INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
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GLOBAL CRISIS
COUNTRY SERIES

COUNTRY BRIEF 1

Kenya: Impacts of the Ukraine and Global Crises on Poverty and Food Security

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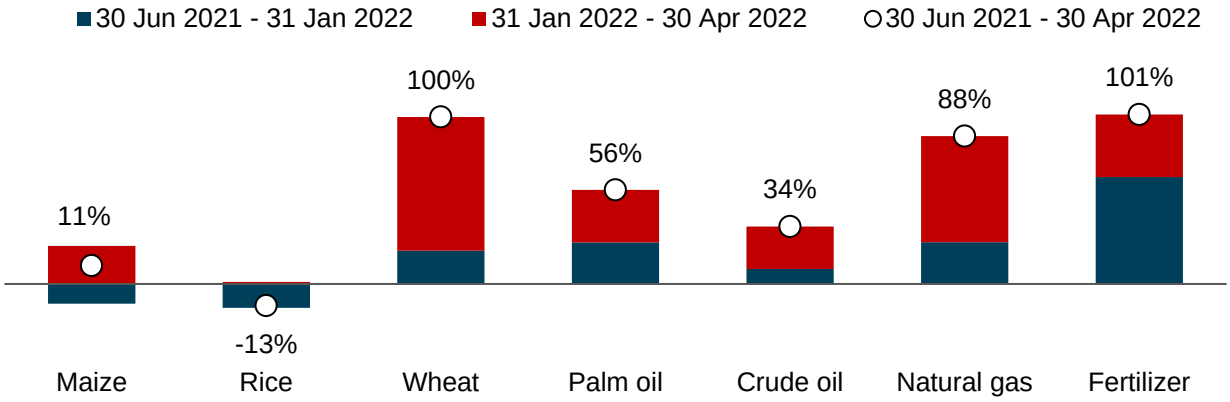
1. World Price Shocks and Domestic Price Transmission

Global food, fuel, and fertilizer prices have risen rapidly in recent months, driven in large part by the fallout from the ongoing war in Ukraine and the sanctions imposed on Russia. Other factors, such as export bans, have also contributed to rising prices. Palm oil and wheat prices increased by 56 and 100 percent in real terms, respectively, between June 2021 and April 2022, with most of the increase occurring since February (Figure 1).

Figure 1. Changes in global real commodity prices since mid-2021 (US dollars)



Source: Authors' calculations using data from World Bank Commodity Price Data (The Pink Sheet, https://www.worldbank.org/en/research/commodity-markets).

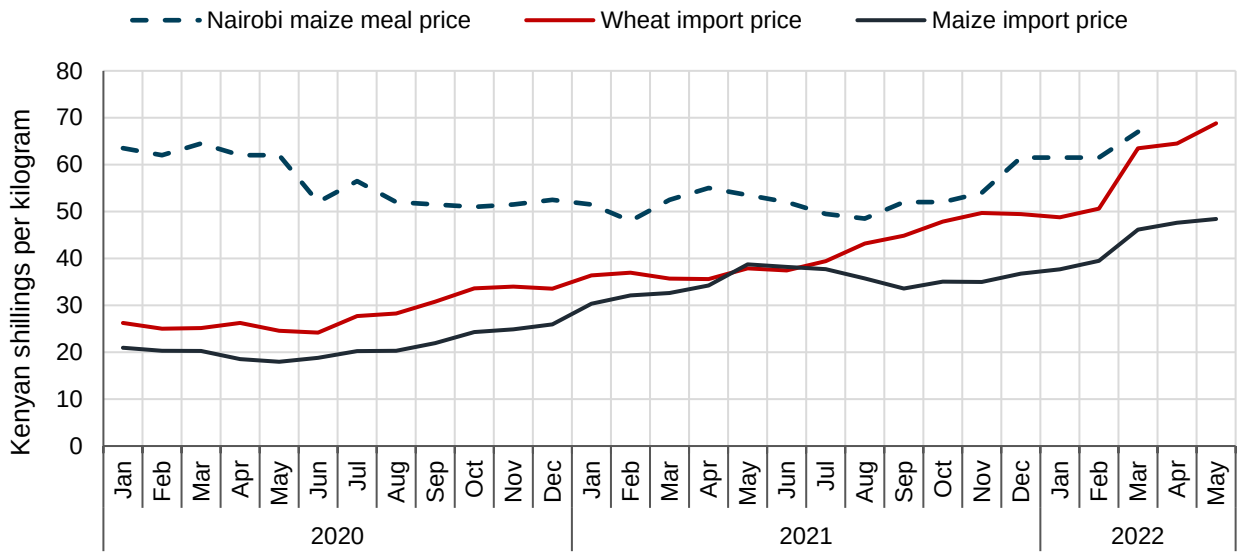
Note: Nominal prices in US dollars from World Bank Commodity Price Data (The Pink Sheet) are converted to real prices, which account for the overall increase in world prices over this period deflated by the US consumer price index, which rose by 7.2 percent between June 2021 and April 2022.

[1] This study was conducted by IFPRI with financial support from BMGF, FCDO, and USAID. The study uses models developed with ongoing support from BMGF, USAID, and CGIAR's Foresight and Metrics Initiative. The study also benefitted from working with CGIAR's National Policies and Strategies (NPS) Initiative and IFPRI's Kenya country program. Edwin Ombui Oseko is from Ministry of Agriculture, Livestock, Fisheries and Cooperatives, Kenya, and all other authors are from IFPRI. Thanks to Joseph Karugia (ILRI, ONE CGIAR Country Convener for Kenya) for facilitating the NPS technical meeting and the representatives from the Ministry of Agriculture, Livestock, Fisheries and Cooperatives, Kenya Agricultural and Livestock Research Organization, Tegemeo Institute, Kenya Institute for Public Policy Research, Egerton University, and private sector representatives and other stakeholders for attending this NPS technical meeting and for their valuable inputs. For further information, please contact Clemens Breisinger (c.breisinger@cgiar.org), Paul Dorosh (p.dorosh@cgiar.org), or James Thurlow (j.thurlow@cgiar.org).

Wide variation exists across products, with real maize prices increasing by only 11 percent, and rice prices declining by 13 percent. The price of crude oil and natural gas has also risen substantially, and the weighted average price of fertilizer has doubled. With these changes in global prices, many developing countries and their development partners are concerned about the implications for economic stability, food security, and poverty.

A comparison of import prices at Kenya's border with prices in the capital city, Nairobi, suggests that world price changes have, to some extent, been transmitted to local markets. For example, nominal maize meal prices in Nairobi rose 35 percent between July 2021 and March 2022 (from 50 to 67 Kenyan shillings per kilogram). Over the same period, the nominal price of imported maize at the border rose by 22 percent, and the import price of wheat rose by 61 percent.

Figure 2. Nominal maize and wheat prices in Kenya, 2020–2022



Source: Authors' calculations using data from WFP, IGC, and World Bank Commodity Price Data (The Pink Sheet).

Note: Import prices include cost, insurance, and freight (CIF).

2. Measuring Impacts on Kenya's Economy and Population

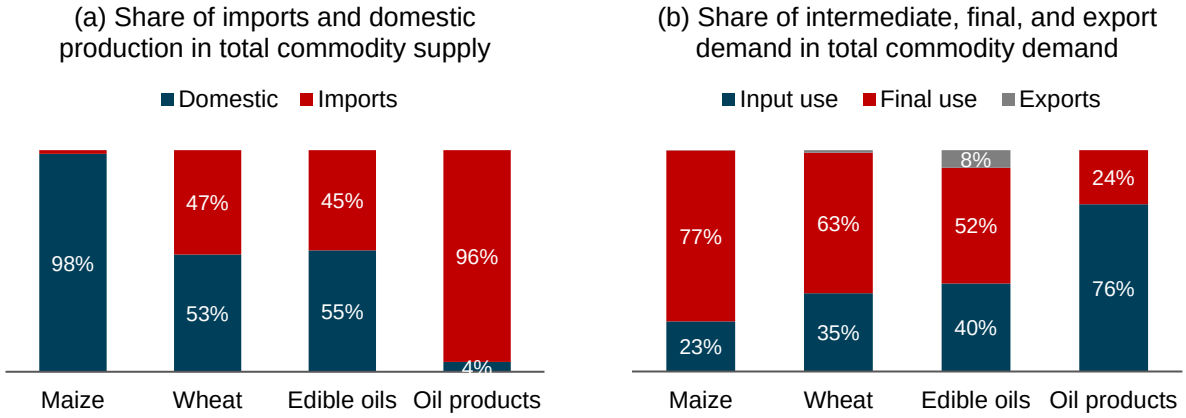
We use an economywide model of Kenya to estimate the impacts of the global price shocks on all sectors, workers, and households.[2] The model allows us to capture a range of considerations that determine the overall impact of the crisis on the country. For example, the effect of higher world prices on Kenya's economy depends on the importance of the affected products in the total supply of each commodity and whether local producers and consumers can readily substitute away from higher-priced imports. While only 2 percent of Kenya's maize supply comes from imports, 60 percent of wheat grains and almost one-fifth of total supply of grain and flour together are imported (wheat flours are all processed domestically) (Panel A in Figure 3). Since wheat supply is more dependent on imports than maize, we expect changes in world prices to have a larger effect on domestic prices. Import shares are even higher for edible oils (e.g., palm oil), and these imported products are close substitutes for domestically produced and consumed edible oils. Almost all oil products (crude oil and processed petroleum) used in Kenya are imported.

The impact of higher oil prices on households cannot be directly assessed by looking at the share of petroleum products in households' consumption baskets. This is because oil products are primarily

[2] Information on the Rural Investment and Policy Analysis (RIAPA) data and modeling system can be found here.

used as inputs into the production of other goods and services, with input use accounting for 76 percent of total demand for oil products in Kenya (Panel B in Figure 3). Most petroleum products, for example, are used by the transport sector, the cost of which affects the price of all marketed goods and services in the economy. IFPRI's model tracks the flow of domestic and imported inputs between sectors and estimates the net effect on final product prices.

Figure 3. Breakdown of commodity supply and demand in Kenya, 2019

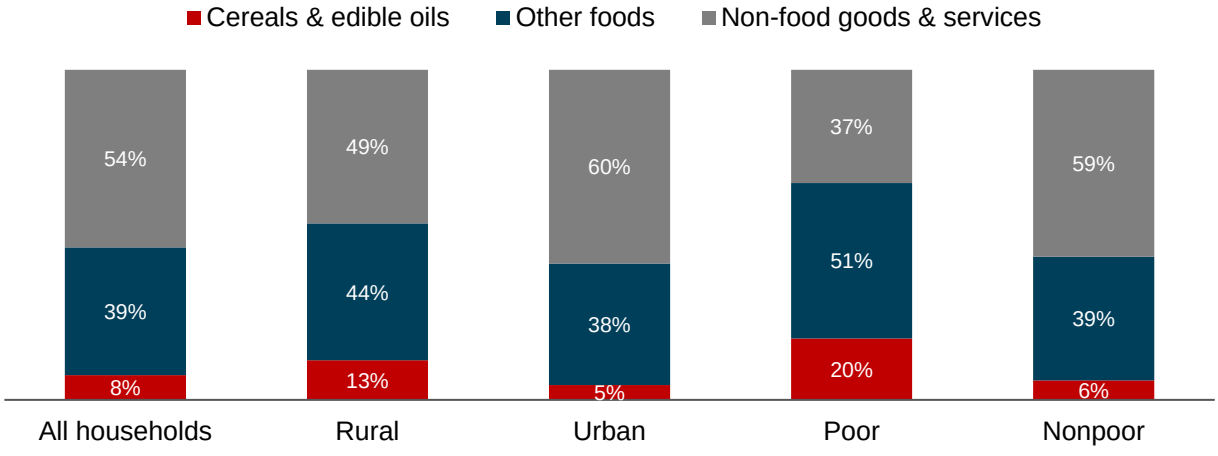


Source: Authors' calculations using social accounting matrix (SAM) data from IFPRI's Kenya RIAPA model.

Note: Maize and wheat include maize flour and wheat flour, and edible oils include edible oilseeds. About 60 percent of wheat grains processed into flours in Kenya are imported, accounting for 35 percent of total supply of wheat grains and wheat flours together. Thus, imported wheat grains are about 18 percent of wheat grains and flours in total. Input use includes grains as intermediates in flour processing, and grain flours are also used as intermediates in the production of other processed foods (excluding flours) and by some service sectors, such as restaurants and hotels. Final use includes private and public consumption and gross capital formation.

Impacts on households also depend on the importance of commodities in their consumption baskets. Cereals and edible oils make up 8 percent of the total value of household consumption in Kenya, which is about one-fifth of total food expenditures (Figure 4).[3] IFPRI's model tracks incomes and expenditures for different population groups and is linked to a survey-based micro-simulation tool that tracks the consumption patterns of individual households. Unpacking populations is crucial because cereals and edible oils are more important for poorer rural households in Kenya than for other groups.

Figure 4. Composition of household consumption spending in Kenya, 2019

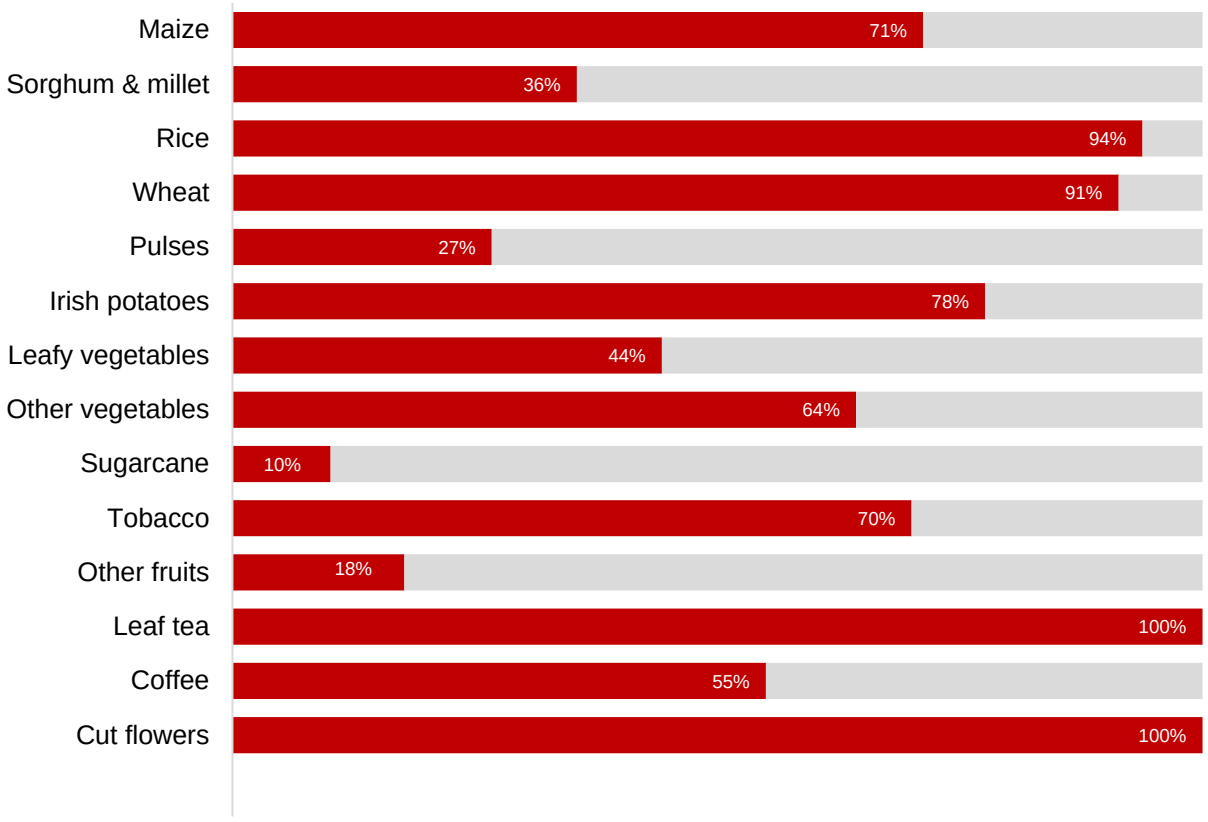


Source: Authors' calculations using social accounting matrix (SAM) data from IFPRI's Kenya RIAPA model.

[3] These figures include the imputed value of home consumption, which is also tracked within the RIAPA model.

Rising fertilizer prices may cause some farmers to reduce their use of this input, leading to lower agricultural production and higher food prices. The magnitude of this decline depends on (1) the responsiveness of fertilizer demand to changes in prices; (2) the amount of fertilizer currently used to grow crops; and (3) the expected productivity losses for farmers who reduce their use of fertilizers. Fertilizer adoption in Kenya varies significantly by crop, with 71 percent of maize land cultivated using fertilizers, compared to only 36 percent for sorghum and millet. There is also variation in the amount of fertilizer used on different crops. For our initial impact analysis, we adopt a conservative set of assumptions regarding farmers' response to rising fertilizer prices. We assume an own-price elasticity of fertilizer demand of −0.15, implying that a 100 percent increase in real fertilizer prices leads to a 15 percent decline in fertilizer use. Drawing on recent survey analysis, we assume that farmers who do not use chemical fertilizers are about 20 percent less productive than farmers who use chemical fertilizers.[4]

Figure 5. Share of cropland using chemical fertilizers in Kenya



Source: Authors' calculations using International Fertilizer Development Center's (IFDC) Fertilizer Use by Crop (FUCP) estimates and further adjusted based on information from the country's experts.

In the eastern and northern regions of Kenya, planting for the main season (long rains) crops begins in mid-March to May, with harvesting during July and August. In western Kenya and the Rift Valley, planting stretches from April through June, and the harvest runs from October through January. The surge in fertilizer prices may therefore have already led to a reduction in fertilizer use in much of Kenya. The link between world fertilizer prices, local fertilizer use, and agricultural productivity is therefore an important impact channel for the current crisis.

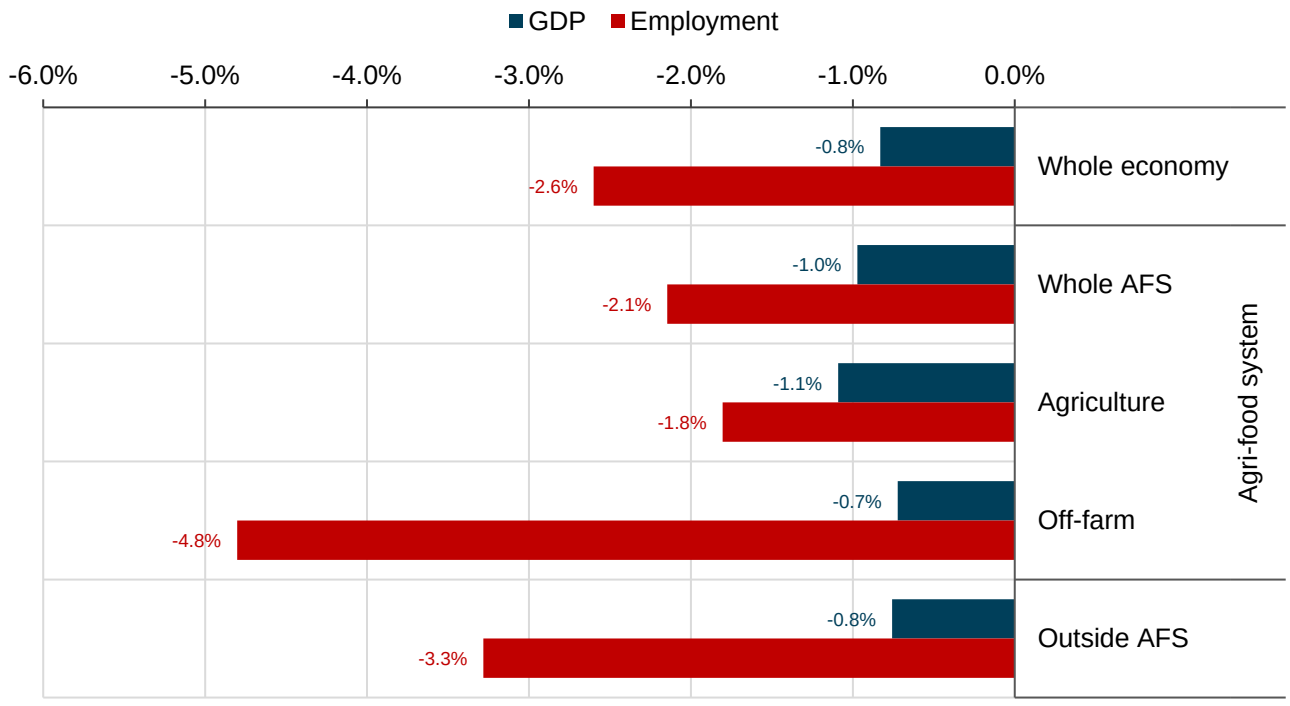
[4] The final impact on crop productivity is: [Change in domestic market price] × [Price elasticity of demand] × [Share of cultivated land using fertilizer] × [Productivity gain from using fertilizer per hectare].

We simulate the effects of both higher world prices (recall Figure 1) and the potential productivity losses from reduced fertilizer use in the current growing season. Simulation results should be interpreted as "medium-term" impacts, that is, after the immediate spillover effects across sectors and households have occurred, but before the government and private sector make significant changes to their investments and policies in response to the crisis (see Section 5 for next steps).

3. Impacts on Kenya's Economy and Agrifood System

The effects of the world price and fertilizer demand shocks on GDP and employment are significant but are not large compared to the size of the overall economy. Real GDP falls by 0.8 percent due to the combined effects of the negative terms-of-trade shock (i.e., the negative effect of higher import prices outweighs the positive effects of higher export prices) and rising import costs that reduce spending on domestically produced goods (Figure 6). Employment declines by 2.6 percent, as falling production leads to job losses. The percentage decline in agricultural GDP is slightly larger than the decline in total GDP and, given the large size of the agriculture sector, it accounts for almost a third of total GDP losses in the country). There are larger drops in employment in the off-farm sectors of the agrifood system, with job losses concentrated in food-related services, including trade and transport. However, because the off-farm agrifood system is small compared to primary agriculture, most of the absolute decline in agrifood system employment occurs on the farm. At the national level, more than half of the decline in total GDP and employment occurs outside of the agrifood system.

Figure 6. Percentage change in GDP and employment due to food, fuel, and fertilizer shocks

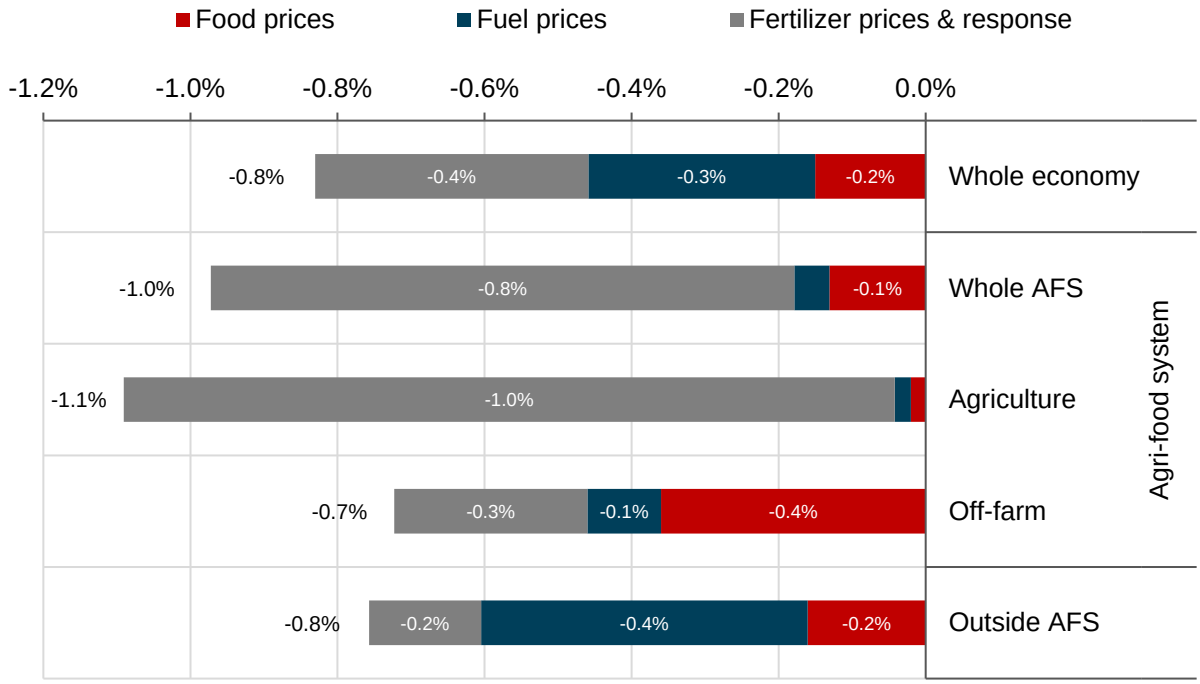


Source: Simulation results from IFPRI's Kenya RIAPA model.

Fertilizer and fuel shocks drive most of the decline in national GDP. Fertilizer shocks, including reduced fertilizer use in response to higher prices, account for 45 percent (or 0.4 percentage points) of the total decline in real GDP, compared to fuel shocks at 37 percent and food price shocks at 18 percent (Figure 7). Within the agrifood system, GDP losses are mostly driven by fertilizer shocks,

which directly affect primary agricultural production and cause disruptions in downstream supply chains. GDP losses outside of the agrifood system, however, are primarily driven by higher fuel prices, which not only raise transactions costs and market prices but also reduce consumer demand. Higher food prices have little effect on real agricultural GDP in the near-term, that is before decisions are made about planting and fertilizer adoption for the next planting season (the latter is captured in the fertilizer response scenario).

Figure 7. Percentage change in real GDP decomposed by food, fuel, and fertilizer shocks



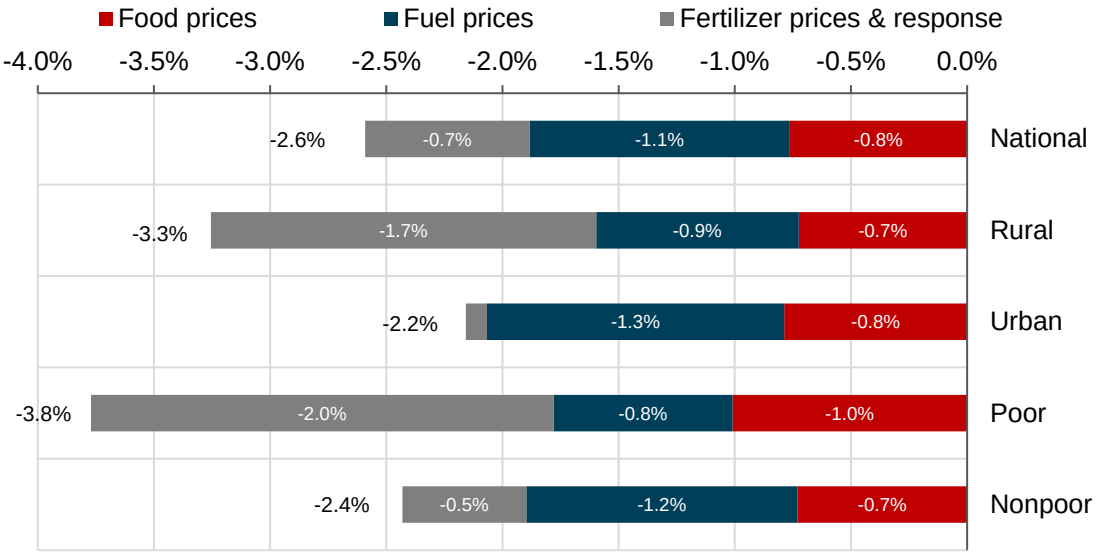
Source: Simulation results from IFPRI's Kenya RIAPA model.

Note: About 15.4 percent of the effect on agriculture GDP under "fertilizer prices and response" is directly from rising fertilizer prices, while the remaining 84.6 percent is from the productivity shock caused by reducing the use of fertilizer.

4. Impacts on Household Poverty, Inequality, and Diets in Kenya

Household consumption falls, with larger losses for poorer and rural households. National consumption spending, including the value of home consumption, falls by 2.5 percent (Figure 8). The percentage decline in consumption is larger than that of GDP because households are hit twice, by rising prices and falling incomes. Moreover, food accounts for a much larger share of household consumption than of GDP. Most of the decline in consumption is driven by the fuel price shock, which raises the market price of most consumer goods and services in the economy. Overall, the fuel shocks account for 42 percent of the absolute decline in household consumption, followed by the food shock at 30 percent, and the fertilizer shock at 28 percent. There are, however, important differences in consumption outcomes across population groups. The fall in consumption is larger for poorer and rural households. Rural households earn more of their incomes from farming and are therefore adversely affected by the decline in agricultural production following the increase in fertilizer prices. Poor households, including those in urban areas, are also affected by the indirect effects of the fertilizer shock on food supply. They are also more affected by higher food prices, since food makes up a larger share of poor households' consumption baskets (see Figure 4).

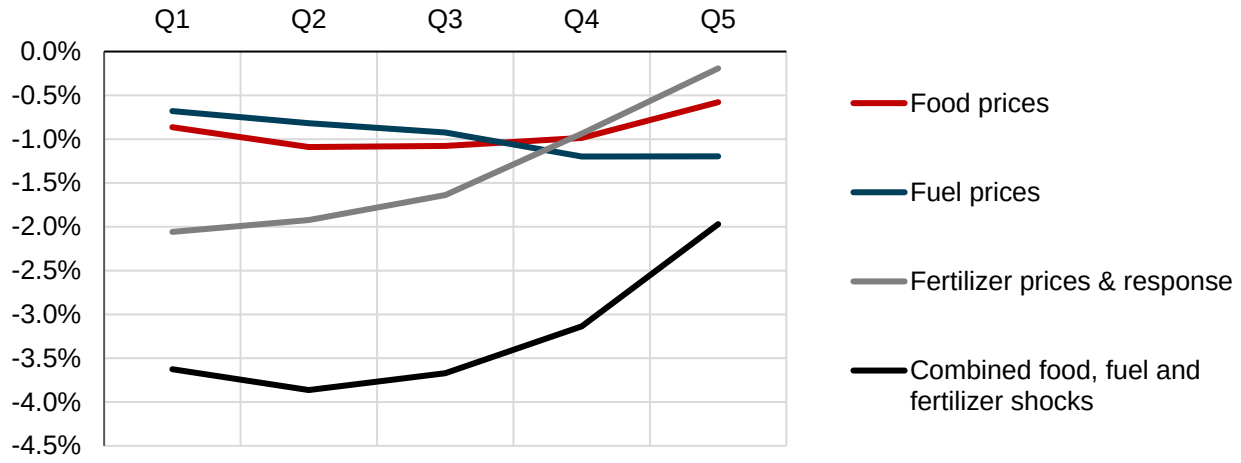
Figure 8. Percentage change in real household consumption due to food, fuel, and fertilizer shocks



Source: Simulation results from IFPRI's Kenya RIAPA model.

Inequality worsens, although all households are adversely affected. The food, fuel, and fertilizer shocks have different implications for (income) inequality in Kenya. The increase in fuel prices leads to larger consumption losses for households in the top expenditure quintile, compared to poorer households in the lowest quintile (Figure 9). Conversely, the fertilizer shock is most detrimental for poorer households, which rely more heavily on agriculture for their incomes and spend a larger share of their incomes on food. Finally, the largest negative impact of higher world food prices is on middle-income households. This is because middle-income households consume more imported food products than poorer households (e.g., wheat and palm oil), and they also spend more of their incomes on foods than higher income households. Overall, the combined effect of the world price shocks is a decline in consumption for all households, with larger declines for households toward the lower end of the income distribution. The result of the global crises is therefore an increase in inequality within Kenya.

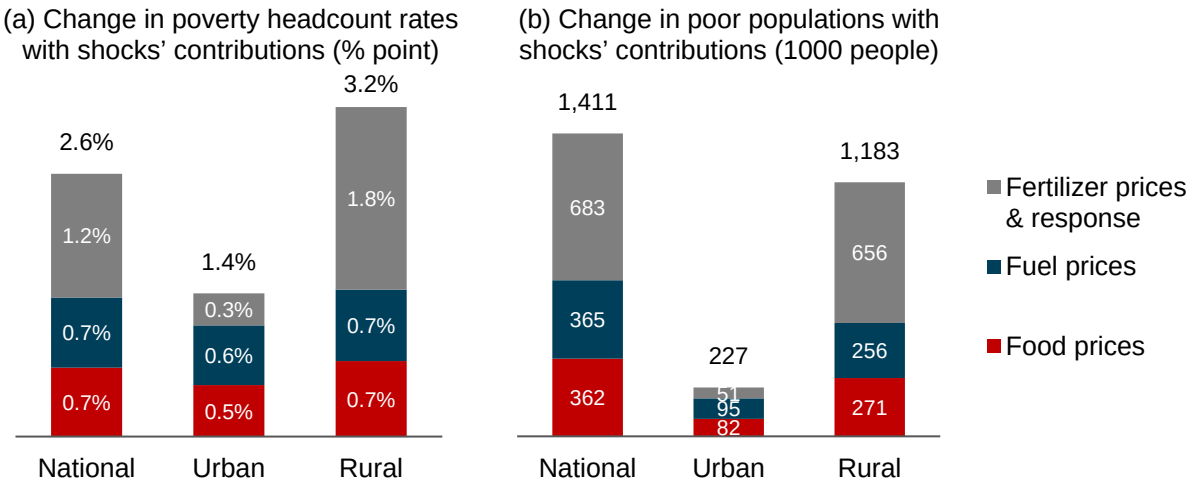
Figure 9. Percentage change in real household consumption across per capita expenditure quintiles



Source: Simulation results from IFPRI's Kenya RIAPA model.

Falling household consumption leads to greater poverty, particularly in rural areas. According to the most recent household survey in Kenya (2015/16), 37 percent of the country's population have adult equivalent consumption levels that fall below the US$1.90 poverty line. The increase in world prices raises the national poverty headcount rate in Kenya by 2.6 percentage points (Panel A in Figure 10), which is equivalent to an additional 1.4 million people falling below the poverty line (Panel B). Most of the increase in poverty is caused by the fertilizer shock. This is consistent with the consumption changes for poor households shown in Figure 8 and for the second quintile in Figure 9. Impacts on rural poverty rates are significantly larger and are almost entirely the result of the impacts of the fertilizer shock on rural farmers. The largest absolute increase in the poor population is in rural areas, although this partly reflects Kenya's smaller urban population and lower initial urban poverty rate.

Figure 10. Changes in poverty due to food, fuel, and fertilizer shocks



Source: Simulation results from the survey-based microsimulation module within IFPRI's Kenya RIAPA model.

Note: Poverty headcount rate is the share of the population with daily adult equivalent consumption levels below the US$1.90 poverty line.

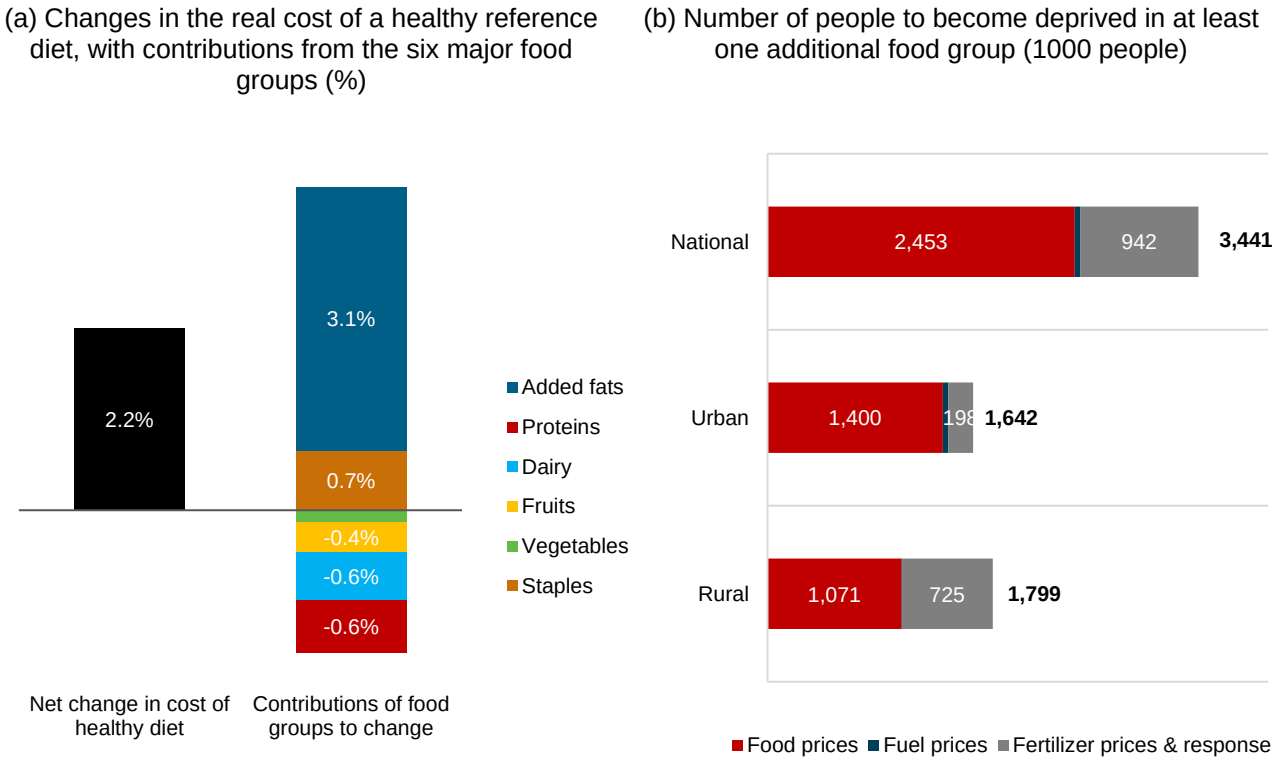
The cost of a healthy diet increases for Kenyan households. The model tracks changes in the cost of a "healthy" reference diet (CoRD) with six major food groups as defined by the EAT-Lancet Commission.[5] The combined food, fuel, and fertilizer shocks increase the CoRD by 2.2 percent in real terms (the first bar in Panel A in Figure 11).[6] This is mainly driven by the rising costs of edible oils within the "added fats" food group and wheat within the "staples" food group, the domestic prices of which are influenced by rising import prices of these commodities (the second bar in Panel A in Figure 11). On the other hand, falling household incomes reduce demand for vegetables, fruits, dairy, and protein foods (meats and fish), and thus, lower their costs slightly. The "staples" food group includes cereals and root crops, and wheat is only a small component of this group in Kenya. Rising maize and wheat prices are compensated for by the falling cost of other staple foods when households reduce overall food consumption. Staples currently dominate most households' consumption baskets and achieving the diversity of the healthy reference diet requires a relative decline in the share of staples in the average household diet. As such, the increases in maize and wheat prices make a modest contribution to the changing cost structure of a healthy diet. On the other hand, consumption levels of vegetables, fruits, dairy products, and meats and fish are far below the

[5] For further information on the RIAPA model's diet module and indicators, see Pauw et al. (2021).

[6] The CoRD is estimated using calorie targets from EAT-Lancet (for major food groups) and the World Bank's International Comparison of Prices (IPC) dataset. The estimated budget shares for the healthy diet include staples (11.7 percent), vegetables (11.2), fruits (13.6), dairy (23.1), proteins (30.7), and added fats (9.8).

required level for a healthy diet among many households in Kenya. The falling costs of these food groups mask the households' deteriorating access due to falling incomes.

Figure 11. Changes in diet costs and household diet deprivation due to food, fuel, and fertilizer shocks



Source: Simulation results from the survey-based microsimulation module within IFPRI's Kenya RIAPA model.

Diet <u>quality</u> worsens for many households. The survey-based micro-simulation tool also measures the increases in number of people with deteriorated diet quality. People are considered deprived in a food group if they obtain fewer calories from that food group than recommended by the healthy reference diet. Prior to the crisis, few households had the consumption levels and diversity needed for a healthy diet in Kenya. Rising food prices become much more important for worsening diet quality than impacts on income and poverty, and it is a leading factor for 3.4 million people to become deprived in at least one additional food group for a healthy diet. The rural population accounts for more of the deterioration in diet quality than the urban population (Panel B in Figure 11).

5. Summary and Next Steps in the Analysis

Global food, fuel, and fertilizer prices have risen rapidly in recent months, raising concerns about how this will affect economic stability, food security, and poverty in developing countries. We have used IFPRI's economywide model—known as RIAPA—to simulate the impacts of the global crises on Kenya's economy and population. The model allows us to track the direct and indirect effects of rising world prices, taking account of key considerations that will determine the overall impact. These include, for example, the share of imports in total product supply; the importance of different sectors and products for households' employment, incomes, and consumption levels; and the responses of farmers to rising fertilizer prices and the knock-on effect this could have on next season's agricultural production.

Our analysis indicates that the global crises cause contractions in Kenya's GDP and employment, but these declines are not large compared to the total size of the economy. Most of the GDP losses

are driven by rising fuel and fertilizer prices, rather than higher food prices. This is because, although the import prices of wheat and edible oils are rising, these products are not typically large items within households' consumption baskets. To some extent, rural farmers also benefit from higher prices for agricultural products, although the net effect on their welfare is negative once we have accounted for the effects of higher fertilizer prices, reduced fertilizer use, and lower agricultural productivity.

Overall, national household consumption falls. Though impacts are larger on poorer and rural households, leading to an increase in inequality in Kenya, all households are adversely affected by the crises. Falling household consumption also leads to greater poverty, particularly in rural areas. Finally, the cost of a healthy diet increases for Kenyan households, and there is a widening gap between households' consumption levels and what is required to achieve a healthy diet. While the global crises will cause a modest slowdown in Kenya's economic growth, its adverse impacts on poverty and food insecurity are likely to be more pronounced, especially in rural areas.

This study is part of a series of case studies that IFPRI is undertaking using economywide models to capture current world market shocks on developing countries. The analysis presented above is an initial impact assessment designed to gauge the vulnerability of countries and key population groups. Subsequent analyses will simulate the mitigating effects of different policy and investment options, including the potential roles of cash transfers, food aid, and subsidies for food, fuel, and fertilizers. Particular attention will be paid to possible synergies and trade-offs between these policy responses, including their implications for government budgets and longer-term development goals.

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