

COUNTRY BRIEF 11

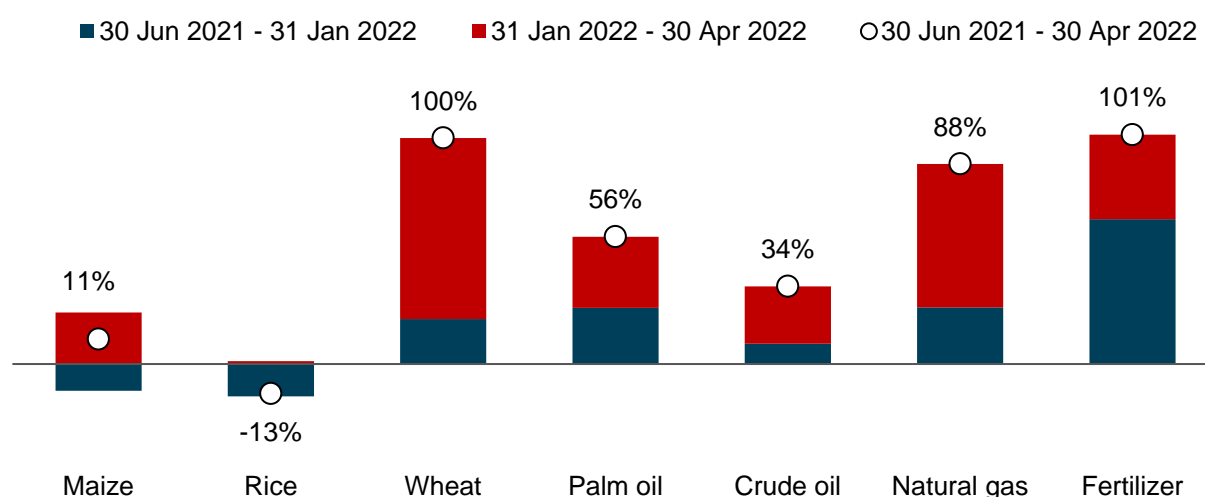
Tanzania: Impacts of the Ukraine and Global Crises on Poverty and Food Security

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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)



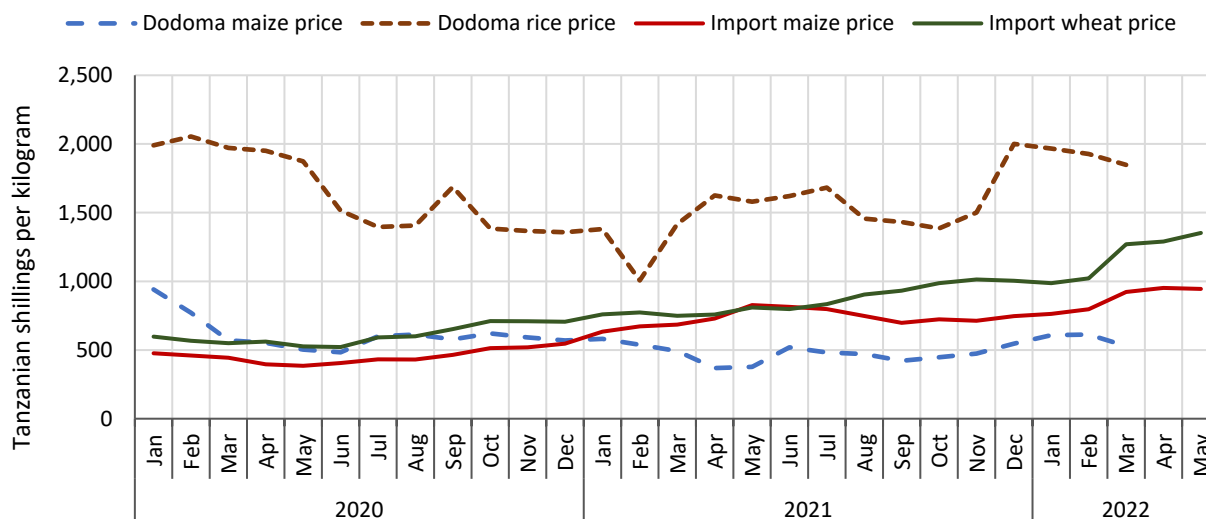
Source: Authors calculations using data from World Bank Commodity Price Data (The Pink Sheet, <https://www.worldbank.org/en/research/commodity-markets>).

Notes: Nominal prices in the 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. For further information, please contact Paul Dorosh (p.dorosh@cgiar.org) or James Thurlow (j.thurlow@cgiar.org).

A comparison of estimated import prices at Tanzania's border with prices in the capital city, Dodoma, suggests that world price changes have, to some extent, been transmitted to local markets. For example, increases in the nominal wholesale prices of maize in Dodoma were similar to the increase in the nominal price of imported maize at the border (which rose by 23 percent) between February and May 2022. Over the same period, the import price of wheat rose by 32 percent.

Figure 2. Nominal cereal prices in Tanzania, 2020–2022



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

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

2. Measuring Impacts on Tanzania's Economy and Population

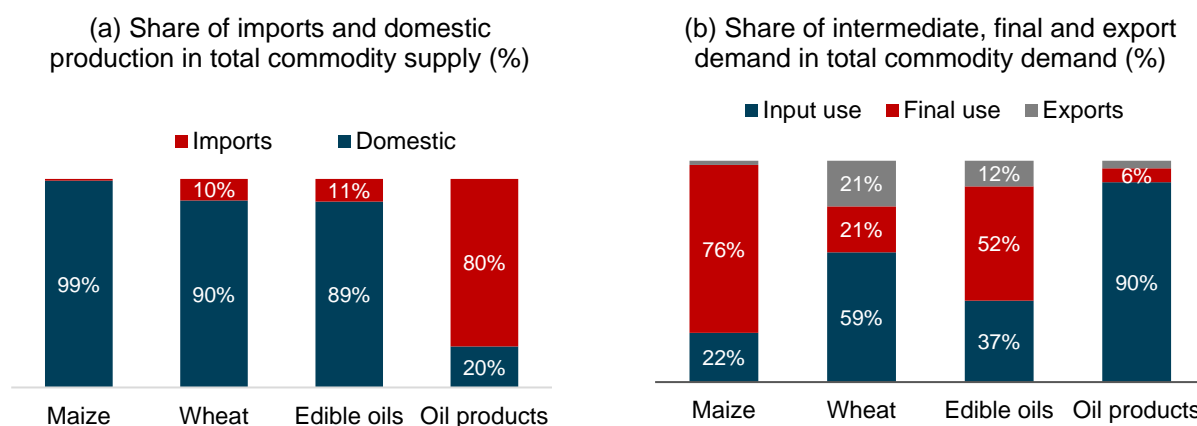
We use an economywide model of Tanzania to estimate the impacts of the global price shocks on all sectors, workers, and households.² The model allows us to capture a range of considerations that will determine the overall impact of the crisis on the country. For example, the effect of higher world prices on Tanzania'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. Tanzania exports and imports only a small amount of maize, and the maize supply is dominated by domestic production (Panel A and B in Figure 3). However, imports account for more than 90 percent of total wheat grain supply (Panel A). Wheat supply is heavily dependent on imports, while Tanzania exports a small amount of wheat flour (Panel B). Thus, we expect changes in world prices to have a larger effect on domestic wheat prices. About one-third of edible oils supply is from imports (mainly palm oil), and these imported products are close substitutes for domestically produced and consumed edible oils.

Tanzania produces a small amount of crude oil and petroleum, and 80 percent of its oil products supply (crude oil and processed petroleum) is from imports (Panel A). The impact of higher oil prices on households cannot be directly assessed by looking at the share of petroleum products in household consumption baskets. This is because oil products are primarily used as an input into the production of other goods and services, with input use accounting for 90 percent of total demand for oil products in Tanzania (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

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

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 Tanzania, 2019

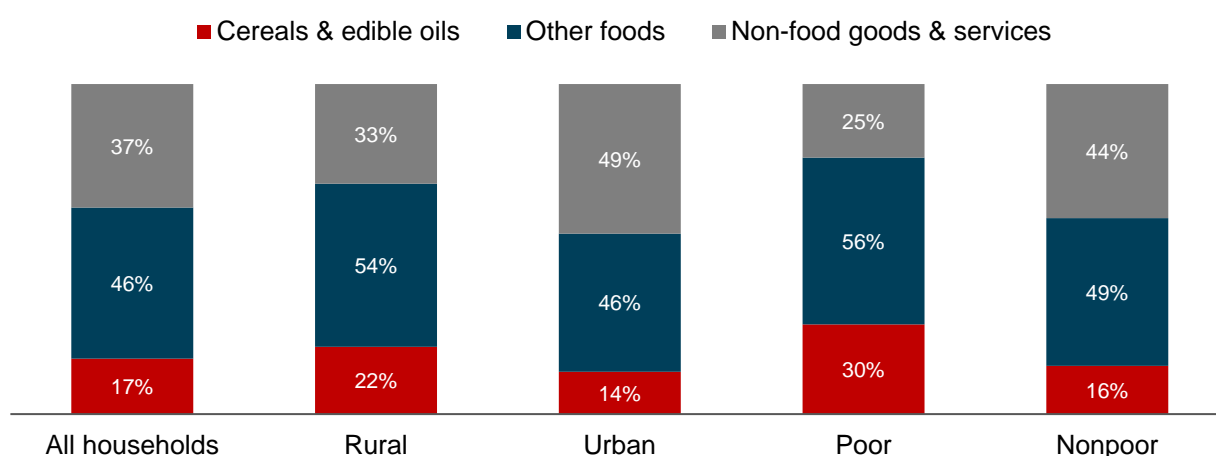


Source: Authors calculations using social accounting matrix (SAM) data from IFPRI's Tanzania RIAPA model.

Notes: Wheat includes flour and edible oils include oilseeds. Input use includes grains as intermediates in flour processing, while grain flours can also be used as intermediates in the production of other processed foods (excluding flours), and 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 17 percent of the total value of household consumption in Tanzania, which is close to 40 percent of total food expenditures (Figure 4).³ IFPRI's model tracks income 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 households in Tanzania than for other groups.

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



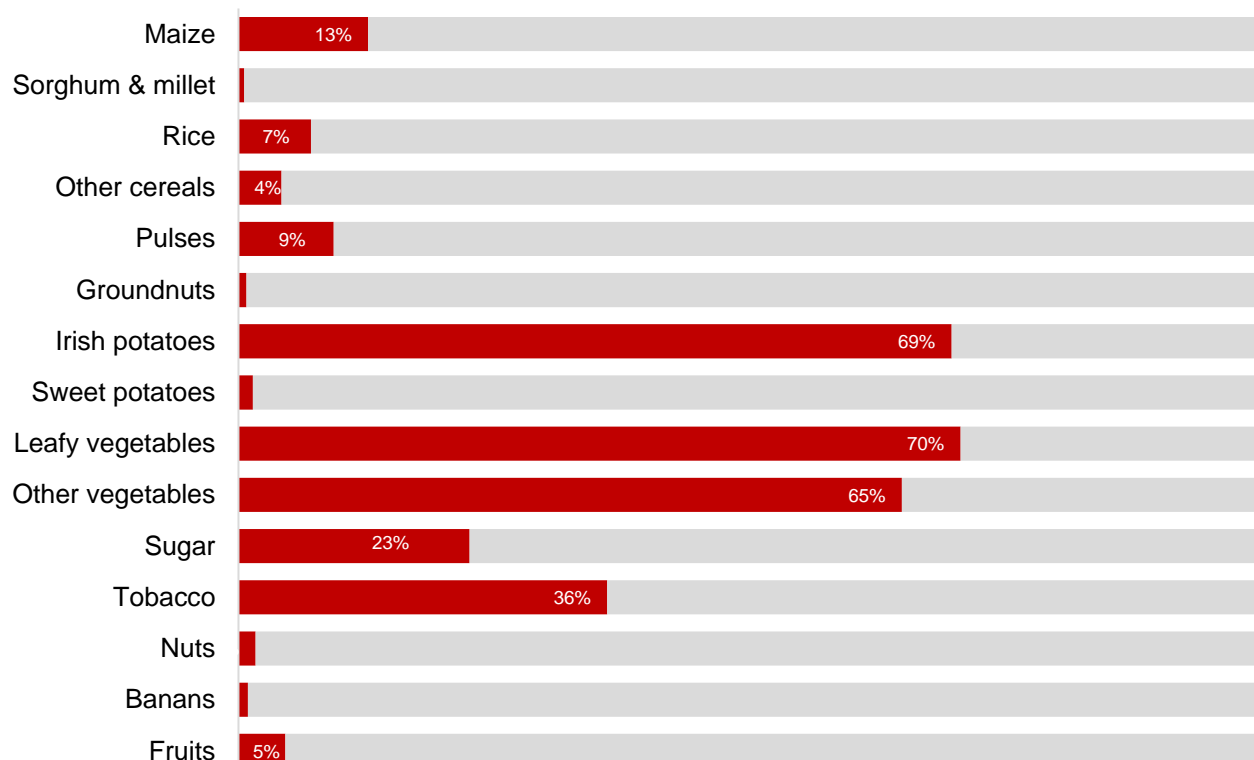
Source: Authors calculations using social accounting matrix (SAM) data from IFPRI's Tanzania RIAPA model.

Rising prices of fertilizer 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

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

to grow crops; and (3) the expected productivity losses for farmers who reduce their use of fertilizers. Fertilizer adoption in Tanzania varies significantly by crop, with 69 percent of Irish potato land cultivated using fertilizers, compared to almost zero for sorghum and millet, sweet potatoes, and banana (including plantains). The amount of fertilizer used on different crops also varies. 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 do.⁴

Figure 5. Share of cropland using chemical fertilizers in Tanzania



Source: Authors' calculations using data of 2019/20 National Sample Census of Agriculture, Tanzania (<https://nbs.go.tz/tnada/index.php/catalog/31>)

The effects of world price changes also vary across Tanzania by agroecological zones and cropping patterns. About half of the country's maize is cultivated in regions of Tanzania with a bimodal rainfall pattern, where planting for the *vuli* season takes place in September and October and harvesting in January and February. (A second, much smaller crop is planted in the *masika* season in February and March and harvested in July and August.) In areas with a unimodal rainfall pattern, planting takes place from October to December at the start of the *msimu* season rains, followed by harvests in May to July. Thus, changes in international food and fertilizer prices may have adversely affected about half of maize production harvested in calendar year 2022.

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

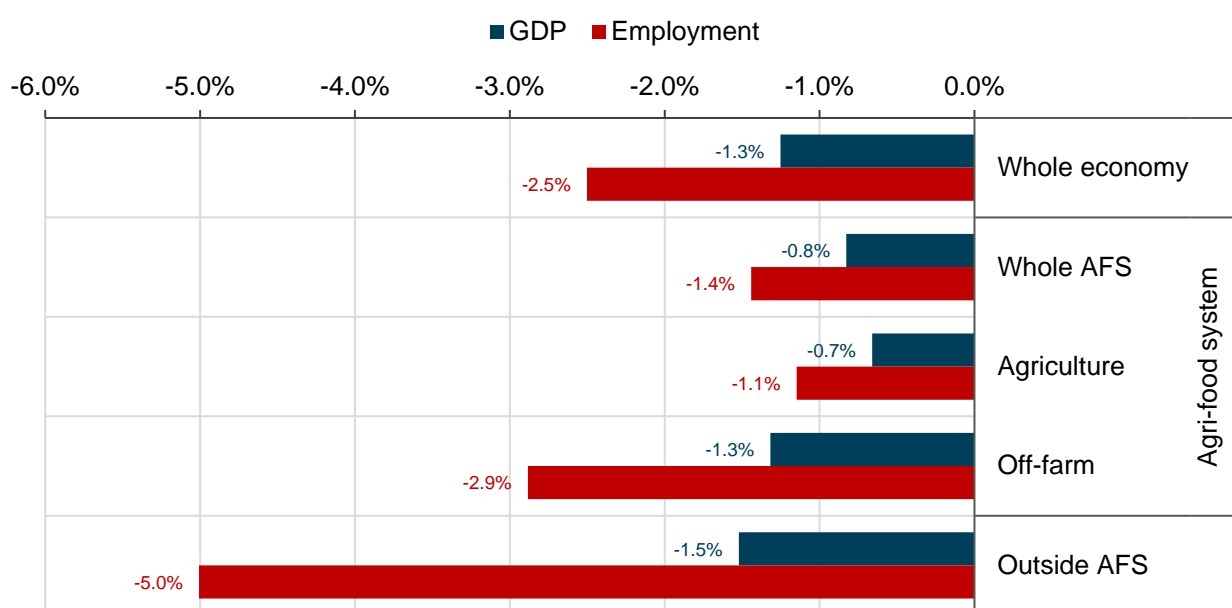
⁴ The final impact on crop productivity is: [Change in domestic market price] × [Price elasticity of demand] × [Share of cultivated land using fertilizer] × [Productivity gain from using fertilizer per hectare].

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 Tanzania's Economy and Agrifood System

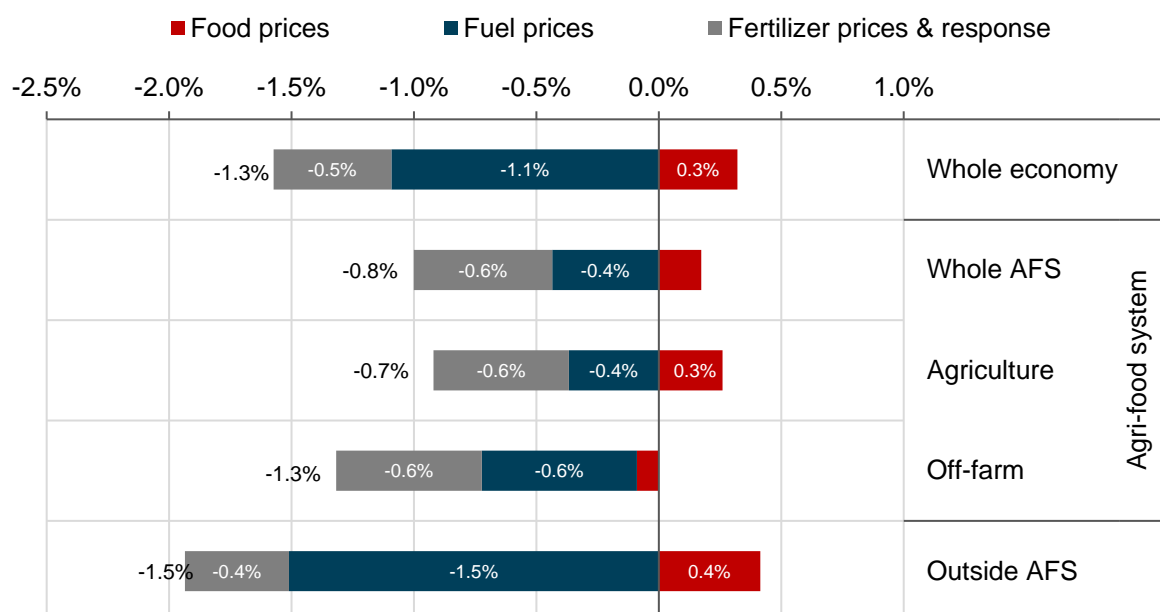
The effects of the world price and fertilizer demand shocks on GDP and employment are significant. Real GDP falls by 1.3 percent due to the combined effects of the negative terms-of-trade shock (that is, the negative effect of higher import prices outweighs the positive effect of higher export prices) and rising import costs that reduce spending on domestically produced goods (Figure 6). Employment falls more, down 2.5 percent, as declines in agricultural and nonagricultural production lead to job losses. However, the percentage decline in agrifood GDP, particularly in primary agricultural GDP, is less than the decline in total GDP, because some export crops benefit from the negative terms of trade shock. While employment falls both on-farm and off-farm within the agrifood system, the percentage point declines are smaller for agricultural employment than for off-farm employment within the agrifood system. The decline in employment is much larger in percentage point terms outside of the agrifood system. At the national level, off-farm activities outside of the agrifood system account for the lion's share of total GDP losses, and about 60 percent of the total decline in employment.

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



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

Fuel and fertilizer shocks drive the decline in national GDP. For total GDP losses, the fuel shock is the most important driver, while for agricultural GDP, fertilizer shocks, including reduced fertilizer use in response to higher prices, accounts for 50 percent (or 0.6 percentage points) of the losses (Figure 7). The agriculture sector as well as the whole agrifood system benefit from rising food prices due to the increase in agricultural exports, but these gains are not large enough to offset the losses in both total GDP and agricultural GDP from rising fuel prices and fertilizer shocks, which directly affect primary agricultural production and cause disruptions in downstream supply chains. As expected, GDP losses outside of the agrifood system are largely driven by higher fuel prices, which raise transaction costs and market prices and reduce consumer demand.

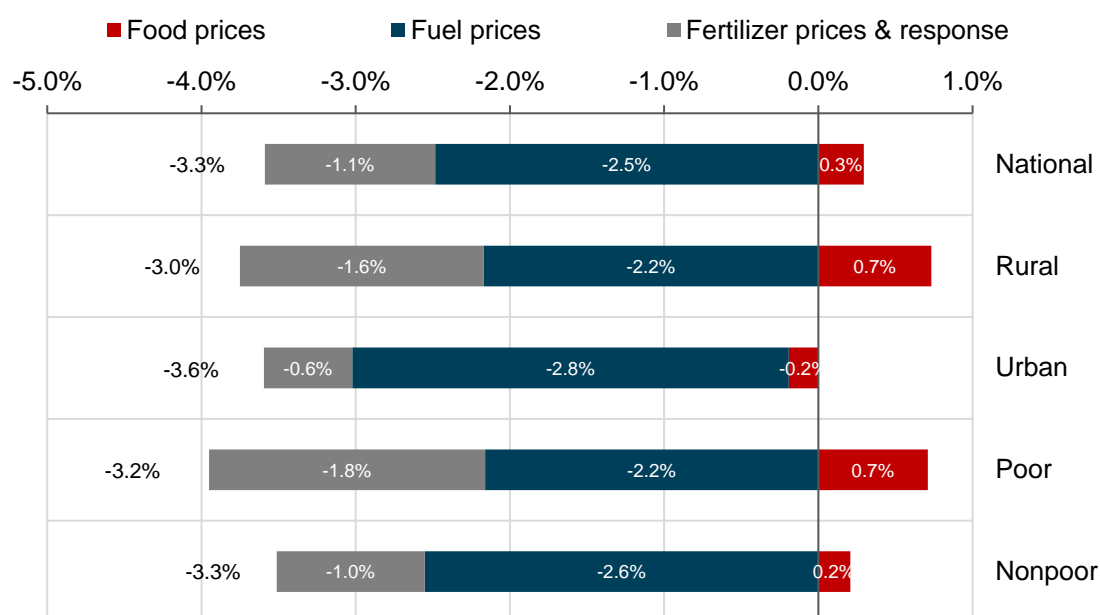
Figure 7. Percentage change in real GDP decomposed by food, fuel, and fertilizer shocks

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

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

Household consumption falls due to the crises, with larger losses for urban households. National consumption spending, including the value of home consumption, falls by 3.3 percent (Figure 8). The percentage decline in consumption is larger than that in 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 2.5 percentage points of the decline in total household consumption. Important differences arise in consumption outcomes across population groups, however. The fall in consumption is larger for urban households that consume fuel-intensive services such as transport. Of the 3.6 percent decline in urban consumption, 2.8 percentage points are due to the fuel shock. Consumption of rural and poor households is also severely affected by fertilizer shocks. Rural households earn more of their income from farming, and so are 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 because locally produced foods make up a larger share of their consumption baskets (Figure 4).

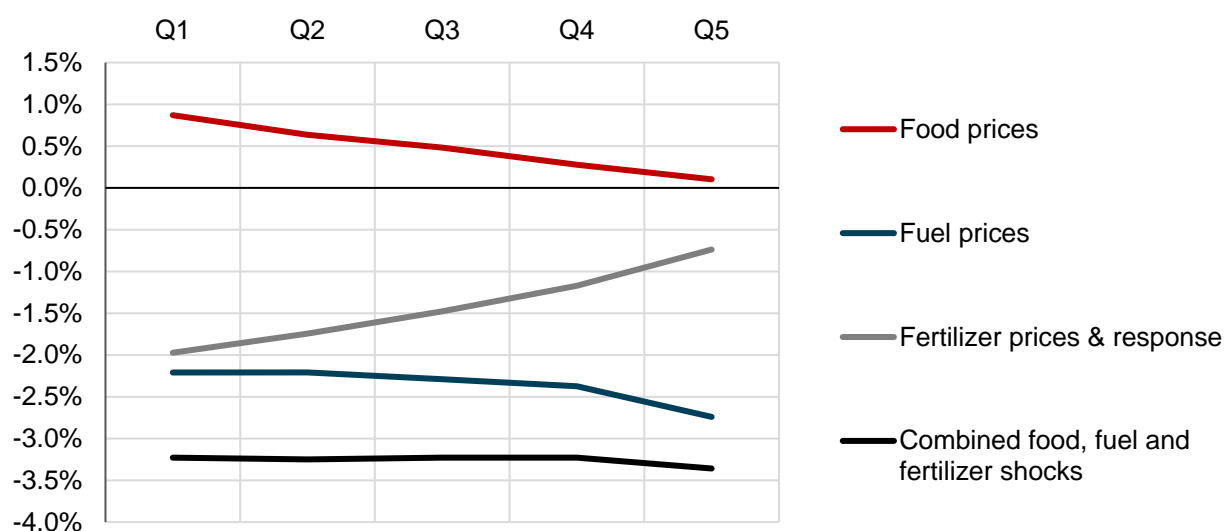
Figure 8. Percentage change in real household consumption due to food, fuel, and fertilizer shocks



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

Inequality is not greatly affected, but all households are adversely affected. The increase in fuel prices is the largest shock for all households, while consumption losses are larger for households in the top quintile (Figure 9). Conversely, the fertilizer shock is most detrimental for poorer households, which rely more heavily on agriculture for their income and spend a larger share of their income on food. Finally, real consumption is not negatively affected by food price shocks across all household groups. Overall, the combined effect of the world price shocks has little impact on income distribution in Tanzania with a decline in consumption across all household groups.

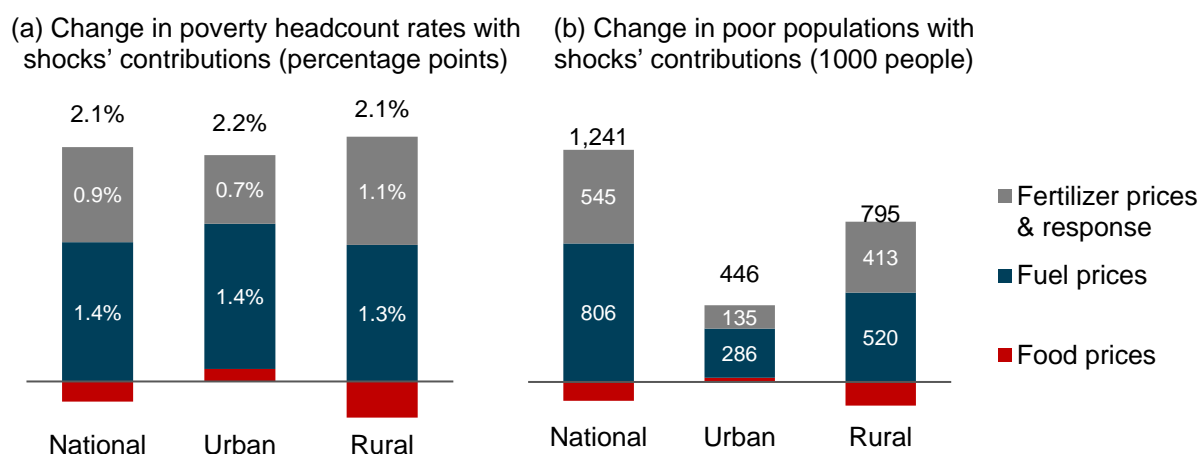
Figure 9. Percentage change in real household consumption across per capita expenditure quintiles



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

Falling household consumption leads to greater poverty. According to the most recent household survey in Tanzania, 49 percent of the country's population has an adult equivalent consumption level that falls below the US\$1.90 international poverty line. The increase in world prices raises the national poverty headcount rate in Tanzania by 2.1 percentage points (Panel A in Figure 10). This is equivalent to an additional 1.2 million people falling below the poverty line (Panel B). Most of the increase in poverty is caused by the fuel shock, which is consistent with the consumption changes for poor households shown in Figure 8. However, fertilizer shocks are almost equally culpable for rising rural poverty because many rural poor rely on agricultural income that is negatively affected by falling agricultural production from lowered use of fertilizer. The urban poverty rate rises slightly more than rural poverty rate, but the largest absolute increase in number of the poor people is in rural areas, as Tanzania has a smaller urban population and a 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 Tanzania RIAPA model.

Notes: 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 Tanzanian households. The model tracks changes in the cost of a "healthy" reference diet (CoRD) with six groups of foods as defined by the EAT-Lancet Commission.⁵ The combined food, fuel, and fertilizer shocks increases the CoRD by 1.3 percent in real terms (the first bar in Panel A in Figure 11).⁶ This is mainly driven by the rising cost of edible oils within the "added fats" food group, whose domestic price is heavily influenced by rising world palm oil prices (the second bar in Panel A in Figure 11). On the other hand, falling household income reduces demand for fruits, dairy products, and proteins (meats and fish), and thus, lower their real costs slightly. The "staples" food group includes cereals and root crops, with wheat only a small component of this group in Tanzania. 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 household 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 have a modest contribution to the changing cost of a

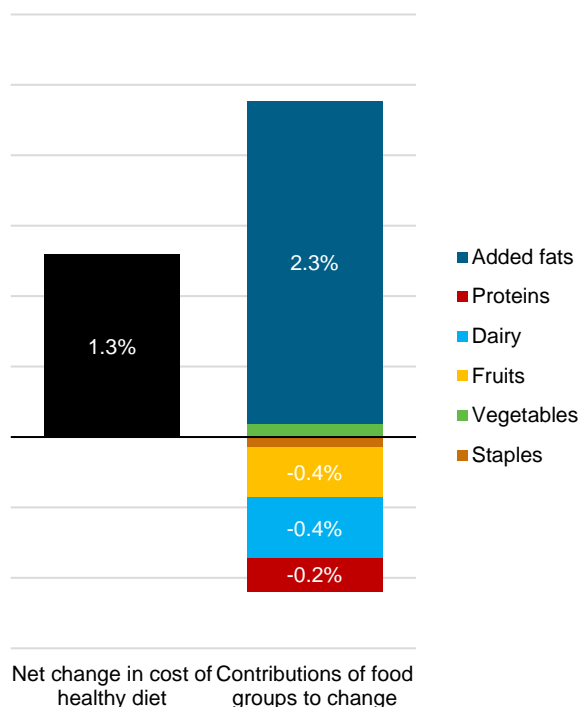
⁵ For further information on the RIAPA model's diet module and indicators, see [Pauw et al. \(2021\)](#).

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 (16.3 percent), vegetables (11.5), fruits (15.9), dairy (16.3), proteins (30.0), and added fats (10.0).

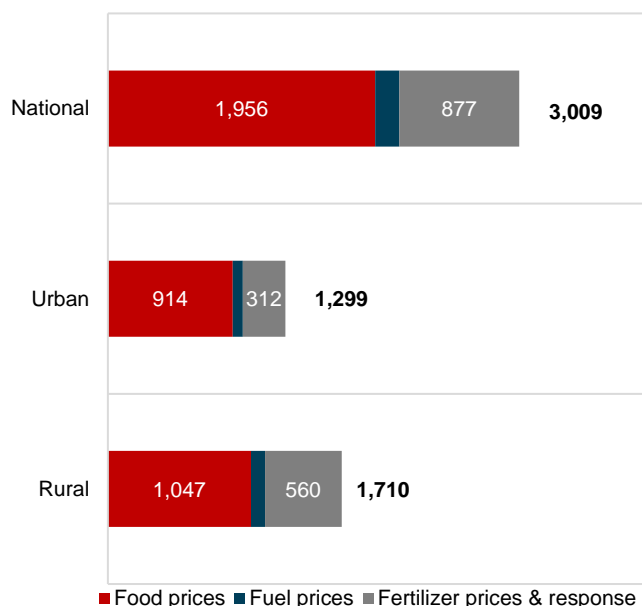
healthy diet. Moreover, consumption levels of fruits, dairy products, and meats and fish are far below the required level for a healthy diet among many households in Tanzania. The falling costs of these food groups mask households' deteriorating access to these foods due to falling incomes.

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

(a) Changes in the real cost of a healthy reference diet, with contributions from the six major food groups (%)



(b) Number of people to become deprived in at least one additional food group (1000 people)



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

Diet quality worsens for many households. The survey-based micro-simulation tool also measures the increased number of people who experience a decline in 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 Tanzania. Rising food prices become much more important for deterioration in diet quality than impacts on household incomes or poverty. This shock, together with fertilizer shocks, causes 3 million people to become deprived in at least one additional food group in Tanzania. The rural population accounts for more of the deterioration in diet quality, while the number of urban people with deteriorated diet quality is alarmingly large compared to the total 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 Tanzania'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, income, and consumption levels; and farmers'

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 GDP and employment in Tanzania to contract, but that these declines are not large compared to the size of the economy. Most of the GDP losses are driven by rising fuel prices, while agricultural GDP losses are driven more by fertilizer shocks. Tanzania exports maize, wheat flours, and edible oilseeds. Although rising world prices cause domestic food prices to increase for consumers, rural farmers benefit from higher prices for agricultural products. However, gains from the increase in agricultural exports are not large enough to offset the income losses caused by fuel and fertilizer shocks that reduce fertilizer use and lower agricultural productivity, and hence, the net effect on both rural and urban welfare is negative.

Overall, national household consumption falls. Impacts are larger on urban households. Falling household consumption also leads to greater poverty in both rural and urban areas. Finally, the cost of a healthy diet increases for Tanzanian households, and there is a widening gap between household consumption levels and what is required to achieve a healthy diet. While the global crises will cause a modest slowdown in Tanzania'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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