



Innovative Methods and Metrics for  
Agriculture and Nutrition Actions

# ANH Academy Learning Lab on Indicators of Food Insecurity and Malnutrition

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The U.S. Government's Global Hunger & Food Security Initiative

# ANH Academy Learning Lab on Indicators of Food Insecurity and Malnutrition

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Feed the Future Innovation Lab for Nutrition



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GERALD J. AND DOROTHY R.

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# Structure of this Learning Lab

## **Part A: Classification and definitions of the indicators**

There are over 150 indicators in current use

We will focus on 33 distinct measures in 8 categories

## **Part B: Interpretation and use of the indicators**

Form groups of 3-6 people around a category of indicator that is particularly important for your work, to discuss:

1. What **best practices** can you recommend?
2. What **common pitfalls** would you warn against?
3. What **priorities for action** can you identify
  - for research** in agriculture, nutrition and health;
  - for policymaking** at global, national and local levels;
  - for program management** in agriculture and nutrition

Then report back to compare your views with other groups

# Background reference document



Technical Working Group  
on Measuring Food and Nutrition Security  
[www.fsincop.net/topics/fns-measurement](http://www.fsincop.net/topics/fns-measurement)

## **Measuring Food and Nutrition Security: An Independent Technical Assessment and User's Guide for Existing Indicators**

June 2016

Uma Lele (Chair), William A. Masters (Co-Chair), Joyce Kinabo, J.V. Meenakshi, Bharat Ramaswami and Julia Tagwireyi with Winnie F.L. Bell and Sambuddha Goswami



# Origins of the user's guide

**October 2012** – FSIN launched by WFP, FAO and IFPRI, to support local and regional food security data analysts

**November 2014** – FSIN launches a Technical Working Group (TWG) on Measuring Food & Nutrition Security to provide an independent assessment of major indicators

<http://www.fsincop.net/topics/fns-measurement>

**June 2015** – The TWG and its Expert Advisory Panel meets in Rome to guide revisions, followed by presentations at ICAE, IFAD, the Africa Union and online feedback

**June 2016** – The FSIN User's Guide published

# Authorship of the user's guide

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# Motivation and objectives

The TWG on food & nutrition security measurement found:

- over 150 distinct indicators in current use
- *many* criteria and ways of classifying and choosing indicators
- much confusion about which indicator to use for what purpose
  - indicators are often variants of each other
  - terminology and descriptions are historical and institutional
- ➔ we saw big opportunities to clarify and explain!

# Motivation and objectives

FSIN stakeholders had diverse views about what was needed

-- a single, unified dashboard?

-- multiple dashboards for different purposes?

➔ we chose to construct a “user’s guide”, with descriptions and assessments of the most widely used indicators to help readers:

- find the most useful indicators, and
- discover new indicators that readers might not know about.

# Definitions and terminology

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

-- World Food Summit, 1996

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Food security exists when all people, at all times, have physical and <sup>social</sup> economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

-- World Food Summit, 1996 **(as amended in 2009)**

**The four pillars of food security are availability, access, utilization and stability.**

**-- World Summit on Food Security, 2009**

# Key principles

The TWG identified four underlying goals for measurement:

**1. Measure more than calories**

Capture the dimensions of diet quality, care practices, and other factors behind food insecurity, undernutrition, obesity and diet-related disease

**2. Look over the whole life cycle**

See the thousand-day period of gestation and infancy in context, identifying the specific needs of particular groups in each life stage

**3. Watch out for whole food system**

Recognize the interdependences between agriculture, nutrition and health that are needed for resilience and sustainability

**4. Use data to mobilize action**

Present appropriate indicators in useful ways, to help jumpstart improvements and generate demand for better data

# Criteria for indicator selection & assessment

<b>Criteria for inclusion</b>		<b>Specific questions asked</b>
<b>Domain</b>	<b><i>Food security</i></b>	<i>Does or could it measure availability and access to food in general?</i>
	<b><i>Nutrition security</i></b>	<i>Does or could it measure availability &amp; access to healthier foods, or to non-food causes of malnutrition?</i>

# Criteria for indicator selection & assessment

*(Continued from previous slide)*

<b>Criteria for inclusion</b>		<b>Specific questions asked</b>
<b>Scale and Scope</b>	<b><i>Geographic scale</i></b>	<i>For what areas is/could this measure be most valuable (global, national, and local)?</i>
	<b><i>Time frame</i></b>	<i>Over what period is/could this measure be most useful (over years, within years)?</i>

# Criteria for indicator selection & assessment

*(Continued from previous slide)*

<b>Criteria for inclusion</b>		<b>Specific questions asked</b>
<b>Validity</b>	<b>Scientific validity</b>	<i>Has/could this measure been validated against a gold standard?</i>
	<b>Statistical sensitivity</b>	<i>Does/could this measure change when the underlying concept changes? (Type II)</i>
	<b>Statistical specificity</b>	<i>Does/could this measure change when the underlying concept does not? (Type I)</i>
	<b>Transparency</b>	<i>Is/could this measure be clear regarding data sources, weighting and methods?</i>
	<b>Comparability</b>	<i>Does/could the measure conform to international standards?</i>



# Criteria for indicator selection & assessment

*(Continued from previous slide)*

<b>Criteria for inclusion</b>		<b>Specific questions asked</b>
<b>Difficulty of Data Collection and Use</b>	<b><i>Cost of collection</i></b>	<i>What is/can be the relative difficulty of collecting underlying observations?</i>
	<b><i>Frequency</i></b>	<i>Is/Can the measure be collected often enough to capture temporal variation?</i>
	<b><i>Spatial density</i></b>	<i>Is/Can it be collected for enough places to capture spatial variation?</i>
	<b><i>Sustainability</i></b>	<i>Is/Can funding and staffing for data collection &amp; analysis be secured?</i>
	<b><i>Timely accessibility</i></b>	<i>Is/Can results be made available quickly in accessible form to end-user?</i>

# Criteria for indicator selection & assessment

*(Continued from previous slide)*

<b>Criteria for inclusion</b>		<b>Specific questions asked</b>
<b>Usefulness of the Indicator</b>	<b><i>Relevance</i></b>	<i>Is the concept being measured within stakeholders' scope of responsibility?</i>
	<b><i>Significance</i></b>	<i>Does the measure have clear implications for action by stakeholders?</i>
	<b><i>Ease of interpretation</i></b>	<i>Is/can the measure be readily understood and communicated?</i>
	<b><i>Political legitimacy</i></b>	<i>Is there political support for using this measure? (e.g. WHA, MDG/SDGs)</i>

# Criteria for indicator selection & assessment

*(Continued from previous slide)*

<b>Criteria for inclusion</b>	<b>Specific questions asked</b>
<b>Covariance</b>	<i>Does information from this indicator correspond with information from other indicators?</i>
<b>Gender/Age Sensitivity</b>	<i>Can this indicator be disaggregated by sex? By age group? Geocoding and small area estimation?</i>

# What we want to measure

Food security exists when all people, at all times, have physical and <sup>social</sup> economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

-- World Food Summit, 1996 **(as amended in 2009)**

**The four pillars of food security are availability, access, utilization and stability.**

**-- World Summit on Food Security, 2009**

# Definitions embody history

- The food crisis of 1973-74

*“Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuation in production and prices”*

--World Food Conference, 1974

- The structural adjustment era of the 1980s

*“Ensuring that all people at all times have both physical and economic access to the basic food stuff that they need.”*

-- FAO, 1983

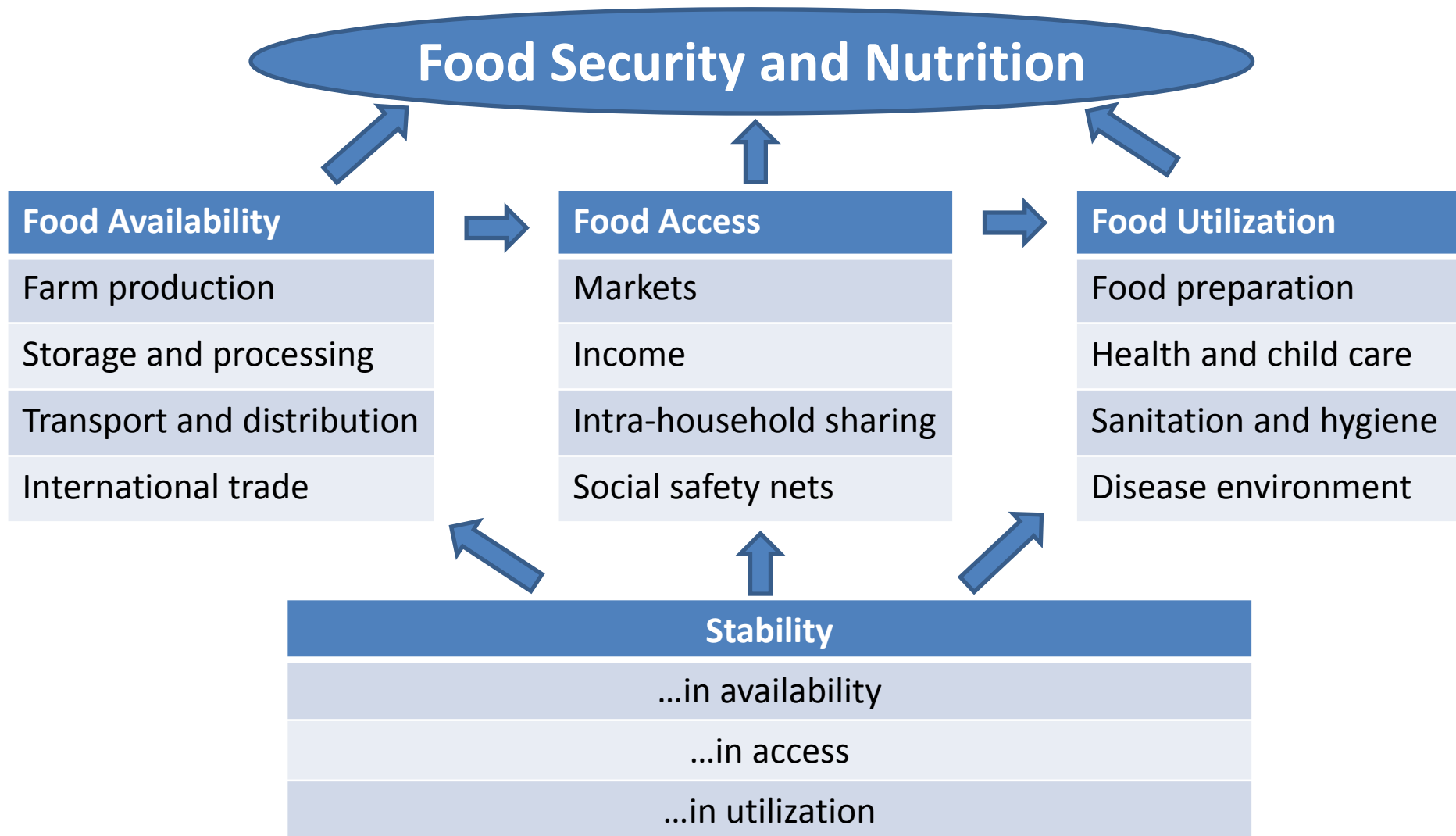
- Health and human development since the 1990s

*“Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.”*

-- World Food Summit, 1996

# Definitions provide a causal framework

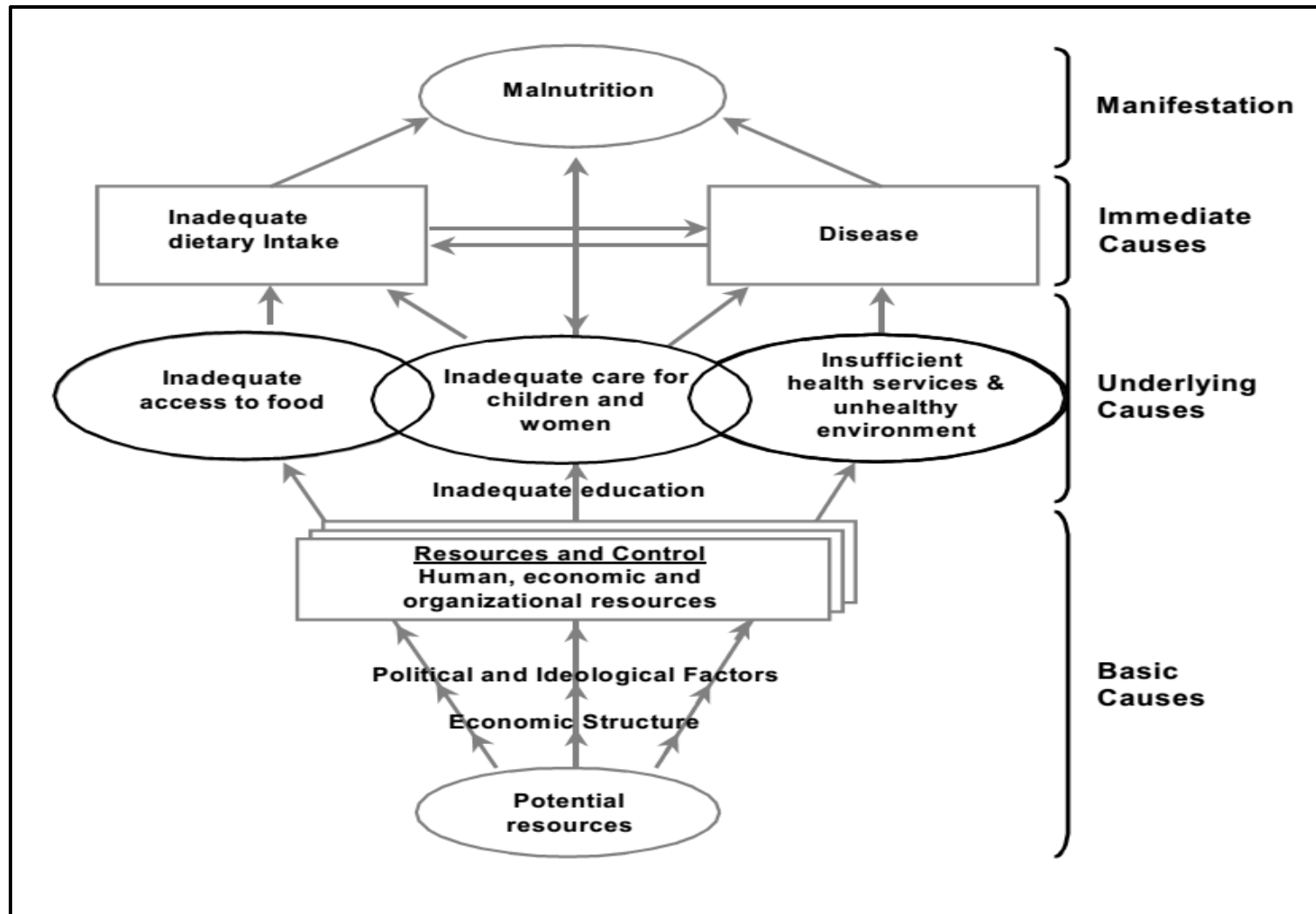
The FAO's four pillars:



Source: Adapted from [Burchi, Fanzo and Frison \(2011\)](#).

# Other perspectives can also be helpful

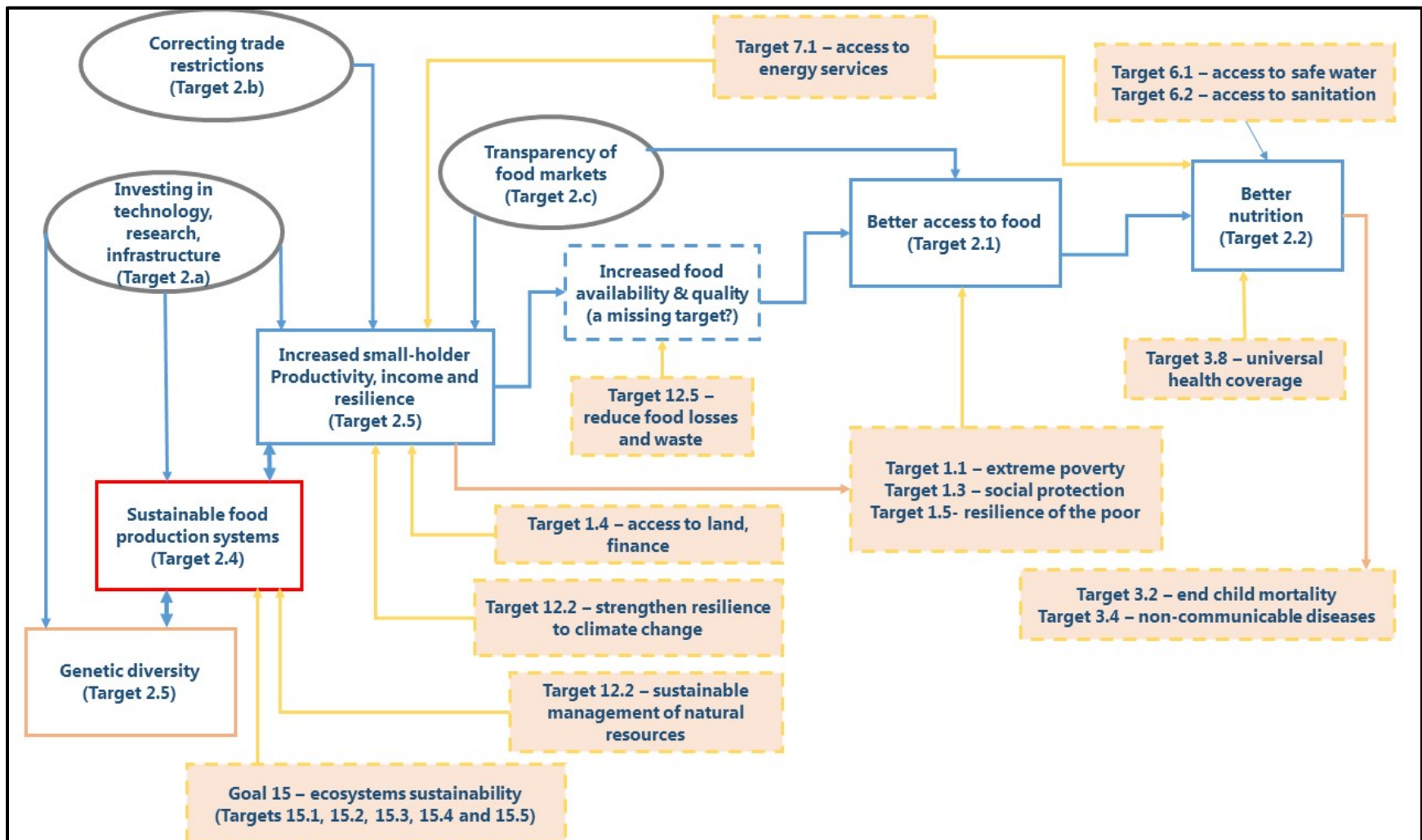
The UNICEF framework of basic, underlying and immediate causes:



Source: [UNICEF \(1990\)](#).

# Systemic change involves many actors

## A “causal pathway” diagram among SDG2 targets

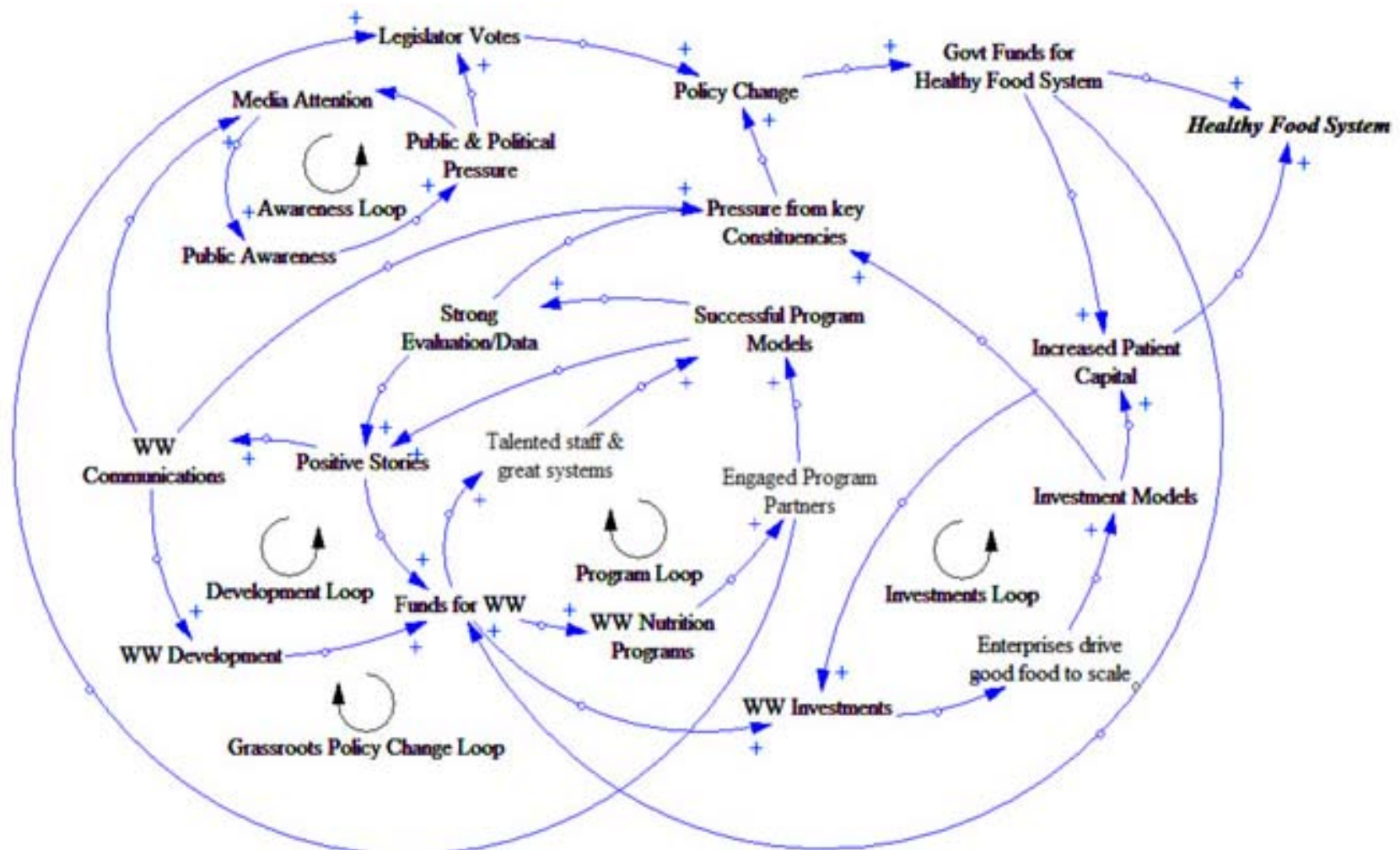


Source: [Cafiero and Gennari \(2015\)](#).



# Causality runs in many directions

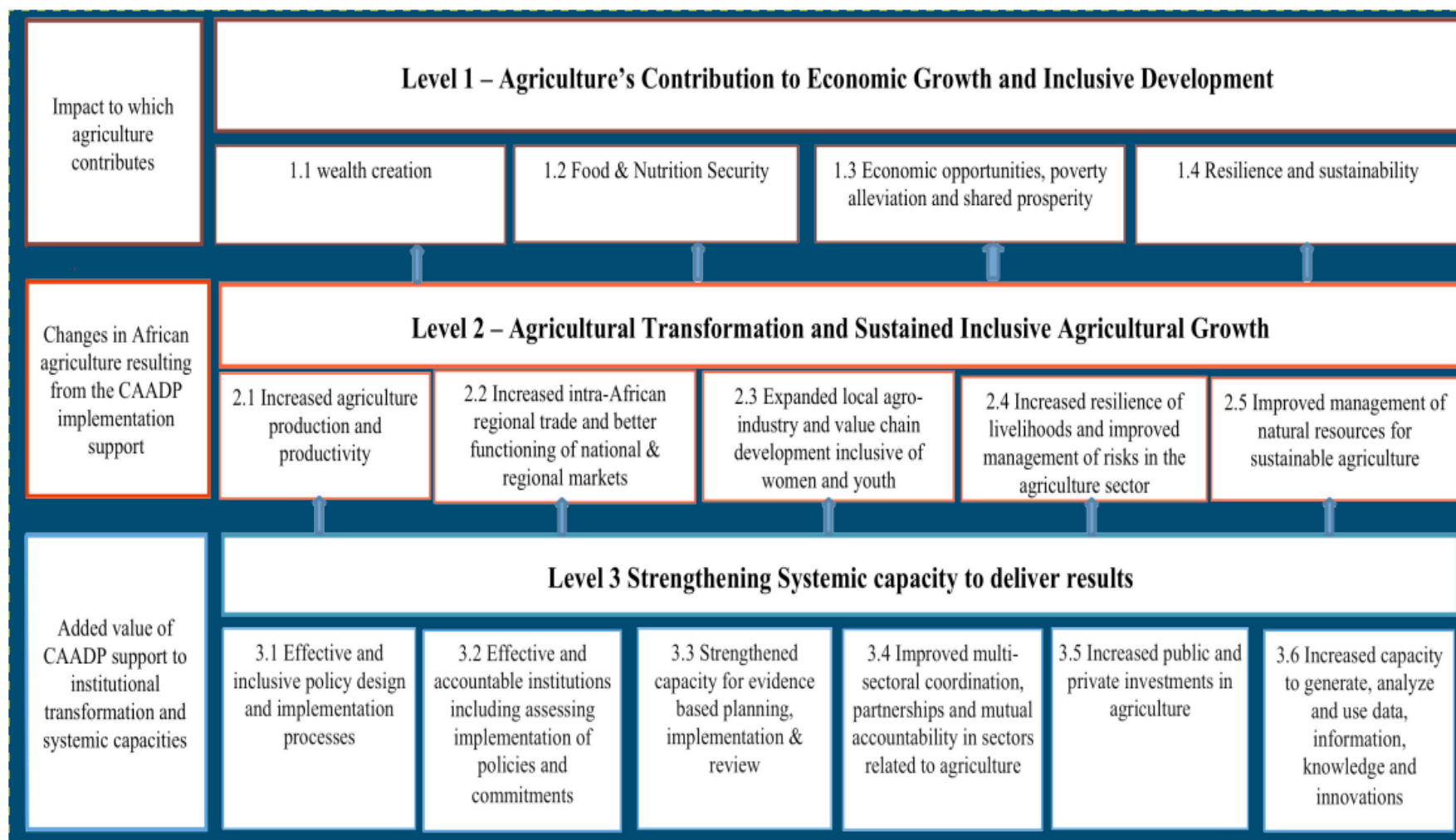
A “system dynamics” diagram for food system change



Source: [Ross \(2014\)](#).

# Measurement guides policy & programs

## The CAADP Results Framework for Africa Union investments



Source: [NEPAD Planning and Coordinating Agency \(2015\)](#).

# Our goal is to guide *measurement*

Some things can be measured only at a national scale

Countries



**For example, food balance sheets are constructed for each commodity from a country's national accounts**

- (a) Quantity produced
- + (b) Quantity imported
- (c) Quantity exported
- (d) All non food uses, stock change and waste

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- = (d) Food supply available for consumption

# Our goal is to guide *measurement*

Some things exist at the scale of a locality, like a marketplace

Countries



Markets and communities



**For example, food prices are observed where products are bought and sold**

There are usually many buyers & sellers who may bring food to & from elsewhere

# Our goal is to guide *measurement*

Other things can be measured for a household

Countries



Markets and communities



Households

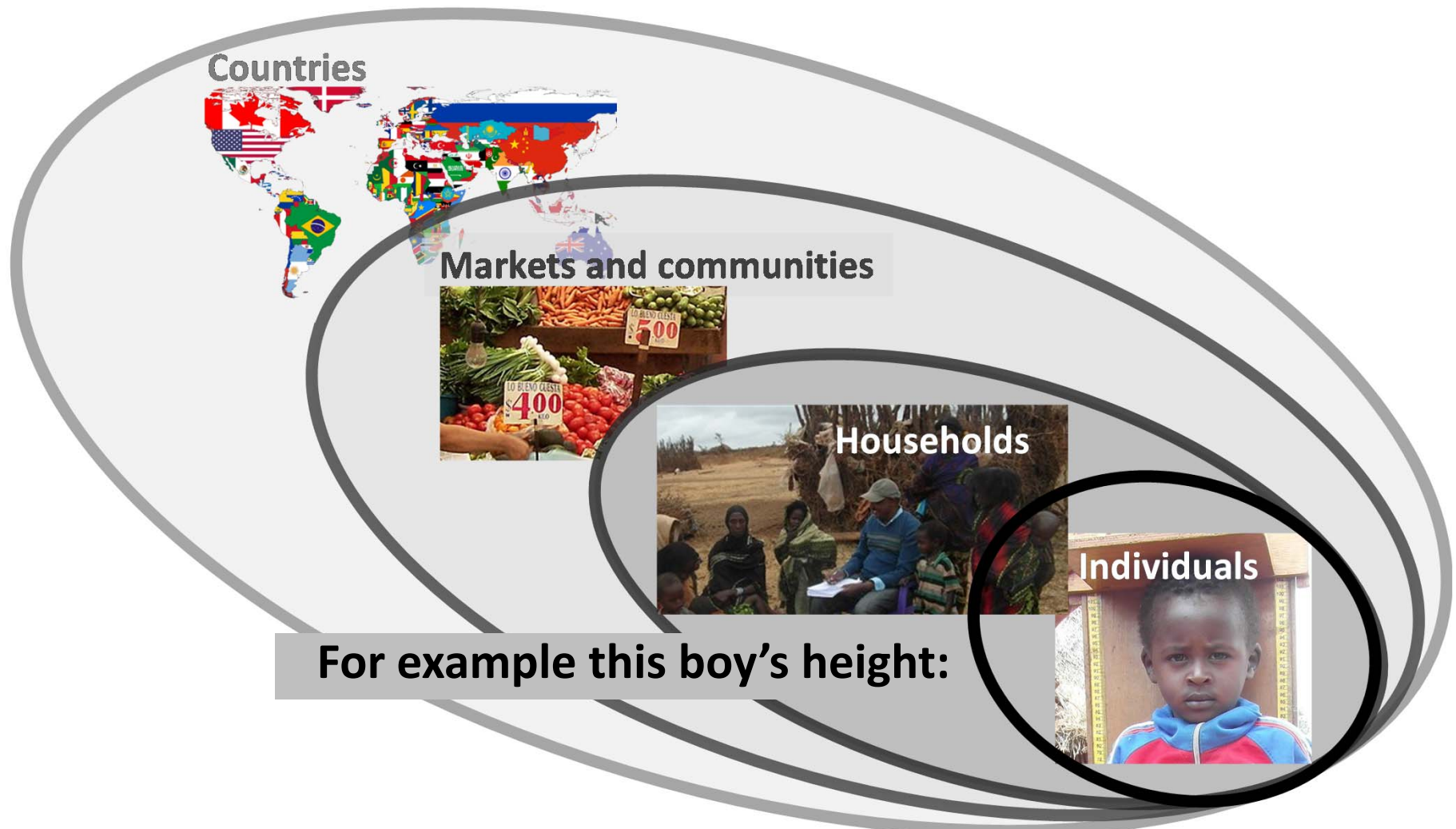


**Households are defined as shared cooking**  
and may also farm together  
so are the natural unit for food transactions  
(production – sale + purchase – loss = consumption)



# Our goal is to guide *measurement*

Many things are attributes of individuals



**For example this boy's height:**

Photo credits: Country map is public domain, market photo is by Bernal (2006) licensed under CC, photos of household interview and child height measurement are from Bekele Megersa (IMMANA Postdoctoral Fellow).

# We use 8 categories to review 33 indicators

## Classifying the indicators by what is actually observed:

### **1. National data**

- five indicators at country level, from national accounts or international trade

### **2. Market data**

- three indicators about markets, involving people located elsewhere

### **3. Household or individual recall**

- seven indicators from surveys about families or individuals

### **4. Anthropometric measurement**

- five indicators of body size, using heights and weights or circumferences

### **5. Prevalence of Undernourishment**

- two indicators that combine data from categories 1-4

### **6. Biomarkers and clinical data**

- three indicators obtained from biological samples or clinical services

### **7. Breastfeeding and sanitation**

- four indicators about a mother-child dyad or a community

### **8. Composite and multidimensional measures**

- four indicators that combine different kinds of observations

# Category #1: National data

## Five indicators observed at the country level:

### **From national accounts, reported to FAO in Food Balance Sheets:**

1. Dietary energy in the food supply (kcal/capita, or pct of requirements)
2. Dietary quality of the food supply (g/cap of each nutrient or food)
3. Diversity of food supply (Shannon-type indexes of attributes or sources)
4. Variability of the food supply (std. deviations of kcal/capita over time)

### **From government accounts, reported to IMF or UN agencies:**

5. Public expenditure (pct of spending, or specific commitments)

*These indicators use observations that are initially made at the country level, as administrative data for the population as a whole. Researchers can infer the share attributable to a subset of the population, but the original data source is a national total or per-capita average.*



# Category #2: Market data

**Three indicators observed in marketplaces, with many participants:**

**From price data, at any scale:**

1. Domestic food price index (local food prices relative to other prices)
2. Food affordability indexes (local food prices relative to labor earnings)
3. Volatility of food prices (standard deviations of prices over time)

*These observations could be an average over many transactions, or a single representative transaction in the market. The actual agents involved are typically unknown and may be located anywhere.*

# Category #3: Household or individual recall

## Seven indicators derived from surveys of people and families:

### From responses to survey questions:

1. Food budget share (share of total spending)
2. Dietary diversity (no. of food groups, or prevalence of low diversity)
3. Dietary energy from household surveys (kcal/day, or pct. of requirement)
4. Diet quality indexes (ratios, indexes or qty/day of a food or nutrient)
5. Nutrient adequacy (pct. of requirements for specific nutrients)
6. Experience-based scales
7. Coping Strategies Index (CSI)

*Household data refers to questions at the level of a family or other unit eating from a common cooking pot. Individual data refers to a specific person, who may or may not be the respondent. For example, a child's dietary intake is typically provided by the mother or other caregiver.*

# Category #4: Anthropometry

## Five indicators derived from heights, weights and circumferences

### From measurement of body size:

1. Child height-for-age (prevalence of stunting, or mean height)
2. Child weight-for-height and MUAC (prevalence of wasting or thinness)
3. Child underweight: weight-for-age (number or pct. of children)
4. Adult, adolescent & child BMI (prevalence of under/overweight or obesity)
5. Waist circumference (pct. of population above risk thresholds)

*Anthropometric data is usually combined with demographic information on age and sex, and compared to reference populations to determine a group's prevalence of extreme values, or changes in the group mean and variation. Heights and weights may be complemented by arm, waist and head circumference for additional insight.*

# Category #5: Prevalence of Undernourishment

## Two indicators obtained by combining data sources

### **From national, household and anthropometric data:**

1. Prevalence of Undernourishment (pct. of pop., or millions of people)
2. Depth of food deficit (kcal/capita/day)

*PoU methodology provides the headline “number of hungry people” calculated by FAO every year. The PoU combines country-level estimates of national dietary energy supply with household survey data to estimate inequality in access and distribution of food, relative to needs estimated using demographic data on age and sex, and anthropometric data on population heights. The result is a compound measure in which year-to-year changes in food supply can be compared to each population’s energy needs.*

# Category #6: Biomarkers and clinical data

## Three indicators derived from biological samples or health services

### **Micronutrient status and disease:**

1. Anemia among women and children (percent of population)
2. Vitamin A deficiency and supplementation (pct. of pre-school children)

### **Maternal and reproductive health:**

3. Low and very low birthweight (percent of births)

*Of the many laboratory tests and clinic records, these are the most widely used to track food security and malnutrition. Micronutrient status is most commonly assessed with blood tests, and maternity service records reveal the prevalence of low birth weight.*

# Category #7: Breastfeeding and sanitation

## Four indicators about interactions between people

### **Within the household**

1. Breastfeeding: initiation, exclusivity and continuation (pct. of children)
2. Diarrhea: Incidence and treatment (percent of children)

### **Between households**

3. Drinking water: use of clean water sources (percent of households)
4. Open defecation: use of toilets (percent of households)

*Data on pairs or groups of people are obtained from interviews and direct observation, using specific kinds of survey instruments to capture the appropriate unit of observation. For example, breastfeeding indicators are specific to a mother-child dyad, and sanitation indicators often refer to the shared environment of each household.*

# Category #8: Composite indexes

## Four examples of composite or multidimensional measures

### **Combining several other indicators into one:**

1. The Global Hunger Index (GHI)
2. The Global Food Security Index (GFSI)
3. The Global Hidden Hunger Index (GHHI)
4. The Hunger and Nutrition Commitment Index (HANCI)

*When combining different indicators into a single ranking or classification, the weights assigned to each element reflect its relative importance for users of the index. Most of these weight all components equally.*

# Questions for your working group

Using the information presented here, form small groups to discuss a category of indicator that is particularly important for your work.

1. What **best practices** can you recommend?
2. What **common pitfalls** would you warn against?
3. What **priorities for action** can you identify
  - for research** in agriculture, nutrition and health;
  - for policymaking** at global, national and local levels;
  - for program management** in agriculture and nutrition

Then report back to share your views with others!