Calculating Wheat Flour Consumption: Sources and Methods

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USAID SPRING Project

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Overview

• 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 Equivalents (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
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

- 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

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

<table>
<thead>
<tr>
<th>Food Item</th>
<th>%</th>
<th>Food Item</th>
<th>%</th>
<th>Food Item</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>White bread (European style)</td>
<td>60%</td>
<td>Crackers</td>
<td>90%</td>
<td>Dried Pasta</td>
<td>90%</td>
</tr>
<tr>
<td>Flatbread (unleavened)</td>
<td>75%</td>
<td>Biscuits and Cookies</td>
<td>60%</td>
<td>Wet/Cooked Pasta:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Noodles</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Spaghetti</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Macaroni</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Other pasta</td>
<td></td>
</tr>
<tr>
<td>Whole wheat bread</td>
<td>75%</td>
<td>Cake</td>
<td>55%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet breads</td>
<td>65%</td>
<td>Pies and Pastries</td>
<td>35%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Estimates provided by Quentin Johnson
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

Household Consumption and Expenditure Surveys

24 Hour Recall

FAO Food Balance Sheets

LESS AVAILABLE

Industry

FRAT

MORE AVAILABLE

Food Frequency Questionnaires

USAID

FROM THE AMERICAN PEOPLE

SPRING

Strengthening Partnerships, Results, and Innovations in Nutrition Globally
Specificity of Data

Household Consumption and Expenditure Surveys

FAO Food Balance Sheets

LESS SPECIFIC

Industry

Food Frequency Questionnaires

MORE SPECIFIC

FRAT

24-Hour Recall
24-Hour Recall

• 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
  – 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

<table>
<thead>
<tr>
<th>Time</th>
<th>Place eaten</th>
<th>Food or drink</th>
<th>Description, and cooking method</th>
<th>Amount eaten</th>
<th>Weight equivalent (g)</th>
<th>Food Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30</td>
<td>Home</td>
<td>Porridge</td>
<td>Prepared with mgayewa, unrefined maize flour</td>
<td>267mL</td>
<td>315</td>
<td></td>
</tr>
<tr>
<td>9:15</td>
<td>Home</td>
<td>Sweet potatoes</td>
<td>Boiled in skins and skins removed</td>
<td>350g</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>11:20</td>
<td>Home</td>
<td>Ground-nuts</td>
<td>Raw</td>
<td>60g</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>12:15</td>
<td>Home</td>
<td>Corn-on-cob</td>
<td>Boiled</td>
<td>5cm</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>14:00</td>
<td>Home</td>
<td>Nsima</td>
<td>Prepared with mgayewa, unrefined maize flour</td>
<td>335g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:00</td>
<td>Home</td>
<td>Fish relish</td>
<td>Boiled (recipe completed)</td>
<td>37g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:05</td>
<td>Home</td>
<td>Sugar cane</td>
<td>Raw</td>
<td>14cm</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>6:20</td>
<td>Home</td>
<td>Nsima</td>
<td>Prepared with ufa, processed maize flour</td>
<td>305g</td>
<td>305</td>
<td></td>
</tr>
</tbody>
</table>

Probe for alcohol: Yes ☐ No ☑

Probe for sickness: Yes ☐ No ☑

If yes, did sickness affect appetite? Yes ☐ No ☑

If yes, how? Increase ☐ Decrease ☑

Was food intake unusual? Yes ☐ No ☑

If yes, how was it unusual?

Was it a feast day? Yes ☐ No ☑

Was it a market day? Yes ☐ No ☑

Was it a fasting day? Yes ☐ No ☑

Probe for tablets: Yes ☐ No ☑

Iron ☑ Vitamins ☑ Other supplements ☐ Anti-malaria ☐
24 Hour Recall: Benefits

• 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

• 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

• 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

#### Foods and Amounts

<table>
<thead>
<tr>
<th>DRINKS</th>
<th>AVERAGE USE LAST YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tea (cup)</td>
<td></td>
</tr>
<tr>
<td>Coffee, instant or ground (cup)</td>
<td></td>
</tr>
<tr>
<td>Coffee, decaffeinated (cup)</td>
<td></td>
</tr>
<tr>
<td>Coffee whitener, eg. Coffee-mate (teaspoon)</td>
<td></td>
</tr>
<tr>
<td>Cocoa, hot chocolate (cup)</td>
<td></td>
</tr>
<tr>
<td>Horlicks, Ovaltine (cup)</td>
<td></td>
</tr>
<tr>
<td>Wine (glass)</td>
<td></td>
</tr>
<tr>
<td>Beer; lager or cider (half pint)</td>
<td></td>
</tr>
<tr>
<td>Port, sherry, vermouth, liqueurs (glass)</td>
<td></td>
</tr>
<tr>
<td>Spirits, eg. gin, brandy, whisky, vodka (single)</td>
<td></td>
</tr>
<tr>
<td>Low calorie or diet fizzy soft drinks (glass)</td>
<td></td>
</tr>
<tr>
<td>Fizzy soft drinks, eg. Coca cola, lemonade (glass)</td>
<td></td>
</tr>
<tr>
<td>Pure fruit juice (100%) eg. orange, apple juice (glass)</td>
<td></td>
</tr>
</tbody>
</table>

#### FRUIT (1 fruit or medium serving)

For very seasonal fruits such as strawberries, please estimate your average use when the fruit is in season

<table>
<thead>
<tr>
<th>Fruits</th>
<th>AVERAGE USE LAST YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td></td>
</tr>
<tr>
<td>Pears</td>
<td></td>
</tr>
<tr>
<td>Oranges, satsumas, mandarins</td>
<td></td>
</tr>
<tr>
<td>Grapefruit</td>
<td></td>
</tr>
<tr>
<td>Bananas</td>
<td></td>
</tr>
<tr>
<td>Grapes</td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td></td>
</tr>
<tr>
<td>Peaches, plums, apricots</td>
<td></td>
</tr>
<tr>
<td>Strawberries, raspberries, kiwi fruit</td>
<td></td>
</tr>
<tr>
<td>Tinned fruit</td>
<td></td>
</tr>
<tr>
<td>Dried fruit, eg. raisins, prunes</td>
<td></td>
</tr>
</tbody>
</table>

Please check that you have a tick (√) on EVERY line
Food Frequency: Benefits

• 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

• 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)
FRAT: Benefits

• 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

- 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

<table>
<thead>
<tr>
<th>Country, year of publication</th>
<th>Total N (in survey)</th>
<th>% Consumed wheat flour, past week</th>
<th>Median amount of wheat flour consumed on previous day (g/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>Urban strata</td>
</tr>
<tr>
<td>Burkina Faso, 1999</td>
<td>840</td>
<td>48 %</td>
<td>83 %</td>
</tr>
<tr>
<td>Cameroon, 2011</td>
<td>912</td>
<td>92 %</td>
<td>98 %</td>
</tr>
<tr>
<td>Congo, 2008</td>
<td>1,050</td>
<td>68 %</td>
<td>NA</td>
</tr>
<tr>
<td>Guinea, 2001</td>
<td>1,050</td>
<td>67 %</td>
<td>98 %</td>
</tr>
<tr>
<td>Mauritania, 2002</td>
<td>225</td>
<td>88 %</td>
<td>99; 100 %</td>
</tr>
<tr>
<td>Mozambique, 2010</td>
<td>2,506</td>
<td>92 %</td>
<td>96; 87; 91 %</td>
</tr>
<tr>
<td>Senegal, 2006</td>
<td>840</td>
<td>93 %</td>
<td>99; 98 %</td>
</tr>
</tbody>
</table>

## FRAT Results: Wheat Flour Consumption among Children

<table>
<thead>
<tr>
<th>Country, year of publication</th>
<th>Age range (months)</th>
<th>% Consumed wheat flour, past week</th>
<th>Median amount of wheat flour consumed on previous day (g/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>Urban strata</td>
</tr>
<tr>
<td>Burkina Faso, 1999</td>
<td>12 – 36</td>
<td>57 %</td>
<td>88 %</td>
</tr>
<tr>
<td>Cameroon, 2011</td>
<td>12 – 59</td>
<td>94 %</td>
<td>97 %</td>
</tr>
<tr>
<td>Congo, 2008</td>
<td>12 – 59</td>
<td>67 %</td>
<td>NA</td>
</tr>
<tr>
<td>Guinea, 2001</td>
<td>12 – 36</td>
<td>68 %</td>
<td>96 %</td>
</tr>
<tr>
<td>Mauritania, 2002</td>
<td>12 – 36</td>
<td>92 %</td>
<td>96; 96 %</td>
</tr>
<tr>
<td>Mozambique, 2010</td>
<td>6 – 59</td>
<td>81 %</td>
<td>84; 78; 81 %</td>
</tr>
<tr>
<td>Senegal, 2006</td>
<td>12 – 59</td>
<td>91 %</td>
<td>96; 94 %</td>
</tr>
</tbody>
</table>

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
## HCES: Global Coverage

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


Calculating Quantities from Wheat Consumption Module

1. Identify food items containing wheat flour

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.

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.
HCES: Variations

• 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

• 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

- 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

• 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
IHSN Survey Catalog

Central Data Catalog

Search by Keyword
- in study description
- in variable description

Filter by Year
Show studies conducted between
- 1890 and 2013

Filter by Data Access
- Any
- Data available from external repository
- Data not available

Filter by Country
- 171
- Any

Found 2745 studies out of 2745

Sort results by: Country | Year | Title | Popularity

Showing 1-15 of 2745 studies

- Global Financial Inclusion (Global Findex) Database 2011
  Afghanistan, 2011
  By: Development Research Group, Finance and Private Sector Development Unit - World Bank

- Mortality Survey 2010
  Afghanistan, 2010
  By: Indian Institute for Health Management Research (IIHMR), Central Statistics Organization (CSO)

- Enterprise Survey 2008
  Afghanistan, 2008
  By: World Bank
## HCES Surveys

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

<table>
<thead>
<tr>
<th>Country</th>
<th>Recall Method</th>
<th>Recall Period</th>
<th>Diary (Days Recorded)</th>
<th>Diary (Visit to Illiterate HHs every X days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Recall Period (Days)</td>
<td></td>
<td></td>
</tr>
<tr>
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<tr>
<td>DRC</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Number of Food Items</td>
<td>Expenditure (X) or Food Quantity (Q) Reported?</td>
<td>Food Acquired from Purchases</td>
<td>Food Consumed from Purchases</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------</td>
<td>------------------------------</td>
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<tr>
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</tr>
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<td>X</td>
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<tr>
<td>Tanzania</td>
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<td>Q</td>
<td></td>
<td>X</td>
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<td>q</td>
<td></td>
<td>X</td>
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<tr>
<td>Zimbabwe</td>
<td>179</td>
<td>q</td>
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<td>X</td>
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</tbody>
</table>
# Wheat Flour and Products

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

<table>
<thead>
<tr>
<th>Country</th>
<th>Wheat Flour</th>
<th>Wheat (Whole Grain)</th>
<th>Bread</th>
<th>Cakes</th>
<th>Biscuits/Scones</th>
<th>Pasta</th>
<th>Wheat Flour Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burundi</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
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<td></td>
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</tr>
<tr>
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<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>✓</td>
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<tr>
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<tr>
<td>Malawi</td>
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<td></td>
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</tr>
<tr>
<td>Mozambique</td>
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<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Rwanda</td>
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<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>South Africa</td>
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<td>✓</td>
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<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Tanzania</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Uganda</td>
<td>✓</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zambia</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>
Wheat Flour Consumption

<table>
<thead>
<tr>
<th>Country</th>
<th>National</th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRC</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>21.0%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Malawi</td>
<td>0.6%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Mozambique</td>
<td>0.6%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Rwanda</td>
<td>47.9%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>South Africa</td>
<td>17.3%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Tanzania</td>
<td>17.3%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Wheat Flour Consumption (Extended)

- DRC: 94.4%
- Ethiopia: 62.5%
- Malawi: 35.2%
- Mozambique: 33.0%
- South Africa: 28.9%
- Tanzania: 79.0%
- Zimbabwe: 100%
Bread Consumption (HCES)

% of Population

- Burundi: 10.1%
- DRC: 15.6%
- Ethiopia: 50.4%
- Kenya: 33.2%
- Malawi: 26.7%
- Mozambique: 87.8%
- Rwanda: 19.6%
- South Africa: 16.0%
- Tanzania: 19.6%
- Uganda: 16.0%
- Zambia: 100%

Legend:
- National
- Rural
- Urban
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
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
A new version of FAOSTAT is available. Please click here to access it.

The Food Balance Sheets domain covers:

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

Elements covered:

- Quantities
- Calories, Proteins, Fats

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
Food Balance Sheets

1. Select country

2. Select most recent year

3. Click on "show data"
### Uganda - 2009

#### 5. Food supply quantity

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
<th>Food supply (kcal/capita/day)</th>
<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2260 Fc</td>
<td>49.20 Fc</td>
<td>46.90 Fc</td>
<td></td>
</tr>
<tr>
<td>2037 Fc</td>
<td>37.10 Fc</td>
<td>35.30 Fc</td>
<td></td>
</tr>
<tr>
<td>173 Fc</td>
<td>12.10 Fc</td>
<td>11.50 Fc</td>
<td></td>
</tr>
</tbody>
</table>

#### 4. Identity Fortification Vehicle

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
<th>Food supply (kcal/capita/day)</th>
<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.80 Fc</td>
<td>97 Fc</td>
<td>2.90 Fc</td>
<td>0.30 Fc</td>
</tr>
</tbody>
</table>

#### Cereals - Excluding Beer + (Total)

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
<th>Food supply (kcal/capita/day)</th>
<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>2037 Fc</td>
<td>37.10 Fc</td>
<td>35.30 Fc</td>
<td></td>
</tr>
<tr>
<td>173 Fc</td>
<td>12.10 Fc</td>
<td>11.50 Fc</td>
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</tr>
</tbody>
</table>

#### Wheat

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
<th>Food supply (kcal/capita/day)</th>
<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.80 Fc</td>
<td>97 Fc</td>
<td>2.90 Fc</td>
<td>0.30 Fc</td>
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</tbody>
</table>

#### Rice (Milled Equivalent)

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
<th>Food supply (kcal/capita/day)</th>
<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.80 Fc</td>
<td>97 Fc</td>
<td>2.90 Fc</td>
<td>0.30 Fc</td>
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</tbody>
</table>

#### Barley

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
<th>Food supply (kcal/capita/day)</th>
<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.80 Fc</td>
<td>97 Fc</td>
<td>2.90 Fc</td>
<td>0.30 Fc</td>
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</tbody>
</table>

#### Maize

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
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<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
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<tbody>
<tr>
<td>12.80 Fc</td>
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<td>2.90 Fc</td>
<td>0.30 Fc</td>
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</table>

#### Rye

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
<th>Food supply (kcal/capita/day)</th>
<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
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</thead>
<tbody>
<tr>
<td>12.80 Fc</td>
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<td>2.90 Fc</td>
<td>0.30 Fc</td>
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</table>

#### Oats

<table>
<thead>
<tr>
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<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
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<tbody>
<tr>
<td>12.80 Fc</td>
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<td>2.90 Fc</td>
<td>0.30 Fc</td>
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#### Millet

<table>
<thead>
<tr>
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<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
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<tr>
<td>12.80 Fc</td>
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<td>0.30 Fc</td>
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</table>

#### Sorghum

<table>
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<tr>
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<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
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<td>12.80 Fc</td>
<td>97 Fc</td>
<td>2.90 Fc</td>
<td>0.30 Fc</td>
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</table>

#### Cereals, Other

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
<th>Food supply (kcal/capita/day)</th>
<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.80 Fc</td>
<td>97 Fc</td>
<td>2.90 Fc</td>
<td>0.30 Fc</td>
</tr>
</tbody>
</table>

#### Starchy Roots + (Total)

<table>
<thead>
<tr>
<th>Food supply quantity (kg/capita/yr)</th>
<th>Food supply (kcal/capita/day)</th>
<th>Protein supply quantity (g/capita/day)</th>
<th>Fat supply quantity (g/capita/day)</th>
</tr>
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<tbody>
<tr>
<td>12.80 Fc</td>
<td>97 Fc</td>
<td>2.90 Fc</td>
<td>0.30 Fc</td>
</tr>
</tbody>
</table>
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

- Zimbabwe: 15.7%
- Zambia: 45.5%
- Uganda: 975.0%
- Tanzania: 221.2%
- South Africa: 15.8%
- Rwanda: 436.8%
- Mozambique: 252.9%
- Malawi: 42.2%
- Kenya: 88.0%
- Ethiopia: 61.6%
- DRC: 22.2%
- Burundi: 95.7%
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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C.Sununtnasuk@cgiar.org