Nutrition Indicators in Agriculture Projects: Current measurement, priorities, and gaps

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Engaging agriculture to improve nutrition: how to measure impact

In the past several years, there has been a movement from an exclusive focus on **nutrition specific – targeted nutrition interventions** for preventing/treating conditions of malnutrition

…

*towards expanding into **nutrition sensitive interventions** – especially in agriculture with focus on improving diets to improve nutrition.*

Premise

Recent reviews demonstrate little impact on nutritional status **but do not critically examine the choice of outcome indicators**.

This paper investigates which nutrition impact indicators are currently used in agriculture-nutrition projects, and highlights priorities and gaps in measurement.

Methods

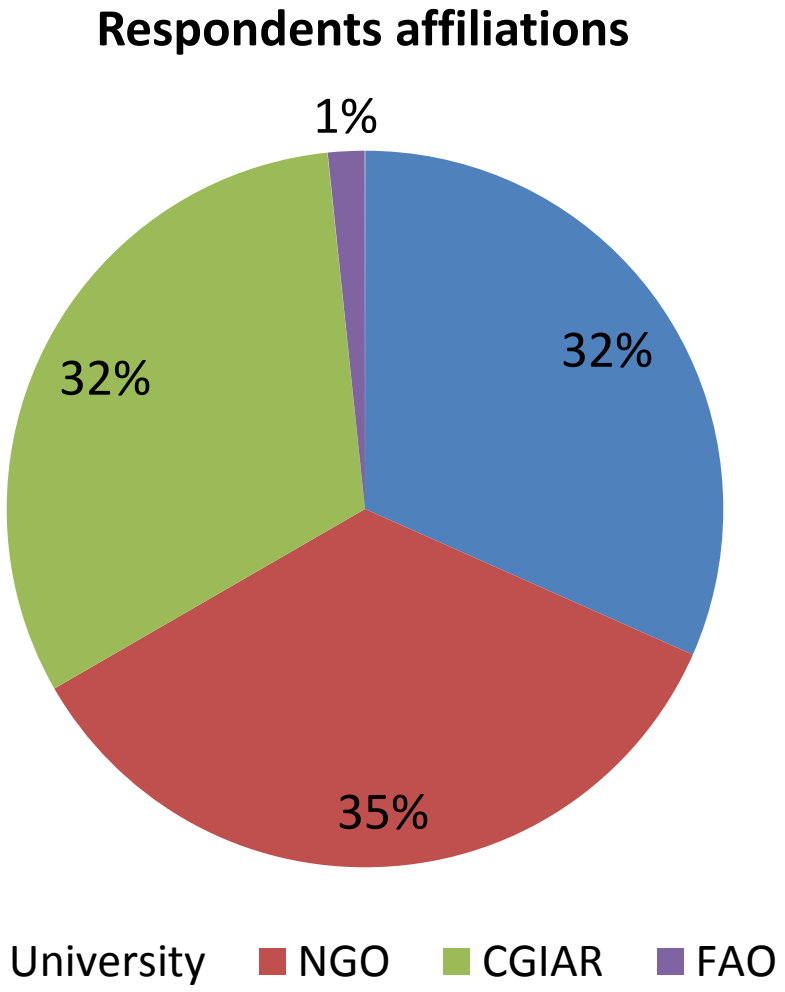
We contacted principle investigators of projects identified from the DFID-funded LCIRAH mapping study

Online survey (SurveyMonkey) covered:

- Indicators chosen
- Reason for choosing indicators
- Program Impact Pathways
- Study Design basics
  - Sample size
  - Evaluation design

Results: Response

- 76 project PIs contacted
- 67 responded (88%)
  - 7 of these excluded (incomplete data, project cancelled)
- 60 with complete data



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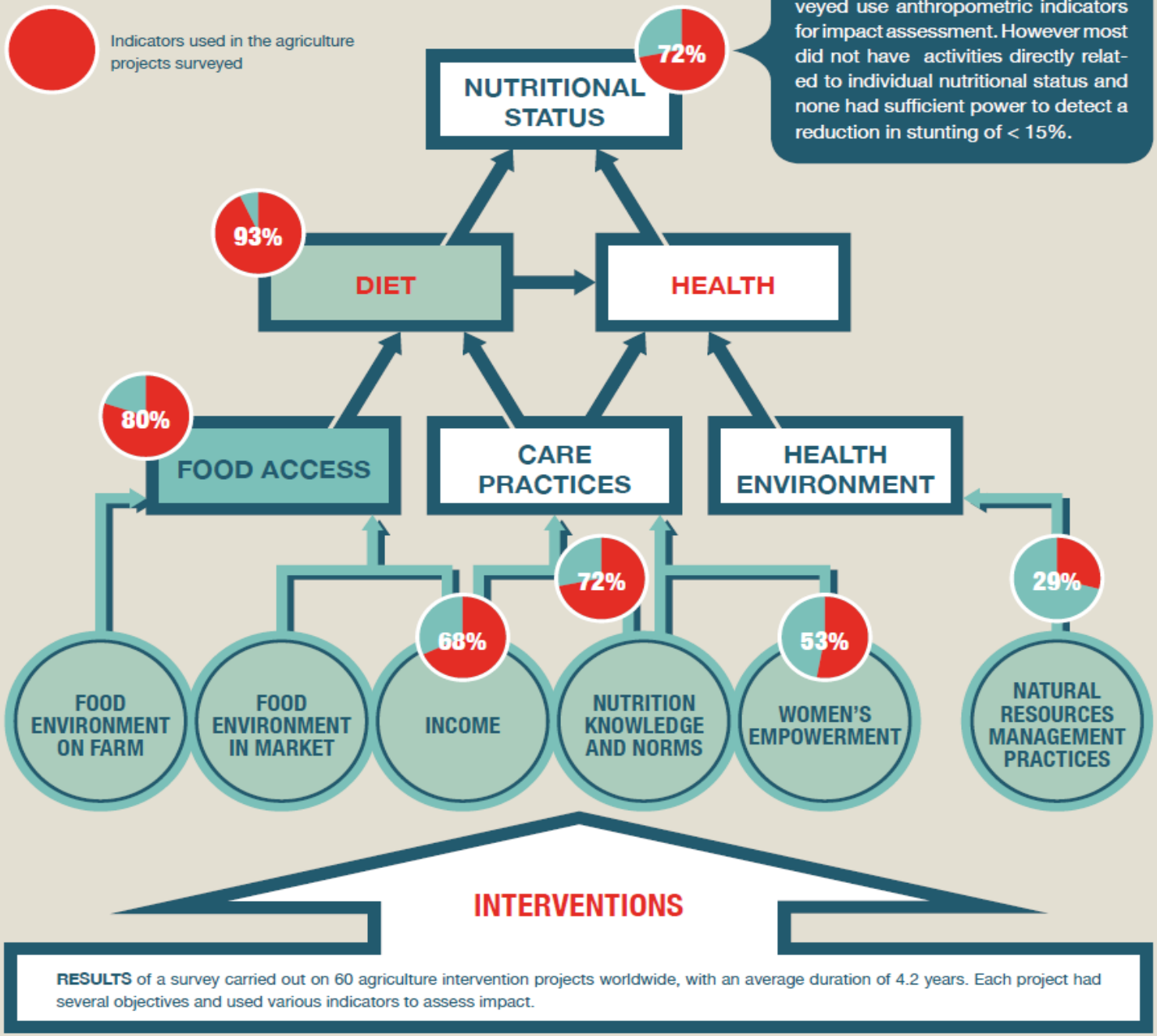


RESULTS of a survey carried out on 60 agriculture intervention projects worldwide, with an average duration of 4.2 years. Each project had several objectives and used various indicators to assess impact.

Examples of Indicators

Type of measure	Notes
Nutritional status	stunting, underweight, wasting, BMI, anemia, serum retinol
Food consumption or diet	Many measuring dietary diversity; MAD; intake of specific foods
Food access	HFIAS, HHS, seasonality, coping strategies
Economic outcomes	of these, 2/3 disaggregating by gender
Women's empowerment or labor	Decision-making, sales or assets, time use, qualitative assessments; a couple using/testing WEAI
Natural resource management	Few indictors described; e.g. use of soil and water conservation practices

What will we learn about impact on nutritional status (in particular, stunting)?

Probably not much

Only 6 studies with counterfactual have adequate power to observe a 20% decline in stunting over 5 years

- Sample sizes of 1,200-2,700 in each comparison required
- No study has adequate power to observe a decline in stunting of <15%

In most studies, improving diets or child feeding is the main hypothesized pathway towards improving nutritional status

What will we learn about impact on diet?

Sample sizes more appropriate for dietary impact

- Most medium to large studies in review would be able to detect a 50% improvement in prevalence of children achieving minimum dietary diversity (4 of 7 food groups).
- Sample sizes of 190-590 in each comparison required (depending on baseline prevalence)

Pathways to dietary change clearer and more linked to agricultural intervention

We won't learn enough about some impacts: Need to develop indicators

- **Food environment**
  - *Most current evidence and research stops at farmgate*
  - *Do these projects improve availability & affordability of nutritious food?*

- **Health and sanitation environment relevant to agriculture/nutrition**
  - *Very little systematic thinking about this so far; only 4 projects measuring*
  - *Water quantity and quality, food safety, exposure to agrochemicals, risk of zoonotic or water vector-born diseases, etc.*

- **Women's empowerment**
  - *Developing indicators of various aspects of empowerment separately (e.g. measures of women's income) could improve the project's ability to attribute improvement to project activities.*

Recommendations

Select indicators that link closely the program impact pathway

- *do not select indicators measuring outcomes that the project is not designed to affect*
- *Indicators that measure* **food access and dietary consumption** *reflect appropriate levels of nutrition impact for most projects*

Apply newer, validated impact indicators such as MDD-W, FIES

Minimum Dietary Diversity – Women (MDD-W)

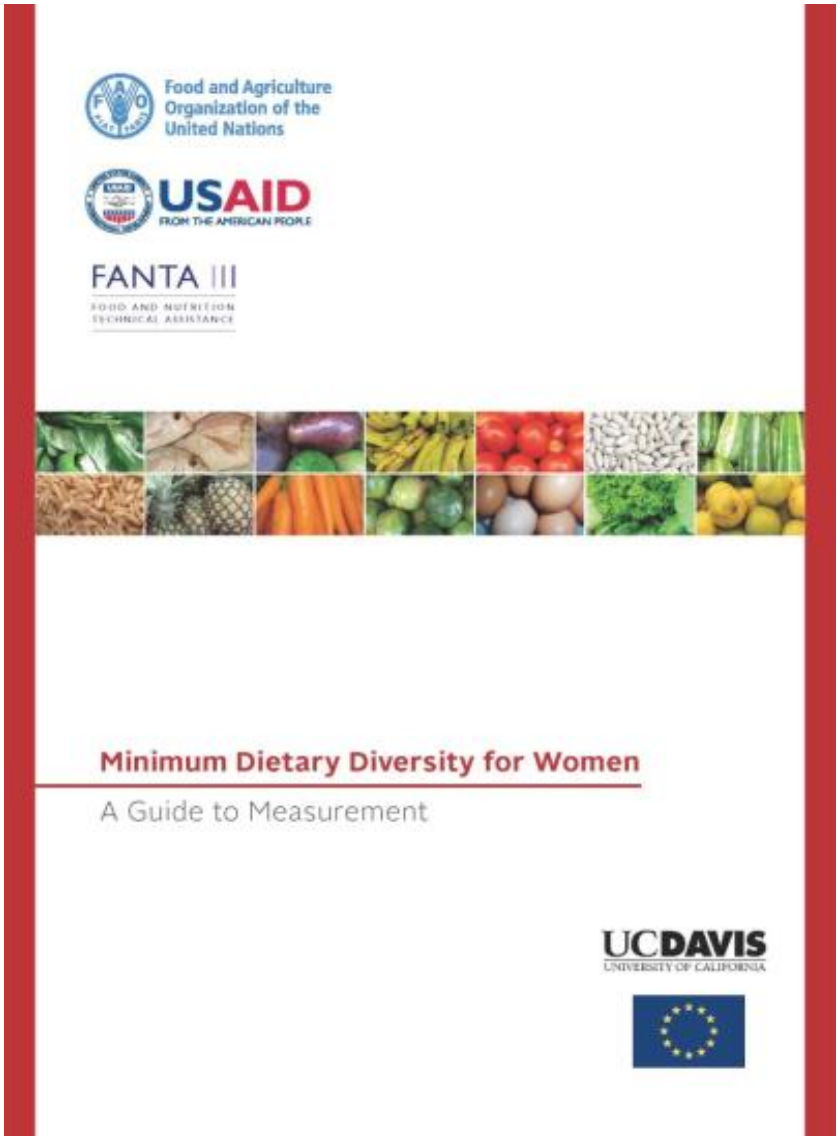
The MDD-W is defined as :

- ✓ A dichotomous indicator of whether or not **women 15-49 years** of age have consumed at **least five out of ten defined food groups** during the **previous day and night**

- ✓ The proportion of women 15–49 years of age who reach this minimum threshold of dietary diversity (i.e. five or more food groups) as a proxy indicator for micronutrient adequacy,

AN IMPORTANT DIMENSION OF DIET QUALITY

Guide available at:



FAO website

http://www.fao.org/3/a-i5486e.pdf

FANTA website

http://www.fantaproject.org/monitoring-and-evaluation/minimum-dietary-diversity-women-indicator-mddw

Food Insecurity Experience Scale (FIES)

- The FIES uses information from a set of 8 questions getting at food-related behaviors and experiences associated with **difficulties in accessing food** due to resource constraints.

  It measures the access dimension of food security.

- Validity of this type of measurement of food access/food security comes from 20 years of using experienced-based scales (HFIAS, ELCSA, USHFSSM)

http://www.fao.org/in-action/voices-of-the-hungry/en/

FIES is an SDG monitoring indicator

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

2.1.2 Prevalence of population with moderate or severe food insecurity using FIES

Baseline data for SDG monitoring process provided by FAO through the Voices of the Hungry project

Country-owned process (countries to collect, analyze and report results on FIES (or similar measures)

Appropriate in Ag2Nut context – strong links between agriculture (improving food access) and nutrition (improving diets).

Food and Agriculture Organization of the United Nations

Compendium of nutrition-sensitive indicators in agriculture

What this document is (and is not)

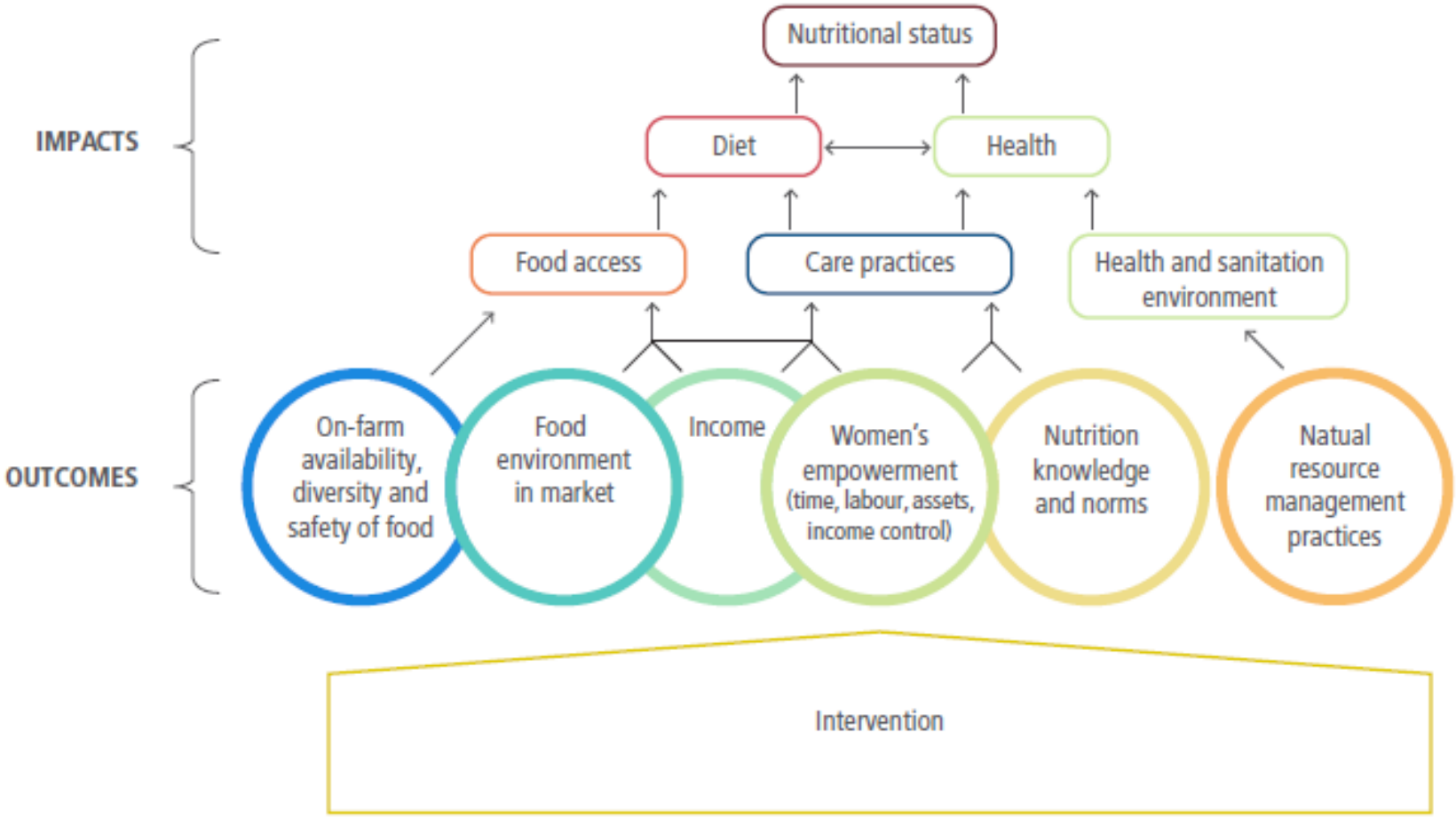
- **The purpose of the compendium** is to provide a current compilation of indicators that may be measured in nutrition-sensitive investments.
  - Does not provide detailed guidance on how to collect a given indicator but points to relevant guidance materials.

- **This compendium does not represent official FAO recommendations for specific indicators or methodologies**.
  - Intended only to provide information on indicators that may be relevant to consider in the monitoring and evaluation of nutrition-sensitive agriculture investments.

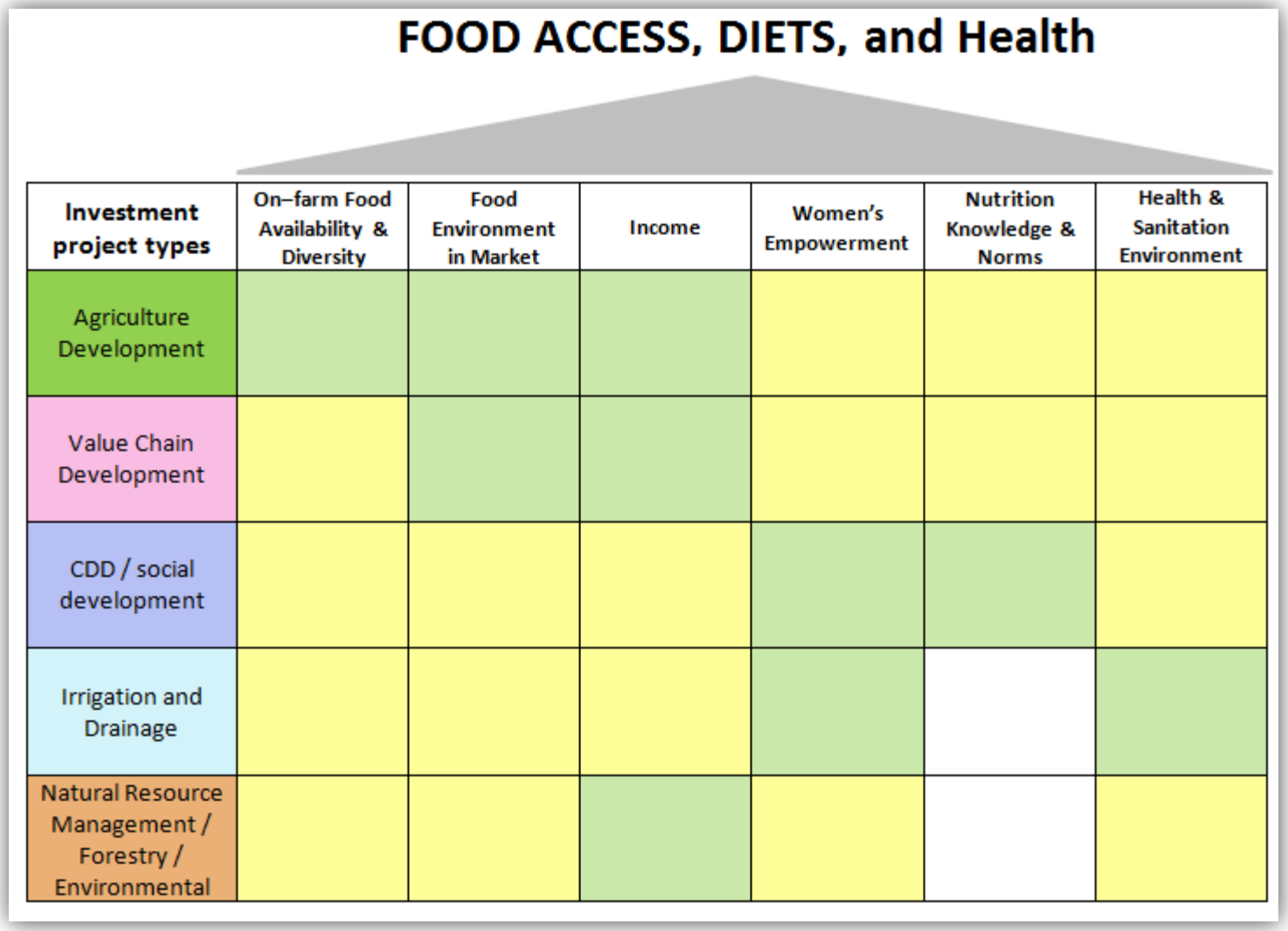
- It is not envisaged that a single project should collect data on all the indicators presented.
  - The selection will be informed by the type of intervention and anticipated impacts

Indicator domains / areas

Figure 1. Simplified result chain framework of investment projects. This framework identifies six outcome areas that are directly affected by agriculture, rural development and food systems, and how these can influence nutrition.



Entry points for nutrition sensitivity



Investment project types	On–farm Food Availability & Diversity	Food Environment in Market	Income	Women's Empowerment	Nutrition Knowledge & Norms	Health & Sanitation Environment
Agriculture Development						
Value Chain Development						
CDD / social development						
Irrigation and Drainage						
Natural Resource Management / Forestry / Environmental						

Green = Important entry points to leverage and measure	Yellow = Potential contribution requiring attention; measure if addressed	Blank = Typically less of a direct contribution, although linkages may be possible

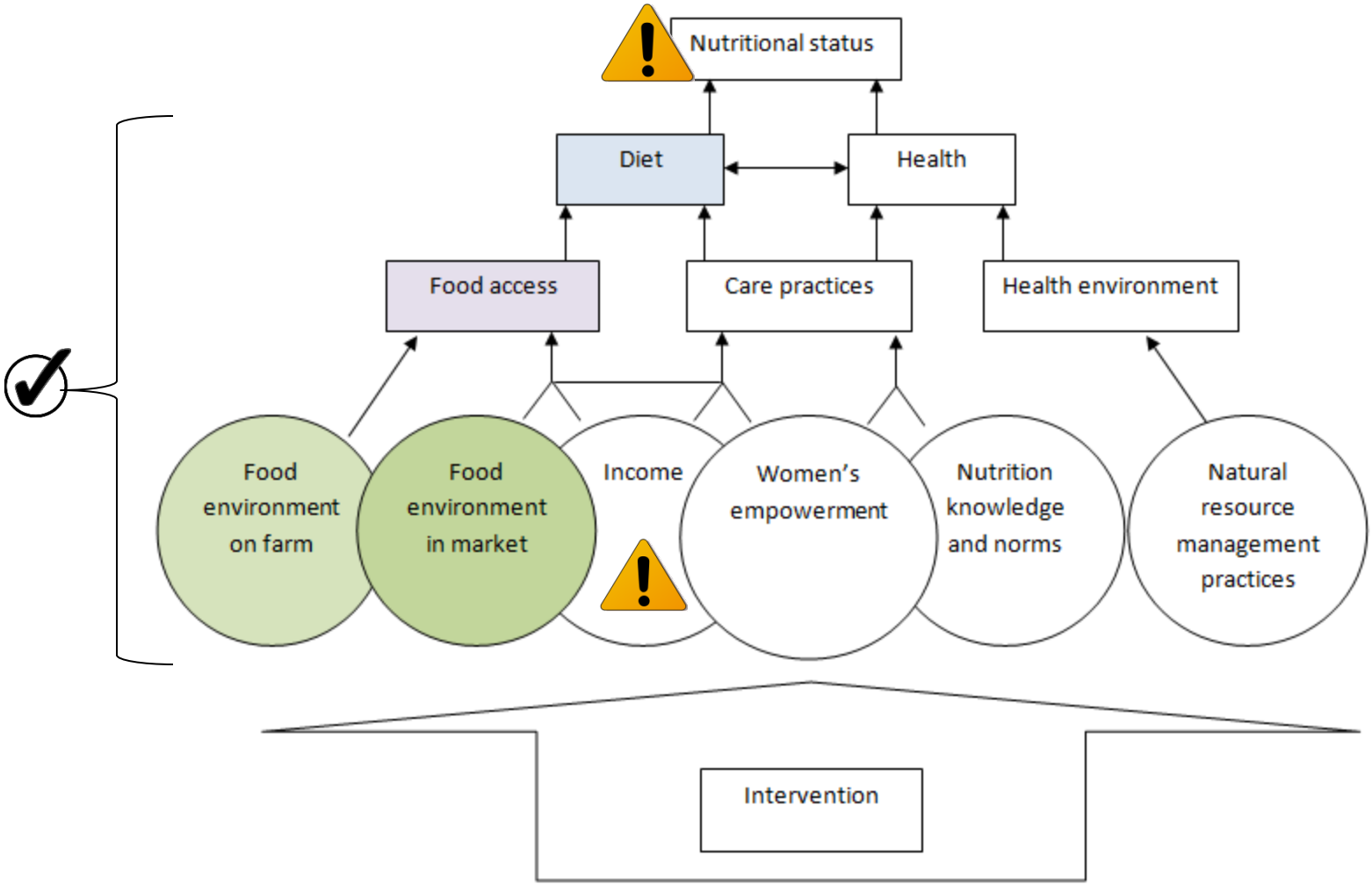
Overarching considerations in choosing indicators

1. Food access, dietary quality, and/or food environment are often appropriate nutrition-sensitive agriculture indicators
   - Caution with measuring nutritional status
   - Caution with assuming positive nutrition impact from income

2. Depending on the nature of the intervention, the most appropriate type of indicators will vary

3. Use existing indicators where they meet the need

Compendium of Indicators for Nutrition-Sensitive Agriculture



Key nutrition-sensitive indicators

Type of measure	*Recommended Indicators*
Diet – Individual level	Minimum Dietary Diversity scores for women (MDD-W) and young children (MDD age 6-24 mos)
Food access – Household level	Food Insecurity Experience Scale (FIES)

Type of measure	*Measurable outcomes – various methods available*
Food availability and diversity on-farm	Production of target nutrient-rich foods Diversity of crops and livestock produced
Food environment in market	Availability and prices of targeted nutrient-rich foods in local markets
Economic outcomes	Income, disaggregated by gender to reflect intra-household income control
Women's empowerment	Women's access to and control over resources (assets and income); women's participation in economic activities
Nutrition knowledge and norms	*Indicators will be project-specific*
Natural resource management	Access to improved drinking water source

Diet Quality indicators (examples)

- Minimum Dietary Diversity – Women (MDD-W)
- Minimum Diet Diversity – Young Children
- Individual Dietary Diversity Score (IDDS)
- Consumption of specific target foods by individuals (Vit. A or Iron rich foods, among others)
- Quantitative nutrient intakes
- Proportion of the diet consisting of processed and ultra-processed foods
- Consumption of 400gr of fruits and vegetables per day

- **When to use:** If the intervention affects food environments or income, women's empowerment and/or nutrition knowledge, skills and practices with hypothesized impact on diet quality.
- **Note:** No easy indicator currently exists that can capture diet quality holistically in its entirety (i.e. a diet that follows dietary recommendations). The MDD-W is validated and relatively easy to administer, but it does not capture dietary quality completely because it is an indicator of micronutrient adequacy and diversity, but does not deal with unhealthy amounts or components of the diet. Other dietary quality scores have been constructed (e.g. the Healthy Eating Index, Dietary Quality Index), but these require a full quantitative 24-hr recall. More diet quality indicators are under development. Currently there are several indicators that capture some aspects of diet quality:

Indicator	What it measures	Population	Data collection	Data analysis	Notes
MDD-W (Minimum Dietary Diversity – Women of Reproductive Age)	A measure of dietary quality, which reflects nutrient adequacy and dietary diversity	Women of reproductive age (15-49 years)	Data are collected on the foods and beverages consumed in the previous 24 hours which are aggregated into 10 distinct food groups. Does not require quantitative food intake.	Several indicators can be derived from the basic data, including (i) proportion of women who consume 5 or more food groups out of ten, (ii) mean dietary diversity score, (iii) proportion of women consuming any specific food group such as animal source foods.	**VALIDITY** This indicator has been validated as an indicator of likelihood of micronutrient adequacy among women of reproductive age. There is a recent global consensus on this indicator as the best, most valid measure of women's dietary diversity; it replaces the WDDS (Women's Dietary Diversity Score) that had been previously developed by FAO and FANTA. Unlike former measurements, it offers a threshold for women's micronutrient needs. CGIAR and USAID Feed the Future have mainstreamed the use of this indicator in their evaluations. **CUTOFF** (Available) Women who consume foods from at least 5 out of 10 food groups have a higher likelihood of micronutrient adequacy. **METHODOLOGY** (Standardized) Standardized methodology for data collection and analysis is available from FAO and FANTA III, 2016.[7]

Food Access indicators (examples)

- Household Dietary Diversity (HDDS)
- Food Consumption Score (FCS)
- Experience based measures of food security (FIES/HFIAS/ELCSA/HHS/CSI/MAHFP

- **When to use:** If the intervention affects food production, income, seasonal variation of food access and prices.
- While there are many existing food security metrics, a suite of indicators that measures each dimension of food security (sufficiency, quality, acceptability, safety, certainty/stability) is not yet established (Coates 2013)

Indicator	What it measures	Population	Data collection	Data analysis	Notes
Food Insecurity Experience Scale (FIES)	Severity of food insecurity experience	Household or individual	8 question survey module	Thresholds set on the score to classify the severity status of respondents	**VALIDITY** The FIES has been collected in over 145 countries since 2014 in the Gallup World Poll. Each country dataset has been validated with the Rasch model (Item Response Theory), demonstrating that the scale is accurately and reliably capturing the latent trait of food insecurity (access dimension). Statistical techniques have been developed to equate country results against a global standard that allows comparison across all countries. The global data reveal that the FIES shows significant and high correlations in the expected direction with most accepted indicators of development, including child mortality, stunting, poverty measures and the Gini index. **METHODOLOGY** (standardized) Description of the indicator available at the Voices of the Hungry website.[9]

Food Environment indicators (examples)

- On-farm availability, diversity and safety of food
  - Availability of specific foods
  - Production diversity
  - Functional diversity
  - Proportion of staple crops biofortified
  - Grain loss

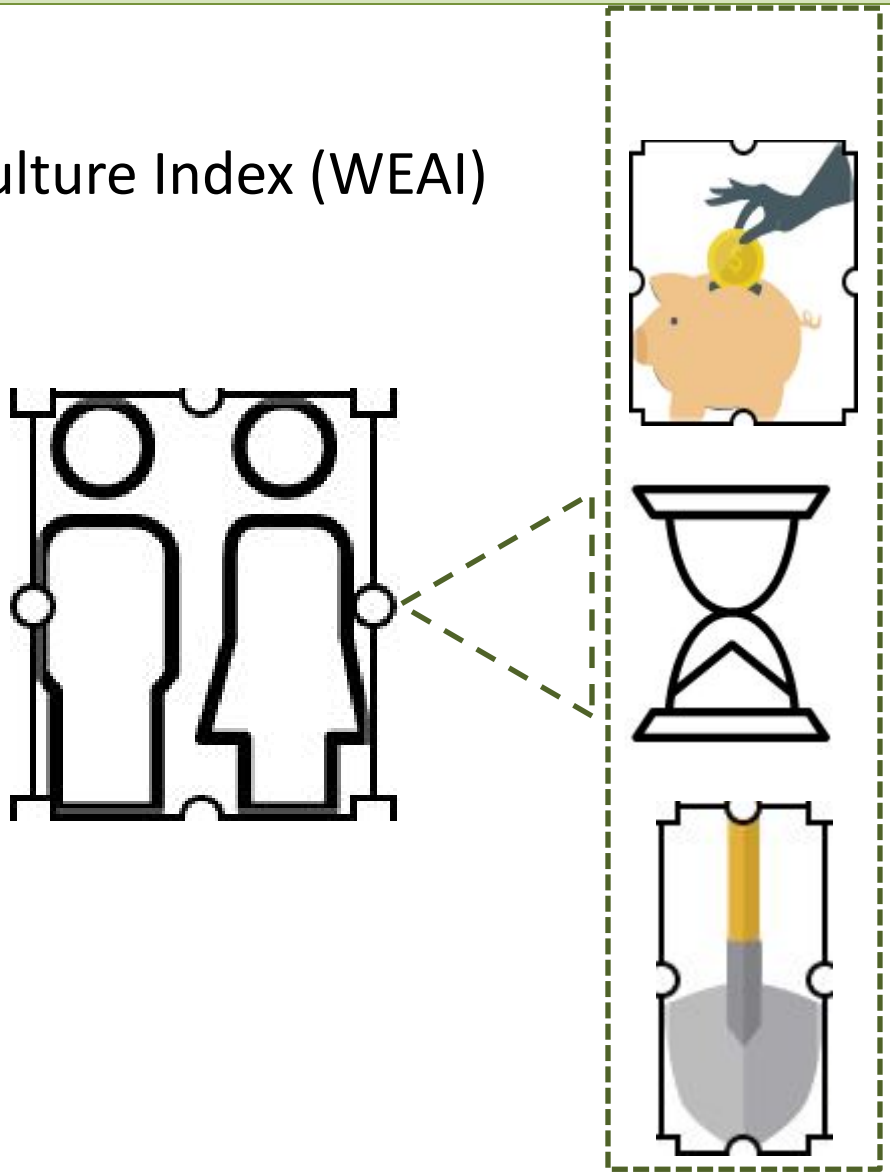
- Market level
  - Availability & prices of specific foods
  - Cost of a healthy diet

Income

- Wealth indices/Poverty level
- Income or consumption (secondary data, not collected by projects)
- Household asset index

Women's empowerment

- Women's Empowerment in Agriculture Index (WEAI)
- Women's control of income
- Women's time use and labor
- Asset ownership by gender
- Qualitative assessment



Nutrition and food safety knowledge and norms

- **When to use**: When intervention is promoting certain nutrition behaviours or messages; or, to understand likelihood of consumption of specific foods or overall dietary patterns for various population sub-groups.

Indicator	What it measures	Population	Data collection	Data analysis	Notes
Most will be intervention-specific	Nutrition- and health-related knowledge, attitudes and practices (KAP) at the community level	Usually women	Household survey and/or qualitative process		These indicators will be project-specific, depending on what sort of knowledge or behaviour is promoted. **VALIDITY** Knowledge and attitudes do not refer to physical objects but to psychosocial and subjective concepts. It is therefore not possible to validate the results concerning knowledge and attitudes in KAP surveys because no objective benchmark or reference exists. (FAO Guidelines 2014) **METHODOLOGY** (standardized) FAO Guidelines for assessing nutrition-related Knowledge, Attitudes and Practices, 2014. The guidelines comprise predefined questionnaires that capture information on critical knowledge, attitudes and practices related to most common nutrition topics: www.fao.org/docrep/019/i3545e/i3545e00.htm Note: if agricultural knowledge (e.g. knowledge of improved practices) is sometimes assessed in projects, relevant nutritional knowledge could be added.
Changes in specific behaviours promoted with regard to food safety	Awareness about safety at household (consumers') level	Households or community	Household survey and/or qualitative process		Indicators would be intervention-specific. They could also be built around the concept of the WHO's 5 keys for safer foods (www.who.int/foodsafety/publications/5keysmanual)

Care practices

- Minimum Adequate Diet (MAD) for children under age 2
  - Breastfeeding indicators
  - Minimum Diet Diversity for children under age 2 (MDD)
  - Minimum meal frequency

Indicator	What it measures	Population	Data collection	Data analysis	Notes
Minimum Acceptable Diet (MAD)	This indicator combines standards of (i) dietary diversity (a proxy for nutrient density); and (ii) feeding frequency (a proxy for energy density) by breastfeeding status; and thus provides a useful way to track progress at simultaneously improving the key quality and quantity dimensions of children's diets	Children under 2 years	Recall of the previous day, administered through a household survey	This is a composite indicator: while it is an indicator of diet quality for young children, it is primarily an indicator of care practices, since those determine young child diet quality to such a large extent Can be used to calculate the proportion of children 6-23 months of age who receive a MAD	**VALIDITY** Validation studies have been done on the minimum dietary diversity component (see diet quality section), but not on the composite indicator. **METHODOLOGY** Indicators for assessing infant and young child feeding practices - Minimum Acceptable Diet, published by WHO, 2008.[8]
Minimum Meal Frequency	Proxy for energy intake from non-breastmilk foods among young children	Children under 2 years	Recall of the previous day, administered through a household survey	Proportion of breastfed and non-breastfed children 6–23 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) a minimum number of times or more	**CUTOFF** Minimum 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 — "Meals" include both meals and snacks (other than trivial amounts) and frequency is based on caregiver report. **METHODOLOGY** Indicators for assessing infant and young child feeding practices - Minimum Meal Frequency, published by WHO, 2008.[8]
Minimum Dietary Diversity (children age 6-23 months) (full description available in the DIET section).[8]					

Natural resources management practices, health and sanitation environment (related to agricultural management practices)

- **When to use**: when intervention affects soil or water management, or livestock-human interactions.
- These indicators will be project-specific, depending on what area of natural resources or health environment that the agricultural activities may affect.
- The dimensions of the health and sanitation environment most relevant to agriculture interventions could include water quantity and quality, environmental contamination having an impact on food safety, agrochemical exposure, risk of zoonotic or water vector-borne disease and cleanliness of children's play areas (Presence of animals in or near the home).

Indicator	What it measures	Population	Data collection	Data analysis	Notes
Access to improved drinking water source	See indicator definitions	Household	Household survey		**DEFINITION** The following specific indicators have been defined: (1) Percentage of population using an improved drinking water source on premises with discontinuity less than 2 days in the last 2 weeks; with less than 10 cfu E.coli/100ml year round at source; accessible to all members of the household at the times they need it (2) Percentage of population using an improved water source with a total collection time of 30 minutes or less for a roundtrip including queuing. The WHO/UNICEF Joint Monitoring Programme has established a standard set of drinking-water and sanitation categories that are used for monitoring purposes. Further information is available here: www.wssinfo.org www.wssinfo.org/definitions-methods/watsan-categories
Presence of animals in/near household	Indicates risk of environmental enteropathy	Household	Household survey		A specific indicator and methodology is not defined.

Nutritional status: anthropometric and biochemical indicators

Indicator	What it measures	Population	Data collection	Data analysis	Notes
Stunting	Height for age	Children under 5	Household survey	<-2 Z scores is the cutoff for moderate level, <-3 Z scores is the cutoff for severe level	Requires carrying height boards to measure heights of children and specific training for accurate measurement Requires determining child's age in months accurately. Would usually not allow to show observable changes in many small-scale interventions and over short periods of time.
Wasting	Weight for height	Children under 5	Household survey	<-2 Z scores is the cutoff for moderate level, <-3 Z scores is the cutoff for severe level	Requires carrying height boards and weighing scales to measure heights and weights.
Underweight	Weight for age	Children under 5	Household survey	<-2 Z scores is the cutoff for moderate level, <-3 Z scores is the cutoff for severe level	Requires carrying scales to measure weights of children; Requires determining child's age in months accurately.
Maternal weight/BMI	Weight in kg/height in m2	Usually adult women	Household survey	<18.5 is the cut-off for underweight; >25 is the cut-off for overweight for many countries; >30 is the	Requires carrying scales to measure weights of women.
Iron status	Whether an individual's body is deficient or replete in iron	Usually women or children under 5	Requires collecting blood for 3-4 different tests of iron biomarkers and usually also requires tests for inflammation.		Assessing the iron status of populations: report of a joint World Health Organization/ Centers for Disease Control and Prevention technical consultation (WHO and CDC, 2007).[81]
Anaemia	Haemoglobin level		Blood samples	Compare data to WHO universal thresholds that define levels of public health importance.	Document to assess haemoglobin concentrations for the diagnosis of anaemia and assessment of severity available on WHO website (WHO, 2011).[82]
Vitamin A status	Whether an individual's body is deficient or replete in vitamin A	Usually women or children under 5	Clinical signs (Bitot's spots, xerophthalmia); Blood collection; Breastmilk collection. Usually also requires tests for inflammation.	Serum retinol, or breastmilk retinol.	Reference document for assessing vitamin A deficiency in monitoring and evaluating interventions, available on WHO website (WHO, 1996).[83]

- *Workshop on MDD-W at FAO, Sept 2016*

- *FAO Dietary Assessment - A resource guide to method selection and application in low resource settings.* To be released 2016.

FSIN
Food Security Information Network

Technical Working Group on
Measuring Food and Nutrition Security
www.fsincop.net/topics/fns-measurement

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

June 2016

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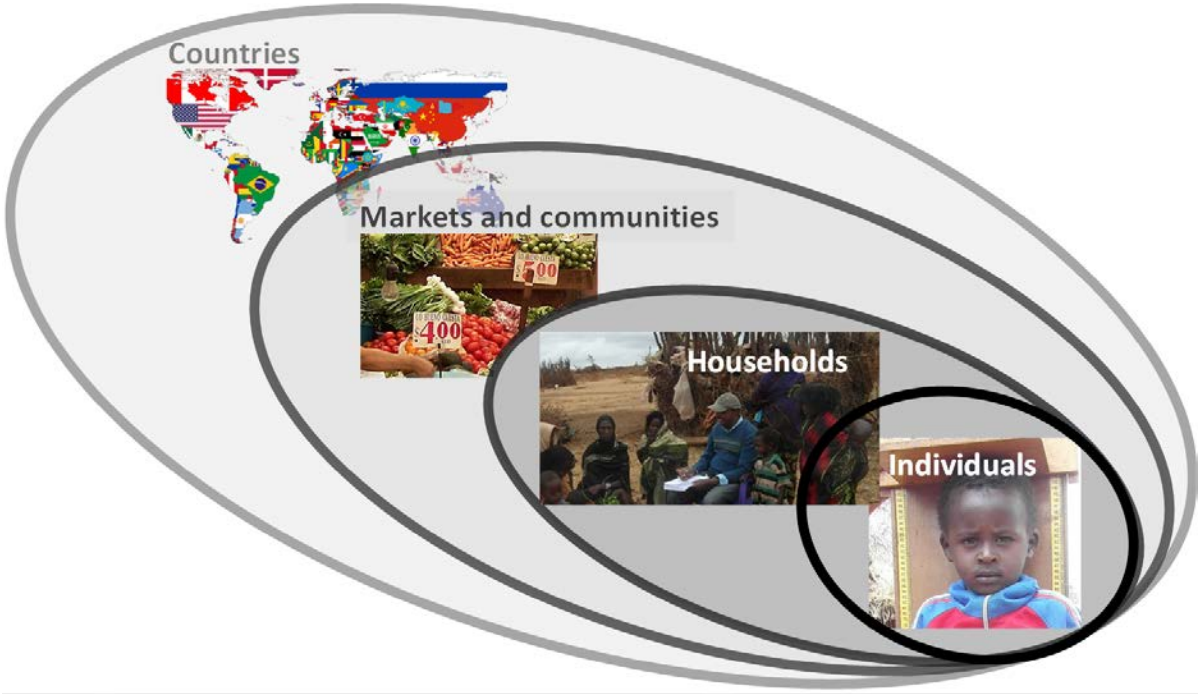

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