Our Experience with Crowd Sourced Food Price Collection in AFRICA

- Balaji Subbaraman, KNOEMA
The question

What was the price of C at L on D?
Ambiguity

What was the price of $C$ at $L$ on $D$?
where
$C$ may be tomatoes
(how many flavors of tomatoes you know?)
$L$ may be Nairobi
(how many places sell tomatoes in Nairobi?)
and $D$ may be week of April, 27th
(we all know there are 7 days in a week and prices may change daily)
Discussion

- What specific flavor of tomatoes we should get price for or we should get prices for all different flavors and aggregate them somehow?

- What is the right place or places to get prices for tomatoes in Nairobi? How do we aggregate data from the different places? At how many places we should collect prices?

- Should we get price on a specific day of week or collect many samples on different days and aggregate them somehow?

- Many more...
Reality

The question «What was the price of tomatoes at Nairobi, Kenya on a week of April, 27th?» doesn’t have any single answer.

In fact, it’s deeply into discussion😊
Conclusion

The approach when we provide single price point for The Question faces a lot of criticism naturally due to all the ambiguity it contains

«I live in Nairobi and bought tomatoes last week in a supermarket, then compared the price you published and it’s off by 40%. Your data is wrong!»
Possible solutions

- Different methodologies to calculate «better» average/median price
- Price range (min-max)
- Price distribution
  - 95% and 99% confidence intervals

Meet Africa Food Price Collection Project
Introduction: the project

- **Objective:** Timely and high frequency food price data collection in Africa for access & analysis near real-time

- **Scope**
  - All African countries, at least 1 urban and 1 rural market per country
  - 25 Agricultural and non-agricultural commodities
  - Weekly collection

- **Implementation:** Web-based and mobile-based platform for submitting data and interacting

- **Participants**
  - The African Development Bank (AfDB)
  - The European Commission's Joint Research Centre (JRC-IPTS)
  - Knoema
List of commodities

<table>
<thead>
<tr>
<th>Cereal products</th>
<th>Livestock products</th>
<th>Vegetables</th>
<th>Flavours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loaf of white bread</td>
<td>Beef with bones</td>
<td>Vegetable oil</td>
<td>White sugar</td>
</tr>
<tr>
<td>White rice, 25% broken</td>
<td>Goat meat</td>
<td>Onion</td>
<td>Cooking salt</td>
</tr>
<tr>
<td>Wheat flour</td>
<td>Whole chicken frozen</td>
<td>Round tomato</td>
<td></td>
</tr>
<tr>
<td>White maize flour</td>
<td>Large size chicken eggs</td>
<td>Green cabbage</td>
<td></td>
</tr>
<tr>
<td>Maize grain</td>
<td>Pasteurized unskimmed milk</td>
<td>Sweet potatoes</td>
<td></td>
</tr>
<tr>
<td>Millet whole grain</td>
<td>Fish products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorghum white whole grain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bream fish</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nile perch</td>
</tr>
</tbody>
</table>

Remarks:
Commodities are selected based out of International Comparison Program (ICP) product list
Project Phases

• **M1: Africa Food Prices Volatility – Pilot**
  – Duration: March, 2013 to September, 2013
  – Scope: 3 countries, 2 markets per country
  – Participants: JRC-IPTS and Knoema

• **M2: Africa Food Prices Volatility**
  – Scope: ~20 countries, ~50 markets
  – Participants: Knoema

• **M3: Africa Food Price Collection**
  – Duration: ongoing from June, 2014
  – Scope: All African countries, ~150 markets
  – Participants: AfDB, JRC-IPTS and Knoema
Market Coverage across Africa
Our Team 😊
Data Collection – Web Submission

**Food Prices**

<table>
<thead>
<tr>
<th>Currency: ETB</th>
<th>Collection time:</th>
</tr>
</thead>
</table>

### Cereals
- Loaf of white bread: 450 g
- White rice, 23% broken: 1 kg
- Wheat flour: 1 kg
- White maize flour: 1 kg
- Maize grain: 1 kg
- Millet whole grain: 1 kg
- Sorghum white whole grain: 1 kg

### Livestock products
- Beef with bones: 1 kg
- Goat meat: 1 kg
- Whole chicken frozen: 1 kg
- Large size chicken eggs: Dozen
- Pasteurized unskimmed milk: 1 litre

### Fish products
- Bream fish: 1 kg
- Nile perch: 1 kg
We are looking for data collectors who will go to the specific markets weekly, collect data on food prices for about 25 items and submit them into our application.
### Food Prices

#### Period: Last 50 days

<table>
<thead>
<tr>
<th>Time</th>
<th>User</th>
<th>Region</th>
<th>Status</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>08/26/2013 09:26:42 PM</td>
<td>Feissa Morho</td>
<td>Yonijama, Lofa, Liberia</td>
<td>Pending review</td>
<td>$15.00</td>
</tr>
<tr>
<td>08/26/2013 09:54:52 PM</td>
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<td>Yonijama, Lofa, Liberia</td>
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<tr>
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<td>Denis Monrovia</td>
<td>Greater Monrovia, Montserrado, Liberia</td>
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<td>$15.00</td>
</tr>
</tbody>
</table>

**Currency:** LRD  **Collected at:** 08/26/2013 06:23 PM  **Map:**

#### Cereals

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Price 1</th>
<th>Price 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loaf of white bread</td>
<td>450 g</td>
<td>19.00</td>
<td>20.00</td>
</tr>
<tr>
<td>White rice, 25% broken</td>
<td>1 kg</td>
<td>6.00</td>
<td>7.50</td>
</tr>
<tr>
<td>Wheat flour</td>
<td>1 kg</td>
<td>120.00</td>
<td>126.00</td>
</tr>
</tbody>
</table>

**Collected at:**

- Loaf of white bread: 08/26/2013 07:29 PM
- White rice, 25% broken: 08/26/2013 07:29 PM
- Wheat flour: 08/26/2013 07:30 PM
Collected data is disseminated to the Africa Food Prices Collection Portal for access/analysis near real time.

Africa Food Prices Collection

This is an initiative of the African Development Bank’s Statistics Department and the European Commission’s Joint Research Center, in partnership with Knoema. Its main objective is to collect weekly price data on various agricultural products, including cereals, meat, fish, vegetables, oils, fruits, dairy products and other food items in Africa, using modern technologies and crowd sourcing techniques. The data so collected has been compiled into a comprehensive and up-to-date commodity price dataset which can be accessed free of charge on this site.

Sign Up to access Africa Food Prices data for free

Explore Food Prices Datasets
Timely and accurate food prices data with high frequency in Africa. Query weekly food prices data online

Our Insight
View key visualization managed by our team and industry experts

All African countries, at least 1 urban and 1 rural location per country.
Learn more on our coverage

Selection of commodities following ICP product list.
See the product list
Three locations in Africa
- Nairobi, Kenya (14 markets, 14 collectors)
- Kampala, Uganda (19 markets, 7 collectors)
- Freetown, Sierra Leone (15 markets, 15 collectors)
- Started in April, 2015
Database with food prices for 3 locations containing data over 3 months:

- Median
- 95% and 99% confidence intervals for prices
New insights

- What is a probability of price of rounded tomatoes at Nairobi, Kenya on a week of April, 27th being 68KES per kg?
- What was the price range for tomatoes on the past week with 95% or 99% confidence level?
Challenges Faced

- Challenges in gathering reasons for relatively higher price variation (30% WoW)
- Intermittent data submissions due to unrest situations in countries, poor infrastructure such as internet/power disruption
- Different unit of measures in various countries (Example - Cooking Gas)
- Multi-lingual Challenges
Next steps

- Improving methodology
  - We do all calculations now assuming that distribution is normal which is not the case obviously. So we are exploring other possibilities
  - Determine optimal sample size to keep a balance between quality of output & cost of collection and by considering population distribution of a location
Thank you for your attention!

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ANNEXURE
A Brief about Software

Module in Knoema Platform

Output from each stage

Data Collection
Raw data, as submitted by data collectors

Data Review
- Standardized data (e.g. conversion of units and currencies)
- Aggregated data (across regions)
- Consolidated data across frequencies

Data Dissemination
Output data, which can be:
- downloaded
- further consumed in data visualization and/or dashboard tools on Knoema Platform
Price Collection - Workflow

- Data collectors hired and trained in data collection software
- Moderator who oversees entire project and data submissions
- Every week data collectors go to the markets, collect food prices information on the ground and insert the food price data into price sheets
- Data collectors submit data using mobile phones or from price sheets into the web based system using Internet connection
- Automatic extreme observation identification
- Moderator reviews each submission and either approves it or rejects with comments
- Approved submissions go into electronic database from which data can be downloaded or reused