overestimate nutrient intakes**
	Respondents have difficulty with concept of usual intake and usual portion sizes

Sources of error in collecting and recording food intakes

Sources of error	24-hr recall	Estimated record	Weighed record
Omitting foods	++	+	+
Adding foods	++	-	-
Estimating food portion sizes	++	++	-
Estimating frequency of consumption	-	-	-
Day-to-day variation	++	++	++
Changes in diet	+	+	++
Coding errors	++	++	++

++ error is likely, + error is possible, - error is unlikely

Lesson Four

Presentation outline

- Selecting an appropriate diet assessment method

Objective

- By the end of this session students will be able to describe important points about selecting an appropriate diet assessment method

5.3 Selecting an appropriate diet assessment method

- **Factors to be considered when selecting a method for measuring food intake**
  - Level of study objectives
  - Measurement errors
  - Validity and reproducibility of the method
  - Characteristics of the study group
  - Respondent burden
  - Available resources

5.3 Selecting an appropriate diet assessment method…….

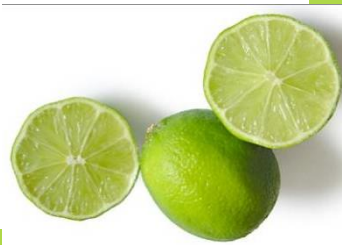
5.3.1 Level of objectives

- Level 1: Average intake of nutrients in a group
- Level 2: Proportion of population ‘at risk’
- Level 3: ‘Usual’ intakes of nutrients individuals for ranking within a group
- Level 4: ‘Usual’ intakes of food or nutrients in individuals for counseling or correlation

5.3 Selecting an appropriate diet assessment method…….

5.3.2 Measurement errors & their control

- Non-response bias
- Interviewer and/or respondent biases: all methods
- Respondent memory lapses: for recalls, FFQ, DH only
- Incorrect estimation of portion sizes: for recalls, FFQ, DH only
- Omission of supplements
- Errors in converting portion sizes to weight equivalents
- Errors in handling of mixed dishes
- Coding and computation errors



5.3 Selecting an appropriate diet assessment method…….

Non-response bias in dietary assessment

- A lack of response or poor compliance from a specific subset
- Results in non-representative sample
- Strategies to avoid non-response bias
  - minimize respondent burden
  - mail or telephone follow-ups
  - offer material rewards; incentives: regular medical checkups; feedback
  - train interviewers

5.3 Selecting an appropriate diet assessment method…….

Interviewer bias

- **Bias may arise from**
  - incorrect use of probing questions
  - incorrect recording
  - intentional omissions
  - distractions; confidentiality and/or rapport issues

5.3 Selecting an appropriate diet assessment method…….

- **Strategies to avoid interviewer bias**
  - standardized computer interviews
  - computer-assisted telephone interviews
  - avoid value judgments
  - train interviewers in ethnographic methods
  - random assignment of interviewer-respondent days

5.3 Selecting an appropriate diet assessment method…….

- ***Criteria and rationale to evaluate interviewer skills***

- **Privacy of interview:** to avoid disturbances thus hindering recall
- **Introduction & manner of interviewer:** enhances data completeness & accuracy
- **Manner of questioning & use of non-directed questions:** avoids bias
  - Did you add anything to your toast; NOT: Did you have butter on your toast
  - How much of that did you eat; NOT: Did you eat all your toast?

5.3 Selecting an appropriate diet assessment method…….

❑ **Criteria and rationale cont..**

- **Objectivity:** avoids bias
- **Probing:** completeness of information with no missing items
- **Use of food models and memory aids:** to enhance portion size estimates; to prompt reports of forgotten items
- **Documentation**: must be accurate for coding data
- **Final recall review**: correct misreported or forgotten items; omission of important details

5.3 Selecting an appropriate diet assessment method…….

Respondent biases

- systematic under- or over-reporting of overall food intake or for certain foods only: e.g. cakes, pies, snacks or alcohol

• Strategies to avoid respondent biases

- train interviewers to avoid socially desirable answers from the respondent
- conduct private interviews
- carry out weekend data collection
  - enhanced alcohol intake

5.3 Selecting an appropriate diet assessment method…….

Respondent bias: Underreporting energy intakes

- **Under-reporting consists of both:**
  - **Under-recording:** discrepancy b/n reported energy intake & measured energy expenditure but no change in BW due to
    - (a) failure to record all items consumed in survey, and/or
    - (b) underestimation of amounts consumed
  - **Under-eating:** Respondents eat less than usual or less than required to maintain BW.
    - Persistent under-eating leads to a decline in BW (body weight)
    - Occurs with ALL dietary assessment methods

5.3 Selecting an appropriate diet assessment method…….

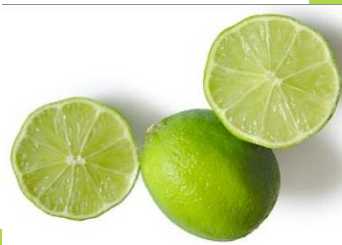
❑ Factors associated with under-reporting

- **Weight status**
  - Underreporting increases with increasing BMI
- **Age and sex**
  - women and older persons more often underreport
- **Socioeconomic status**
  - not a consistent effect-perhaps because of cultural differences
- **Health-related activities**
  - persons practicing dietary restraint; smokers more often underreport

5.3 Selecting an appropriate diet assessment method…….

Factors ass. with under-reporting cont …

- **Behavior**
  - inconvenience; embarrassment; guilt; respondent burden-weighing
- **Psychological effects: mixed results**
  - eating disorders; depression; social desirability scores
- **Types of foods or beverages consumed**
  - Differential underreporting of foods perceived as "bad" (Alcohol; cakes; cookies; sugar; candies; fats)



5.3 Selecting an appropriate diet assessment method…….

Respondent memory lapses

- Failure to recall foods actually consumed OR failure to report foods consumed
- Affected by age; gender; education level; ethnicity
- Strategies to avoid memory lapses
  - Supply picture chart of staple foods
  - Multiple-pass recall interviews
  - Probing questions; standard prompts
  - Memory aids: simulated foods; actual foods; graduated food models or photographs
  - Minimizing time between actual intake & its recall

5.3 Selecting an appropriate diet assessment method…….

Incorrect estimation of portion size

- Failure to quantify accurately amount of food consumed
  - vary with type and size of food
  - independent of age, body weight, SES, gender
- Misconception of 'average' portion size

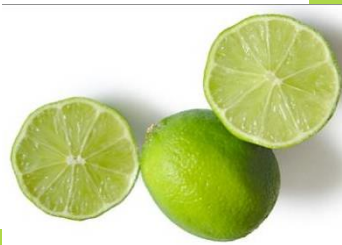
5.3 Selecting an appropriate diet assessment method…….

- **Strategies to avoid errors in portion size estimates**
  - use of measurement aids
    - abstract graduated food models
    - salted replicas of staple foods
    - graduated food models, drawings, or photographs
    - household measures : measuring cups, spoons
    - for meat: sausage diagram; ruler plus thickness measures
  - train interviewers and respondents

5.3 Selecting an appropriate diet assessment method…….

Errors recording supplement use

- No uniform definition of "supplement" or categorization
- No standard method to obtain data on supplement usage
- Various criteria used to define supplement users
  - Optimal time period over which dietary supplement usage should be recorded has not been established
- Magnitude of under-reporting of supplement use unknown
- Estimates of supplement intake do not consider bioavailability



5.3 Selecting an appropriate diet assessment method…….

Errors in handling mixed dishes

- **Recording errors during recall/record**
  - no recipe details and/or amounts of raw ingredients
  - no details of preparation or cooking methods
  - no details of amount of recipe consumed by respondent
- **Errors in estimates of the nutrient content**
  - weight change factors due to cooking ignored or inappropriate
  - nutrient retention factors ignored or inappropriate

5.3 Selecting an appropriate diet assessment method…….

Errors in handling mixed dishes cont…

- **Errors in assignment of mixed dish to food groups**
  - conventionally based on primary ingredient in each mixed dish
  - practice may increase contribution of fats and oils to energy intake
- **Strategies to avoid errors**
  - use of separate recipe form for recording mixed dishes
  - apply weight change/ nutrient retention factors based on local cooking methods
  - define 'prepared' foods vs. those coded with separate ingredients

5.3 Selecting an appropriate diet assessment method…….

Food coding errors

- Discrepancies in coding can confound:
  - potential changes in nutritional surveillance
  - between country differences in cross cultural studies

Compiling food identification codes with food group and food subgroup information

- Food identification codes often consist of 4 parts (10 digits) which together code information on:
  - Food Group
  - Food subgroup
  - Individual Food
  - Food processing/storage

Presentation outline

- Assessment of nutrient intakes from food consumption data
  - ✓Analysis of foods or diets
  - ✓Assessment of available nutrient intake

❑ **Objectives**

- By the end of this session students will be able to describe the assessment of nutrient intakes from food consumption data

5.4 Assessment of nutrient intakes from food consumption data

- Individual & population groups nutrient intake can be calculated from quantitative or semi-quantitative methods
- The calculation uses food composition values representative of the average composition of a particular food stuff

5.4 Assessment of nutrient intakes from food consumption data.....

Steps in assessment of nutrient intakes

1. Measuring food intake
2. Converting foods to nutrients
   - conversion of portion sizes to weight equivalents
   - compile or augment a local food composition database
   - coding the data and calculating nutrient intakes
3. Assessing distribution of `usual'' nutrient intakes
4. Evaluating dietary adequacy

5.4 Assessment of nutrient intakes from food consumption data.....

5.4.1 Analysis of foods or diets

**Food composition values

- Should represent average composition of a particular foodstuff on a year-round, nation-wide basis
- Represent total amount of constituent in food & not the amount absorbed & utilized by the body
  - thus nutrient intakes represent maximum available to the body
- Hence potential bioavailability of nutrients from the diets must always be considered

5.4 Assessment of nutrient intakes from food consumption data…..

How to calculate nutrient content of mixed dishes from recipes

1. Collect *weighed recipe data in the home for each mixed* dish consumed; calculate nutrient content of each recipe
2. Collect recipe data in recall interviews *BUT errors in:*
   - estimates of weight of raw ingredients
   - final weight/volume of cooked dish

3 Calculate average nutrient content of generic mixed dish from (1) or (2)

4. Compile a standard recipe for local mixed dishes when no household data available
   - employ local women (n=5) to cook recipe
   - record weights of raw ingredients (as eaten)
   - record final weight of cooked dish
   - calculate *average nutrient content of mixed dish from five recipes*

5.4 Assessment of nutrient intakes from food consumption data…..

Calculating nutrient content of mixed dishes based on nutrient values for *raw ingredients*

- Calculate weight of each *raw ingredient*
- Calculate nutrient content of each *raw ingredient*
- Adjust nutrient content for each raw ingredient for losses during cooking with nutrient retention factors
- Sum raw weights to give *total raw weight of mixed dish*

5.4 Assessment of nutrient intakes from food consumption data…..

- **Calculating nutrient content of mixed dish cont…**
- Adjust total raw weight for any weight change after cooking
- Calculate total nutrient content of cooked dish by summing nutrient values of weight of each cooked ingredient
- Convert nutrient values for total cooked dish to values per 100 g
- Assign a single food code for this mixed dish
- Enter these nutrient values into the FCT for mixed dish

Analysis of Dietary Data

Evaluation of Nutrient intake data #1

- Foods can be converted into nutrients using food composition tables or nutrient data banks

- Then the nutrient intake will be compared to the RDAs(RNI) to determine the adequacy of intake

Food composition Table of Ethiopia

ITEM No.	FOOD & DESCRIPTION	LOCAL NAME					COMPOSITION IN TERMS OF 100 GRAMS EDIBLE PORTION									
			Food Energy	Protein	Fat	CHO (inc.fiber)	Fiber	Ash	Calcium	Phosphorous	iron	β-carotene Equiv.	Thiamine	Riboflavin	Niacin	Tryptophan	Ascorbic acid
	CEREALS & CEREAL PRODUCTS		Calories	Grams	Grams	Grams	Grams	Grams	Milligrams	Milligrams	Milligrams	Micrograms	Milligrams	Milligrams	Milligrams	Milligrams	Milligrams
1	Barley, black, Hordeum vulgare L.: flour	Gebs, t'iqur, duqyet	370.90	10.10	1.70	78.80	2.40	1.30	28.00	290.00	9.60	0.00	0.27	-	-	-	0.00
2	Barley, black, Hordeum vulgare L.: enjera	Gebs, t'iqur, injera	124.90	3.40	0.10	27.60	0.80	0.60	34.00	96.00	3.60	0.00	0.13	0.07	1.00	-	0.00
3	Barley, black, Hordeu	Gebs, fiqur	195.50	5.10	0.40	42.90	1.10	1.10	13.00	144.00	5.10	0.00	0.20	0.09	1.90	-	0.00

Evaluation of Nutrient intake data #2

- Calculating Nutrient adequacy ratio(NAR) and Mean adequacy ratio(MAR)
- NAR = $\frac{\text{Subjects daily intake of a nutrient}}{\text{RDA of that nutrient}}$

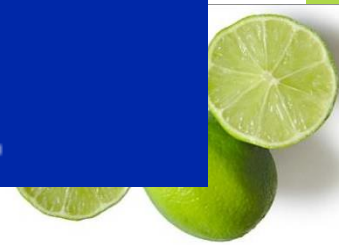
MAR = $\frac{\text{Sum of the NARs for X nutrients}}{\text{X}}$

NAR- *represents an index of adequacy for a nutrient*

MAR-*Reflects an index of the overall quality of the diet*

Qualitative Dietary Data Analysis

- Dietary Diversity Scores (DDS)
- Food Variety Scores (FVS)
- Animal Source Food (ASF)
- Food consumption Score (FCS)



FANTA Food Groups

HDDS **Food Groups** **(Score: 0-12)**	**IDDS (Children)** **Food Groups** **(Score: 0-8)**
Cereals	Grains, roots or tubers
Roots and tubers	Vitamin A-rich plant foods
Vegetables	Other fruits or vegetables
Fruits	Meat, poultry, fish, seafood
Meat, poultry, offal	Eggs
Eggs	Pulses/legumes/nuts
Fish and seafood	Milk and milk products
Pulses/legumes/nuts	Foods cooked in oil/fat
Milk and milk products	
Oils/ fats	
Sugar/honey	
Miscellaneous	

7 Food groups for Complementary feeding

- **. Minimum Dietary Diversity:-** proportion of children with 6–23 months of age who received foods from four or more food groups of the seven food groups.

1. Grains, roots and tubers
2. Legumes and ~~nuts~~
3. Dairy products
4. Flesh food
5. Eggs
6. Vitamin A rich fruits and vegetables
7. Other fruits and vegetables

Consumption of any amount and quality of food from each food group was sufficient to 'count' (WHO,2008)

> 4 food groups is acceptable(World Health Organization 2010)

Food groups

Table 1
Percent of children having food consumed from specific food groups

6 food groups (%)	9 food groups (%)	13 food groups (%)	21 food groups (%)
All starch staples (99.6)	All starch staples (99.6)	All starch staples (99.6)	All starch staples (99.6)
All dairy (56.2)	All dairy (56.2)	All dairy (56.2)	Milk/yogurt (55.8)
			Cheese (3.7)
All animal foods excluding dairy (57.8)	Organ meat (5.5)	Organ meat (5.5)	Organ meat (5.5)
	Eggs (13.3)	Eggs (13.3)	Eggs (13.3)
	Flesh foods (50)	Flesh foods (46.8)	Red meat (26.7)
		Small fish eaten whole (4.2)	Chicken/birds (23.4)
			Insects, grubs small animals (0)
			Large whole fish/seafood (4)
			Small fish (4.2)
All legumes & nuts (19.5)	All legumes & nuts (19.7)	All legumes & nuts (19.7)	Cooked dry beans and peas (9.5)
			Nuts and seeds (8.9)
			Soybeans & products (2.6)
Vitamin A-rich fruit & vegetables (23.4)	Vitamin A-rich dark green leafy vegetables (12.2)	Vitamin A-rich dark-green leafy vegetables (12.2)	Vitamin A-rich dark-green leafy vegetables (12.2)
	Other vitamin A-rich vegetables & fruit (12.1)	Vitamin A-rich deep yellow/ orange/red vegetables (11.5)	Vitamin A-rich deep yellow/orange/ red vegetables (11.5)
Other fruits & vegetables (53.9)	Other fruits & vegetables (53.9)	Vitamin A-rich fruits (0.7)	Vitamin A-rich fruits (0.7)
		Vitamin C-rich vegetables (20.8)	Vitamin C-rich vegetables (20.8)
		Vitamin C-rich fruits (9.5)	Vitamin C rich fruits (9.5)
		All other fruits & vegetables (40.5)	All other fruits (16.9)
			All other vegetables (30.8)

Calculating Food consumption scores(WFP)

Food item	Food group	Weight (A)	Days eaten in past 7 days	Score
Maize, rice, sorghum, millet, bread and other cereals	Cereals and tubers	2		
Cassava, potatoes and sweet potatoes				
Beans, peas, groundnuts and cashew nuts	Pulses	3		
Vegetables, relish and leaves	Vegetables	1		
Fruits	Fruit	1		
Beef, goat, poultry, pork, eggs and fish	Meat and fish	4		
Milk, yoghurt and other dairy	Milk	4		
Sugar and sugar products	Sugar	0.5		
Oils, fats and butter	Oil	0.5		

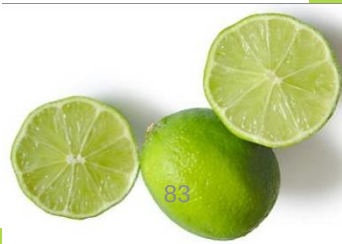
Interpretation of FCS (3)

FCS	Interpretation
≤ 21	Quantity and quality inadequate
21.5 - 35	Quality inadequate (quantity?)
> 35	Adequate diet

Indirect Methods of Nutritional Assessment

❑ Indirect methods:

- Include assessment of indicators of the food and nutrition situations in the area/ region of interest by looking at certain data that are closely related to malnutrition or which are aggravated by malnutrition.



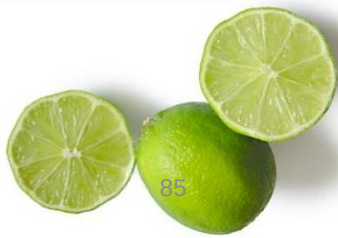
Indirect methods(E)

These include three categories:

- Ecological variables such as crop production
- Economic factors e.g. per capita income, population density & social habits
- Vital health statistics particularly infant & under 5 mortality & fertility index

INDIRECT METHODS …..

- The methods include:
  - Cause specific mortality rates
  - Age specific mortality rates
  - Health service statistics
  - Rate of nutritionally relevant infections
  - Meteorological data (rainfall data)
  - Production pattern and distribution pattern
  - Income levels
  - Market price of foods
  - Predominance of cash crops



CHAPTER 6
NUTRITIONAL ASSESSMENT OF HOSPITAL PATIENTS

- Malnutrition is associated with impaired immune function, physical dependence, longer hospital stay and increased morbidity and mortality.
- Thus, it is imperative to address the nutritional needs of hospitalized patients.
- Nutritional depletion is common amongst hospital admissions, especially the elderly, and hospitalization often results in further deterioration.

Cont….

- Nutritional assessment of hospital patient
  - aims to define the nutritional status of patients, characterize any clinically relevant malnutrition, & monitor any changes in nutritional status during nutritional support.
  - Clinically relevant malnutrition ca be defined as the state of altered nutritional status that is associated with an increased risk of adverse clinical events such as complications or death

6.1 Screening using a single index

- Biochemical or anthropometric measurements & sometimes functional tests are the most often used for screening based on a single index

A. Screening with a single biochemical index

B. Screening using anthropometry

C. Screening using other functional indices

A. Screening with a single biochemical index

- E.g. of biochemical tests that show nutritional status & outcome of hospital patients
  - Serum transferrin & hospital mortality
  - Serum albumin: identify those who fail to respond to nutritional support or who might benefit from nutritional support
    - Serum albumin was associated with a longer hospital stay, reduced ability to return home &increased mortality.

B. Screening using anthropometry

- Used in a situation, for example “Interpretation of serum protein” levels in sick hospital patients is often confounded by the underlying disease state.
- Which makes it difficult to identify patients with PEM.
- Therefore, “serum protein level” are replaced by anthropometry for screening.
- Preadmission & preoperative weight loss are both known to be associated with increases in postoperative complications, duration of hospital stay, & postoperative mortality.

C. Screening using other functional indices

- There are significant relation between the functional effects of nutritional depletion & clinical outcomes.
- Physiological functional impairment is likely to occur when <20% of body protein is lost.
- Examples of functional indices exhibited in hospital patients
  - muscle weakness
  - poor wound healing
  - impaired thermoregulation
  - depression,
  - Irritability and fatigue

6.2 Multiparameter screening

- There is no universally accepted multi-parameter scoring system of nutritional status
  - Mini nutritional assessment
  - Subjective global assessment
  - Prognostic nutritional index & nutritional risk index

Multiparameter screening

- **Mini nutritional assessment**: to detect malnutrition in elderly patients
- **Subjective global assessment**: predict patients at high risk of developing complication.
- **Prognostic nutritional index & nutritional risk index:** developed to help clinicians decide when specialized nutrition therapy is required.

END OF THE COURSE

- 10Q U FOR UR ATTENTION