Training Workshop on: PoU

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Virtually - ESCWA

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Introduction to the Prevalence of Undernourishment (PoU)

Sustainable Development Indicator 2.1.1
Objectives

- Defining the prevalence of undernourishment, highlight on its benefits and origins
- Understanding the main characteristics of the PoU
- Describing what the PoU measures and what it does not measure
The PoU indicator:

PoU is an estimate of the proportion of the population whose habitual food consumption is insufficient to provide the dietary energy (Kcal) levels that are required to maintain a normal, active and healthy life.

• It is expressed as a percentage (%).
• It measures progress towards SDG Target 2.1.
The PoU indicator:

Under SDG Target 2.1

By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round
The benifets of the PoU

Provides useful information about food (in)security’s general trends over time as estimates have been published by FAO for:

1. global and regional monitoring since 1974, and
2. countries since 1999.
The origins of the PoU

P.V. Sukhatme in 1961 for the first time proposed to monitor food security by estimating the prevalence of undernourishment in the population

Based on two revolutionary ideas:

1. Part of the variability observed in food consumption is not linked to food insecurity, BUT it reflects the normal variability due to differences in food requirements,

2. Food Security is not just a matter of availability BUT also of access to food.

Application of Sukhatme method become possible for most countries where household surveys including food consumption module are available.
The origins of the PoU

Then...

- The FAO World Food Survey (1977, 1987, 1996) published estimates of the PoU at global and regional level

- The 1996 World Food Summit, suggested reducing by half the number of undernourished people in the world by 2015

Taking as the baseline the FAO latest available estimates of the number of undernourished people in the world in 1990-92 (published with the sixth edition of the World Food Survey)
The origins of the PoU

• Since **1999**, FAO publishes estimates of the PoU in *The State of Food Insecurity in the World* (14 editions) for most of the countries in the world and for all the regions.

• in **2000**, a similar less ambitious target, to reduce by half the proportion of people suffering form hunger by **2015**, was set with the Millennium Development Goals, as part of MDG 1: “eradicate extreme poverty and hunger.”
The origins of the PoU

- PoU has been always debated and discussed
  - FAO International Symposium 2002
  - Committee on Food Security (CFS) Round Table 2011
  - Another FAO International Symposium 2012
- In 2015, the PoU is chosen as one of the SDG monitoring indicators for Goal 2 – Target 2.1
- Last, in 2017, 2018, 2019 and 2020, national, regional and global estimates are published in the new publication The State of Food Security and Nutrition in the World
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Questions?
PoU’s Dietary Energy Approach

An individual is considered to be *undernourished* if the level of her/his *habitual* dietary energy *intake* is below the minimum dietary energy *requirement* that assumed to be appropriated by nutritionists.

1. Dietary energy intakes
2. Dietary energy requirements

   Steady state: intakes = requirements
Dietary Energy Intake (DEI)

- Humans require energy for a long-term, active and healthy life,
- The energy is taken by consuming food. When people ingest food, the body’s biological processes transform it into energy and nutrients,
- The amount of energy (kilocalories) the body gets from the food is called Dietary Energy Intake.
Dietary Energy Requirements (DER)

• The amount of energy that the human body requires to live a long-term active and healthy life is called **Dietary Energy Requirements**,  

• For a **group of individuals** there is a **range of energy requirements** that are **compatible with long-term good health**,  

• Factors that affect the individual requirements are: **age, physiological status, gender, body weight and lifestyle**.
PoU: Probability Distribution Framework

The estimation of the undernourished in a population **CANNOT** be viewed as a simple accounting exercise involving:

I. the comparison of the observed household Dietary Energy Consumption (DEC) with the estimated household Dietary Energy Requirement, and

II. counting the individuals in the households with DEC < DER

**Instead**, it must be viewed within a probability distribution framework
The Distribution of DER

- The energy requirement of individuals are represented by a distribution where the values of energy requirement have a range of acceptable levels.

- Each sex-age group has its own distribution of dietary energy requirements.

Distribution of dietary energy requirements of a group of individuals within a population

Acceptable range of dietary energy requirements compatible with long-term good health
Probability Distribution of DEI

- The dietary energy intake of individuals are distributed within a population and represented by a probability distribution where the values of dietary energy intake are associated to a probability of occurrence.

- Each population group has its own probability distribution of dietary energy intake.
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\[
PoU = \int_{x < MDER} f(x | DEC; CV) \, dx
\]

- PoU represents the fraction of the population with dietary energy intake below the minimum dietary energy requirements (MDER).  
- The integral calculates the area under the curve of the distribution function \( f(x | DEC; CV) \) for values of \( x \) less than the MDER.  
- The figure illustrates the distribution of dietary energy intake, with \( CV_x > CV_r \), indicating that the variability of individual dietary intake exceeds that of the average individual representative of the population.  
- The shaded area represents the proportion of the population with undernourishment.
PoU Definition

*Within a probability distribution framework*, the PoU is the **probability** that a **randomly selected individual** from a **population** has an **habitual access to food** which **does not** provide the **dietary energy necessary to cover her/his normative energy requirements**

I. It measures the proportion of individuals in a population suffering from **chronic hunger** (a state, lasting for at least one year, of inability to acquire enough food to satisfy the energy requirements)

II. It is an **estimate** **NOT** a **direct** measure.
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Questions?
The fundamental elements of the PoU

1. The average **Dietary Energy Consumption (DEC)** – kcal/cap/day
2. The inequality in access to food, the **Coefficient of Variation (CV)**
3. The **Minimum Dietary Energy Requirement (MDER)**, the threshold – kcal/cap/day
The Average Dietary Energy Consumption

The mean can be estimated from:

1. **The individual dietary intake surveys:**
   - Rarely conducted to a group of population representative at national or subnational levels

2. **The household consumption and expenditure surveys (HCES):**
   - There is no information on **intra-household** distribution of food
   - They are developed to **inform economic policy** not to capture food consumption

3. **The Food Balance Sheets (FBS):**
   - Suffers from issues of **coverage** (i.e., non-commercial production, accounting for losses etc.), precision (unreported trade, stocks).
The Coefficient of Variation

The CV can be estimated from:

1. The **individual dietary intake surveys:**
   - Rarely conducted to a group of population representative at national or subnational levels
   - There is an excess variability due to day-to-day variation in individual’s intake

2. The **household consumption and expenditure surveys (HCES):**
   - There is no information on intra-household distribution of food
   - They are developed to inform economic policy not to capture food consumption
   - There is an *excess variability* due to survey design and the presence of *outliers.*
The Minimum Dietary Energy Requirement

The DERs including MDER can be estimated using:

1. Data on population structure by age and gender
2. Median height by age and sex
3. International standards of weight-for-age and BMI
4. Physical activity level in the population
5. Birth Ratio
6. Under 5 Mortality Rate
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Questions?
What PoU measures

• *Undernourishment (hunger)* terms have been usually interpreted as referring to a food insecurity situation of continued inability to obtain **enough food** (quantity of food sufficient to conduct a healthy and active life) by a **person**, ...

... but their meaning is **narrower**.

• **FAO’s undernourishment can be considered as the extreme form of food insecurity**, arising when even the caloric supply is not adequate to merely cover the **basic dietary needs**.
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What PoU measures

FAO monitors the “enough food” using the dietary energy intake. Accordingly, a human being is considered undernourished if the level of her/his habitual dietary energy intake is below the minimum level that nutritionists would consider appropriate (MDER).

FAO monitors the “continued inability” using the year as reference period, focusing on the habitual chronic undernourishment:

- long enough for the consequences of low food intake to be harmful to health).

Note: PoU is NOT meant to capture short-term effects of temporary crisis (acute food insecurity).
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Questions?
Overcoming three persistent misconceptions

1. PoU is **NOT** an indicator of food availability

2. The **Average Dietary Energy Requirement** cannot be used as cut-off point.. But the **Minimum**

3. PoU estimation is **NOT** based on **headcount** of households who report food consumption below a certain threshold
Overcoming three persistent misconceptions

“Why assuming a parametric distribution for food consumption? It imposes ad hoc restrictions and it is not needed for a headcount approach. Why not simply refer to the empirical distribution of a sample?” [examples: Smith 1999; IFPRI, 2006]

The PoU is NOT a headcount approach..

The estimate of PoU in a country is not obtained simply by drawing a sample of the population and counting the cases that are classified as undernourished:

I. Conceptually, rather simple procedure

II. Practically unfeasible because we cannot:
   i. Monitor habitual consumption of individuals
   ii. Observe actual individual requirements
Questions?
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Thank Your For Your Attention