SIAP Training Program for Supporting the Monitoring of Sustainable Development Goals (SDGs) 2030 in the Asia Pacific Region

SDG Indicators under FAO Custodianship

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Food and Agriculture Organization of the United Nations | SUSTAINABLE DEVELOPMENT GOALS

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

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

- Indicator 2.1.1: Prevalence of undernourishment (PoU) (Tier I)
- Indicator 2.1.2: Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) (Tier II)

  ➢ They provide complementary information on food access based on different methods and sources of data

•SDG INDICATOR 2.1.1: PREVALENCE OF UNDERNOURISHMENT

Food Security

- Food security exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (World Food Summit, Rome 1996).
- Four dimensions:
  - ✓Availability
  - ✓Access
  - ✓Utilization
  - ✓Stability

P_oU - Concept

- The indicator was developed for monitoring the World Food Summit (Rome 1996) Goal "**reducing the number of undernourished people to half their present level no later than 2015**".
- After introduction of MDGs, have been used also to monitor the MDG Target 1c "**halving the proportion of people who suffer from hunger by 2015**"
- The indicator has been calculated since 1999 and regularly reported in:
  - ✓the annual "State of Food Insecurity in the World (SOFI)" FAO flagship report
  - ✓the MDG progress reports

P_oU - Concepts

- Undernourishment is defined as the condition by which a person has access, on a regular basis, to amounts of food that are insufficient to provide the energy required for conducting a normal, healthy and active life, given his or her own dietary energy requirements.
- While the undernourishment condition applies to individuals, due to conceptual and data-related considerations, the indicator can only be referred to a population, or group of individuals.
- The prevalence of undernourishment is thus an estimate of the percentage of individuals in a group that are in that condition, but it does not allow for the identification of which individuals in the group are, in fact, undernourished.

PoU - Concept

Individual headcounts of undernourishment are not possible:

- firstly, due to the cost of individual dietary intake surveys, individual food consumption is measured only in a few countries, every several years, on relatively small samples;
- secondly, individual energy requirements are practically unobservable with standard data collection methods. This means that even if it were possible to obtain accurate observations of the individual dietary energy consumption, this would be insufficient to infer the undernourishment condition at individual level, unless integrated by the observation on the physical status (body mass index) and of its dynamic over time, of the same individual.

PoU - methodology

PoU is thus the probability that a randomly selected individual in a population regularly consumes the quantity of food that is unable to cover his/her normal energy requirements. It is based on a model requiring 4 parameters:

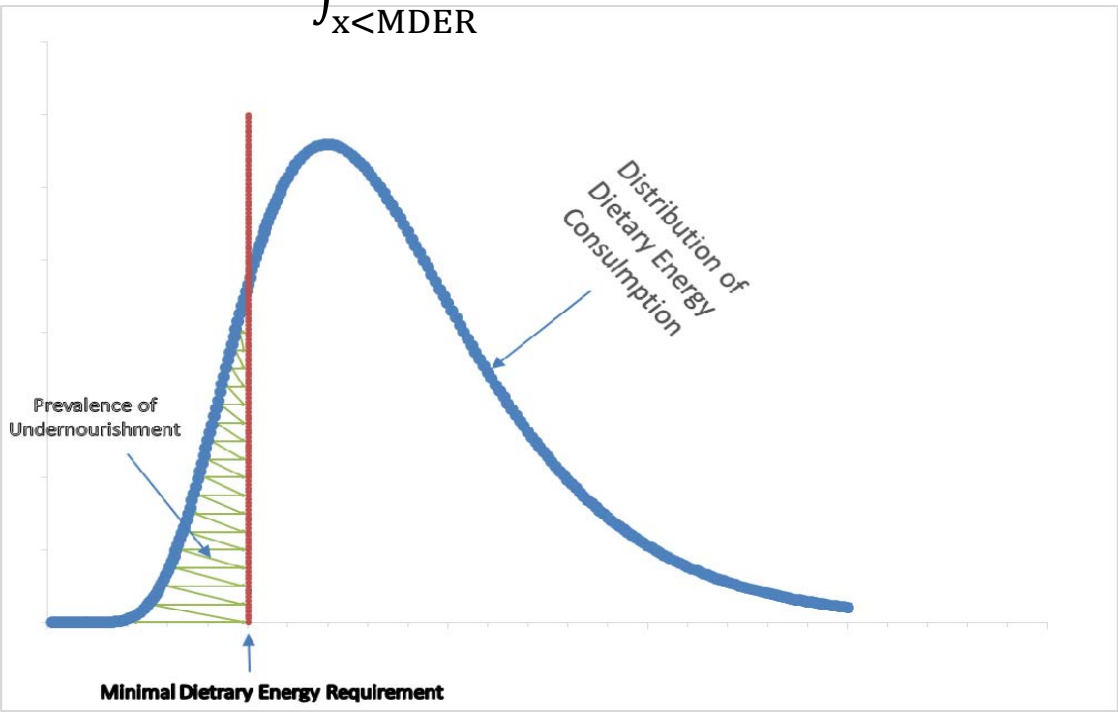
- ✓**Average Dietary Energy Consumption (DEC)** per capita per day (determines where the curve is positioned with regard to the level of energy consumption

PoU - methodology

- ✓**Coefficient of Variation (CV)** of dietary energy consumption (determines the variability in the distribution of energy consumption – the higher the CV the more the consumption of individuals is distanced from the mean, reflecting greater disparities in the consumption of individuals). Has two components:
  - ➢Factors affecting energy requirements (range of body weights and life-styles) (**CV/r**)
  - ➢Factors affecting food access (variation due to socio-economic and geographical characteristics) (**CV/y**)
- ✓**Skewness of Dietary Energy Consumption (SK)** (a measure of the asymmetry of the proability distribution of a real variable around its mean - determines the tail of the distribution)
- ✓**Minimum Dietary Energy Requirement (MDER)** per day

PoU - methodology

$$\mathrm{PoU} = \int_{x<\mathrm{MDER}} f(x|\mathrm{DEC};\mathrm{CV};\mathrm{SK})\,dx$$



P_oU - sources

The ideal data source for estimating individual dietary energy consumption are **dietary intake surveys**.

However, these are conducted regulary in only a few countries and are usually conducted on specific population groups

They require robust financial and technical resources

P_oU - sources

In practice, data sources for estimation of the four main parameters are the following:

- **Average Dietary Energy Consumption (DEC)** per capita per day – Food Balance Sheets or dietary intake survey data (both with limitations, leading to the indicator traditionally being reported as a three-year average)
- **Coefficient of Variation (CV) of dietary energy consumption** – Household income-expenditure surveys (HIES)
- **Skewness of Dietary Energy Consumption (SK**) – Household income-expenditure surveys (HIES)
- **Minimum Dietary Energy Requirement (MDER)** per day – Demographic data, UN Population Division's World Population Prospects data (age, sex, height)

P_oU - sources

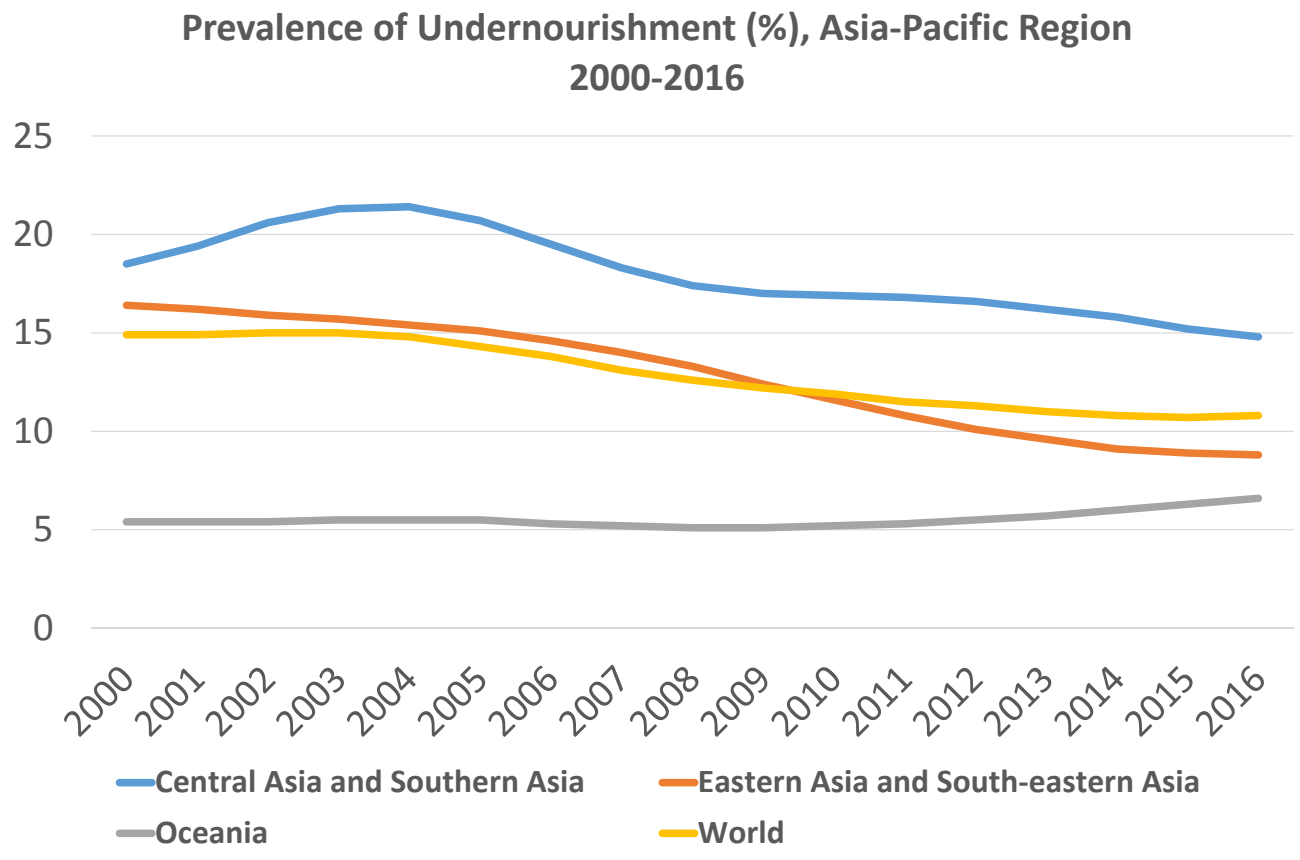
- CV and SK are derived from **household consumption and expenditure** surveys where these are available and reliable.
- Average household per capita dietary energy consumption can be used as a proxy for the meanHowever, these surveys are usually run to inform economic policies and do not directly capture food consumption
- When survey data are not available for CV and SK, indirect estimates may be used based on essential macroeconomic variables such as GDP, Gini coefficient of Income, an index of the relative price of food, or other indicators of development such as Under 5 Mortality Rate

P_oU - sources

- Food Balance Sheets give a picture of the pattern of food supply in the country by capturing both food supply and food utilization.
- They are produced by FAO for more than 150 countries and are therefore very useful for global monitoring
- FBS figures are prone to measurement errors since it is challenging to collect accurate data on the different components of the supply and utilization accounts

PoU – sources of discrepancies

- Many countries have produced and reported on estimates of the Prevalence of Undernourishment, including in their national MDG Reports, but almost invariably using a **different, incomparable** methodology
- The most common approach used in preparing national reports has been to calculate the percentage of households for which the average per capita daily dietary energy consumption is found to be below thresholds based on **Average Recommended Dietary Intake (ADER)**, usually set at 2,100 kcal.
- The reason why the MDER, and not the ADER should be used is simply to recognize the fact that in any population there exists a certain range of normal variability in requirements; Using the ADER as a threshold would therefore:
  - ✓Greatly overestimate undernourishment as it would count also the proportion of the healthy population that consumes less than average, simply because of having less than average requirements
  - ✓Reveal little or no progress in the reduction of PoU over time.



Country	2.1.1 Prevalence of Undernourishment, 2015-17 (%)
Afghanistan	30.3
Bhutan	NV
India	14.8
Iran	4.9
Japan	<2.5%
Laos	16.6
Malaysia	2.9
Maldives	11
Mongolia	18.7
New Zealand	<2.5%
Pakistan	20.5
Papua New Guinea	NV
Republic of Korea	<2.5%
Samoa	3.1
Thailand	9.0
Turkmenistan	5.5
Uzbekistan	7.4

Data situation in participating Asia-Pacific countries

- For the 2 countries for which PoU is not available, FAO does not compile Food Balance Sheets (http://faostat3.fao.org/download/FB/*/E). Food Balance Sheets provides updated estimates of the national availability of food every year for most countries in the world, but not all
- For most of the participating countries for which PoU is available, FAO relies on Food Balance Sheets to calculate the **Average Dietary Energy Consumption (DEC).** Official information on food commodity production, trade and utilization used by FAO to compile Food Balance Sheets is provided mainly by Statistical Units of the Ministry of Agriculture or the Agricultural Units of the National Statistical Office. FAO sends out a data collection questionnaire every year to an identified focal point.

Data situation in participating Asia-Pacific countries

- Micro data from household surveys that collect food consumption data are sourced by FAO directly through the National Statistical Agencies' websites, or through specific bilateral agreements.
- In the last ten years, FAO has updated survey information for Afghanistan (2007-08), Bangladesh (2010), Cambodia (2009), India (2009), Indonesia (2008), Laos (2008), Mongolia (2007), Myanmar (2006), Pakistan (2006), Thailand (2011), and Vietnam (2006) to calculate the **CV** and **SK**, provided by the respective National Statistical Office

Estimating the PoU assuming that the distribution of dietary energy consumption is log-normal

- This excludes skewness. To estimate the PoU with a skewed distribution requires more statistical software than Excel.

Numerical example on estimation of the PoU under the log-normal assumption

Average Dietary Energy Consumtpion (kcal/person/day)	CV due to socio economic characteristics	CV owing to requirements	FULL CV of DEC	MDER	Variance of the log normal ln(cv²+1)	Mean of the log normal ln(DEC)-var/2	Prevalence of undernourishment	Population (million)	Number of undernourished
2250.0	0.230	0.160	0.280	1645	0.076	7.681	15.8	12.0	1.9
		coming from the survey				transformation of parameters under the assumption of log normality			

This example shows a country where:

- Minimum Dietary Energy Requirement (MDER) is **1645 kcal/capita/day**;
- CV due to socio-economic and geographical factors **(CV/y) is 0.230**;
- CV due to requirements **(CV/r) is 0.160**; and
- Average Dietary Energy consumption **(DEC) is 2250.0 kcal/capita/day**.

•SDG INDICATOR 2.1.2 PREVALENCE OF MODERATE OR SEVERE FOOD INSECURITY IN THE POPULATION, BASED ON THE FOOD INSECURITY EXPERIENCE SCALE (FIES)

FIES - Concept

- Many different indicators have been used during the last 30 years to provide information on household food insecurity, but none existed that combined the properties of **validity, reliability** and cross-country and over-time **comparability**
- The prevalence of undernourishment alone is not enough to inform food security. It must be accompanied by other indicators. In response to this criticism, FAO has been proposing a set of food security indicators since 2013. However, there was a lack of direct evidence of lack of access to food.

FIES - Concept

- FAO's method of calculating under-nutrition does not provide information on the **inequalities** that may exist in the **distribution** of food within households. The parameters that describe the distribution of food in the population are derived from household-level surveys, not information about individuals.
- Finally, FAO's method of calculating the prevalence of undernourishment does not provide information on the **severity** of food insecurity experienced by a population. The model only estimates the proportion of the population that suffers from undernourishment, but says nothing about the composition of undernourishment in this part of the population

FIES - Concept

- The FIES is an innovative tool to measure the severity of households or individual food insecurity. Comprises 2 indicators:
  - Prevalence of **moderate + severe** food insecurity
  - Prevalence of **severe** food insecurity

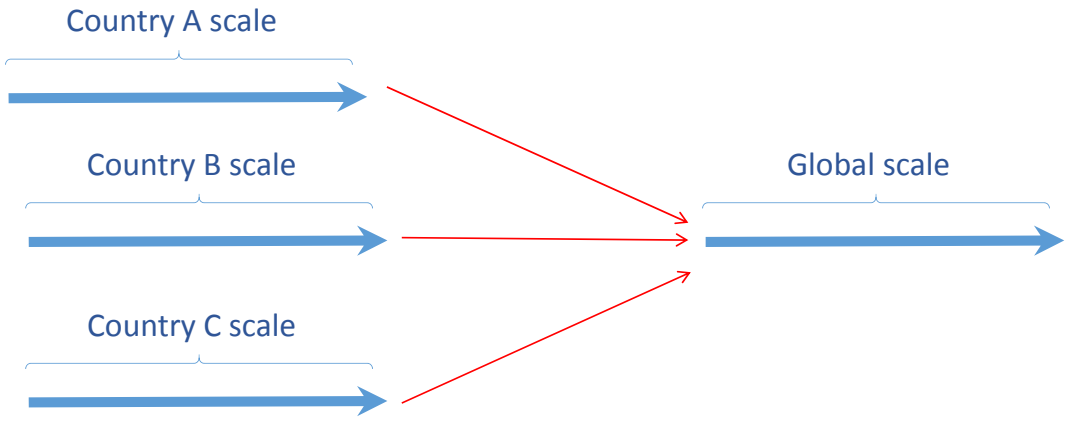
Food insecurity at moderate levels of severity is typically associated with the inability to regularly eat healthy, balanced diets. As such, high prevalence of food insecurity at **moderate levels** can be considered a predictor of various forms of diet-related health conditions in the population, associated with micronutrient deficiency and unbalanced diets. **Severe levels** of food insecurity, on the other hand, imply a high probability of reduced food intake and therefore can lead to more severe forms of undernutrition, including hunger.

FIES - Concept

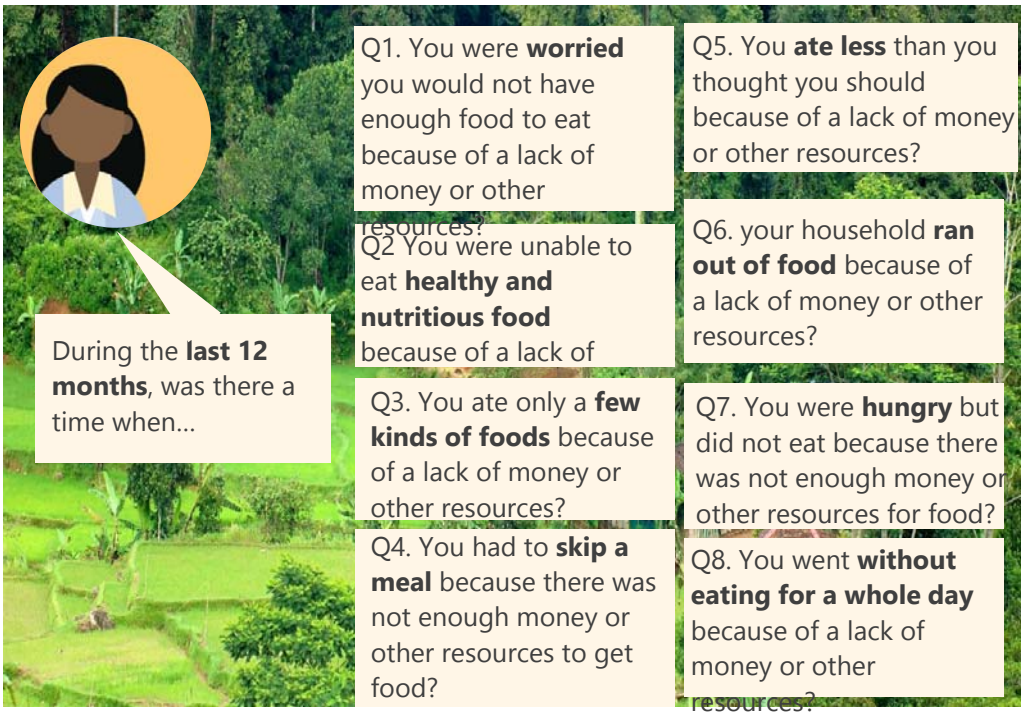
- Food insecurity is seen from the perspective of the people who struggle every day to get the food they need
- Based on simple yes or no answers to the 8 questions collected through the FIES survey module.
- Developed the methodology including the Global FIES reference standard against which experience based food security scales of different countries can be calibrated
  - ✓Calibration makes it possible to take into account possible differences in peoples perceptions or in food related habits across different cultures
  - ✓This makes the results comparable across countries

The global scale: FAO's value added

Each country can be evaluated on its own scale, but in order to compare the indicators across countries, a global reference scale is needed – a common "ruler".



The eight FIES Questions



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FIES- Methodology

- Analysis of the data is based on Item Response Theory (Rasch model)
- The severity of the condition of a household or individual is treated as a "latent" trait (i.e., it cannot be observed directly, but its magnitude can be inferred from observable facts)
- The same model is used in assessing knowledge level of individuals using the system of tests
- Although the answers to questions are subjective, use of advanced statistical methods ensures that the final results objectively reflect the situation
- Moderate or severe food insecurity roughly corresponds to the level expressed by Q4 and above

Benefits of using the FIES to measure food insecurity

Feature	Rationale
Direct	The FIES asks respondents directly about their experiences in the face of constrained access to food. In this way, the FIES "listens" to the people affected by food insecurity.
Easy	Simple and quick to administer in a survey. It takes no more than than 5 minutes and does not require technical expertise.
Low cost	Can be included in almost any existing survey, at very little additional cost.
Statistically sound	FIES and similar scales have been shown to be valid in different settings, and by using the FIES methodology, food insecurity prevalence rates can be compared across countries and populations.
Distinguish between severity levels	Able to reflect the depth of food insecurity
Results can be disaggregated	Observe differences in food insecurity by population characteristics e.g. gender, age, occupation, etc. and among sub-populations that differ by location, ethnicity, language etc.

The implementation of FIES

- Since 2014, the FIES has been included in the Gallup World Poll in 150 countries
- Why?
  - To develop a **sound analytic methodology** and a **global standard**.
  - To define **provisional baseline** estimates for SDG monitoring in the absence of data produced by countries.
- As data comes from non-official sources, FAO conducted a process of validation with countries to be able to disseminate FIES estimates at the country level.
- Data are available for 2014-2016, soon for 2017 as well

FIES- data collection

- Use of the Gallup World Poll has only been meant as an interim solution in order to calibrate the global scale and establish a provisional baseline. FAO intends to phase out this service in the future.
- Instead, FAO strongly advocates inclusion of the FIES module in **national household surveys**
- Questionnaires are available in many official country languages and major dialects where the module has been applied, and the translation process will continue.

Results so far….

Countries using a comparable tool:

- Bolivia, Brazil, Canada, Colombia, Ecuador, Guatemala, South Korea, Mexico, Philippines, Sri Lanka and USA

FIES already included in national surveys:

- Bangladesh (HFIAS), Botswana, Burkina Faso, Chile, Colombia, Cote d'Ivoire, Dominican Republic, El Salvador, Ethiopia, Ghana, Indonesia, Jordan, Israel, Kenya, Lesotho, Malawi, **Malaysia** (HFIAS), Marshall Islands, Namibia, Pakistan, Palestine, Rwanda, Sierra Leone, St. Lucia, Seychelles, Sudan, Swaziland, Uganda, Vietnam.

Plans in place to include the FIES in national surveys:

- **Afghanistan**, Benin, Cabo Verde, Chad, Guinea, Guinea-Bissau, Honduras, Kiribati, Mauritania, Mali, Nicaragua, Niger, **Samoa**, Senegal, Solomon Islands, Togo and Tonga

The experience of Seychelles

- The National Bureau of Statistics (NBS) undertook a survey on food insecurity for the first time in 2016, and a second survey in 2017
- The survey is an application of the FAO's Food Insecurity Experience Scale (FIES) and it was administered to some 1200 households during the second quarter of 2016 and 2017
- Based on the survey findings, the majority of households experienced low food insecurity in Seychelles during the 12 month period preceding Quarter 1 of 2016. It has been estimated that around 12.4% of households experienced moderate to severe food insecurity in the reference period. At the individual level, the same survey suggests that 14.3% of the population live in moderately to severely food insecure households while 3.2% of the people are estimated to be living in severely food insecure households.
- The NBS used the 2016 survey as a springboard to launch a new data series that will serve as a monitoring tool for food security in the country.

Country	2.1.2 Prevalence of severe food insecurity, 2016 (%)	2.1.2 Prevalence of moderate and severe food insecurity, 2016 (%)
Afghanistan	16	49.7
Bhutan		
India	11.8	27.4
Iran	8.9	46.6
Japan	<0.5	2.4
Laos		
Malaysia	6	16.5
Maldives		
Mongolia	2.8	24.7
New Zealand	3.2	11.8
Pakistan	7.6	34.3
PNG		
Korea	<0.5	5.1
Samoa		
Thailand	5.8	19.4
Turkmenistan		
Uzbekistan	1.5	15.5

Comparison of PoU and FIES

- Different methods and sources of data
- Both methods contribute important information
- The prevalence of severe food insecurity based on the FIES is expected to approximate the PoU (both are measures of food deprivation)
- The prevalence of moderate and severe food insecurity captures other factors, i.e. stress, anxiety and the inability to maintain healthy diets. Thus, the FIES indicators complement the PoU as they are relevant for all countries, irrespective of income level.

Comparison of PoU and FIES

- The PoU captures the adequacy of dietary energy intake in a population.
- The PoU is strongly related to the availability of food in a country
- The FIES measures the overall ability of households (or individuals) to access adequate food.
- A household or individual may experience food insecurity even if able to acquire enough food to meet dietary energy needs, as they may obtain dietary energy from less expensive, low quality/energy dense food
- The two indicators should always be looked at in combination and not confounded with each other

Other ways the FIES indicators complement the PoU

- PoU may not precisely reflect the current situation; the FIES can give a more timely assessment of the food insecurity situation in a country
- FIES indicators can generate disaggregated information to identify population groups most affected by food insecurity
- When the FIES is collected with household data, it can be used to assess the factors that determine food insecurity
- All of these enhance the use of the data to guide policy and intervention

PoU and FIES reporting

http://www.fao.org/state-of-food-security-nutrition/en/

Key messages – State of Food security and nutrition in the world (SOFI) report, 2018

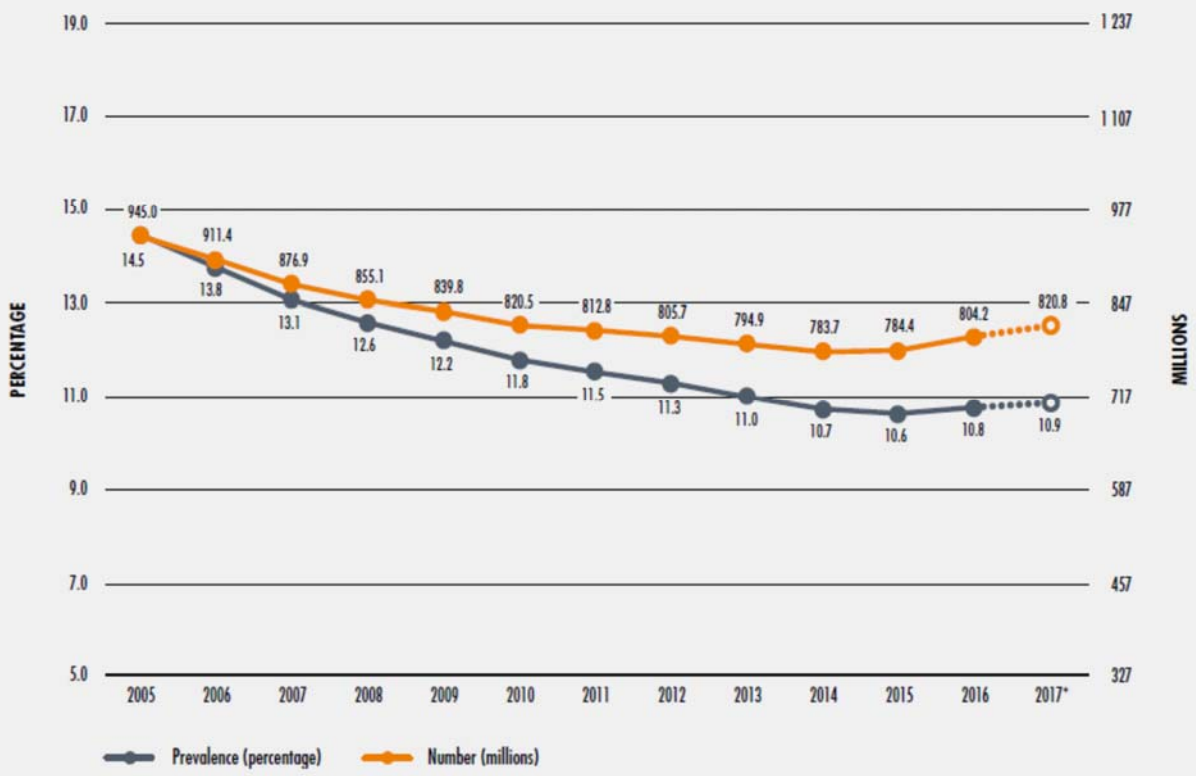
- New evidence continues to signal a rise in world hunger and a reversal of trends after a prolonged decline. In 2017 the number of undernourished people is estimated to have increased to 821 million – around one out of every nine people in the world.
- While some progress continues to be made in reducing child stunting, levels still remain unacceptably high. Nearly 151 million children under five – or over 22 percent – are affected by stunting in 2017.
- Wasting continues to affect over 50 million children under five n the world and these children are at increased risk of morbidity and mortality. Furthermore, over 38 million children under five are overweight.

Key messages – State of Food security and nutrition in the world (SOFI) report, 2018

- Adult obesity is worsening and more than one in eight adults in the world is obese, or more than 672 million. Undernutrition and overweight and obesity coexist in many countries.
- Exposure to more complex, frequent and intense climate extremes is threatening to erode and reverse gains made in ending hunger and malnutrition.
- In addition to conflict, climate variability and extremes are among the key drivers behind the recent uptick in global hunger and one of the leading causes of severe food crises. The cumulative effect of changes in climate is undermining all dimensions of food security – food availability, access, utilization and stability.

FIGURE 1

THE NUMBER OF UNDERNOURISHED PEOPLE IN THE WORLD HAS BEEN ON THE RISE SINCE 2014, REACHING AN ESTIMATED 821 MILLION IN 2017



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PoU capacity development

- A custom R function is available from the Statistics Division at FAO to compute the PoU, given the four parameters DEC, CV, Skew and MDER.
- Jointly by WB and FAO, a module was included in ADEPT for calculation of various food security indicators, including PoU
- ADEPT - a WB software for deriving social statistics from household surveys
- Various trainings have been conducted on PoU and FIES, especially with Asia-Pacific countries

PoU and FIES capacity development

- FAO/SESRIC workshop for Anglophone Islamic Countries, Ankara, February 2017: The Workshop was attended by 21 delegates from the National Statistical Offices (NSOs) and institutes of agricultural and rural development support of 19 OIC Member Countries, including **Afghanistan** and **Iran**
  - AFGHANISTAN: Mr. Ahmad Khalid AMARKHEL, Central Statistics Organization
  - IRAN: Mr. Hamidreza JALALI, Statistical Centre of Iran

PoU and FIES capacity development

Sub-regional workshop in Dhaka, March 2018, on Monitoring Food Security in the Context of the 2030 Sustainable Development Agenda, including participants from **Bhutan, Maldives, Pakistan**.

- **Bhutan:** Ms. Manisha Subba, MoAF, Bhutan, Ms. Wangchuk Dema, Gross National Happiness Commission, Mr. Tobden, National Statistics Bureau
- **Maldives:** Mr. Ahmed Shaheed and Ms. Rasheeda Najeeb, National Bureau of Statistics, and Ms. Mariyam Shajua Ministry of Fisheries and Agriculture
- **Pakistan**: Mr. Imtiaz Ali Gopang, Ministry of National Food Security, and Kaneez Amna Pakistan Bureau of Statistics

PoU and FIES capacity development

- Eventual expectation is that countries will acquire the capacity to produce the indicators independently, but that may take years.
- FAO will provide ongoing technical support:
  - ✓Conducting regional and country-level workshops; targeting decision-makers as well as technicians
  - ✓A custom R function is available from the Statistics Division at FAO to compute the PoU, given the four parameters DEC, CV, Skew and MDER.
  - ✓R package for FIES data
  - ✓Technical assistance missions (including to **Pakistan and Afghanistan**) as well as remote support (including to **Korea**)
  - ✓E-learning courses on 2.1.1 and 2.1.2 already available!

THANK YOU

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For more detailed information on Indicators 2.1.1 and 2.1.2 please see:

http://www.fao.org/sustainable-development-goals/indicators/211/en/

http://www.fao.org/sustainable-development-goals/indicators/212/en/