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Tracking prices during COVID-19 in Kenya and Uganda



In brief

- The goal of this project was to serve as a proof of concept exploring whether it is possible to collect high-quality, high-frequency price data at scale through a crowd-sourcing approach. To this end we collected over 39,000 price quotes of essential food items in Kenya and Uganda between April 2020 and mid-March 2021.
- The generated high-frequency price data features a wide geographic coverage and allows us to document retail price dynamics during the pandemic.
- The findings suggest that prices were higher during the initial lockdown phase in 2020, but declined relatively swiftly thereafter. It is important to highlight that while price levels eventually fell, it was likely that higher prices had a substantial impact on food security.
- The pandemic fundamentally altered mobility and consumption patterns even above and beyond immediate government-imposed restrictions. We theorize that this was as a result of changes in behaviour due to lockdown measures, but can importantly also be driven by the sustained adverse impact of the pandemic on income generating activities.
- We estimate that an increase in activity at work places, grocery stores, and other retail locations are associated with a decline in food prices. The results are stable across a number of alternative specifications.

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Overview of the project

Food price dynamics have been a central concern for policymakers throughout the pandemic due to their importance for food security and the high expenditure share of low-income households on food. In a dynamically evolving situation like the COVID-19 crisis, real-time price data can help decision-makers in planning, implementing, and assessing the effectiveness of relevant policies. Cash transfer programmes, for example, targeted at vulnerable households only translate into increased food security if the markets for essential consumer goods are relatively stable (Gerard et al., 2020; Gadenne et al., 2021).

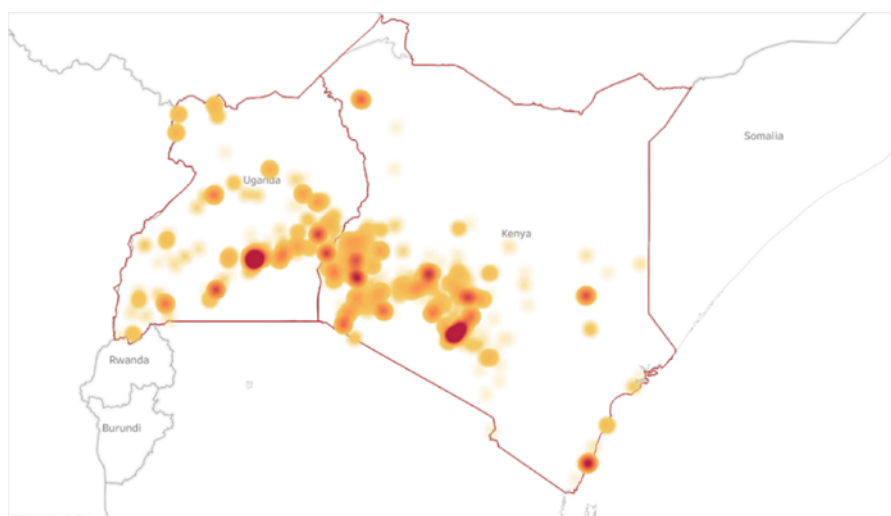
In this project we:

- Explore an easily scalable, non-traditional way for collecting timely, high-frequency price data with wide geographic coverage,
- Track and unpack price dynamics during the initial lockdown period and the subsequent re-opening phase, and
- Study the link between changes in visiting patterns at workplaces, grocery stores and other retail locations and price dynamics.

We relied on a quick-response online survey to generate real-time price data during the evolving pandemic for Kenya and Uganda. We recruited volunteers, mainly university students and staff/network members of NGOs. They recorded prices for essential food items in an online form - either when or after visiting a shop in-person or getting deliveries. Relying on this crowdsourcing approach we collected over 39,000 retail price quotes across Kenya and Uganda between April 2020 and mid-March 2021. Benchmarking the data against national average prices published by the Kenya National Bureau of Statistics, the Uganda National Bureau of Statistics, and the Famine Early Warning Systems Network confirms the robust quality of the data. The data does particularly well in picking up key price trends. Some discrepancies in price levels mainly occur because of differences in the varieties tracked.¹

1. Gadenne, L., Norris, S., Singhal, M. and Sukhtankar, S., 2021. In-kind transfers as insurance (No. w28507). National Bureau of Economic Research. and Gerard, F., Imbert, C. and Orkin, K., 2020. Social protection response to the COVID-19 crisis: options for developing countries. *Oxford Review of Economic Policy*, 36, pp.S281-S296.

Figure 1: Geographic dispersion of collected price quotes for rice



Note: Figure 1 shows the geographic dispersion of the collected price quotes for rice. Darker colours indicate a greater density of price quotes. Lighter colours indicate fewer price quotes.

We use this data to study price dynamics during the initial lockdown period in the first half of 2020, and the subsequent re-opening phase in the second half of 2020 and early 2021. The pandemic fundamentally altered mobility and consumption patterns even above and beyond immediate government-imposed restrictions. The study therefore specifically looks at the links between price dynamics and mobility patterns. To measure changes in mobility we draw on publicly available data on changes in visiting patterns of smartphone users at locations like workplaces, grocery and other retail stores.² For each day the mobilities indices capture the percentage change in activity relative to the median activity level on the same weekdays during a 5-week baseline period in January and February 2020. Figure 2 shows the evolution of changes in activity levels for both Kenya and Uganda between March 2020 and March 2021. The first insight is that, unsurprisingly, the most drastic change for both countries is picked up in April when imposed government-restrictions were at their height. While the drop off is rather sudden – in particular in Uganda – the recovery is more gradual and stretches several months. In this analysis we focus on 17 items in Kenya and 11 items in Uganda for which we collected the most comprehensive data over space and time.³

2. The Google COVID-19 Mobility Reports can be downloaded here: <https://www.google.com/covid19/mobility/>

3. List of items in Kenya: Rice, bread (white), sugar, eggs, wheat flour, maize flour (sifted), milk (fresh, packaged), bread (brown), tomatoes, banana (ripe), cooking oil, onions (bulbs), cabbage, avocado, soft drinks, salt. List of items in Uganda: Rice, bread (loaf), beans (dry), sugar, eggs, avocado, groundnuts, maize flour (sifted), tomatoes, banana (ripe), salt.

Figure 2: Variation in activity levels across different categories of locations

Kenya



Uganda



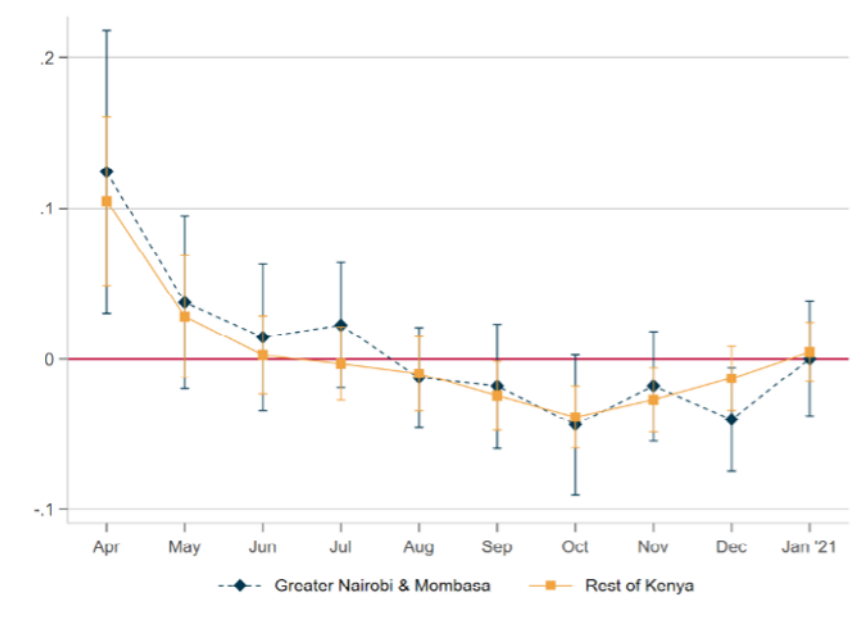
Note: Figure 2 compares the variation in activity levels across time for three different Google mobility indices. The daily index is reported at the county level in Kenya and at the district level in Uganda. Each dot represents a county-day (district-day) observation. The data are sourced from: <https://www.google.com/covid19/mobility/>

Findings

- We find evidence that prices were higher during the initial weeks of shutdown orders to contain the spread of COVID-19 in Kenya and Uganda. Due to the long-lived and more stringent nature of the lockdown, the impact seems to have been more pronounced in Uganda.
- After the end of the lockdown, prices remained lower relative to the last week of March for an extended period. While we cannot rule out a partial role of seasonality, this finding is likely driven by the sustained reduction in household incomes due to the pandemic and the associated economic shock (Pape et al., 2020 and Kansiime et al., 2021).⁴
- The price trend in Greater Nairobi and Mombasa, which had seen additional travel restrictions early on in the pandemic, does not follow a different trajectory than the rest of the country (see Figure 3).
- In Uganda, prices remained higher until July 2020 in the 40 border districts that had prolonged lockdown measures imposed. However, the same pattern is also observed for the Greater Kampala region, where the main lockdown measures were lifted in late May.⁵

Figure 3: Price dynamics for different localities across time

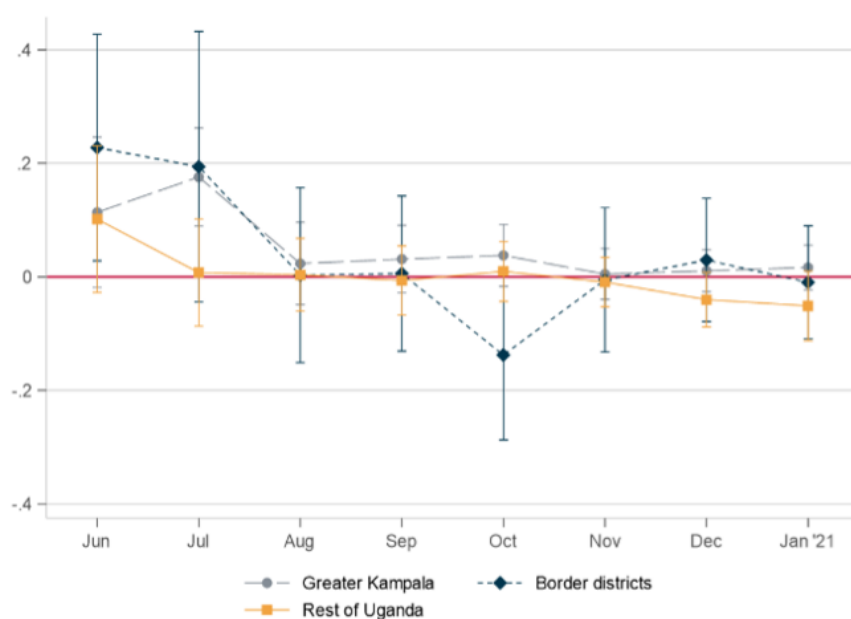
Kenya



4. Pape, U. J., Delius, A., Khandelwal, R. and Gupta, R. (2020), Socio-economic impacts of covid-19 in Kenya : Results update, World Bank Group, Washington, D.C. and Kansiime, M.K., Tambo, J.A., Mugambi, I., Bundi, M., Kara, A. and Owuor, C., 2021. COVID-19 implications on household income and food security in Kenya and Uganda: Findings from a rapid assessment. *World development*, 137, p.105199.

5. The data collection in Uganda was only launched in June 2020 and scaled up in August, while in Kenya we started piloting the data collection in late March.

Uganda

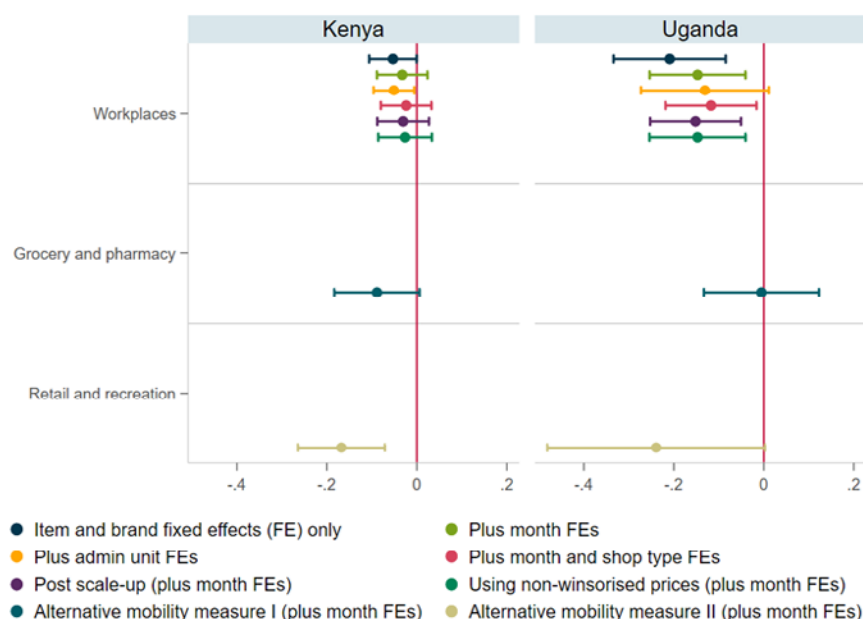


Note: Figure 3 shows the evolution of the (log) price over time for controlling item, brand, and county/district fixed effects. We distinguish between the Rest of Kenya, and Greater Nairobi and Mombasa. The latter have seen travel restrictions imposed between 6th April and 7th July 2020. In Uganda, we distinguish between Greater Kampala, the border districts which were under prolonged lockdowns, and the rest of Uganda. For Kenya, the data covers the time period between the last week of March 2020 until the first week of March 2021. For Uganda, the data covers the time period between the last week of May 2020 until the second week of March 2021. The error bars indicate the 95% confidence intervals.

In contrast to the more short-lived impact of the lockdown measures, changes in mobility patterns continued to drive price dynamics beyond the initial lockdown phase. Interestingly, our findings suggest that retail prices increase as the level of activity at workplaces, grocery and retail stores declines. We estimate that a 10 percentage point reduction in activities at workplace locations corresponds to a 0.3% and 1.4% increase in food prices in Kenya and Uganda respectively. The results are stable across a number of robustness checks, although we cannot rule out that the effect is indeed zero in Kenya. In Uganda, we find that prices for imported products follow a different pattern, where prices rise with an increase in mobility.⁶

6. The sample does not contain a sufficient number of imported items to replicate this exercise for Kenya. In addition, the impact of the local level of activity increases with distance to the product origin for branded items in Uganda.

Figure 4: Price dynamics and mobility



Note: Figure 4 summarises the results for eight alternative specifications where we regress the log price on the Google mobility index (workplace). We control for item and brand fixed effects in all specifications, and for month fixed effects in most other specifications. The error bars show the 95% confidence intervals. The Google mobility index captures the level of activity at the specified location category relative to a baseline period in January and February 2020.

Insights and policy recommendations

- 1. Lockdown measures are not the only driver of economic outcomes during the pandemic.** Changes in consumption and mobility patterns can equally impact price dynamics. This can occur due to changes in behaviour to avoid infection but can importantly also be driven by the sustained adverse impact of the pandemic on income generating activities. Furthermore, post-lockdown mobility patterns might drive business decisions to re-open.
- 2. The project serves as a proof of concept showing that it is possible to collect high-quality, high-frequency price data at scale through a crowd-sourcing approach.** Statistical bureaus like the U.S. Bureau of Labour Statistics reported challenges in collecting vital food price data during the pandemic.⁷ Complementary, timely data collection through non-traditional channels can thus be a vital tool to track prices in a fast

7. <https://www.bls.gov/opub/mlr/2020/article/the-impact-of-the-covid-19-pandemic-on-food-price-indexes-and-data-collection.htm>

changing and uncertain environment. A limitation of our approach lies in the challenge of collecting data in particularly remote regions that have limited internet connectivity. This could be addressed through more targeted recruiting of volunteers in relevant areas in future data collection efforts. In addition, more crude measures (e.g., number of fruits) instead of standardised measures (e.g., kilogram) have to be used for items like fruits and vegetables.

3. **Future research will look into the implications of the shift in mobility patterns for households' ability to access different types of retail outlets.** Here we will explore whether the initial movement restrictions and potential lasting changes in income generating activities might have had a knock-on effect on the fixed costs of accessing consumption goods.