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Nutritional Data Analysis

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Nutritional Data analysis

Learning Objectives

At the end of this session, the learners should be able to:

- Indentify the software to be used for analyzing anthropometric data for the different age groups
- Analyze anthropometric data
  - Convert measurements to indices
  - Convert indices to indicators
- Other software used dietary data analysis
    - food processor software

1.

Softwares

for analysing Anthropometric Data

Sofwares

- WHO Anthro
- WHO AnthroPlus
- ENA smart
- Epinfo

1.1 WHO Anthro

- **WHO Anthro,** is a software which was published in 2006 together with the first set of the WHO Child Growth Standards (i.e. weight-for-age, height-for-age, weight-for-height and BMI-for-age)

- **In 2008 WHO Anthro was updated to include the second set of attained growth indicators:**
  - Head-circumference-for-age,
  - arm-circumference-for-age,
  - triceps and subscapular skinfold-for-age, and to allow users to choose a French or Spanish language version.
  - Thus Anthro facilitates the detection of stunting, wasting , underweight, and overweight in individuals and populations from 0-10 years.

1.2 WHO AnthroPlus

- **WHO AnthroPlus** was developed to facilitate the application of the **WHO Reference 2007 for 5-19 years to monitor the growth of school-age children and adolescents**.

- Thus AnthroPlus **facilitates the detection of thinness, underweight, overweight and obesity in individuals and populations from 0-19 years**.

- WHO AnthroPlus consists of three modules:
  - Anthropometric calculator (AC)
  - Individual assessment (IA)
  - Nutritional survey (NS)

- Each module has specific functions, i.e. to **assess an individual's nutritional status**, **follow a child's growth from birth to 19 years**, and **conduct nutritional surveys covering the same age group**, respectively.

WHO AnthroPlus

Icon	Description
	Add
	Back/Return to the higher-level screen
	Cancel
	Delete (child, record, survey, etc.)
	Edit
	Graph
	Reset graph to original dimensions
	Import
	Open
	Reset
	Restore
	Save
	Search
	Add new section (for managing additional data)
	Add new variable (for managing additional data)
	Archive
	Add to Archive
	Copy to clipboard
	Standard report (Excel)
	Estimates report (Excel)
	Export
	Filter
	Clear filter
	Options
	Print

1.3. Other Softwares

- ENASmart

- EPINFO

Data Required

- The child's
  - **age**
  - **weight**
  - **edema status (yes/no)**
  - **length/height and**
  - **type of measurement (recumbent or standing**) for 0-60 months are the basic variables required to derive the nutritional status in terms of weight-for-age, height-for-age and BMI-for-age.

- For children **61 months and older the "type of measurement**" information is not required, hence the box appears greyed out.
- Tab and Enter keys as well as the mouse-click allow the user to move from one field to the next.

- The software uses **date of birth (DoB)** and **date of visit (DoV)** to derive and display age in years and completed months (total completed months in parenthesis).

- Age in days is derived using the formula
  - = : Number of months **× 30.4375**. For example age in days at 24 months is: 24 × 30.4375 = 730.5 (rounded to 731 days).

- Given that the WHO **standards are in units of days** and **WHO reference tables are in months**, the age information is derived accordingly.

Age Calculation

- **To apply the WHO standards for 0-5 years** the software uses DoB and DoV to calculate the precise age in days:

  ## Age (in days) = DoV-DoB

- **To apply the WHO reference 2007 for 5-19 years**, the software uses DoB and DoV to calculate the age in months.

  ## Age (in months) = DoV-DoB

- If the exact day of birth is unknown, the user should fill in the **year and month of birth** and tick the box next to **"Approximate date"**. When that field is ticked, the software attributes a random day to complete the date of birth.

- This date is then used to derive an exact age in months.

- If the **year and month of birth are not known the observer is advised to use a local events calendar** to identify two events between which the birth took place and thus estimate an approximate month and year of birth

- A slider control gives the percentile position of the measurement within the range **0-100%**

- The individual module enables the user to collect and save data for children **who are repeatedly examined up to the age of 19 years.**

Local Events Calendar

Year & Month of Birth	Age in moths	Season & legend	Legend/crop	Local Events
2005				
Yekatit	0	Bega		
Tir	1	Bega		Timiket (11) Mewulid (16)
Tahisas	2	Bega		Kulubi Gabriel (19)
Hidar	3	Tseday		Michael (12)
Tikimit	4	Tseday	Land Preparation	Eid al-Adha/Arafa (16) Gena (29)
Meskerem	5	Tseday	Land Preparation	New year (01) Meskel (17) Start of schools

Length / Height Adjustments

- For children less than 61 months (1857 days), the child's age influences **how the software handles the variables Length/Height and Measured**.

  – For example, if a child is 24-60 months old (731-1856 days) and has a length measurement, **0.7 cm is subtracted to derive an estimated height.**

  – Similarly, if a child is younger than 24 months and is measured standing, **the software adds 0.7 cm to derive an estimated length.**

- To enhance validity at data-entry and data-import, **the software is programmed to accept the following measurement ranges** (inclusive for minimum and maximum limits).

- Should the user enter a value outside those ranges, the entry field returns to blank.

Measurement	Min	Max
Weight (kg)	0.9	275.0
Length/height (cm)	38.0	230.0

Indices based on the WHO standards for preschool children and based on the WHO reference for the older children

Indices	Age ranges
Height-for-age	0 - 19 Years
Weight-for-age	0 - 10 Years
BMI-for-age	0 - 19 Years

- For **older children the interpretation** of height-for-age and weight-for-age is as for children 0-60 months,

- However, **for BMI-for-age the recommended cut-offs for overweight and obesity are not the same as in preschool children.**

  – For children 5-19 years the **+ 1 SD in the WHO reference** (equivalent to the **85th percentile**) coincides at 19 years with the adults cut-off of BMI = **25 [kg/m2],** which is the cut-off for overweight.

  – Similarly, **the + 2 SD** (equivalent to the 97th centile) coincides at 19 years with the adults cut-off of BMI = **30 [kg/m2]= = obesity,**

- Consequently the + 3 SD cut-off will be considered **severely obese (**corresponding to a BMI of above **40 [kg/m2]).**

- For **thinness and severe thinness** the cut-offs are -2 and -3 SD, respectively

No values for z-scores

The z-scores appear as not available (NA) when:

- Child's age is above **120 completed months, consequently weight-for-age** is NA

- Child's age **is above 228 completed** months, consequently all indicators are NA child's age is unknown, consequently WAZ, HAZ and BAZ are NA

Flags and error tracking

WHO standards (0-60 months):

Indicator	Lower SD	Upper SD
WAZ	-6	+5
HAZ	-6	+6
BAZ	-5	+5

WHO reference (61 months-19 years):

Lower SD	Upper SD
-6	+5
-6	+6
-5	+5

What could the flags indicate

Flag	Error tracking
None	Valid z-scores were derived for all indicators.
HAZ	This could be an extremely short or tall child, or length/height data missing. If missing the HAZ and BAZ cells are empty. It is recommended to double check the height data to assure that it is correct and consistent on the data collection form and the computer file. Alternatively, the age could be incorrect or missing; therefore one should look at the WAZ value to see if it is extreme as well or blank.
WAZ	Either weight or age may be incorrect or missing.
HAZ & WAZ	Age information may be incorrect, out of range or missing.
BAZ	This may indicate an unusual combination of WAZ and HAZ.

Data entry | Results

➕ 📂 ❌ | 🔽 933 record(s)

	Weight (kg)	Oedema	Recumbent	Height (cm)	WAZ	HAZ	BAZ	Flag	Wt. factor
▶	50.70	No	No	153.70		-1.13	0.94		7832.795116
	84.60	No	No	181.70		1.44	1.66		6001.779447
	76.70	No	No	166.60		0.14	2.23		7148.13991
	46.50	No	No	144.30		-0.25	1.65		44768.14116
	126.40	No	No	171.40		-0.07	4.21		6228.652014
	18.80	No	No	114.60	-1.27	-1.07	-0.87		12089.97782
	49.70	No	No	153.10		-0.85	0.98		30519.38934
	61.80	No	No	159.90		-0.14	1.26		7066.952328
	39.40	No	No	162.90		1.36	-1.90		6254.927127
	25.30	No	No	129.20	0.34	0.87	-0.32		78518.37879
	83.40	No	No	192.10		2.86	0.93		37338.13385
	56.00	No	No	162.50		0.18	0.40		33774.08331

Summary

Index	SOFTWARE TO BE USED FOR THE DIFFERENT AGE GROUPS			
	0-10 years	0-5 years	Adolescents	0-19 years
Weight for age	WHO anthro WHO Anthroplus	WHO anthro WHO Anthro ENA smart	-	-
Height for age	WHO anthro WHO Anthroplus	WHO Anthro Anthroplus ENA smart	WHO Anthroplus	WHO Anthroplus
Weight for Height	WHO anthro WHO Anthroplus	WHO Anthro Anthroplus ENA smart	-	-
BMI for age	WHO anthro WHO Anthroplus	WHO Anthro AnthroPlus	WHO Anthroplus	WHO Anthroplus

- Exporting and merging anthropometric data with other data

- Eliminating Flags/outliers

2. Analysis of Dietary Data

Learning Objectives

At the end of the lecture the learners should be able to:

- Analyse dietary data both qualitatively and quantitatively.
- Convert foods **into** nutrients using a software(food processor)
- Develop MARs and NARs

Evaluation of Nutrient intake data #1

A. Qualitative Dietary Data Analysis

- Foods can be converted into nutrients using **food composition tables** or **nutrient data banks**
- Convert foods **into** nutrients using a software(food processor)

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

Evaluation of Nutrient intake data #2

- Calculating Nutrient adequacy ratio(NAR) and Mean adequacy ratio(MAR)

- NAR = $\dfrac{\text{Subjects daily intake of a nutrient}}{\text{RDA of that nutrient}}$

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

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

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

B. Qualitative Dietary Data Analysis

- Dietary Diversity Scores (DDS)

- Food Variety Scores (FVS)

- Animal Source Food (ASF)
- Food consumption Score (FCS)

1. What do we need for DDS?

- **Dietary data**
  - 24 hours dietary recall
  - FFQ
  - Dietary History
  - Weighed record method

- **Consumer Definition**

- **Food groups**

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	

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)

2. What do we need for FVS & ASF?

- **Dietary Data**

    - 24 hours dietary recall
    - FFQ
    - Weighed record method

- **Consumer definition**

3. Calculating Food consumption scores(WFP)

Food item	Food group	Weight (A)	Days eaten in past 7 days (B)	Score A x B
Maize, rice, sorghum, millet, bread and other cereals	Cereals and tubers	2	7	14
Cassava, potatoes and sweet potatoes				
Beans, peas, groundnuts and cashew nuts	Pulses	3	1	3
Vegetables, relish and leaves	Vegetables	1	2	2
Fruits	Fruit	1	0	0
Beef, goat, poultry, pork, eggs and fish	Meat and fish	4	0	0
Milk, yoghurt and other dairy	Milk	4	1	4
Sugar and sugar products	Sugar	0.5	4	2
Oils, fats and butter	Oil	0.5	2	1
			Composite score	26

Interpretation of FCS (3)

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

Example: frequency and diversity over the last 7 days

Household 1

- **Maize = 4 days**
- **Tubers = 3 days**
- **Rice = 1 day**
- **Beans = 5 days**
- **Meat = 1 day**
- **Cooking oil = 7 days**
- **Leaves = 3 days**

Household 2

- **Rice = 7 days**
- **Tubers = 2 days**
- **Meat = 5 days**
- **Cooking oil = 7 days**
- **Vegetables = 3 days**

1. **What are the scores for each household?**
2. **Who enjoys better food intake and why?**

Household 1 = 41.5 scores
Household 2 = 44.5 scores

4. Minimum Meal Frequency(WHO Recommendation)

- **Minimum meal frequency (%)Proportion of breastfed and non-breastfed children 6-23.9 months of age who receive solid, semi-solid, or soft foods or milk feeds the minimum number of times or more.**

- **Minimum meal frequency is defined as:**
  - 2 times for breastfed infants 6–8 months
  - 3 times for breastfed children 9–23 months
  - 4 times for non-breastfed children 6–23 months

Thank You