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# Calculating Wheat Flour Consumption: Sources and Methods

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# Overview

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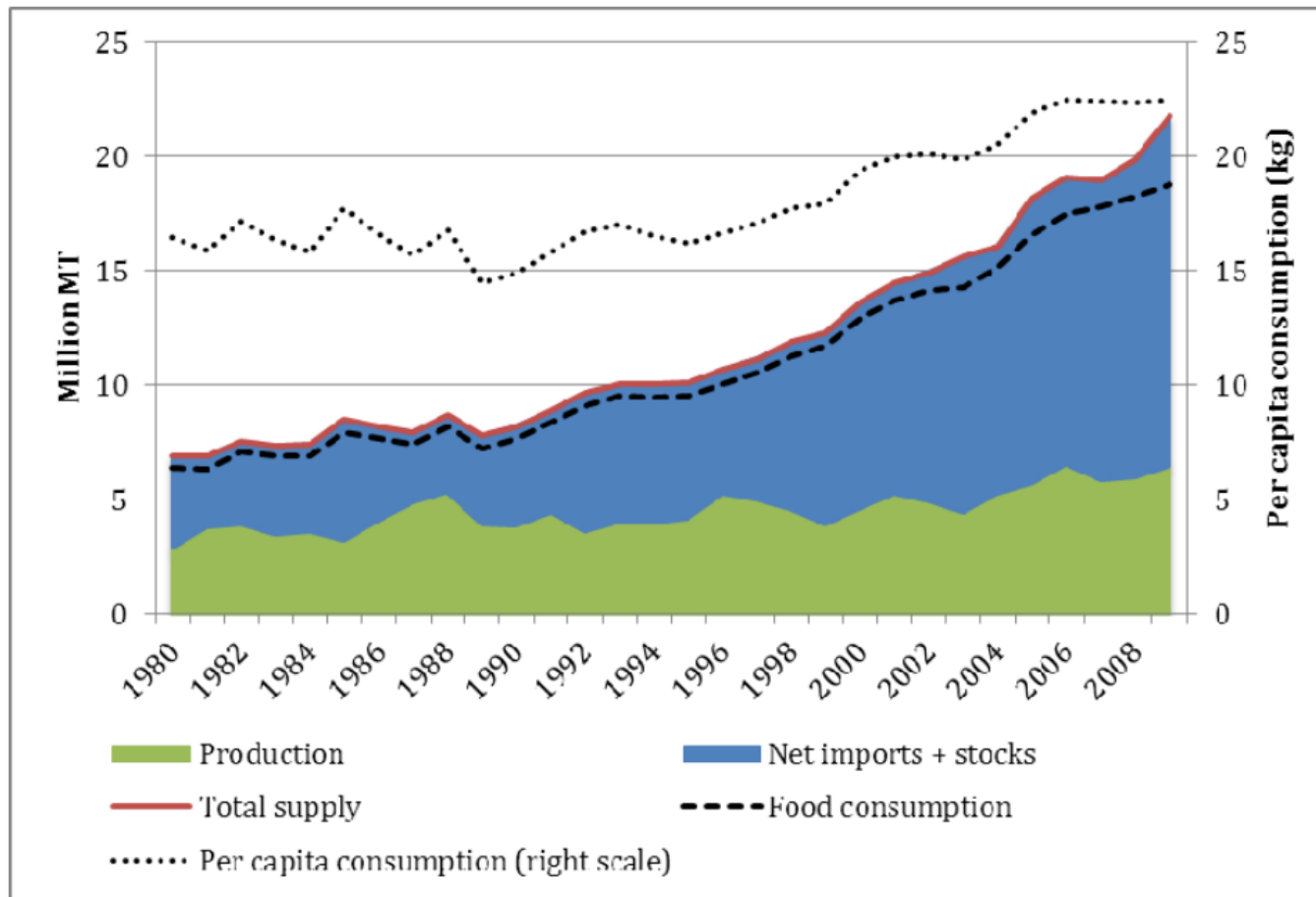
- Wheat consumption trends in SSA
- Summary of consumption data needs and considerations
- Sources of wheat flour consumption data
  - Benefits and Limitations
  - Data examples
  - Comparisons of wheat flour consumption estimates across countries
- Estimating Consumption using HCES
  - Household Consumption → Individual Intake
  - Food Composition Tables (FCTs), Adult Male Equivalent (AME), Tolerable Upper Intake Levels (UL)
  - ADePT

# Wheat Consumption\* Trends in SSA

\*Based on FAOSTAT data and the disappearance method

- Between 2000 and 2009, per capita wheat consumption in SSA increased at a rate of 0.35 kg/yr
- Consumption is expected to increase at an even faster rate in the future:
  - 670,000 MT to 1.12 million MT per yr between 2010 and 2020
  - 770,000 MT to 1.28 million MT per yr between 2020 and 2030

# Wheat Consumption, Production and Net Imports in SSA 1980-2009



Sources: FAOSTAT Commodity Balances and Population databases.

# Top Net Importers of Wheat

- The top 5 wheat imports in SSA (between 2000-2009) account for **53%** of wheat net imports, **64%** of total consumption, and **44%** of the population in the region:
  1. Nigeria (23.0%)
  2. Sudan (10.7%)
  3. Ethiopia (8.2%)
  4. South Africa (6.6%)
  5. Kenya (4.9%)

## Top Exporters

**United States: 34%**

**Argentina: 15%**

**Australia: 8%**

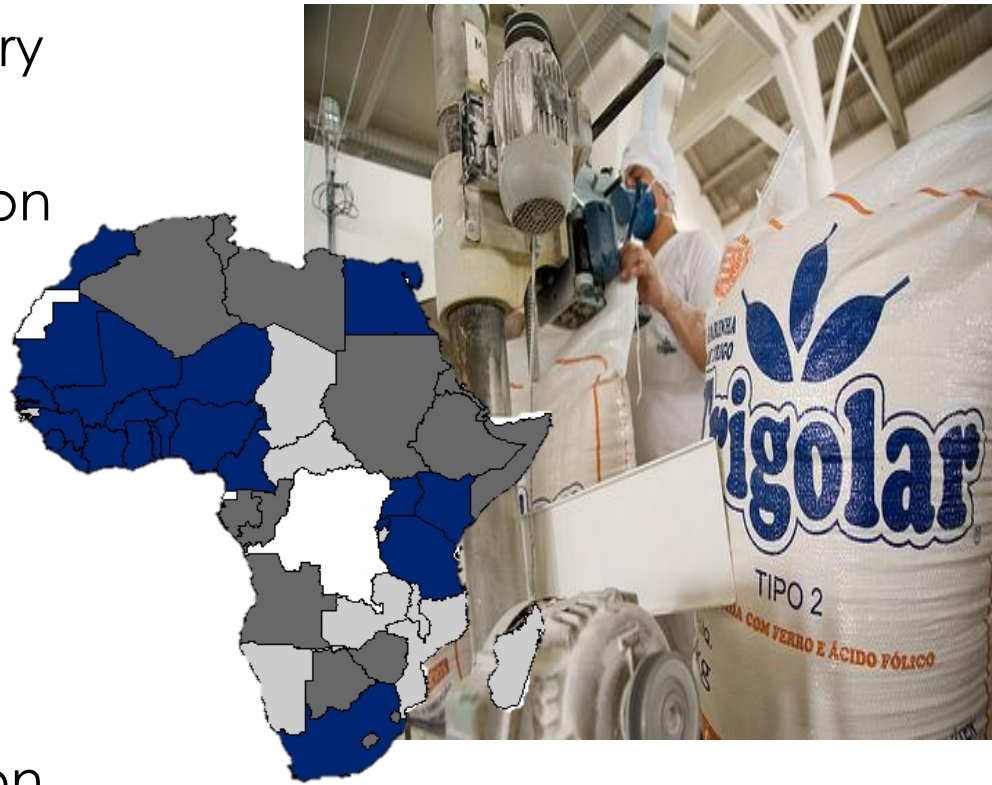
# Potential Drivers of Demand

- Rising incomes
- Growing populations
- Urbanization
- Women's participation in the labor force and the opportunity costs of time
- Wheat food aid
- Declining price of wheat relative to other staples (in countries such as Kenya and Nigeria)

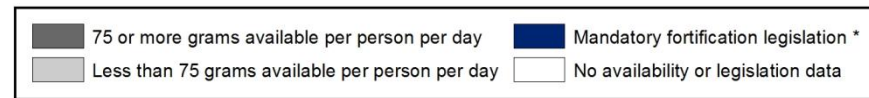


# Fortification Process

1. Gather political and industry support
2. Define the target population
3. Collect baseline data
4. Select the food vehicle(s)
5. Estimate costs and secure finances
6. Implement fortification program
7. Food control and inspection
8. Monitor and evaluate progress
9. Impact analysis



**Wheat Availability and Fortification Legislation**



# What can consumption data tell us?

- The current consumption environment
- Baseline information on nutrient intake
- Frequency and quantities of fortification vehicle consumption
- Individual consumption
- Food acquisition





# Cost-Benefit Analysis

- Overall objective:

Make projections of possible reduced economic burden via wheat flour fortification and provide a cost-benefit projection.

- Consumption data needed:

- % of population consuming commercial flour and flour products
- Average kg of wheat flour consumed per person per year (**among wheat flour consumers**)
- Projected change in number of wheat flour consumers over 10 years
- Projected change in flour consumption (kg/year) over 10 years (**among wheat flour consumers**)

# Conditional vs. Unconditional

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- Conditional mean quantity consumed
  - Total quantity consumed divided by the number of consumers of wheat flour
- Unconditional mean quantity consumed
  - Total quantity consumed divided by the total number of persons

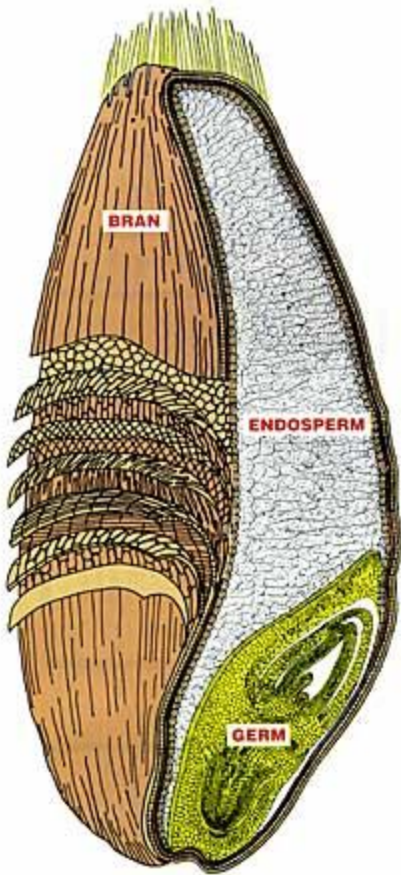
**The numerators are the same, but the denominators differ!**

# Changes in Demand: Consumers vs. Quantities

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- Changes in wheat flour demand may occur because of:
  1. Consumers
    - Changes in the number of consumers and the proportion of households consuming wheat flour (quantity remains constant)
  2. Quantity
    - Changes in the average quantity of wheat flour consumed by those **already consuming** it (number of consumers remains constant)
  3. Consumers and Quantity
    - Changes in both factors

# Additional Factors to Consider...



- Wheat extraction rates
- Wheat content estimates for foods containing wheat flour
- How wheat flour is quantified (weight vs. monetary)
- Methods for calculating individual consumption from household level data

# Wheat Flour Content Estimates

- Many data sources identify wheat flour and food items which contain wheat flour
- This requires estimating wheat flour content in various wheat flour products.



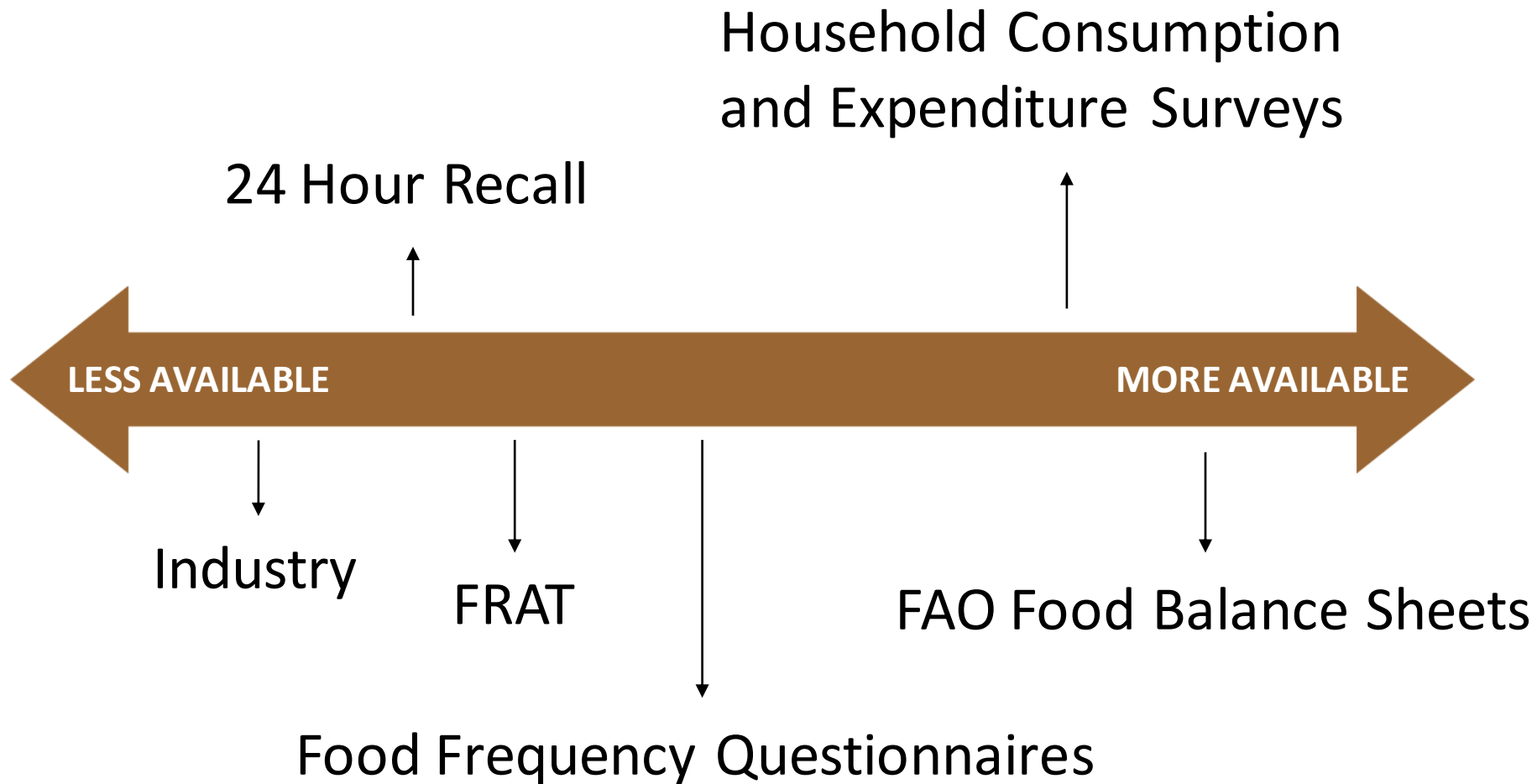
Food Item	%	Food Item	%	Food Item	%
White bread (European style)	60%	Crackers	90%	Dried Pasta	90%
Flatbread (unleavened)	75%	Biscuits and Cookies	60%	Wet/Cooked Pasta: <ul style="list-style-type: none"> <li>• Noodles</li> <li>• Spaghetti</li> <li>• Macaroni</li> <li>• Other pasta</li> </ul>	28%
Whole wheat bread	75%	Cake	55%		
Sweet breads	65%	Pies and Pastries	35%		

# Sources of Consumption Data

- Individual Food Consumption Data
  - 24-Hour Survey (diary, directly observed, weighed, or recall)
  - Food Frequency Questionnaire
- Fortification Rapid Assessment Tool (FRAT)
- Household Consumption and Expenditure Surveys (HCES)
- FAO Food Balance Sheets
- Industry Production Data

**....but how available is the data? What are the benefits and limitations of each source?**

# General Availability of Data



# Specificity of Data

Household Consumption  
and Expenditure Surveys

FAO Food Balance Sheets

LESS SPECIFIC

MORE SPECIFIC

Industry

FRAT

24-Hour Recall

Food Frequency Questionnaires



# 24-Hour Recall

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- Recall and/or food weighing methods are used to account for individual consumption within the previous 24 hours
- Food models, photographs, or weighing or volumetric estimation techniques
- Often considered the “gold standard” source among nutritionists for food consumption data
  - But is it?
- Recently conducted 24-Hour Recall Surveys
  - South African National Food Consumption Survey (1999)
  - Uganda Food Consumption Survey (2008)
  - Cameroon (2010)

# 24-Hour Recall

TABLE 5.1

## FORM FOR RECORDING THE INTERACTIVE 24-HOUR RECALL, WITH A SAMPLE RECALL FOR A 4-YEAR-OLD FEMALE

Interviewer: Darsen Scale no.: 12 Interview date: 6 <sup>th</sup> June 2005 Day food eaten: Thursday			Location: Nembya Subject ID: 00455 Subject name: Sandikonda		Sex: F Age: 48 months Weight: 14kg	
Time	Place eaten	Food or drink	Description, and cooking method	Amount eaten	Weight equivalent (g)	Food Code
7:30	Home	Porridge	Prepared with mgayewa <b>unrefined maize flour</b>	267mL	315	
		Salt	Not iodized	1/2tsp	4	
9:15	Home	Sweet potatoes	Boiled in skins and skins removed	350g	350	
11:20	Home	Ground-nuts	Raw	60g	60	
12:15	Home	Corn-on-cob	Boiled	5cm	100	
14:00	Home	Nsima	Prepared with mgayewa <b>unrefined maize flour</b>	335g		
14:00	Home	Fish relish	Boiled (recipe completed)	37g		
			Ingredients: dry usipa			
			Salt, not iodized			
4:05	Home	Sugar cane	Raw	14cm	76	
6:20	Home	Nsima	Prepared with ufa <b>processed maize flour</b>	305g	305	
Probe for alcohol: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>			Probe for sickness: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, did sickness affect appetite? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, how? Increase <input type="checkbox"/> Decrease <input type="checkbox"/>			
Was food intake unusual? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, how was it unusual?			Probe for tablets: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Iron <input type="checkbox"/> Vitamins <input checked="" type="checkbox"/> Other supplements <input type="checkbox"/> Anti-malaria <input type="checkbox"/>			
Was it a feast day? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Was it a market day? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Was it a fasting day? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>						

# 24 Hour Recall: Benefits

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- High degree of accuracy (but only if administered correctly)
- Account for intra-household distribution of food
  - Quantitative estimates of individual diets
- Accounts for foods eaten outside of the home
- Open ended food consumption inquiries provide detailed estimates
  - Food items not limited to a predetermined list
  - Can include type of food preparation (raw, boiled, etc.)
  - Four passes approach (Gibson and Ferguson)

# 24 Hour Recall: Limitations

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- Expensive, complex, and difficult to conduct
  - Few are available
- Often conducted regionally or for specific target populations
  - Small sample size
  - May not be statistically representative samples
  - Use for national food and nutrition work is questionable
- Conducted once, may not capture
  - Typical diet
  - Seasonality

# Food Frequency Questionnaire

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- Provides the frequency of consumption of foods over a given period of time
  - Typically one week to one year
- Most common method of measuring dietary patterns in large studies
- May be semi-quantitative
  - “typical” portion sizes
- Often combined with 24-hour recalls to provide estimates of normal diet patterns

# Food Frequency Questionnaire

PLEASE PUT A TICK (✓) ON EVERY LINE

FOODS AND AMOUNTS	AVERAGE USE LAST YEAR								
	Never or less than once/month	1-3 per month	Once a week	2-4 per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day
<b>DRINKS</b>									
Tea (cup)								✓	
Coffee, instant or ground (cup)						✓			
Coffee, decaffeinated (cup)	✓								
Coffee whitener, eg. Coffee-mate (teaspoon)	✓								
Cocoa, hot chocolate (cup)						✓			
Horticks, Ovaltine (cup)	✓								
Wine (glass)	✓								
Beer, lager or cider (half pint)	✓								
Port, sherry, vermouth, liqueurs (glass)	✓								
Spirits, eg. gin, brandy, whisky, vodka (single)	✓								
Low calorie or diet fizzy soft drinks (glass)	✓								
Fizzy soft drinks, eg. Coca cola, lemonade (glass)						✓			
Pure fruit juice (100%) eg. orange, apple juice (glass)	✓								
Fruit squash or cordial (glass)							✓		
<b>FRUIT</b> (1 fruit or medium serving) For very seasonal fruits such as strawberries, please estimate your average use when the fruit is in season									
Apples				✓					
Pears				✓					
Oranges, satsumas, mandarins		✓							
Grapefruit	✓								
Bananas			✓						
Grapes			✓						
Melon	✓								
Peaches, plums, apricots				✓					
Strawberries, raspberries, kiwi fruit						✓			
Tinned fruit		✓							
Dried fruit, eg. raisins, prunes	✓								
	Never or less than once/month	1-3 per month	Once a week	2-4 per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day

Please check that you have a tick (✓) on EVERY line



# Food Frequency: Benefits

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- Easy to conduct
- Captures individual diet patterns
- Longer recall periods better capture a “typical” diet and may account for seasonality
- Well suited for assessing the reach and coverage of fortification programs

# Food Frequency: Limitations

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- Does not assist with setting fortification *levels*
  - Cannot account for quantities consumed
- Longer recall periods
  - Less accurate responses
- Predetermined food lists
  - Exclude important food items (nutrient rich or food fortification vehicles)
- Does not distinguish food source (purchased, produced, etc.)



# Fortification Rapid Assessment Tool (FRAT)

- Developed by PATH Canada in 1997/98
- Designed to assist public health program managers in designing fortification programs
- Combine a simplified 24-hour recall and Food Frequency Questionnaire
- Collects representative, quantitative data on the consumption of food vehicles among children (6 – 59 months) and women of reproductive age (16-45 years)

Enquête FRAT sur la consommation de la farine de blé au CONGO

**ENQUÊTE FRAT SUR LA CONSOMMATION DE LA FARINE DE BLE AU CONGO**  
*Questionnaire consommation Femme & Enfant*

Enquêteur N°: | | | | | Date : | | | | | | | | | | | | | |

Strate : \_\_\_\_\_ N° S' strate | | | |

Grappe : \_\_\_\_\_ Département \_\_\_\_\_ N° Grappe | | | |

Adresse : \_\_\_\_\_ Arrondissement/Quartier/Village \_\_\_\_\_

Nom et prénom du chef de ménage : \_\_\_\_\_

**Partie I. Liste des membres du ménage ayant partagé le repas la veille**

N°	Nom et prénoms	Âge (ans)	Sexe		Filiation avec le chef de ménage (Epouse, Epouse, Nourrice, Père, etc., Tuteur)	Occupation
			M	F		
1						
2						
3						
4						
5						
6						



	Réponses	Passer à	Codes
chef de ménage	Femme (Epouse, Epouse Nourrice, Bébé-sœur, Sœur, Grande Sœur, Petite Sœur, Mère, Grande Mère, Petite Mère) Homme (Père, Grand-père, Petit-père, Oncle, Grand-oncle, Petit-oncle, Neveu, Népote, Tuteur) Autre		
Age ?	0-1 ans           1-4 ans           5-14 ans           15-19 ans           20-24 ans           25-29 ans           30-34 ans           35-39 ans           40-44 ans           45-49 ans           50-54 ans           55-59 ans           60-64 ans           65-69 ans           70-74 ans           75-79 ans           80-84 ans           85-89 ans           90-94 ans           95-99 ans           Autre		
Sexe ?	Masculin ..... 1 Féminin ..... 2		
Niveau scolaire	Non scolarisé ..... 1 Primaire ..... 2 Collège ..... 3 Lycée ..... 4 Université ..... 5 NSP ..... 6		
Statut de mariage ?	Célibataire ..... 1 Vie en couple ..... 2 Divorcé ..... 3 Veuf (ve) ..... 4 Sédentaire ..... 5 Fonction publique ..... 6 Secteur privé ..... 7 Secteur informel ..... 8 Retraité ..... 9 Autre ..... 10		
Statut du chef de ménage ?	Non salarié ..... 1 Elève-Étudiant ..... 2 Sans emploi ..... 3 En apprentissage ..... 4 Autre ..... 5 Propriétaire ..... 6 NSP ..... 7		
Revenu mensuel ?	0-1000 FCFA ..... 1 1001-2000 FCFA ..... 2 2001-3000 FCFA ..... 3 3001-4000 FCFA ..... 4 4001-5000 FCFA ..... 5 5001-6000 FCFA ..... 6 6001-7000 FCFA ..... 7 7001-8000 FCFA ..... 8 8001-9000 FCFA ..... 9 9001-10000 FCFA ..... 10 Autre ..... 11 NSP ..... 12		
Source de l'énergie ?	Bois ..... 1 Acrot ..... 2 Radio ..... 3 Télévision ..... 4 Journaux ..... 5 Locataire ..... 6 Propriétaire ..... 7 Sous-logé ..... 8		

# FRAT: Benefits

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- Designed specifically to assess consumption patterns of fortification vehicles
- Collects additional, qualitative information
  - Processing and storage of food vehicle
  - Availability and ease of obtaining fortification vehicle
- Can be added on to existing surveys, including HCES, or implemented on its own

# FRAT: Limitations

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- Surveys focus on food intake of potential food vehicles
  - Overall nutrient intake analysis is impossible
- Conducted specifically for the purpose of designing fortification programs
  - Only conducted once, cannot measure trends
- Targets population subgroups
  - Women of reproductive age (16 – 45 years)
  - Children (6 – 59 months)
- Smaller sample sizes than HCES
  - Sample size recommended by FRAT is 210 households
  - Sample size and representativeness may vary dramatically

# FRAT: Wheat flour

- FRAT survey countries in which wheat flour was a food vehicle of interest:



- Burkina Faso, 1999
- Cameroon, 2011
- Congo, 2008
- Guinea, 2001
- Mali, 1999
- Mauritania, 2002
- Mozambique, 2010
- Senegal, 2006

# FRAT Results: Wheat Flour Consumption among WRA

Country, year of publication	Total N (in survey)	% Consumed wheat flour, past week			Median amount of wheat flour consumed on previous day (g/day)		
		All	Urban strata	Nonurban strata	All	Urban strata	Nonurban strata
Burkina Faso, 1999	840	48 %	83 %	15;52; 41 %	49 g	65 g	21;47;55 g
Cameroon, 2011	912	92 %	98 %	90;91 %	79 g	90 g	66;71 g
Congo, 2008	1,050	68 %	NA	NA	85 g	133 g	76;76;68 g
Guinea, 2001	1,050	67 %	98 %	40;74;77; 42%	95 g	95 g	NA;82;110; 85 g
Mauritania, 2002	225	88 %	99;100 %	67 %	108 g	77;130 g	91 g
Mozambique, 2010	2,506	92 %	96;87;91 %	NA	NA	NA	NA
Senegal, 2006	840	93 %	99;98 %	77;98 %	104g	111 g	98;115;98 g

Source: Hess, Sonja Y., Brown, Kenneth H., Sablah, Mawuli, Engle-Stone, Reina, Aaron, Grant J. and Shawn K. Baker. 2013. "Results of Fortification Rapid Assessment Tool (FRAT) surveys in sub-Saharan Africa and suggestions for future modifications of the survey instrument." *Food and Nutrition Bulletin*, 34(1): 21-38.

# FRAT Results: Wheat Flour Consumption among Children

Country, year of publication	Age range (months)	% Consumed wheat flour, past week			Median amount of wheat flour consumed on previous day (g/day)		
		All	Urban strata	Nonurban strata	All	Urban strata	Nonurban strata
Burkina Faso, 1999	12–36	57%	88%	19;58;62%	32 g	30 g	15;38;40 g
Cameroon, 2011	12–59	94%	97%	90;95%	49 g	71 g	40;49 g
Congo, 2008	12–59	67%	NA	NA	67 g	67 g	59;56;59 g
Guinea, 2001	12–36	68%	96%	39;74;78; 51%	48 g	48 g	NA;63;49; NA g
Mauritania, 2002	12–36	92%	96;96%	79%	66 g	66 g	46 g
Mozambique, 2010	6–59	81%	84;78;81%	NA	NA	NA	NA
Senegal, 2006	12–59	91%	96;94%	76;98%	65 g	65 g	62;66;60 g

Source: Hess, Sonja Y., Brown, Kenneth H., Sablah, Mawuli, Engle-Stone, Reina, Aaron, Grant J. and Shawn K. Baker. 2013. "Results of Fortification Rapid Assessment Tool (FRAT) surveys in sub-Saharan Africa and suggestions for future modifications of the survey instrument." *Food and Nutrition Bulletin*, 34(1): 21-38.

# Household Consumption and Expenditure Surveys (HCES)

- Large scale, multi-purpose, recurring HH surveys, including:
  - Household Income and Expenditure Surveys (HIES)
  - Household Budget Surveys (HBS)
  - Integrated Household Surveys (IHS)
  - Living Standards Measure Surveys (LSMS)
  - Welfare Monitoring Surveys (WMS)
- Generally representative at a subnational (regional or state) level
- Detailed information on household food acquisition and consumption



**Section 15: Household Consumption Expenditure**  
**Part A: Number of household members present**  
 On average, how many people were present in the last 7 days? In this section children are defined as less than 18 years.

Household Members				Visitors			
Male adults	Female adults	Male children	Female children	Male adults	Female adults	Male children	Female children

**Part B: Food, Beverage, and Tobacco (During the Last 7 Days)**

Item Description	Code	How many days was (ITEM) consumed out of the last 7 days?		Unit of Qty	Consumption out of Purchases				Consumption out of home produce				Received in-kind?	Market Price	Farm gate price
		1- Yes	2- No		Household		Away from home		home produce		home produce				
					Qty	Value	Qty	Value	Qty	Value	Qty	Value			
1	2	3A	3B	3C	4	5	6	7	8	9	10	11	12	13	
Matooke (Bunch)	101														
Matooke (Cluster)	102														
Matooke (Heap)	103														
Matooke (Others)	104														
Sweet Potatoes (Fresh)	105														
Sweet Potatoes (Dry)	106														
Cassava (Fresh)	107														
Cassava (Dry Flour)	108														
Irish Potatoes	109														
Rice	110														
Maze (grains)	111														
Maze (cobs)	112														
Maze (flour)	113														
Bread	114														
Millet	115														
Sorghum	116														
Beef	117														
Pork	118														
Goat Meat	119														
Other Meat	120														
Chicken	121														
Fresh Fish	122														
Dry/Smoked fish	123														
Eggs	124														
Fresh Milk	125														
Infant Formula Foods	126														
Cooking oil	127														
Ghee	128														
Margarine, Butter, etc.	129														

# HCES: Global Coverage

Region	Population covered by at least one survey in WDR 1990 (%)	Population covered by at least one survey in WDI 2008 (%)
East Asia	85	96
East Europe & Central Asia	21	98
Latin America	55	98
Middle East & North Africa	11	79
South Asia	95	98
Sub-Saharan Africa	6	92
<b>Total</b>	<b>65</b>	<b>95</b>

WDR: World Development Report. WDI: World Development Indicators.

Source: Ravallion M. Global poverty measurement: Current practices and future challenges.  
[http://sites.nationalacademies.org/PGA/sustainability/foodsecurity/PGA\\_060826](http://sites.nationalacademies.org/PGA/sustainability/foodsecurity/PGA_060826)



# Calculating Quantities from Wheat Consumption Module

## MODULE G: FOOD CONSUMPTION OVER PAST ONE WEEK

DATA ENTRY LINE NUMBER	Over the past one week (7 days), did you or others in your household consume any [...]?  INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.	G01 YES...1 NO...2>> NEXT ITEM	G02 ITEM CODE	G03 How much in total did your household consume in the past week?		G04 How much came from purchases?		G05 How much did you spend?		G06 How much came from own-production?		G07 How much came from gifts and other sources?	
				QUANTITY	UNIT	QUANTITY	UNIT	MK	QUANTITY	UNIT	QUANTITY	UNIT	
1	<b>Cereals, Grains and Cereal Products</b>												
2	Maize <i>ufa mgaiwa</i> (normal flour)												
3	Maize <i>ufa</i> refined (fine flour)												
4	Maize <i>ufa madeya</i> (bran flour)												
5	Maize grain (not as <i>ufa</i> )												
6	Green maize												
7	Rice												
8	Finger millet ( <i>mawere</i> )		107										
9	Sorghum ( <i>mapira</i> )		108										
10	Pearl millet ( <i>mchewere</i> )		109										
11	Wheat flour		110										
12	Bread		111										
13	Buns, scones		112										
14	Biscuits		113										
15	Spaghetti, macaroni, pasta		114										
16	Breakfast cereal		115										
17	Infant feeding cereals		116										
18	Other (specify)		117										
19	<b>Roots, Tubers, and Plantains</b>												
20	Cassava tubers		201										
21	Cassava flour		202										
22	White sweet potato		203										
23	Orange sweet potato		204										
24	Irish potato		205										
25	Potato crisps		206										
26	Plantain, cooking banana		207										
27	Cocoyam ( <i>masimbi</i> )		208										
28	Other (specify)		209										

2. Multiply food items by % wheat flour content before calculating quantity consumed

3. Sum kg of wheat flour consumed per week and multiply by 52 to get kg/yr average.

1. Identify food items containing wheat flour

4. Add all household wheat consumption estimates, and apply Adult Male Equivalents (AME) approach to estimate individual consumption of wheat flour.\*\*

\*\*Some food items will be listed in volumetric units and will need to be converted to kg equivalents.

**CODES FOR UNIT:**

KILOGRAMME	. . . . .1
50 KG. BAG	. . . . .2
90 KG. BAG	. . . . .3
PAIL (SMALL)	. . . . .4
PAIL (LARGE)	. . . . .5
No. 10 PLATE	. . . . .6
No. 12 PLATE	. . . . .7
BUNCH	. . . . .8
PIECE	. . . . .9
HEAP	. . . . 10
BALE	. . . . 11
BASKET (DENGU)	
(SHELLED)	. . . 12
BASKET (DENGU)	
(UNSHELLED)	. . . 13
OX-CART	
(UNSHELLED)	. . . 14
LITRE	. . . . 15
CUP	. . . . 16
TIN	. . . . 17
GRAM	. . . . 18
MILLILITRE	. . . 19
TEASPOON	. . . 20
BASIN	. . . . 21
SATCHET/TUBE	. . . 22
OTHER (SPECIFY)	. 23

# HCES: Variations

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- Data capture methods
  - Diary approach (with multiple visits) versus recall (periods vary)
- Method of food acquisition
  - Consumption from own production may not be asked or asked about only a subset of foods
- Quantitative measures
  - Sometimes only expenditure levels are reported, not food quantities
- Food lists
  - Number and types of foods vary
- What is measured:
  - Distinguishing food purchased and food consumed

# HCES: Variations

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- General statements are challenging to make because HCES are diverse.
- What we judge to be strengths and shortcomings depend on:
  - General survey characteristics: the particular type of survey (i.e., NHBS, LSMS, HIES, etc.)
  - Country-specific characteristics: How the survey was designed and implemented in a country, and how the data was processed
  - Specific issues / applications of interest

# HCES: Benefits

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- Nationally representative
  - Representative at subnational (regional, provincial/state, or district) level
- Detailed consumption data
- Already being conducted, paid for and processed
  - HCES costs are about 2% the cost of a 24HR survey
- HCES are routinely, periodically updated (generally once every 3-5 years, and largely dependent on funding)

# HCES: Limitations

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- A mixture of food acquisition and food consumption
  - Acquisition is likely to be greater than consumption
  - Food categories are more likely to report foods as commodities as opposed to food that is ready-to-eat
- Units of measurement may not be standardized
  - May have a common name, but not a common metric (e.g., heap, bunch, etc.)
- Recall period may be too long to be accurate, too short to reflect “usual intake”

# HCES: Limitations

---

- Food consumed away from home is often not asked about and, when it is, is likely to be under-reported
- Predetermined food item lists may not be specific enough
  - Processed foods may be underreported
- Unit of analysis: Household level data, not individual level
  - To analyze nutrition status, it is necessary to make some assumptions about the intra-household distribution of the foods acquired

# HCES Data

---

- International Household Survey Network (IHSN)
  - Central Data Catalog provides searchable metadata from thousands of surveys and censuses conducted in low- and middle-income countries
  - Often include the questionnaires, resource manuals, and survey reports

**[www.ihsn.org](http://www.ihsn.org)**



# IHSN Website

IHSN  
International Household Survey Network

Home About Projects Guidelines Software Survey catalogs

How (well) is education measured in household surveys?  
An evaluation of 50 survey questionnaires

Promoting the availability, relevance, reliability, and accessibility of survey data

**Survey Catalog**

**Guidelines**

**Software**

Our Central Data Catalog provides searchable metadata from thousands of surveys and censuses conducted in low- and middle-income countries.

Our knowledge base provides guidelines, reference materials, and tools to help statisticians address all phases of the survey life cycle.

Free and open-source software supports the documentation, cataloging, dissemination, and de-identification of microdata.



# IHSN Survey Catalog

The screenshot displays the IHSN Survey Catalog interface. At the top left is the IHSN logo (International Household Survey Network). The page title is "IHSN Survey Catalog". Below the logo, there are navigation links for "Home" and "Central Data Catalog".

The main content area is titled "Central Data Catalog". On the left side, there are several filter panels:

- Search by Keyword:** This panel has two input fields: "in study description" (circled in red) and "in variable description". Below these fields are "Search" and "Reset" buttons.
- Filter by Year:** This panel allows filtering studies by year, with a range from 1890 to 2013.
- Filter by Data Access:** This panel has three options: "Any" (checked), "Data available from external repository", and "Data not available".
- Filter by Country:** This panel shows "Any" selected, with a count of 171 studies. A "View / Select More" link is provided.

The main search results area shows "Found 2745 studies out of 2745". Below this, there are sorting options: "Sort results by: Country | Year | Title | Popularity" (where "Country" is circled in red). A pagination bar shows "Showing 1-15 of 2745 studies" with page numbers 1, 2, 3, 4, 5, and a "Next" button.

The list of studies includes:

- Global Financial Inclusion (Global Findex) Database 2011**  
Afghanistan, 2011  
By: Development Research Group, Finance and Private Sector Development Unit - World Bank  
Created on: Dec 20, 2012 | Last modified: Sep 14, 2013 | Views: 4852 | Downloads: 131
- Mortality Survey 2010**  
Afghanistan, 2010  
By: Indian Institute for Health Management Research (IIHMR), Central Statistics Organization (CSO)  
Created on: Feb 01, 2012 | Last modified: Sep 14, 2013 | Views: 2462 | Downloads: 278
- Enterprise Survey 2008**  
Afghanistan, 2008  
By: World Bank  
Created on: Sep 29, 2011 | Last modified: Sep 14, 2013 | Views: 36612 | Downloads: 436

# HCES Surveys

Country	Year	Survey	# of Households
Burundi	1998	Questionnaire Unifié sur les Indicateurs de Base du Bien-être	6,688
DRC	2005/2006	Employment, Informal Sector and Household Consumption Survey	4,715
Ethiopia	2000	Household Income and Expenditure Survey	16,672
Kenya	2005/2006	Integrated Household Budget Survey	13,390
Malawi	2004	Malawi Second Integrated Household Survey	11,280
Mozambique	2002	Questionário de Indicadores Básicos de Bem-Estar	8,700
Rwanda	2005/2006	Integrated Household Living Conditions Survey	6,378
South Africa	2000	Income and Expenditure Survey 2000	26,263
Tanzania	2000	Tanzania Household Budget Survey	22,718
Uganda	2002/2003	Uganda National Household Survey	9,711
Zambia	2006	Living Conditions Monitoring Survey	19,560
Zimbabwe	2007/2008	Income, Consumption and Expenditure Survey	?

# HCES: Recall Methods

Country	Recall Method			Recall Period		
	Interview	Diary	Both	Recall Period (Days)	Diary (Days Recorded)	Diary (Visit to Illiterate HHs every X days)
Burundi	X			15		
DRC	X			15		
Ethiopia	X			7		
Kenya	X			7		
Malawi	X			7		
Mozambique		X		14	7	2
Rwanda	X			NA*		
South Africa	X			30		
Tanzania	X			7		
Uganda	X			7		
Zambia	X			14		
Zimbabwe	X			7		

# HCES: Food Items and Acquisition

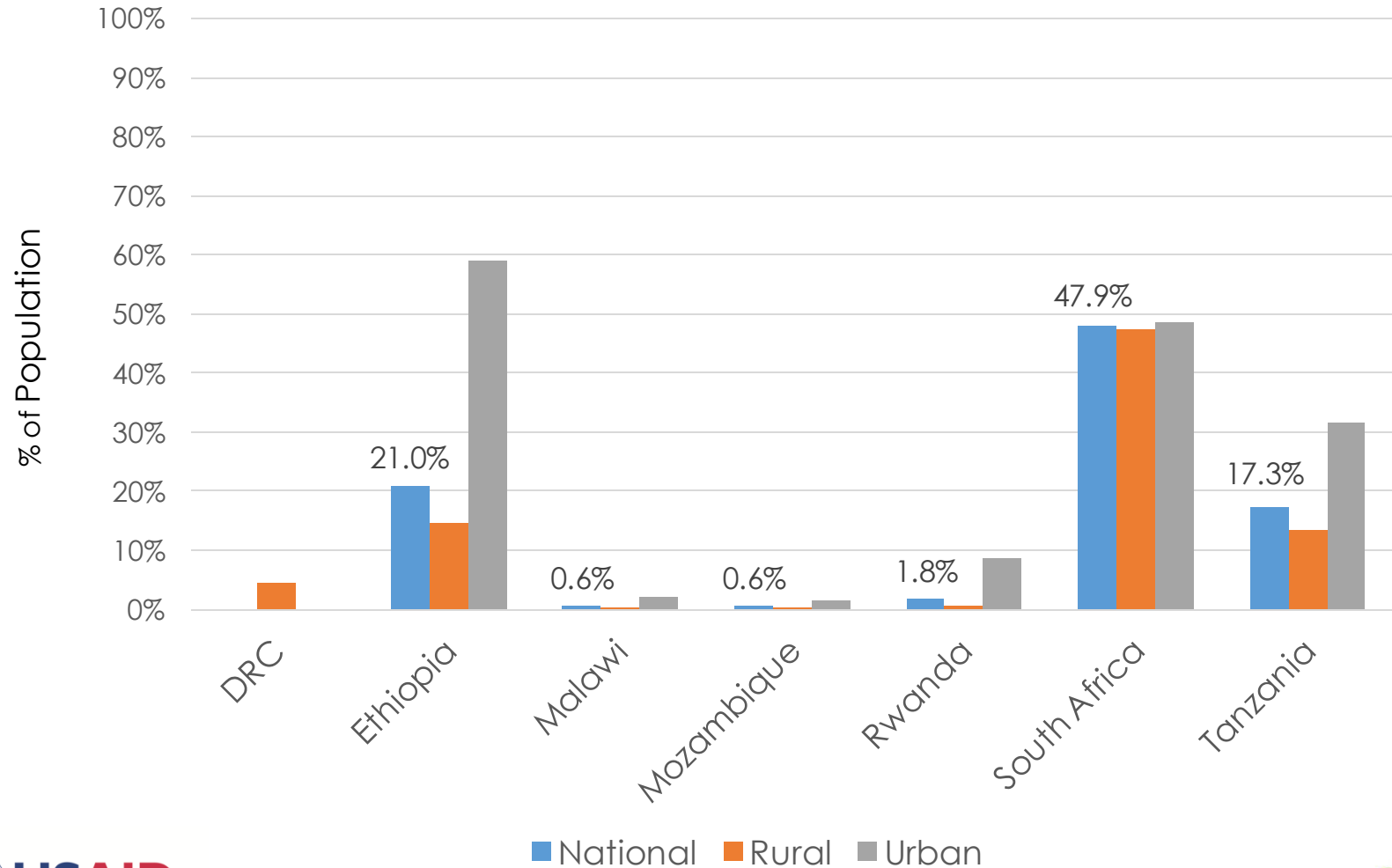
Country	Number of Food Items	Expenditure (X) or Food Quantity (Q) Reported?	Food Acquired from Purchases	Food Consumed from Purchases	Consumption from Own Production	Gifts, In-Kind, Other
Burundi	32	X		X	X	X
DRC	500	Q				
Ethiopia	224	Q		X	X	X
Kenya	162	Q	X	X	X	X
Malawi	115	Q		X	X	X
Mozambique	332	Q	X		X	
Rwanda	151	Q/X	X			
South Africa	122	X				
Tanzania	135	Q		X	X	X
Uganda	58	Q				
Zambia	36	Q		X	X	X
Zimbabwe	179	Q		X	X	X

# Wheat Flour and Products

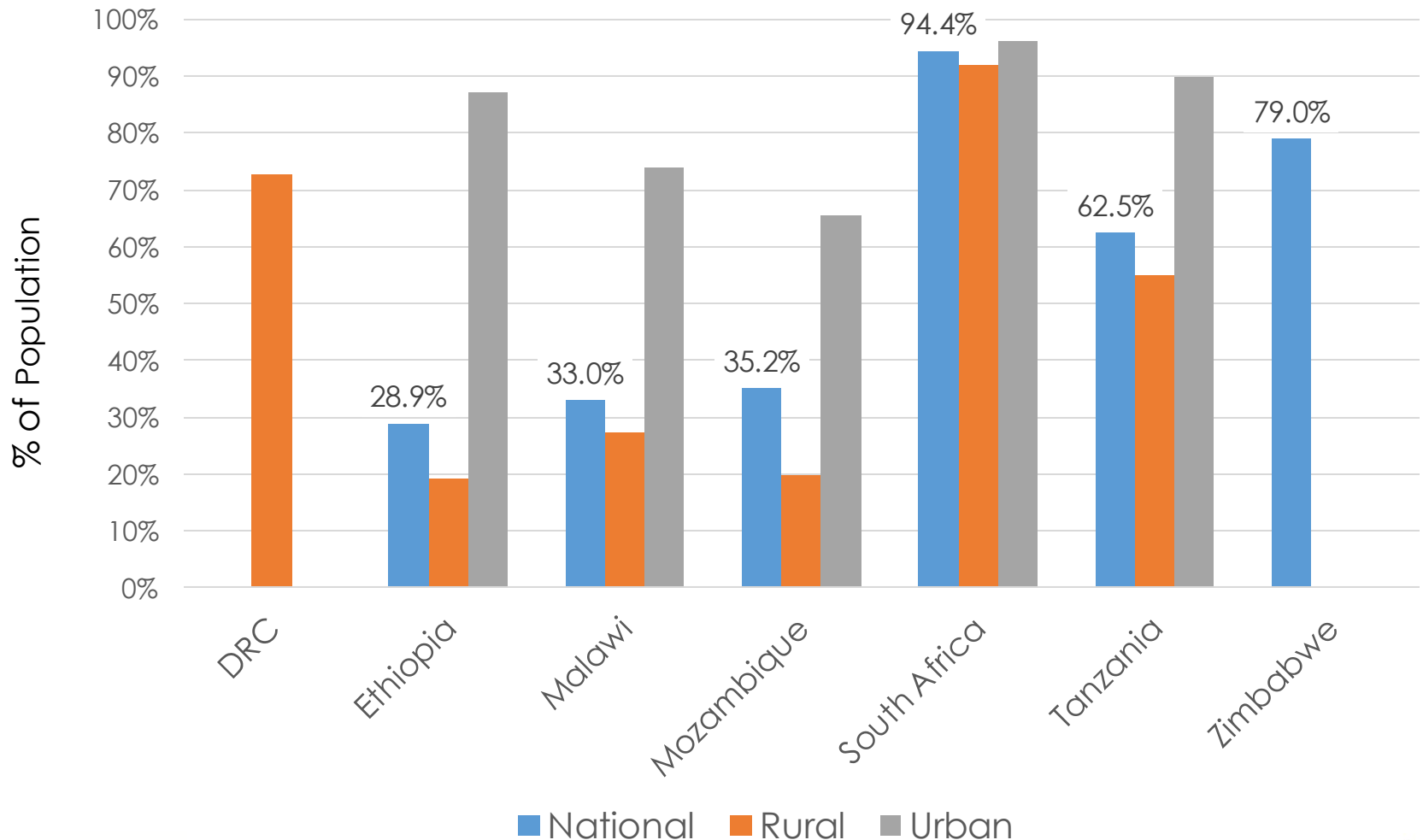
Wheat flour and food items containing wheat flour reported in HCES:

Country	Wheat Flour	Wheat (Whole Grain)	Bread	Cakes	Biscuits/Scones	Pasta	Wheat Flour Products
Burundi			✓				
DRC	✓		✓	✓	✓	✓	
Ethiopia	✓		✓	✓	✓	✓	
Kenya	✓	✓	✓	✓	✓	✓	
Malawi	✓		✓		✓	✓	
Mozambique	✓	✓	✓		✓		
Rwanda	✓	✓	✓	✓	✓	✓	
South Africa	✓		✓			✓	✓
Tanzania	✓	✓	✓	✓	✓	✓	
Uganda			✓				
Zambia			✓				
Zimbabwe	✓	✓	✓	✓	✓	✓	

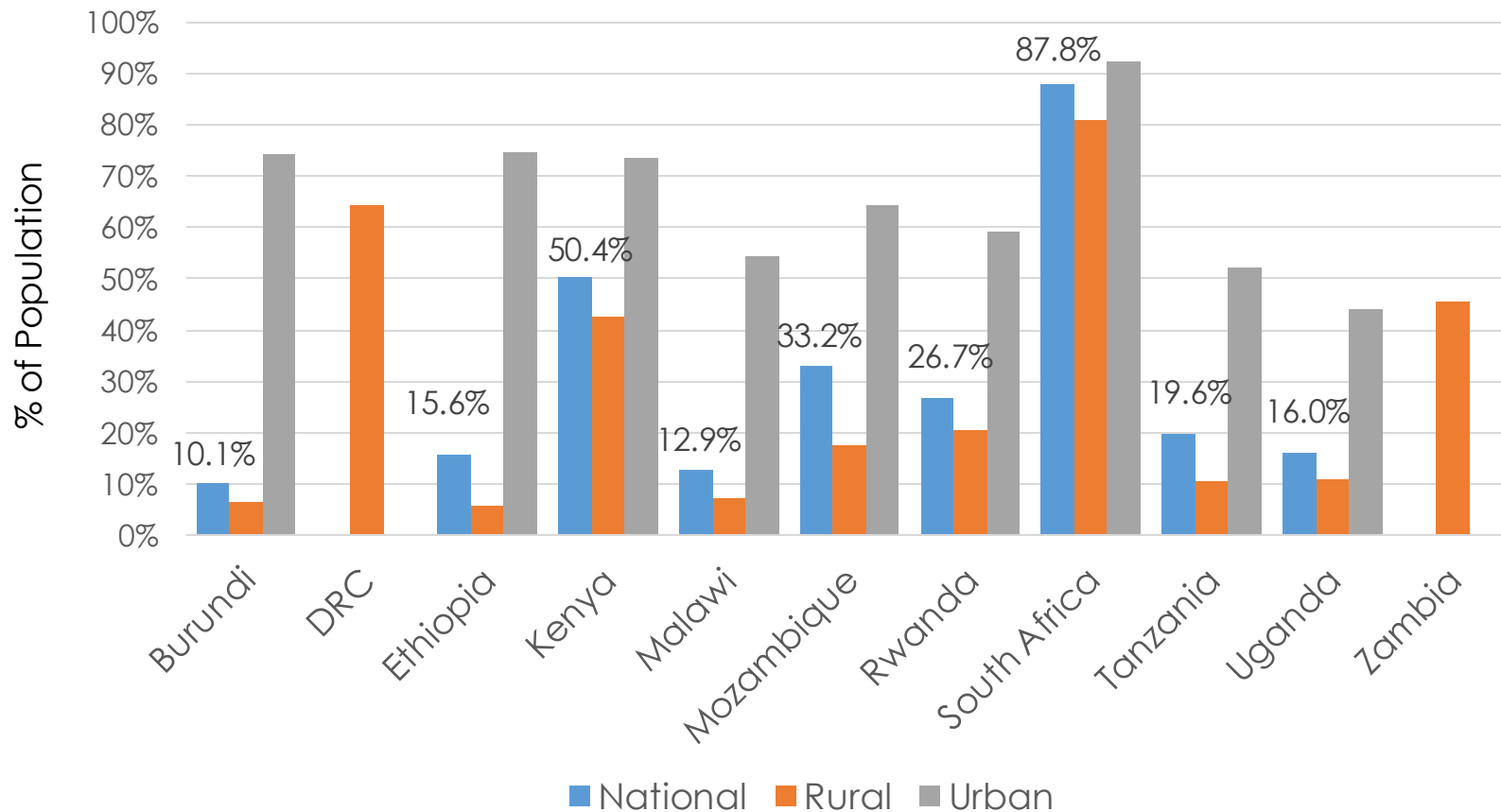
# Wheat Flour Consumption



# Wheat Flour Consumption (Extended)



# Bread Consumption (HCES)





# Food Balance Sheets



- Developed by the Food and Agricultural Organization (FAO) of the United Nations
- National food accounts, supply/utilization accounts, food disappearance data, and food consumption level estimates
  - Provides **supply** data
- Most commonly used data for estimating national diet patterns, levels, and trends

Uganda - 2009

element

country	item	Total Population - Both sexes (1000)	Production (1000 tonnes)	Import Quantity (1000 tonnes)	Stock Variation (1000 tonnes)	Export Quantity (1000 tonnes)	Domestic supply quantity (1000 tonnes)	Feed (1000 tonnes)	Seed (1000 tonnes)	Waste (1000 tonnes)
	Population	32368								
	Grand Total + (Total)									
	Vegetal Products + (Total)									
	Animal Products + (Total)									
	Cereals - Excluding Beer + (Total)		2751	A 556	A 1	A 166	A 3142	A 264	A 59	A 280
	Wheat		20	S 426	S 0	S 15	S 431		1	S 13
	Rice (Milled Equivalent)		121	S 80	S 0	S 38	S 163		9	S 6
	Barley			S 30	S 0	S 0	S 29	S 1		
	Maize		1272	S 13	S 0	S 100	S 1186	S 128	S 27	S 152
	Rye			S 0	S 0	S 0	S 0			
	Oats			S 0	S 0	S 0	S 0			
	Millet		841	S 0	S 0	S 0	S 841	S 84	S 12	S 59
									10	S 50
									82	A 973

Home Production Trade Food Supply Food Balance Sheets Food Security Prices Resources Agri-Environmental Indicators Emissions Forestry FI

about Food Balance Sheets Commodity Balances

country: Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, **Uganda**, Ukraine, United Arab Emirates, United Kingdom

year: 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002

item: Alcohol, Non-Food, Apples, Aquatic Animals, Others, Aquatic Plants, Bananas, Barley, Beans, Beer

element: Total Population - Both sexes, Production Quantity, Import Quantity, Stock Variation, Export Quantity, Domestic supply quantity, Feed, Seed

nested by: year  
Y1-axis: country  
Y2-axis: item  
X-axis: element

[show data]

[units] [flags] [codes] [download] [settings] [print] [FBS Style]

Download format: Excel, CSV, XML, Flags: yes, Flags: no  
Thousands separator: Comma, Period, Space, None  
Decimal separator: Comma, Period

selected parameters [show/hide]

# Food Supply (vs. Consumption)

- Supply is determined as:

Total quantity produced

+ Imports

- Exports

- Qty. used for Feed and Seed

- Storage and Transportation Losses

= Total food available for human consumption

Total food available/Total population = Per capita consumption

# FAOSTAT

<http://faostat.fao.org/site/354/default.aspx>



A new version of FAOSTAT is available.  
Please click [here](#) to access it.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
*for a world without hunger*



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<a href="#">about</a>	<a href="#">Food Balance Sheets</a>	<a href="#">Commodity Balances</a>													



The **Food Balance Sheets domain** covers:

- Production
- Trade
- Feed and Seed
- Waste
- Other utilisation
- Food availability

Elements covered:

- Quantities
- Calories, Proteins, Fats

#### Important Notice

##### Important Notice on Changes in Food Balance Sheets

Due to insufficient data at this time some countries are omitted. It is hoped that as additional information is provided to our statisticians, we will be able to update these too.

Related to the SUA/FBS and Commodity Balances the users are informed that, in some cases, the unbalance is due to the rounding or aggregation algorithm.

#### Food Balance Sheets

A food balance sheet presents a comprehensive picture of the pattern of a country's food supply during a specified reference period. The food balance sheet shows for each food item i.e. each primary commodity availability for human consumption which corresponds to the sources of supply and its utilisation. The total quantity of foodstuffs produced in a country added to the total quantity imported and adjusted to any change in stocks that may have occurred since the beginning of the reference period gives the supply available during that period. On the utilisation side a distinction is made between the quantities exported, fed to livestock + used for seed, losses during storage and transportation, and food supplies available for human consumption. The per capita supply of each such food item available for human consumption is then obtained by dividing the respective quantity by the related data on the population actually partaking in it. Data on per capita food supplies are expressed in terms of quantity and by applying appropriate food composition factors for all primary and processed products also in terms of dietary energy value, protein and fat content.

▶▶ Proceed to the **Food Balance Sheets data** (queries) page

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# Food Balance Sheets



Home Production Trade Food Supply Food Balance Sheets Food Security Prices Resources Agri-Environmental Indicators Emissions Forestry Fi  
about Food Balance Sheets Commodity Balances

## country

Trinidad and Tobago  
Tunisia  
Turkey  
Turkmenistan  
Uganda  
Ukraine  
United Arab Emirates  
United Kingdom

1. Select country

## year

2009  
2008  
2007  
2006  
2005  
2004  
2003  
2002

2. Select most recent year

nested by: year

Y1-axis: country

Y2-axis: item

X-axis: element

## item

Alcohol, Non-Food  
Apples  
Aquatic Animals, Others  
Aquatic Plants  
Bananas  
Barley  
Beans  
Beer

## element

Total Population - Both sexes  
Production Quantity  
Import Quantity  
Stock Variation  
Export Quantity  
Domestic supply quantity  
Feed  
Seed

3. Click on "show data"

show data

units |  flags |  codes |  download |  settings |  print |  FBS Style

### Download format

Excel | **CSV** | XML | Flags: yes | **Flags: no**

### Thousands separator

Comma | Period | Space | **None**

### Decimal separator

Comma | **Period**

selected parameters [show/hide]

# Food Balance Sheets

Uganda - 2009

element																	5. Food supply quantity				
country	item	Total Population - Both sexes (1000)	Production (1000 tonnes)	Import Quantity (1000 tonnes)	Stock Variation (1000 tonnes)	Export Quantity (1000 tonnes)	Domestic supply quantity (1000 tonnes)	Feed (1000 tonnes)	Seed (1000 tonnes)	Waste (1000 tonnes)	Processing (1000 tonnes)	Other Util (1000 tonnes)	Food (1000 tonnes)	Food supply quantity (kg/capita/yr)	Food supply (kcal/capita/day)	Protein supply quantity (g/capita/day)	Fat supply quantity (g/capita/day)				
	Population	32368																			
	Grand Total + (Total)														2260	Fc	49.20	Fc	46.90	Fc	
	Vegetal Products + (Total)														2087	Fc	37.10	Fc	35.30	Fc	
	Animal Products + (Total)														173	Fc	12.10	Fc	11.60	Fc	
	Cereals - Excluding Beer + (Total)		2751	A 556	A 1	A 166	A 3142	A 264	A 59	A 280	A 513	A 1	A 2027	A 62.60	Fc	505	Fc	11.70	Fc	2.40	Fc
	Wheat		20	S 426	S 0	S 15	S 431	S	S 1	S 13	S 0	S 0	S 418	S 12.90	Fc	97	Fc	2.90	Fc	0.30	Fc
	Rice (Milled Equivalent)		121	S 80	S 0	S 38	S 163	S	S 9	S 6	S	S 0	S 147	S 4.60	Fc	44	Fc	0.90	Fc	0.10	Fc
	Barley			S 30	S 0	S 0	S 29	S 1	S	S	S 28	S	S 0	S 0.00	Fc	0	Fc	0.00	Fc		Fc
	Maize		1272	S 13	S 0	S 100	S 1186	S 128	S 27	S 152	S 153	S 1	S 725	S 22.40	Fc	190	Fc	4.50	Fc	1.10	Fc
	Rye			S 0	S 0	S 0	S 0	S 0	S	S	S	S	S	S	S	S	S	S	S	S	S
	Oats			S 0	S 0	S 0	S 0	S 0	S	S	S	S	S 0	S 0.00	Fc	0	Fc	0.00	Fc	0.00	Fc
	Millet		841	S 0	S 0	S 0	S 841	S 84	S 12	S 59	S 103	S	S 583	S 18.00	Fc	133	Fc	2.20	Fc	0.60	Fc
	Sorghum		497	S 8	S 0	S 11	S 494	S 50	S 10	S 50	S 230	S	S 153	S 4.70	Fc	41	Fc	1.30	Fc	0.40	Fc
	Cereals, Other			S 0	S 1	S 2	SD	S 0	S	S	S	S 0	S 0	S 0.00	Fc	0	Fc	0.00	Fc	0.00	Fc
	Starchy Roots + (Total)		8634	A 82	A 0	A 7	A 8708	A 1718	A 82	A 973	A	A 0	A 5939	A 183.50	Fc	508	Fc	5.60	Fc	0.70	Fc

# Food Balance Sheets: Benefits

---

- Provide data from 1961-2009
  - Able to demonstrate long-term trends in national food supply
- Low cost and highly accessible
- May be used to *suggest* which nutrient inadequacies might be common in the population due to nutrient availability
  - Only at the aggregate level and to a limited extent
  - Focus mainly on staples

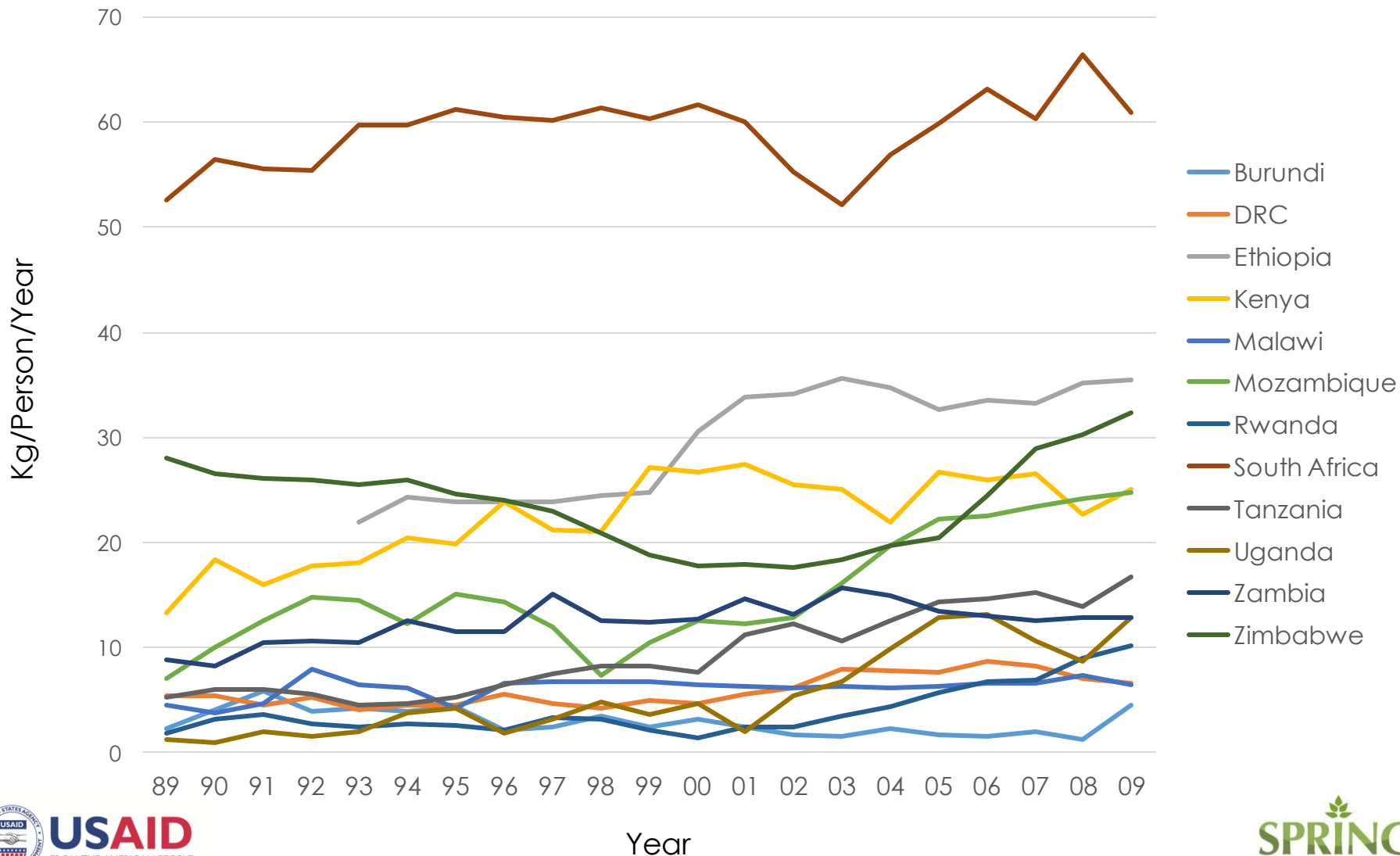
# Food Balance Sheets: Limitations

---

- Data limited to primary commodities and minimally processed foods
  - Data for wheat, not wheat *flour*
- Provides supply, not demand, estimates
- Cannot provide coverage estimates
  - Unconditional estimates
  - Who are the consumers? Where are they located?
  - How much of the food item is purchased?
- Lengthy delays in updating annual FBS figures
  - Most recent data available is for 2009

# Changes in Wheat Supply, 1989-2009

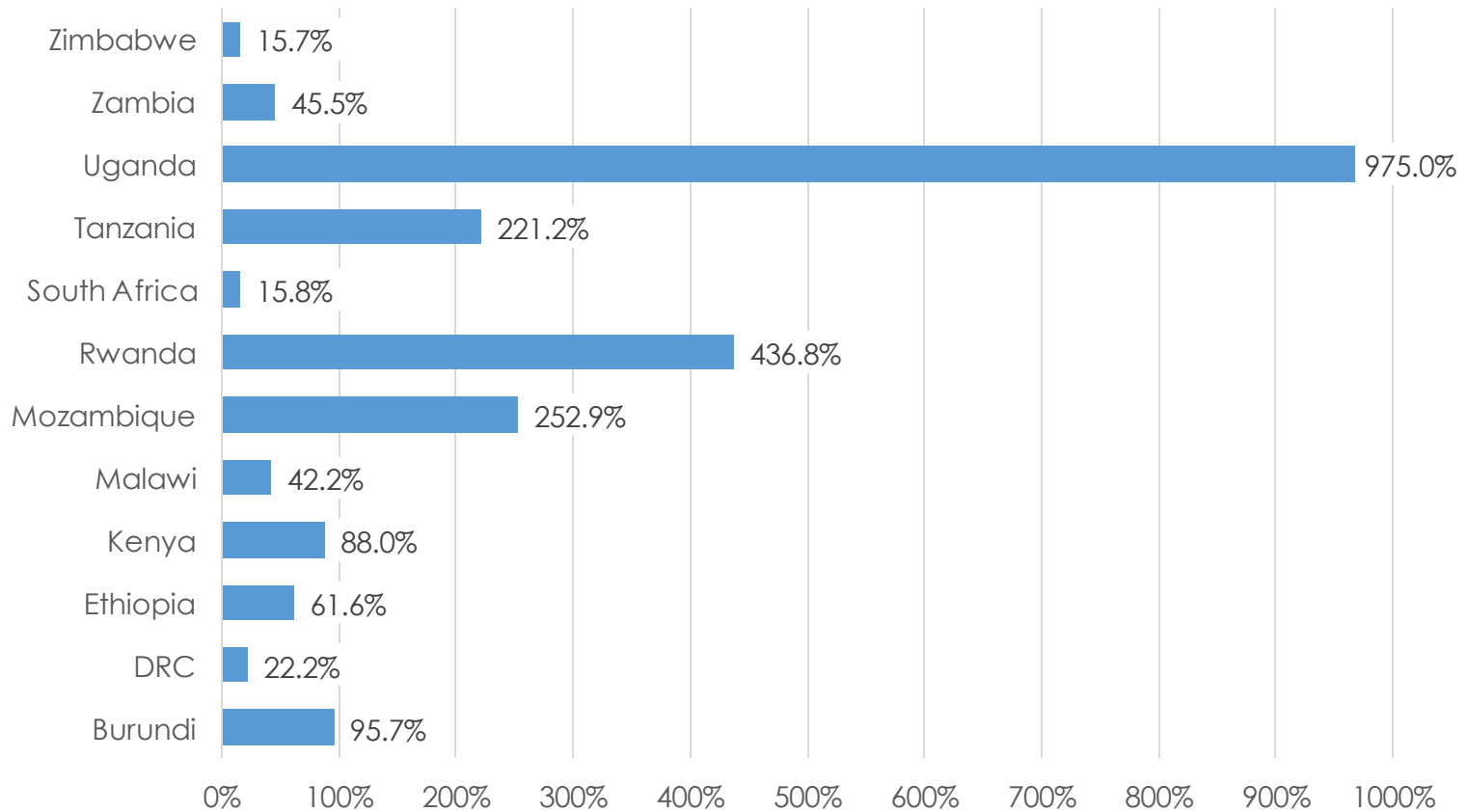
(kg/person/year)





# % Change 1989 – 2009

% change in per capita wheat supply (kg/person/year) 1989-2009



# Industry Data

---

- Industry data from millers can provide important consumer information, such as:
  - market share
  - where (e.g. what regions) products are shipped
  - accurate milling extraction rates
- However, millers may be hesitant to disclose private business information
  - Often report production capacity, rather than actual production
- Supply-side rather than demand-side data

# Discussion

---

- Consumption data is needed throughout the food fortification process:
  - Needs assessment
  - Feasibility Assessment and Program Design
  - Program Baseline
  - Program Monitoring
  - Impact Evaluation
- Is there a right source of consumption data for each application?

# Discussion

---

- Each data source has its strengths and weaknesses, there is no single “gold standard”
- Each source and method may be better suited for particular applications than others
- Tradeoffs will exist between the degree of validity and accuracy, and cost
- Potential bias and error for each method must be taken into consideration when interpreting results
- Some of the weaknesses may be corrected for
  - Household Consumption and Expenditure Surveys, in particular

# Thank you

---



## Questions?

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International Food Policy Research Institute (IFPRI)  
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Strengthening Partnerships, Results  
and Innovations in Nutrition Globally

# Household Consumption and Expenditure Surveys: A Tool for Estimating Food and Nutrient Intake

---

Celeste Sununtnasuk

International Food Policy Research Institute (IFPRI)

USAID SPRING Project

Dar es Salaam, Tanzania

10-14 December 2013



# A Tool for Better Understanding...

---

1. Diet and dietary patterns
2. Key food sources of essential micronutrients
3. Regional variations in diet
4. Seasonal variations in diet & food security
5. Designing fortification programs & estimating their impacts
6. Food markets
7. Harmonizing portfolios of nutrition programs

# Cost, Frequency and Availability

- Already being conducted, paid for and processed
  - Cost of a nutrition analytic file based on typical 24HR survey (8,500 HHs): \$2.3 million
  - Cost of a nutrition analytic file from already processed HCES data: \$40,000
  - HCES costs are about 2% the cost of a 24HR survey (Source: Fiedler, Martin-Prevel & Moursi, 2011)
- HCES are routinely, periodically updated (generally once every 3-5 years)





# Understanding the Diet

---

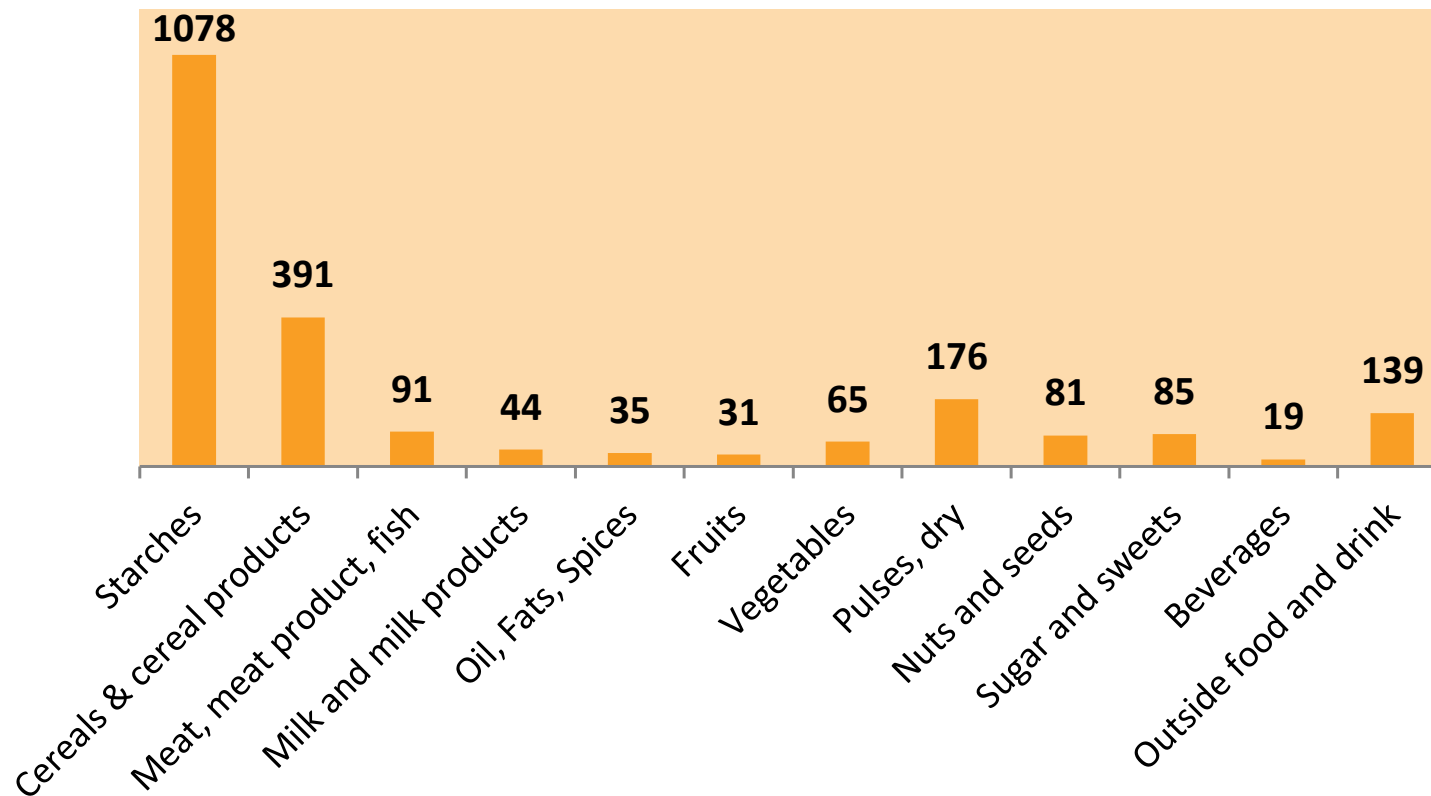
## Why is this so important?

- We need a good understanding of an individual's
  - Overall nutrient intake
  - Key sources of micronutrients
  - Bioavailability of nutrients

to establish safe fortificant levels with the appropriate fortification vehicles

# Ex: Sources of Energy in Uganda

Average dietary energy consumption (kcal/person/day) by food group



# Fortificant Levels

---

- Where to get them? Bureau of standards and regulations
- What do we assume about their levels?
  - Are they at the plant?
  - At retail?
  - At the household taking into account how foods are prepared and consumed?
- Losses
- Bioavailability
- Current population intake

# Calculating Individual Consumption and Nutrient Intake

---

- HCES provide consumption data at the household level
- How do you calculate individual consumption and nutrient intake?
  - Calculate total household consumption of each food item
  - Match food items with items listed in country-specific Food Composition Tables (FCTs)
  - Apply Adult Male Equivalents (AMEs) concept

# Food Composition Tables (FCTs)

- Provide the nutrient content per 100g of edible food
- How precise are they?
- How unambiguously can they be matched to the HCES food item list?

food_code	food_description	food_state	energy_kcal	calcium_mg
1001	MAIZE GRAIN,WHITE VARIETY,FRESH,RAW	Raw	172.00	3
1002	MAIZE GRAIN,WHITE VARIETY,FRESH,BOILED/STEAMED	Boiled	207.00	3
1003	MAIZE GRAIN,WHITE VARIETY,FRESH,ROASTED	Roasted	224.00	4
1004	MAIZE GRAIN,YELLOW VARIETY,FRESH,RAW	Raw	172.00	3
1005	MAIZE,GRAIN,YELLOW VARIETY,FRESH,BOILED/STEAMED	Boiled	172.00	3
1006	MAIZE GRAIN,YELLOW VARIETY,FRESH,ROASTED	Roasted	224.00	4
1007	MAIZE GRAIN,WHITE VARIETY,DRIED,RAW	Raw	365.00	7
1008	MAIZE GRAIN,WHITE VARIETY,DRIED,BOILED	Boiled	188.00	4
1009	MAIZE GRAIN,WHITE VARIETY,DRIED,ROASTED	Roasted	374.00	7
1010	MAIZE GRAIN,YELLOW VARIETY,DRIED,RAW	Raw	365.00	7
1011	MAIZE GRAIN,YELLOW VARIETY,DRIED,BOILED	Boiled	188.00	4
1012	MAIZE GRAIN,YELLOW VARIETY,DRIED,ROASTED	Roasted	374.00	7
1014	MAIZE GRAIN,WHITE VARIETY,DRIED,FRIED	Fried	397.00	8
1015	MAIZE GRAIN,YELLOW VARIETY,DRIED,FRIED	Fried	397.00	8
801007	* MAIZE GRAIN,WHITE VARIETY,DRIED,RAW *BOILED*	Raw	365.00	7
801010	* MAIZE GRAIN,YELLOW VARIETY,DRIED,RAW *BOILED*	Raw	365.00	7
maize_grains			284.31	5.375
1021	MAIZE ON COB,WHITE VARIETY,FRESH,RAW	Raw	172.00	3
1022	MAIZE ON COB,WHITE VARIETY,FRESH,BOILED	Boiled	207.00	4
1023	MAIZE ON COB,WHITE VARIETY,FRESH,STEAMED	Steamed	207.00	4
1024	MAIZE ON COB,WHITE VARIETY,FRESH,ROASTED	Roasted	224.00	4
1025	MAIZE ON COB,YELLOW VARIETY,FRESH,RAW	Raw	172.00	3
1026	MAIZE ON COB,YELLOW VARIETY,FRESH,BOILED	Boiled	206.00	4
1027	MAIZE ON COB,YELLOW VARIETY,FRESH,STEAMED	Steamed	206.00	4
1028	MAIZE ON COB,YELLOW VARIETY,FRESH,ROASTED	Roasted	224.00	4
maize_cob			202.25	3.75

# UNPS: Consumption Module

## Section 15: Household Consumption Expenditure

### Part A: Number of household members present

On average, how many people were present in the last 7 days? In this section children are defined as less than 18 years.

Household Members				Visitors			
Male adults	Female adults	Male children	Female children	Male adults	Female adults	Male children	Female children

### Part B: Food, Beverage, and Tobacco (During the Last 7 Days)

Item Description	Code	Did you consume [ITEM] 1= Yes 2= No	How many days was [ITEM] consumed out of the last 7 days? 3A 3B	Unit of Qty 3C	Consumption out of Purchases				Consumption out of home produce		Received in-kind/Free		Market Price	Farm gate price
					Household		Away from home		Qty	Value	Qty	Value		
					Qty	Value	Qty	Value						
1	2	3A	3B	3C	4	5	6	7	8	9	10	11	12	13
Matooke (Bunch)	101													
Matooke (Cluster)	102													
Matooke (Heap)	103													
Matooke (Others)	104													
Sweet Potatoes (Fresh)	105													
Sweet Potatoes (Dry)	106													
Cassava (Fresh)	107													
Cassava (Dry/ Flour)	108													
Irish Potatoes	109													
Rice	110													
Maize (grains)	111													
Maize (cobs)	112													
Maize (flour)	113													
Bread	114													
Millet	115													
Sorghum	116													
Beef	117													
Pork	118													
Goat Meat	119													
Other Meat	120													
Chicken	121													
Fresh Fish	122													
Dry/ Smoked fish	123													
Eggs	124													
Fresh Milk	125													
Infant Formula Foods	126													
Cooking oil	127													
Ghee	128													
Margarine, Butter, etc	129													

56 Food Items

# HarvestPlus FCT

Nutrient Content per 100g of Edible Food



food_code	food_description	food_state	energy_kcal	calcium_mg	iron_mg	zinc_mg	vit_a_iu
1001	MAIZE GRAIN,WHITE VARIETY,FRESH,RAW	Raw	172.00	3	1.3	1	0
1002	MAIZE GRAIN,WHITE VARIETY,FRESH,BOILED/STEAMED	Boiled	207.00	3	1.5	1.1	0
1003	MAIZE GRAIN,WHITE VARIETY,FRESH,ROASTED	Roasted	224.00	4	1.7	1.3	0
1004	MAIZE GRAIN,YELLOW VARIETY,FRESH,RAW	Raw	172.00	3	1.3	1	101
1005	MAIZE GRAIN,YELLOW VARIETY,FRESH,BOILED/STEAMED	Boiled	172.00	3	1.2	1	91
1006	MAIZE GRAIN,YELLOW VARIETY,FRESH,ROASTED	Roasted	224.00	4	1.7	1.3	125
1007	MAIZE GRAIN,WHITE VARIETY,DRIED,RAW	Raw	365.00	7	2.7	2.2	0
1008	MAIZE GRAIN,WHITE VARIETY,DRIED,BOILED	Boiled	188.00	4	1.3	1.1	0
1009	MAIZE GRAIN,WHITE VARIETY,DRIED,ROASTED	Roasted	374.00	7	2.6	2.3	0
1010	MAIZE GRAIN,YELLOW VARIETY,DRIED,RAW	Raw	365.00	7	2.7	2.2	214
1011	MAIZE GRAIN,YELLOW VARIETY,DRIED,BOILED	Boiled	188.00	4	1.3	1.1	99
1012	MAIZE GRAIN,YELLOW VARIETY,DRIED,ROASTED	Roasted	374.00	7	2.6	2.3	198
1014	MAIZE GRAIN,WHITE VARIETY,DRIED,FRIED	Fried	397.00	8	2.8	2.4	0
1015	MAIZE GRAIN,YELLOW VARIETY,DRIED,FRIED	Fried	397.00	8	2.8	2.4	210
801007	* MAIZE GRAIN,WHITE VARIETY,DRIED,RAW *BOILED*	Raw	365.00	7	2.7	2.2	0
801010	* MAIZE GRAIN,YELLOW VARIETY,DRIED,RAW *BOILED*	Raw	365.00	7	2.7	2.2	193
maize_grains			284.31	5.375	2.05625	1.69375	76.9375
1021	MAIZE ON COB,WHITE VARIETY,FRESH,RAW	Raw	172.00	3	1.3	1	0
1022	MAIZE ON COB,WHITE VARIETY,FRESH,BOILED	Boiled	207.00	4	1.5	1.1	0
1023	MAIZE ON COB,WHITE VARIETY,FRESH,STEAMED	Steamed	207.00	4	1.5	1.1	0
1024	MAIZE ON COB,WHITE VARIETY,FRESH,ROASTED	Roasted	224.00	4	1.7	1.3	0
1025	MAIZE ON COB,YELLOW VARIETY,FRESH,RAW	Raw	172.00	3	1.3	1	101
1026	MAIZE ON COB,YELLOW VARIETY,FRESH,BOILED	Boiled	206.00	4	1.5	1.2	109
1027	MAIZE ON COB,YELLOW VARIETY,FRESH,STEAMED	Steamed	206.00	4	1.5	1.2	109
1028	MAIZE ON COB,YELLOW VARIETY,FRESH,ROASTED	Roasted	224.00	4	1.7	1.3	125
maize_cob			202.25	3.75	1.5	1.15	55.5

>700

Food Items

# Calculating Adult Male Equivalents

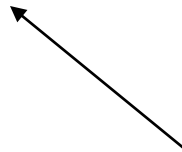
- The Adult Male Equivalent (AME)
  - An expression of household food intake that accounts for the composition of the household and allows the direct comparison of food or energy intakes of households of different sizes and compositions
- Individual AMEs are divided by total household AMEs, to estimate the intrahousehold distribution of food



# Adult Male Equivalents (AMEs)

ADULT MALE EQUIVALENT		
MALE	AGE (y)	FEMALE
0.216721311	0-1	0.216721311
0.311475410	1-2	0.278688525
0.368852459	2-3	0.344262295
0.409836066	3-4	0.377049180
0.442622951	4-5	0.409836066
0.483606557	5-6	0.434426230
0.516393443	6-7	0.467213115
0.557377049	7-8	0.508196721
0.598360656	8-9	0.557377049
0.647540984	9-10	0.606557377
0.704918033	10-11	0.655737705
0.770491803	11-12	0.704918033
0.836065574	12-13	0.745901639
0.909836066	13-14	0.778688525
0.983606557	14-15	0.803278689
1.040983607	15-16	0.819672131
1.090163934	16-17	0.819672131
1.114754098	17-18	0.819672131
<b>1</b>	18-30	0.786885246
0.967213115	30-60	0.770491803
0.803278689	60-150	0.688524590

Adult males,  
age 18-30 y, are  
the benchmark  
for comparison



# Ex: Rice Consumption, AMEs

SEX	AGE (y)	AME	HH AME	IND AME
Female	60	0.68852	3.61475	0.19048
Female	30	0.77049	3.61475	0.21315
Female	11	0.70492	3.61475	0.19501
Male	40	0.96721	3.61475	0.26757
Male	5	0.48361	3.61475	0.13379

Total Household consumption of rice: 1,571.43 g

Individual consumption (not using AMEs):

$$1,571.43 \text{ g} \div \text{HH size} = 314.26 \text{ g per person}$$

Individual consumption (using AMEs):

$$1,571.43 \text{ g} \times \text{Individual AME} =$$

Female, 60: 299.32 g  
Female, 30: 334.95 g  
Female, 11: 306.45 g  
Male, 40: 420.47 g  
Male, 5: 210.24 g

# Calculating Nutrient Adequacies

- How do we determine whether or not someone is deficient in a specific nutrient?
  - If nutrient intake is below the corresponding Estimated Average Requirement (EAR)
  - Probability approach for iron
- How do we determine if nutrient intake is excessive?
  - If intake exceeds the Tolerable Upper Level Intake (UL) for the age and sex of the individual

# Estimated Average Requirements (EARs)

	AGE	GENDER	STATUS	ESTIMATED AVERAGE REQUIREMENT			
				IRON (mg/d)	VITAMIN A (µg/d)	ZINC (mg/d)	FOLATE (µg/d)
1	0-6 mos.	Both		.27 (AI)	400 (AI)	2 (AI)	65 (AI)
2	6-12 mos.	Both		6.9	500 (AI)	2.5	80 (AI)
3	1-3 y	Both		3	210	2.5	120
4	4-8 y	Both		4.1	275	4	160
5	9-13 y	Male		5.9	445	7	250
6	9-13 y	Female		5.7	420	7	250
7	14-18 y	Male		7.7	630	8.5	330
8	14-18 y	Female	NPNL	7.9	485	7.3	330
9	14-18 y	Female	P	23.0	530	10.5	520
10	19-30 y	Male		6.0	625	9.4	320
11	19-30 y	Female	NPNL	8.1	500	6.8	320
12	19-30 y	Female	P	22.0	550	9.5	520
13	31-50 y	Male		6.0	625	9.4	320
14	31-50 y	Female	NPNL	8.1	500	6.8	320
15	31-50 y	Female	P	22.0	550	9.5	520
16	51-70 y	Male		6.0	625	9.4	320
17	51-70 y	Female		5.0	500	6.8	320
18	>70 y	Male		6.0	625	9.4	320
19	>70 y	Female		7.0	500	6.8	320



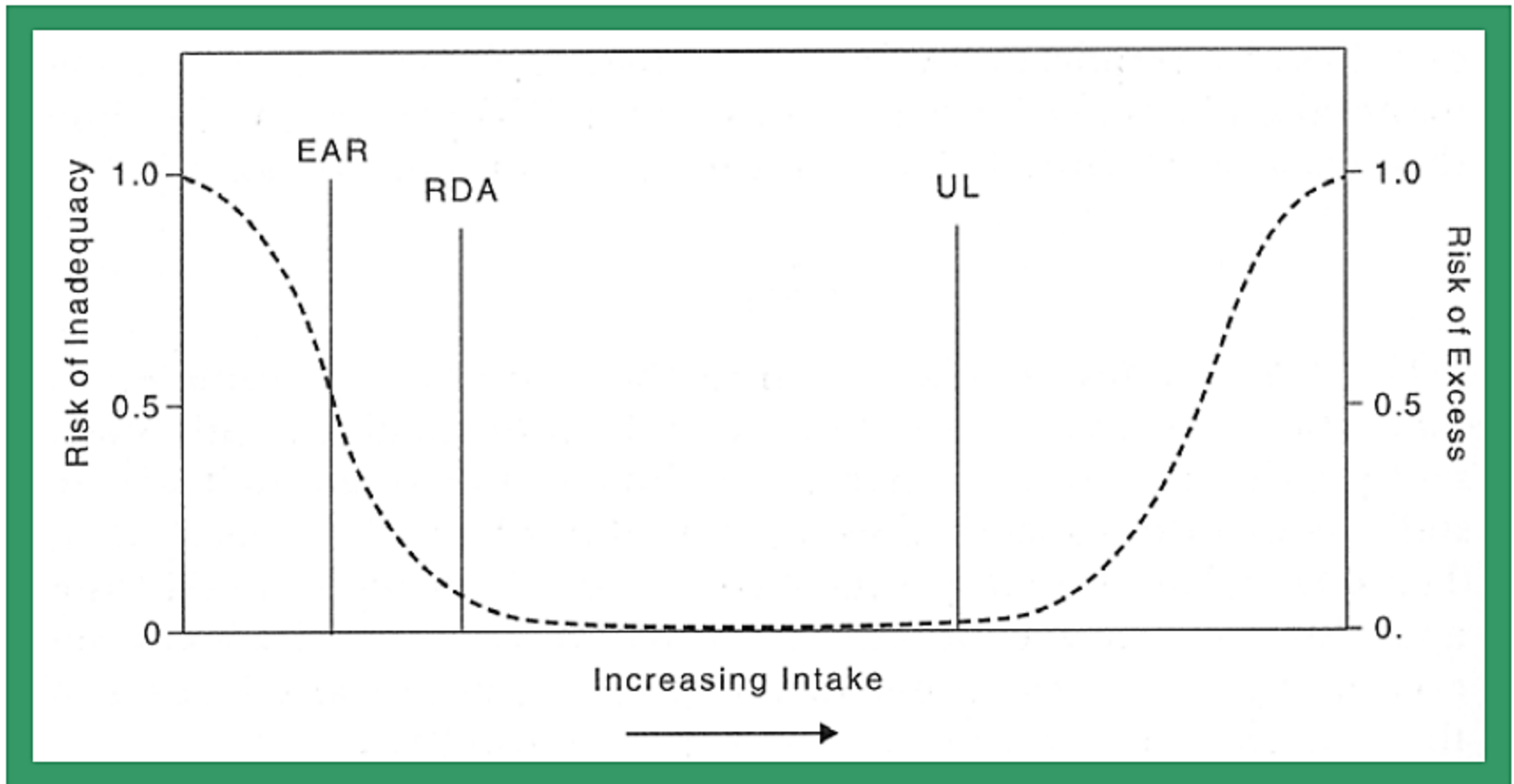
# Tolerable Upper Intake Level (UL)

	AGE	GENDER	STATUS	TOLERABLE UPPER INTAKE LEVEL			
				IRON (mg/d)	VITAMIN A (µg/d)	ZINC (mg/d)	FOLIC ACID (µg/d)
1	0-6 mos.	Both		40	600	4	ND
2	6-12 mos.	Both		40	600	5	ND
3	1-3 y	Both		40	600	7	300
4	4-8 y	Both		40	900	12	400
5	9-13 y	Male		40	1,700	23	600
6	9-13 y	Female		40	1,700	23	600
7	14-18 y	Male		45	2,800	34	800
8	14-18 y	Female	NPNL	45	2,800	34	800
9	14-18 y	Female	P	45	2,800	34	800
10	19-30 y	Male		45	3,000	40	1,000
11	19-30 y	Female	NPNL	45	3,000	40	1,000
12	19-30 y	Female	P	45	3,000	40	1,000
13	31-50 y	Male		45	3,000	40	1,000
14	31-50 y	Female	NPNL	45	3,000	40	1,000
15	31-50 y	Female	P	45	3,000	40	1,000
16	51-70 y	Male		45	3,000	40	1,000
17	51-70 y	Female		45	3,000	40	1,000
18	>70 y	Male		45	3,000	40	1,000
19	>70 y	Female		45	3,000	40	1,000

NPNL= Non-pregnant, Non-lactating

P = Pregnant

# Dietary Reference Intakes



# WHO Nutrient Recommendations

Table 1. Average levels of nutrients to consider adding to fortified wheat flour based on extraction, fortificant compound, and estimated *per capita* flour availability

Nutrient	Flour Extraction Rate	Compound	Level of nutrient to be added in parts per million (ppm) by estimated average per capita wheat flour availability (g/day) <sup>1</sup>			
			<75 <sup>2</sup> g/day	75-149 g/day	150-300 g/day	>300 g/day
Iron	Low	NaFeEDTA	40	40	20	15
		Ferrous Sulfate	60	60	30	20
		Ferrous Fumarate	60	60	30	20
		Electrolytic Iron	NR <sup>3</sup>	NR <sup>3</sup>	60	40
	High	NaFeEDTA	40	40	20	15
Folic Acid	Low or High	Folic Acid	5.0	2.6	1.3	1.0
Vitamin B <sub>12</sub>	Low or High	Cyanocobalamin	0.04	0.02	0.01	0.008
Vitamin A	Low or High	Vitamin A Palmitate	5.9	3	1.5	1
Zinc <sup>4</sup>	Low	Zinc Oxide	95	55	40	30
	High	Zinc Oxide	100	100	80	70

# Footnotes

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1. These estimated levels consider only wheat flour as the main fortification vehicle in a public health program. **If other mass-fortification programs with other food vehicles are implemented effectively, these suggested fortification levels may need to be adjusted downwards as needed.**
2. Estimated per capita consumption of <75 g/day does not allow for addition of sufficient level of fortificant to cover micronutrients needs for women of childbearing age. Fortification of additional food vehicles and other interventions should be considered.
3. NR = Not Recommended because very high levels of electrolytic iron needed could negatively affect sensory properties of fortified flour.
4. These amounts of zinc fortification assume 5 mg zinc intake and no additional phytate intake from other dietary sources.



# Ex: 2008 UFCFS

- 24-hour recall conducted in three regions of Uganda to determine
  - Food intake and nutrient inadequacies
  - Adequacy of mass fortification
- Sample
  - Children, 24-59 months
  - Women, 15-49 years
  - Central (Kampala), and rural Western and Northern regions
- After calculating dietary intakes and accounting for existing interventions
  - The WHO recommended fortificant levels for folic acid and vitamin A for populations consuming <75 g of flour would be unnecessarily **high** and even **excessive** for WRA and children



# Ex: 2010/2011 Cameroon

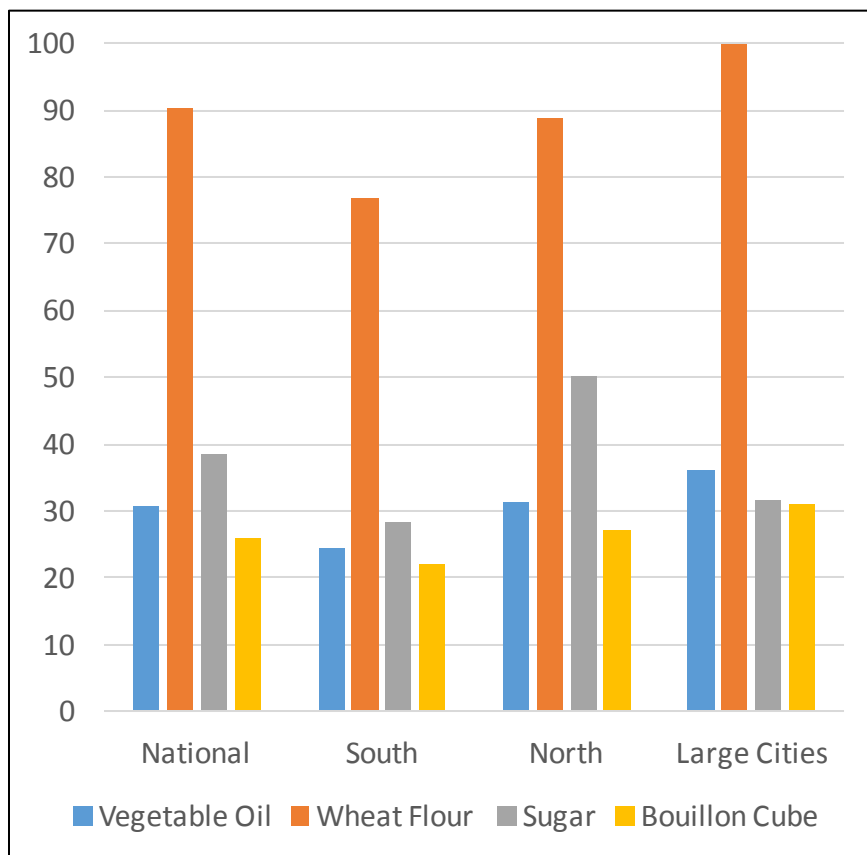
- Combined FFQ and 24-hour recall conducted in Cameroon to assess potential fortification vehicles (vegetable oil, wheat flour, sugar, and bouillon cube)
- Sample
  - Children, 12-59 months
  - Women, 15-49 years
  - 3 ecological zones (north, south, large cities)
- Consumption of fortifiable foods varied by ecological zone and socioeconomic status
  - Lower SES groups were less likely to consume fortifiable foods and consumed less amounts
- Micronutrient inadequacy greatest in the north, lower SES groups, and children



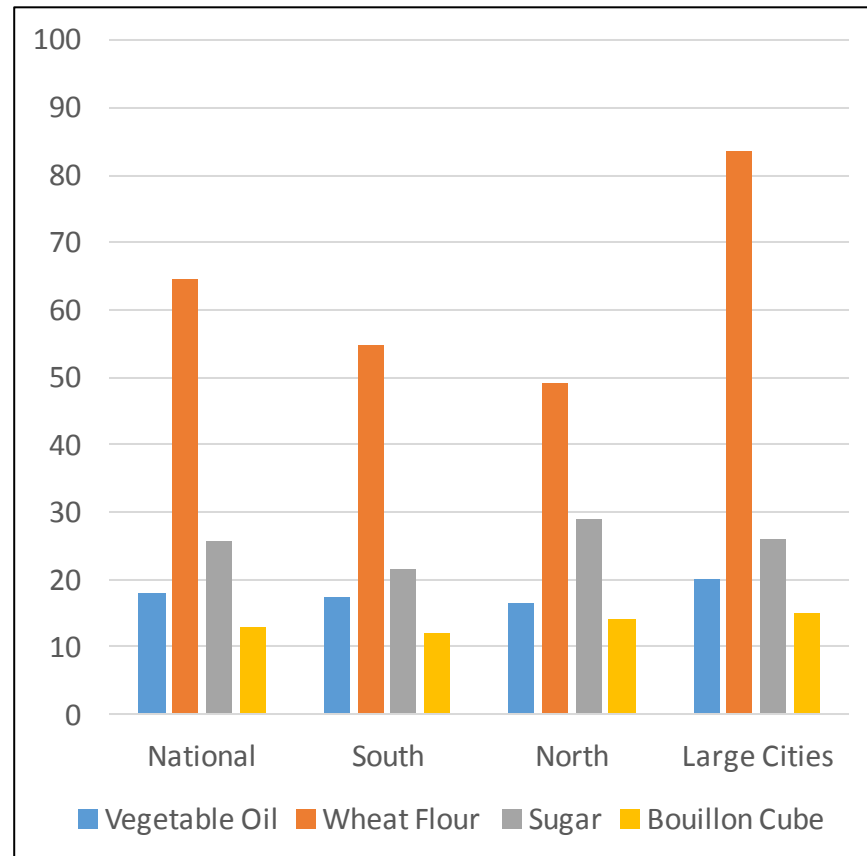
# Ex: Cameroon

Amount of fortifiable foods consumed in the previous day (g/d)

\*\*bouillon cubes in tenths of g/d



Women



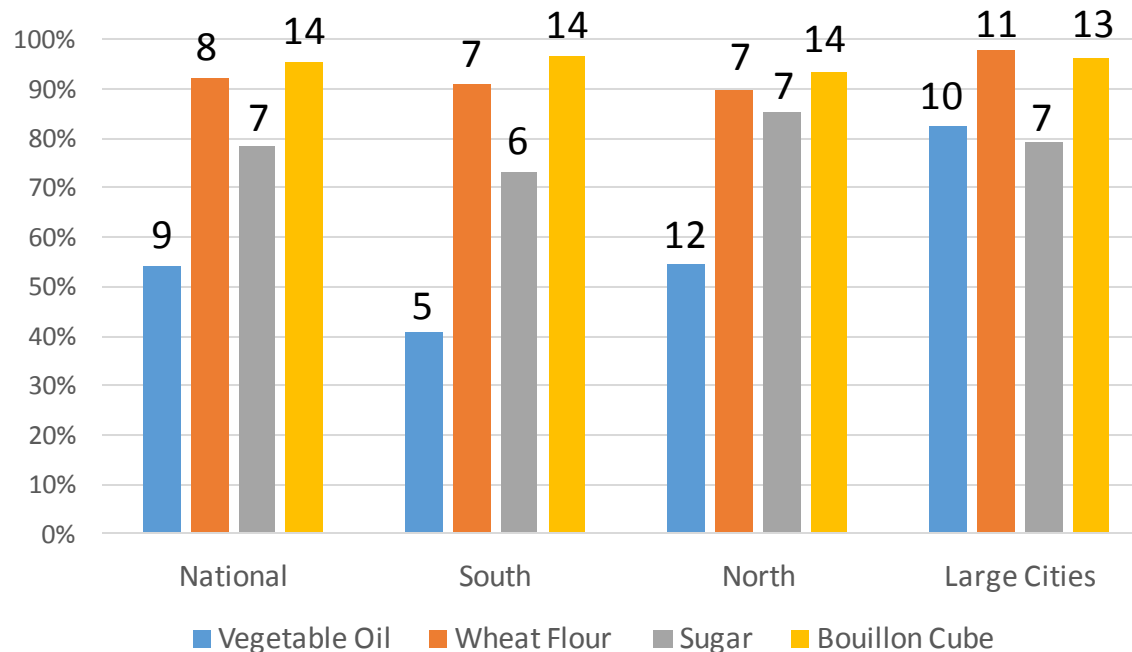
Children

# Ex: Cameroon

- Before coverage data was available, a preliminary decision was made to fortify vitamin A
- But coverage turned out to be relatively low....

Proportion of Cameroonian women consuming fortifiable foods at least once in previous week

\*\*Food Frequencies listed above (number of times consumed in previous week)





# ADePT

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- **A**utomated **DEC**'s **P**overty **T**ables
- Developed in collaboration between the FAO statistics division and World Bank
- Food Security module can produce indicators from consumption data collected in household surveys
  - Consumption of calories and micronutrients
  - Availability of micronutrients and amino acids
  - Distribution of calories
  - Proportion of people undernourished

# ADePT Quick Reference

Follow the numbered steps to perform an analysis.

After launching ADePT, double-click desired module in **Select ADePT Module** window. **Module > Select Module...** to change module from within ADePT.

Use the example project (**Project > Open Example Project**) to familiarize yourself with ADePT analysis steps, options, reports and other features.

**1. Click Add... to load dataset(s). Enter dataset year in Label column.**

**3. Select tables and/or graphs to be included in report.**

Click **Variables** tab to see basic variable information for selected dataset.

Click **Browse...** to see data, and variable details, for selected dataset.

(Shortcut: double-click file name.)

Select to calculate changes between two years selected at right.

Click **Parameters** tab to adjust factors used in calculations.

*Italics:* field can accept multiple input variables.

This panel is module-specific.

**Project > Open Example Project** to see dataset variables properly mapped to input variables.

**2. Map dataset variables to input variables by selecting dataset variables in drop-down lists.**

Alternatively, drag variable names from dataset **Variables** tab and drop in fields in input **Variables** tab.

Hover cursor over input variable names and fields to see description in status bar.

**4. Click Generate button. Report is automatically displayed in Microsoft® Excel® or Excel Viewer.**

Report can also be viewed in an Excel-compatible spreadsheet program.

The screenshot shows the ADePT software interface. The main window is titled "poverty" and has a menu bar with "Project", "Modifs", "Tools", and "Help". Below the menu bar are two tabs: "Datasets" and "Variables | 2002". The "Variables" tab is active, showing a table with columns "Label" and "Dataset". The table contains three rows: "2002" with "D:\ADePT\Example\adep\_2002.dta", "2003" with "D:\ADePT\Example\adep\_2003.dta", and "2007" with "D:\ADePT\Example\adep\_2007.dta". Below the table are buttons for "Add...", "Remove", and "Browse...". To the right of the table are radio buttons for "Individual level" (selected) and "Household level". Below these are two dropdown menus for years "2002" and "2003", and a checkbox "Show changes between periods" which is checked. Below the table and dropdowns are two tabs: "Variables" and "Parameters". The "Parameters" tab is active, showing a grid of input fields for various variables. The "Variables" tab shows a list of variables: "Household level variables" (Household ID, Urban, Welfare aggregate, Poverty line(s), Household size, Household weights) and "Individual level variables" (Household head, Age, Gender). The "Parameters" tab shows a grid of input fields for these variables, with dropdown menus for "Regions", "Land area", "Income", "Custom category", "Number of children (0-6)", "Education", "Economic status", and "Custom category". At the bottom of the "Parameters" tab is a status bar that says "Urban/rural indicator (1 denotes urban) [Binary variable or an expression]". To the right of the main window is a "Tables (1/27/31)" panel showing a tree view of tables. The "Poverty (1/16/20)" table is selected, and its sub-tables are listed: "T2.1: Overall Poverty", "T2.2: Poverty by Geographic Regions", "T3.1: Mean Expenditure for Different Groups", "T3.6: Regional Poverty Decomposition", "T3.6a: Urban/rural Poverty Decomposition", "T4.1: Poverty by The Status of Employment", "T4.2: Poverty by Household Head's Status of Empl", "T4.3: Poverty by Education Level", "T4.4: Poverty by Household Head's Education Lev", "T4.5: Poverty by Household Head's Gender", "T4.15: Poverty by Age Groups", "T4.16: Poverty by Household Head's Age", "T4.7: Poverty by Demographic Composition", "T4.11: Poverty by Land Ownership", "T6.1: Mean per-capita incomes in real terms", and "T6.3: Income-based poverty estimates". Below the table selection tree are checkboxes for "For all tables", "Standard errors (slow)", and "Frequencies". A "Generate" button is located below these checkboxes. Below the "Generate" button is a "Table description and if-condition" panel showing a list of messages: "10 Note: in variable wrodchro value 1 was assumed to mean 'Household head'", "11 Note: in variable pol value 1 was assumed to mean 'Male'", "12 Suspected outliers with code(s): 1, 2 - in variable ekimost", and "13 some respondents might be too young for education level Primary school".

Select to include summary of original data in report.

Select name to see details in **Table description** and if-condition tab below.

Select to calculate standard errors and/or frequencies for each table. Report shows results in separate worksheets for each selected table.

Review messages for potential calculation problems. Messages are also in report's **Notifications** worksheet.

# Food Security Module

NewProject\_fssm\_0001 - ADePT: Food Security

Project Module Tools Help

Household Individual Food Country

Variable name Variable label

Search: Household Individual Food Main factors Micronutrients Amino acids Parameters

Household ID (\*) Household size Household region (\*) Household size categories Household area (\*) Number of food partakers Total consumption per day Total income per day (\*) Household weights (\*) Consumer price index Food price index Survey year Survey month

Food Security tables selected: 0 | feasible: 0 | total: 66

- Original Data Report
  - Food consumption tables (0/0/14)
    - 1.1 Prevalence of Undernourishment using mainly survey data
    - 1.2 Prevalence of Undernourishment using mainly external sources
    - 1.3 Selected food consumption statistics by population groups
    - 1.4 Selected food consumption statistics of population groups by income deciles
    - 1.5 Shares of food consumption by food sources (in dietary energy)
    - 1.6 Shares of food consumption by food sources (in dietary value) by income deciles
    - 1.7 Shares of food consumption by food sources (in monetary value)
    - 1.8 Shares of food consumption by food sources (in monetary value) by income deciles
    - 1.9 Food consumption in dietary energy, monetary and nutrient content by population groups
    - 1.10 Nutrient contribution to dietary energy consumption
    - 1.11 Nutrient contribution to dietary energy consumption at income quintile levels
    - 1.12 Nutrient density per 1000 kcal
    - 1.13 Share of animal protein in total protein consumption
    - 1.14 Within-region differences in nutrient consumption, by regional income quintiles
  - Food group consumption tables (0/0/8)
    - 2.1 Food consumption by food commodity groups
    - 2.2 Contribution of food groups to total nutrient consumption
    - 2.3 Food consumption by food commodity group and income quintile
    - 2.4 Food consumption by food commodity group and area
    - 2.5 Contribution of food groups to total nutrient consumption by area
    - 2.6 Food consumption by food commodity group and region
    - 2.7 Food consumption by food commodity group and region in the first quintile
    - 2.8 Nutrient costs by food commodity group
  - Food item consumption tables (0/0/10)
    - 3.1 Consumption statistics for each food item at national level
    - 3.2 Food item protein consumption at national level
    - 3.3 Consumption statistics for each food item by area
    - 3.4 Food item protein consumption by area

For all tables

Generate

Table description and if-condition Messages

Description
-------------

Categorical variable of the area where the household resides, e.g., capital city, other urban, and rural

ADePT 5.50.5001

# Levels of Data

- Household
  - Size
  - Region
  - Area
- Individual
  - Age
  - Gender
  - Height
  - Relationship to HH head
- Food
  - Item code
  - Unit of quantity
  - Monetary value
- Country
  - FCT
  - Vitamins, minerals, etc.

Search:

Household Individual Food Main factors Micronutrients Amino acids Parameters

Vitamins

Retinol (mcg)	<input type="text"/>	Thiamin, B1 (mg)	<input type="text"/>
Beta-carotene (mcg)	<input type="text"/>	Riboflavin, B2 (mg)	<input type="text"/>
Total vitamin A (mcg RAE)	<input type="text"/>	Total Vitamin B6 (mg)	<input type="text"/>
Ascorbic Acid, C (mg)	<input type="text"/>	Cobalamin, B12 (mcg)	<input type="text"/>

Minerals

Animal iron (mg)	<input type="text"/>	Non animal iron (mg)	<input type="text"/>
Calcium (mg)	<input type="text"/>		

Household Individual Food Main factors Micronutrients Amino acids

Household ID (*)	<input type="text"/>
Food item code (*)	<input type="text"/>
Unit of quantity	<input type="text" value="Kilograms"/>
Food quantity, per day (*)	<input type="text"/>
Food monetary value, per day (*)	<input type="text"/>
Food source (*)	<input type="text"/>





# Improving HCES

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- To date, HCES have been overwhelmingly used only as a source of data for secondary data
- How much could HCES be strengthened to collect more relevant and precise data for food and nutrition analysis?



# Shared Agenda for Improvements

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- Standardizing units of measure
- Better capturing food away from home
- Improving the food item list
- Optimizing the recall period
- Distinguishing consumption and acquisition
- Collecting more information about individual consumption

# Thank you

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## Questions?

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