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GLOBAL CRISIS
COUNTRY SERIES

COUNTRY BRIEF 4

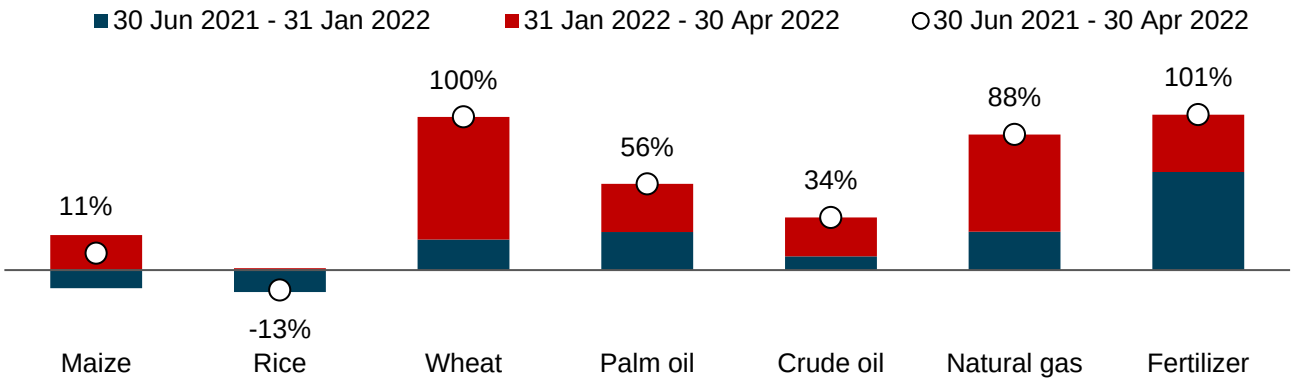
Nigeria: Impacts of the Ukraine and Global Crises on Poverty and Food Security

Kwaw Andam, Xinshen Diao, Paul Dorosh, Angga Pradesha, and James Thurlow[1]
International Food Policy Research Institute, Washington, DC

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). 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, while 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.

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



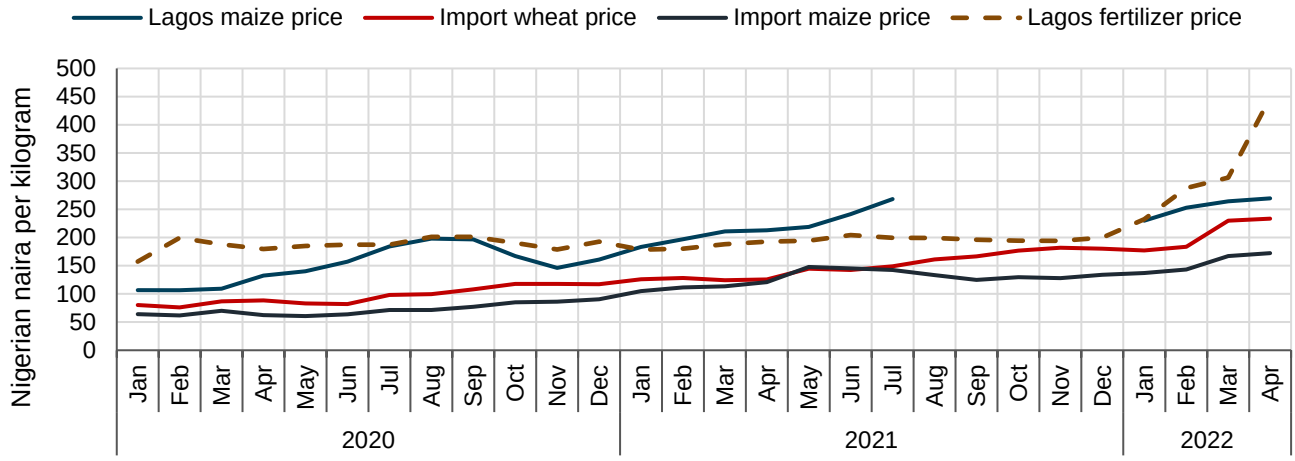
Source: Authors' calculations using data from World Bank Commodity Price Data (The Pink Sheet, https://www.worldbank.org/en/research/commodity-markets).

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 benefited from working with CGIAR's National Policies and Strategies Initiative, IFPRI's Nigeria country program, and national partners. All authors are from IFPRI. For further information, please contact Kwaw Andam (k.andam@cgiar.org), Paul Dorosh (p.dorosh@cgiar.org), and James Thurlow (j.thurlow@cgiar.org).

A comparison of import prices at Nigeria's border with market prices in Lagos, its largest commercial city, suggests that world price changes may not have had a major direct influence on domestic prices of food, in part because many of the major food products produced and consumed in Nigeria (including sorghum, millet, cassava, yams, and plantains) are not widely traded in international markets. The nominal price of maize (to some degree a substitute in consumption for wheat products, sorghum, and millet) rose by 27 percent between April 2021 and April 2022, compared to a 43 percent increase in the cost and freight import price of maize in the same period and an 86 percent increase for wheat (Figure 2). Note also that substantial volumes of foreign trade take place at parallel market exchange rates (which in April 2022 were about 35 percent above the official naira/US dollar exchange rate).[2] However, fertilizer prices have been rising rapidly since the war began in Ukraine and rose by 46 percent in just one month between March and April 2022, demonstrating a big risk to crop production for Nigerian farmers.

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



Source: Authors' calculations using data from FEWSNET, IGC, and World Bank Commodity Price Data (The Pink Sheet). Fertilizer prices are obtained from the Nigeria Fertilizer Dashboard produced by the Visualizing Insights on Fertilizer for African Agriculture (VIFAA) program.

Note: Import prices include cost, insurance, and freight (CIF). Fertilizer prices are for NPK 15-15-15.

2. Measuring Impacts on Nigeria's Economy and Population

We use an economywide model of Nigeria to estimate the impacts of the global price shocks on all sectors, workers, and households.[3] The model allows us to capture a range of considerations that determine the overall impact of the crisis on the country. Nigeria exports large volumes of crude oil but imports most of its supply of oil products: diesel, petrol, and other petroleum products. Nigeria also produces 80 percent of the fertilizer used by its farmers. The impacts of higher world fuel and fertilizer prices on Nigeria's economy are thus more complicated than on an economy without oil exports or a large domestic fertilizer supply. Moreover, recent investments in domestic production of urea may further dampen the impacts from higher import prices for fertilizer (Balana et al. 2020).

The effects of higher world food prices depend 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. Less than 1 percent of Nigeria's maize supply comes from imports, while imports account for 97 percent of its total wheat supply (Panel A in Figure 3). The

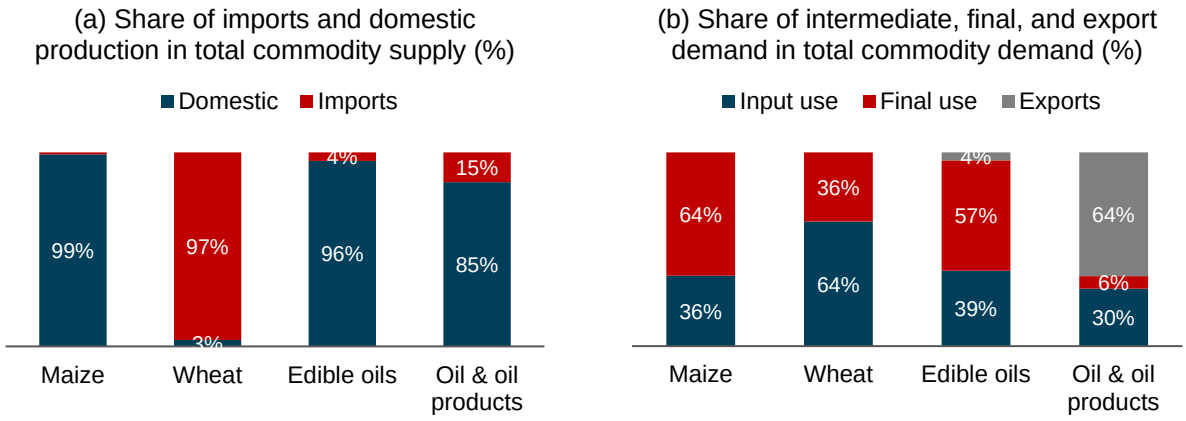
[2] To the extent the premium in the parallel market remains approximately constant, domestic prices of tradable goods such as coffee, cocoa, and rice will move together with world prices, consistent with the specification in our modeling work.

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

effects of international wheat price movements on domestic wheat prices are thus expected to be much larger than the effects of international maize price movements on domestic maize prices. Import shares of supply are also relatively low for edible oils including oilseeds, and domestically produced edible oils are close substitutes for products traded in international markets.

The impact of higher fuel prices on households cannot be directly assessed by looking only at the share of petroleum products in households' consumption baskets. This is because fuel is mainly used as an input into the production of other goods and services. More than four-fifths of total domestic demand for oil products in Nigeria is for input use, mainly by the transport sector. Moreover, exports of crude oil account for 64 percent of total oil and oil products (Panel B in Figure 3).

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

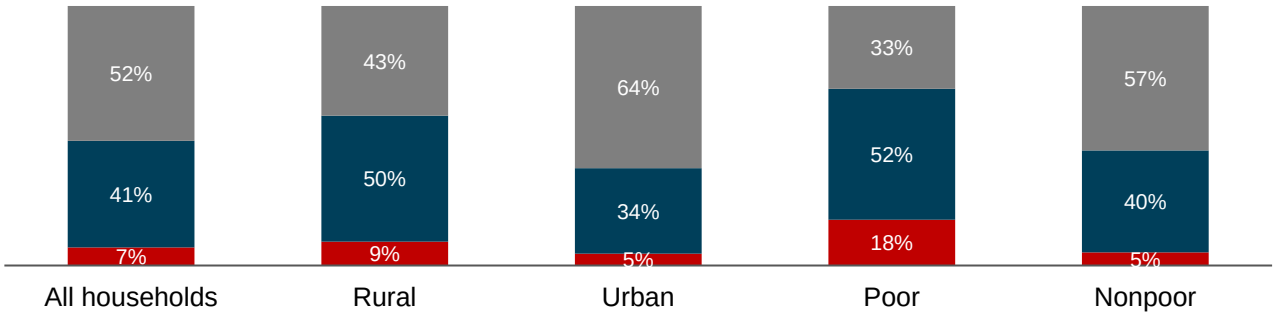


Source: Authors' calculations using social accounting matrix (SAM) data from IFPRI's Nigeria RIAPA model.

Note: Maize and wheat include maize flour and wheat flour, and edible oils include edible oilseeds in Panel B. 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 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 account for a small share of the total value of household consumption (7 percent) in Nigeria (Figure 4), which is about 15 percent of total food expenditures.[4] 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 the shares of cereals and edible oils in expenditures are much larger for poorer households in Nigeria than for other groups.

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

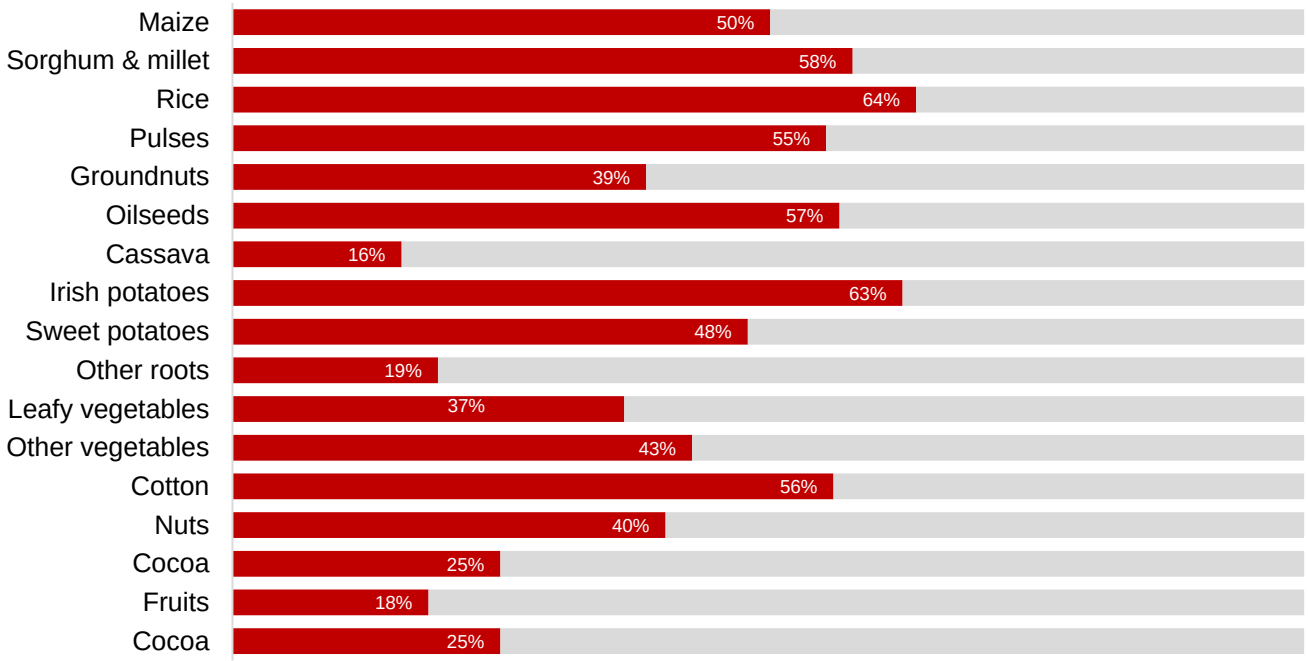


Source: Authors' calculations using social accounting matrix (SAM) data from IFPRI's Nigeria RIAPA model.

[4] 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 prices for many locally grown crops. 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 Nigeria varies significantly by crop, with 64 percent of rice land cultivated using fertilizers, compared to only 16 percent for cassava. Variation also arises in the amount of fertilizer used on different crops. For our initial impact analysis, we adopt a conservative set of assumptions regarding farmers' responses 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 do.[5]

Figure 5. Share of cropland using chemical fertilizers in Nigeria



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 northern Nigeria, planting for the main season (long rains) crops takes place from mid-February to May, with harvests late in the year. In the south, planting of most crops takes place in April and May, with the main harvest starting in September. The surge in fertilizer prices in March can be expected to have a significant adverse effect on fertilizer use for the 2022 crops in much of the country.

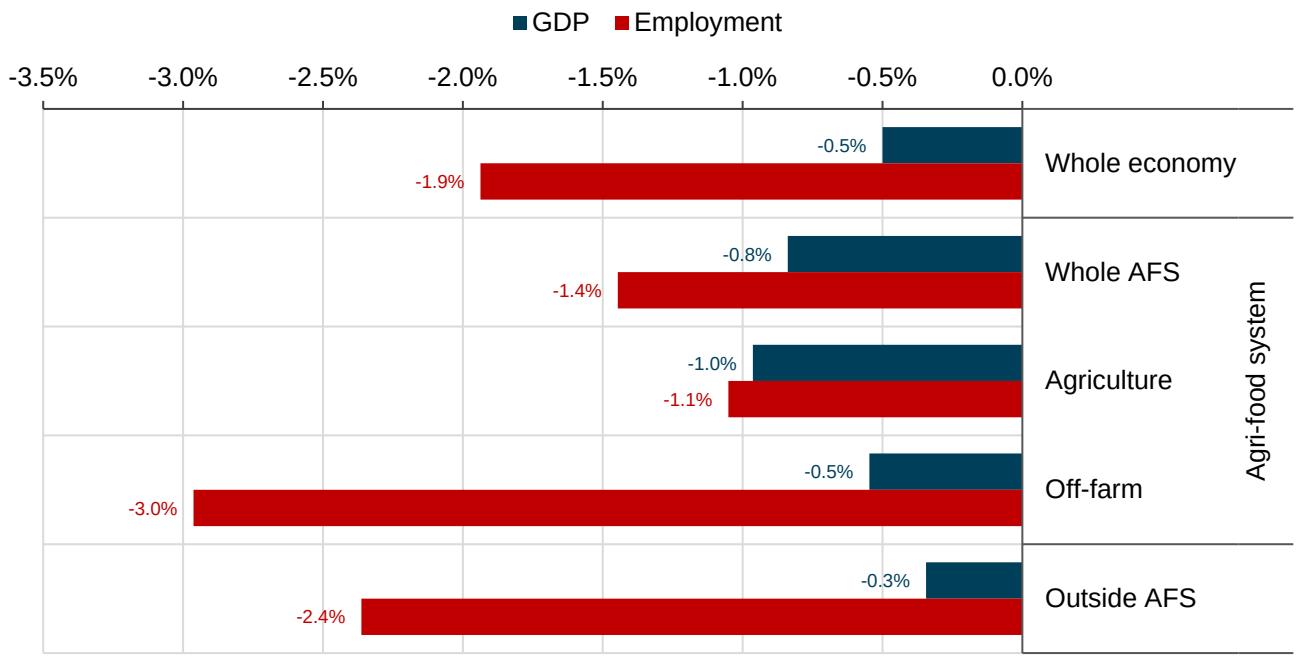
We simulate the effects of both higher world prices (recall Figure 1) and the potential productivity losses from reduced fertilizer use in the current growing season. Simulation results should be interpreted as "medium-term" impacts; that is, after the immediate spillover effects across sectors and households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

[5] 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].

3. Impacts on Nigeria's Economy and Agrifood System

The effects of the world price and fertilizer demand shocks on GDP and employment are negative but are not large compared to the size of the overall economy. As a large oil-exporting country, the windfall revenues from higher crude oil export prices went mainly to the government, while the country imports petroleum, and hence, the economy is negatively affected by the higher import petrol prices. The total GDP losses are small, at −0.5 percent, while the employment impact is relatively large at −1.9 percent (Figure 6). The impact on the agrifood system is larger than on the total economy. Agricultural GDP falls by 1.0 percent, while employment falls much more in the off-farm agrifood system (by 3.0 percent) because higher food and fuel prices raise costs of food processing and food-related services, including trade and transport. The GDP impact in the rest of the economy outside the agrifood system is small, while the employment impact is large, reflecting differential impacts within nonagricultural sectors.

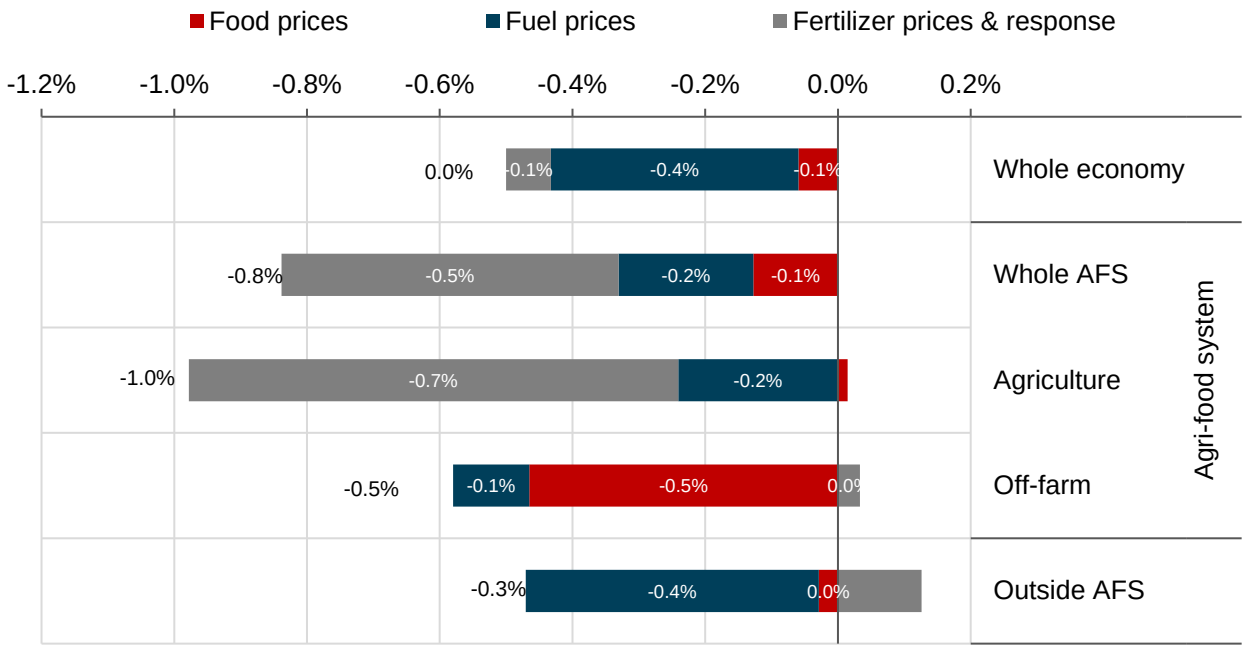
Figure 6. Percentage change in GDP and employment due to food, fuel, and fertilizer shocks



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

The negative effects on national GDP come mainly from fuel shocks. Petroleum is mainly used as intermediate inputs in different economic sectors, and thus, the higher import petrol prices are the dominant factor in the decline in total GDP. However, agricultural GDP is more negatively affected by the fertilizer shocks, which directly affect primary agricultural production and result in reduced output of downstream agrifood sectors (Figure 7). On the other hand, off-farm agrifood GDP is more negatively affected by food price shocks, as rising food prices increase costs for food processing sectors and lower their production. Food-related services, particularly restaurants and hotels, are also negatively affected by higher food prices that increase their operational costs. The whole agrifood system is less affected by the fuel price shock, which leads to GDP losses outside of the agrifood system.

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



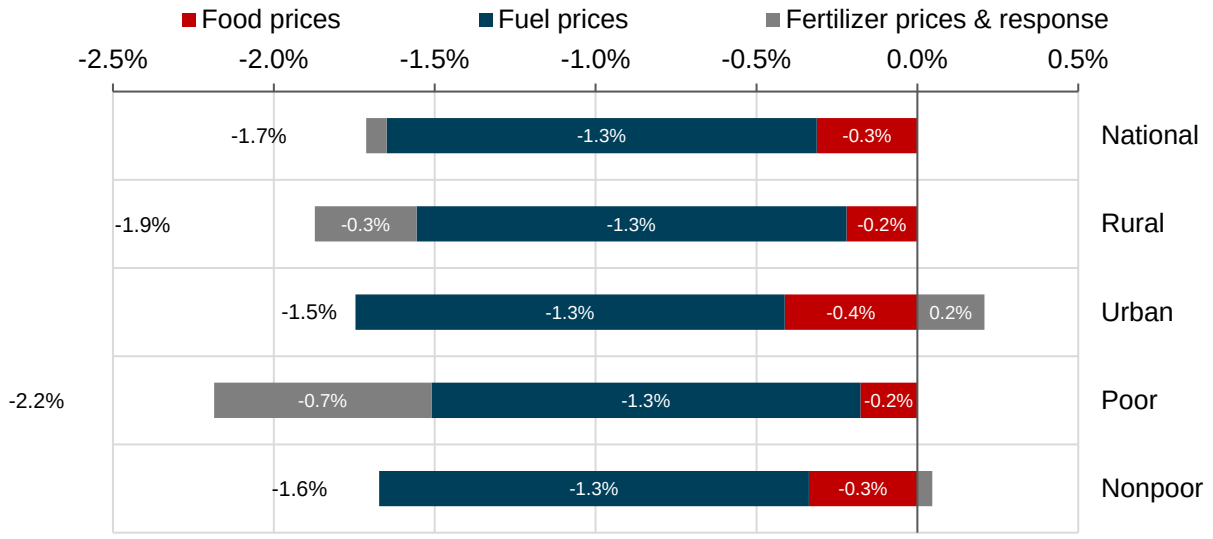
Source: Simulation results from IFPRI's Nigeria RIAPA model.

Note: About 40 percent of the effect on agricultural GDP under "fertilizer prices and response" is directly from rising fertilizer prices, while the remaining 60 percent is from the productivity shock caused by lower fertilizer use.

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

Household consumption falls, with larger losses for poorer and rural households. With windfall revenues accruing to the government, households do not benefit directly from rising oil prices. In fact, national real consumption, including home consumption, falls by 1.7 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. While most of the decline in consumption is driven by the fuel price shocks, the impact of the food price shock on household consumption is larger than on total GDP. Differences in consumption outcomes across population groups are driven mainly by the differential impact of the fertilizer shocks, which mainly affect rural and poor households. Rural households earn more of their income from farming, and thus, they are more adversely affected by the decline in agricultural production following the increase in fertilizer prices. And since most of the poor live in rural areas, as a group they are also more adversely affected by fertilizer shocks. On the other hand, urban households benefit slightly from higher fertilizer prices. Nigeria produces fertilizer, which covers about 80 percent of domestic use. Facing higher fertilizer import prices, domestic fertilizer manufacturers expand production to substitute for imported fertilizer, which benefits some urban households on the income side.

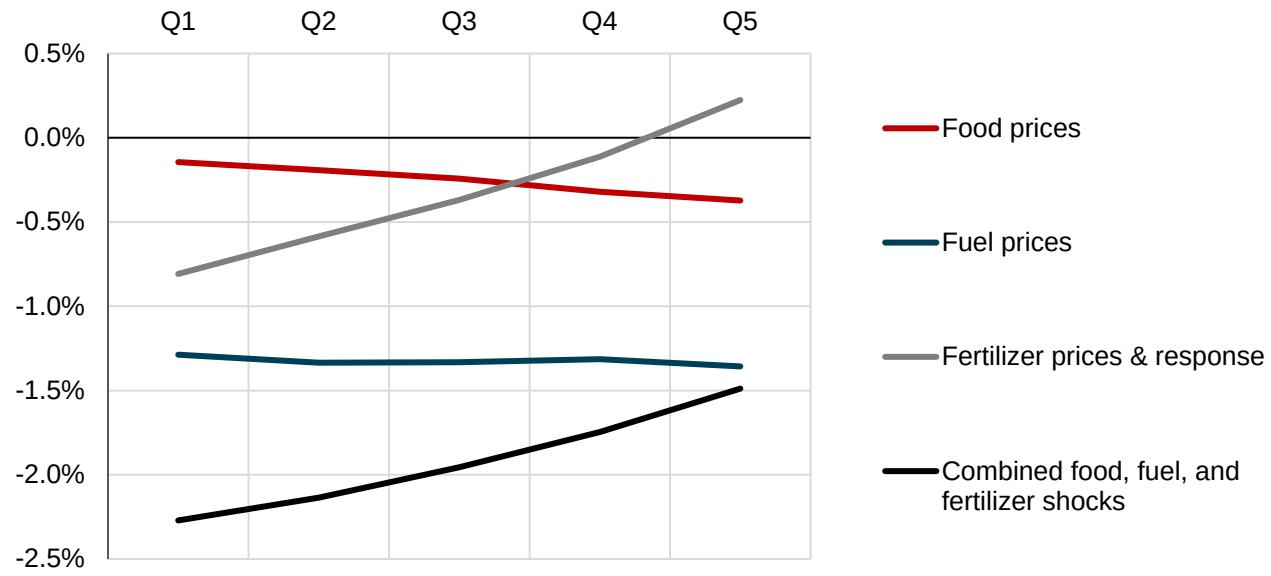
Figure 8. Percentage change in real household consumption due to food, fuel, and fertilizer shocks



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

Inequality worsens, although all households are adversely affected. The food, fuel, and fertilizer shocks have different implications for (income) inequality in Nigeria. Fertilizer shocks affect those households in lower quintiles negatively while benefiting those in the top quintile slightly (Figure 9), causing inequality to increase. Conversely, the negative impact of higher world food prices is slightly larger for richer households, because they consume more imported food products than poorer households or processed food products that rely more on imported products as inputs. The effect of fuel shocks is felt similarly across all household groups. Overall, the combined effect of the world price shocks is a decline in consumption for all households, but 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 Nigeria.

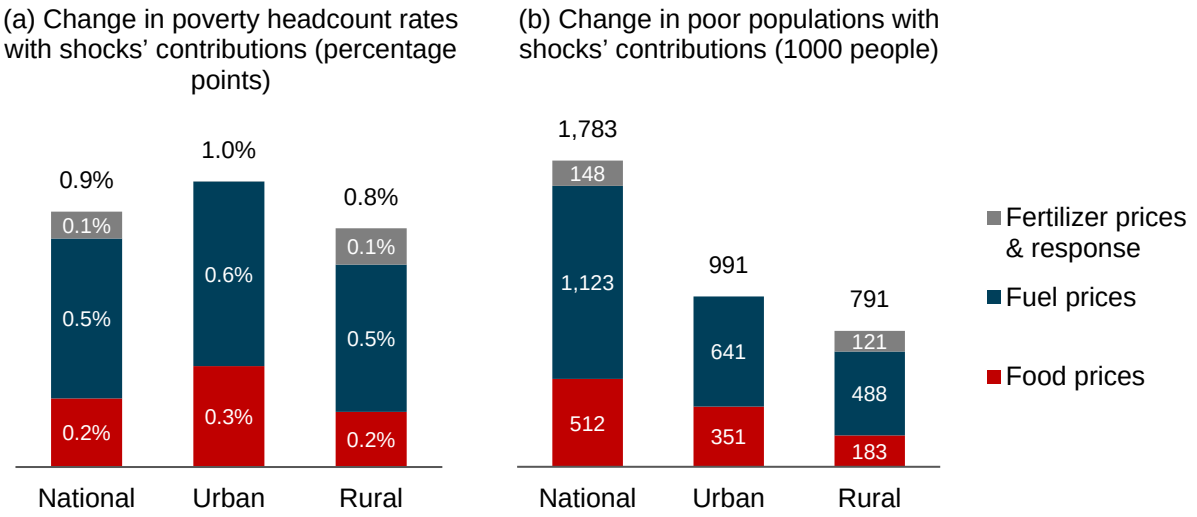
Figure 9. Percentage change in real household consumption across per capita expenditure quintiles



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

Falling household consumption leads to greater poverty, particularly in urban areas. According to the most recent household survey in Nigeria, more than 50 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 reduces real expenditures of lower-income households, increasing the national poverty headcount rate by 0.9 percentage points (Panel A in Figure 10). This is equivalent to an additional 1.8 million people falling below the poverty line (Panel B). The impact on the urban poverty rate is larger, and near one million of the increased poor population live in urban areas.

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



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

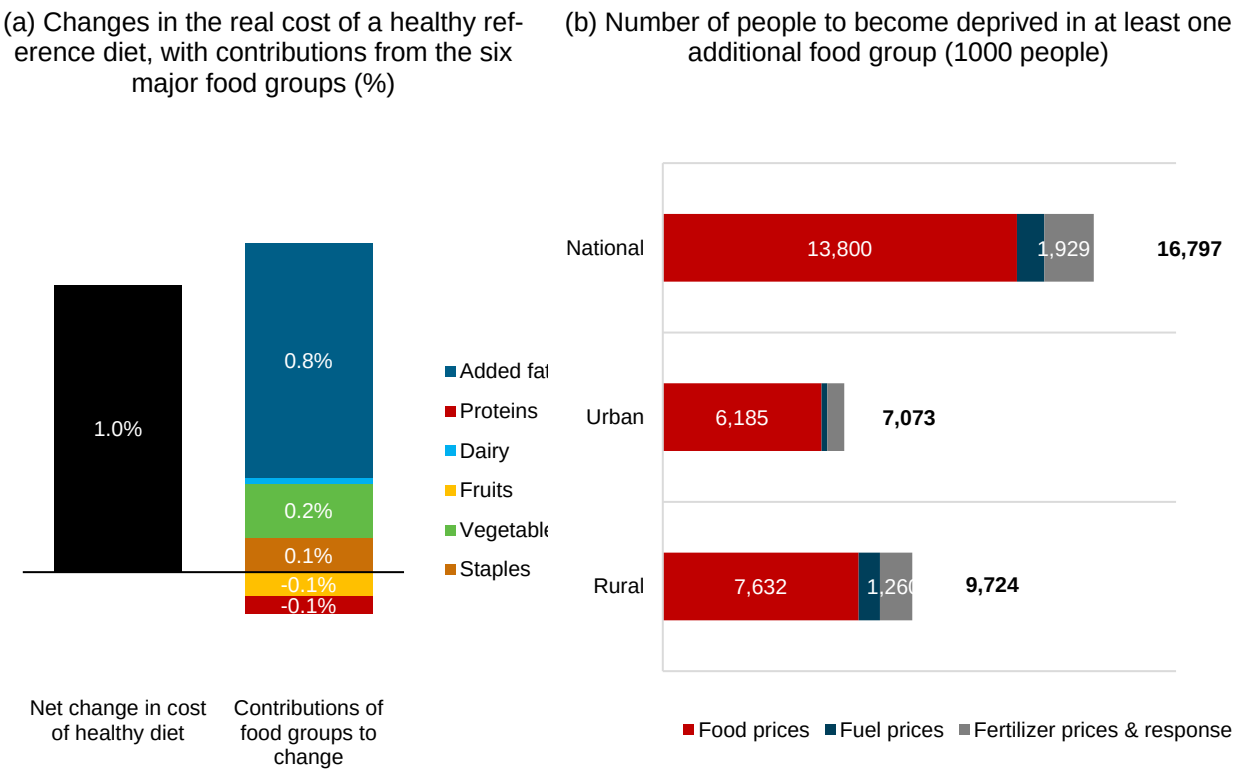
Notes: Poverty headcount rate is the share of the population with daily adult equivalent consumption levels below the US$1.90 poverty line.

The cost of a healthy diet increases for Nigerian households. The model tracks changes in the cost of a "healthy" reference diet (CoRD) with six food groups as defined by the EAT-Lancet Commission.[6] The combined food, fuel, and fertilizer shocks increase the CoRD by 1.0 percent in real terms (the first bar in Panel A in Figure 11).[7] This is mainly driven by the rising costs of edible oils within the "added fats" food group and wheat within the "staples" food group, whose domestic prices are influenced by rising import prices (the second bar in Panel A in Figure 11). The "staples" food group includes cereals and root crops, which are affected by higher wheat import prices. However, wheat is only a small portion of consumption baskets in Nigeria. Maize also is only a small share of consumption, and the increased maize price is modest. Moreover, achieving the diversity of the healthy reference diet requires a decline in the large share of cereals in the average household diet. As such, the increase in wheat and maize prices has only a modest contribution to the changing cost of a healthy diet. On the other hand, consumption levels of vegetables and dairy products are far below the required level for a healthy diet among many households in Nigeria. The rising costs of these food groups cause further deterioration in households' access to these foods.

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

[7] 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 (17.1 percent), vegetables (16.1), fruits (12.6), dairy (14.2), proteins (33.6), and added fats (6.4).

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 Nigeria RIAPA model.

Diet quality 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 crises, few Nigerian households had the consumption levels and diversity needed for a healthy diet. Rising food prices become much more important for worsening diet quality than impacts on income and poverty, and it is a leading factor for 16.8 million people to become deprived in at least one additional food group. The rural population accounts for more people (9.7 million) with a deterioration in their diet quality, while the number of urban people is also alarmingly large (7.1 million) (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 used IFPRI's economywide model – known as RIAPA – to simulate the impacts of the global crises on Nigeria'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 household employment, income, and consumption levels; and farmers' responses to rising fertilizer prices and the knock-on effect this could have on next season's agricultural production.

Our analysis indicates that for Nigeria, a crude oil-exporting and petrol importing country, the global crises cause a modest contraction in the country's GDP and a slightly larger negative impact on

total employment. The losses in agricultural GDP and the decline in off-farm agrifood employment are larger than those for the total economy. Most of agricultural GDP losses are driven by rising fertilizer prices, rather than higher food prices. This is because, although import prices of wheat and edible oils are rising, these products are not typically large items within household consumption baskets in Nigeria. To some extent, rural farmers also benefit from higher prices for agricultural products, although the net effect on their welfare is negative once we account for the effects of higher fertilizer prices, reduced fertilizer use, and lower agricultural productivity.

Overall, with the windfall oil revenue accruing to the government and little going to consumers, household consumption falls. Impacts are larger on poorer and rural households, leading to increased inequality in Nigeria. Because of the already high poverty rate among rural households, falling household consumption leads to rising poverty among urban households more than rural households, while rural poor people are likely to become more impoverished (that is, the depth of poverty increases). Finally, the cost of a healthy diet increases for Nigerian households, and the gap between household consumption levels and what is required to achieve a healthy diet widens. While the global crises will not greatly affect Nigeria's economic growth, its adverse impacts on poor people and food insecurity are likely to be more pronounced.

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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1201 Eye Street, NW, Washington, DC 20005 USA | T. +1-202-862-5600 | F. +1-202-862-5606 | Email: ifpri@cgiar.org | www.ifpri.org | www.ifpri.info