

COUNTRY BRIEF 9

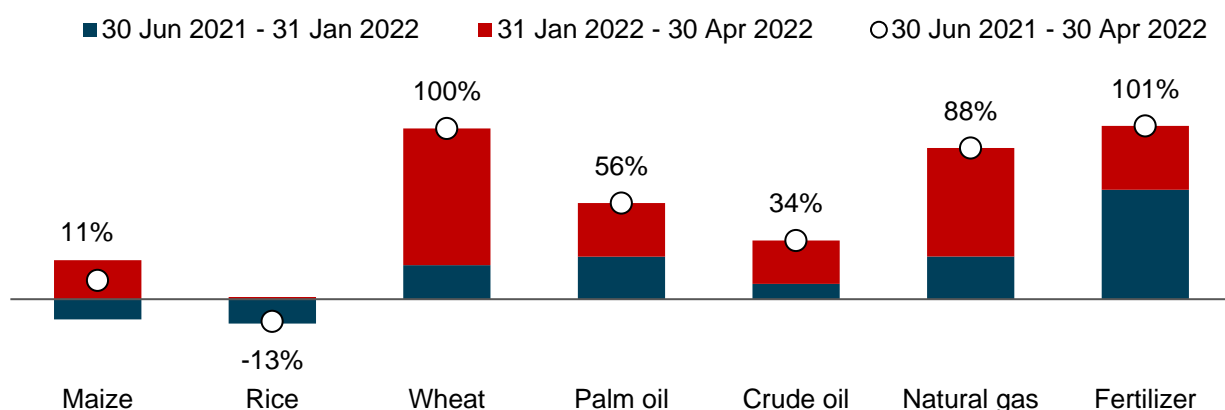
Ghana: Impacts of the Ukraine and Global Crises on Poverty and Food Security

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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). 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



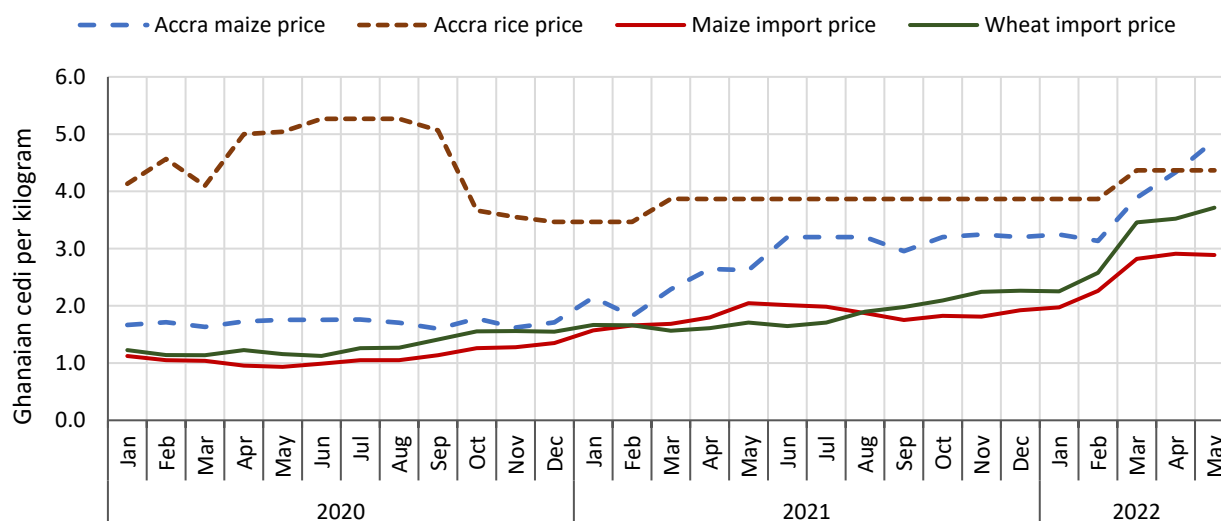
Source: Authors calculations using data from World Bank Commodity Price Data (The Pink Sheet, <https://www.worldbank.org/en/research/commodity-markets>).

Note: Nominal prices in 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 These country studies are conducted by IFPRI with financial support from BMGF, FCDO, and USAID. All studies use data and models developed with ongoing support from BMGF, USAID and CGIAR's Foresight and Metrics Initiative. The Ghana case study benefited from working with IFPRI's Ghana country program and national partners. For further information, please contact Karl Pauw (k.pauw@cgiar.org), Paul Dorosh (p.dorosh@cgiar.org), or James Thurlow (j.thurlow@cgiar.org).

Ghana's domestic food commodity markets have traditionally been well integrated, exhibiting efficient price transmission between producer and consumer markets. Likewise, local markets are also well integrated with regional and global markets.² It is therefore not surprising that during the recent global crisis, world price changes have been transmitted to local markets. For example, nominal maize prices in Accra rose 65 percent between September 2021 and May 2022 (from 3.0 to 4.9 Ghanaian cedi per kilogram). Over the same period, the nominal price of imported maize at the border also rose by 65 percent and the import price of wheat rose by 88 percent.

Figure 2. Nominal maize and wheat prices in Ghana, 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 Ghana's Economy and Population

We use an economywide model of Ghana 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 will determine the overall impact of the crisis on the country. For example, the effect of higher world prices on Ghana'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. Ghana is largely self-sufficient in maize, with less than 1 percent of total supply from imports. On the other hand, all wheat grain supply is from imports (Panel A in Figure 3), although wheat imports are dwarfed by rice imports. Ghana is also a large producer of rice, with local producers affected negatively by lower world prices. Import shares are also high for edible oils (such as palm oil), and these imported products are close substitutes for domestically produced and consumed edible oils. Therefore, the net effect of global food price movements for Ghana is not immediately evident.

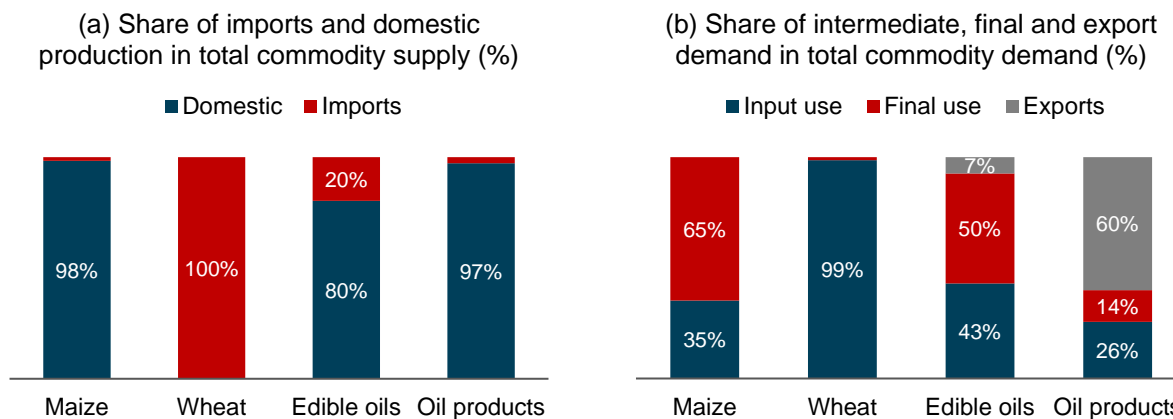
Since the discovery of oil and gas almost a decade ago, Ghana has become a crude oil exporting country (Panel B in Figure 3). But with limited refining capacity, Ghana continues to import some processed oil products (Panel A). Thus, while the crude oil sector will benefit from rising global oil prices, the net impact of higher oil and petroleum prices on the economy is harder to assess. This is

² See Amewu, Arhin and Pauw (2021) for a review of commodity market trends in Ghana (<https://www.ifpri.org/publication/farm-input-subsidies-and-commodity-market-trends-ghana-analysis-market-prices-during>).

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

mainly because oil products are primarily used as an input into the production of other goods and services. 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 Ghana, 2019

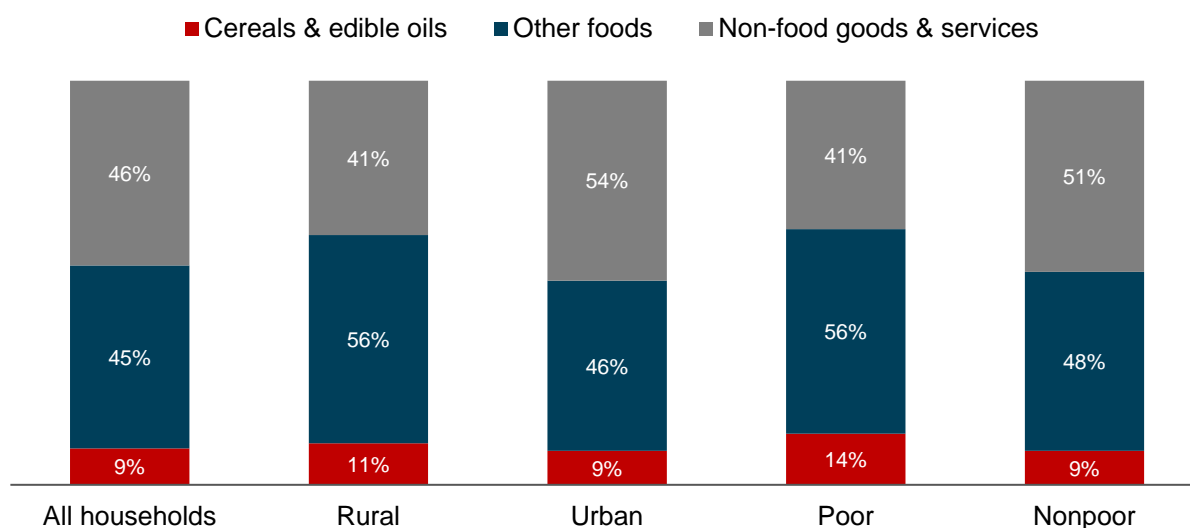


Source: Authors' calculations using social accounting matrix (SAM) data from IFPRI's Ghana RIAPA model.

Note: Wheat includes wheat grain and wheat flour, and edible oils include 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 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 a small portion (9 percent) of the total value of household consumption in Ghana, less than one-fifth of total food expenditures (Figure 4), because root crops are important staples in Ghana.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 cereals and edible oils are more important for poorer rural households in Ghana than for other groups.

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

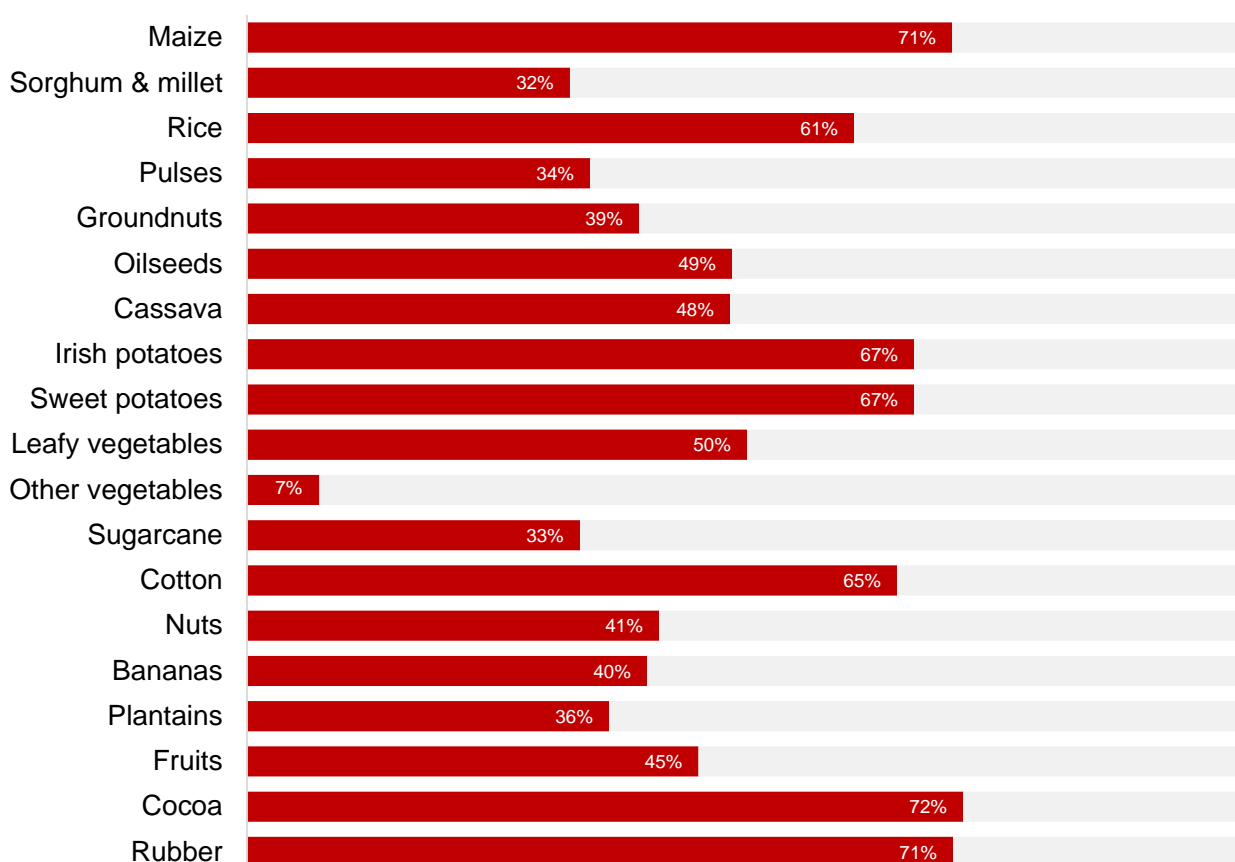


Source: Authors calculations using social accounting matrix (SAM) data from IFPRI's Ghana RIAPA model.

⁴ These figures include the imputed value of home consumption, which is also tracked within the 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 to grow crops; and (3) the expected productivity losses for farmers who reduce their use of fertilizers. Farm survey data reveal that, nationally, just over half of cultivated plots in Ghana are fertilized. However, fertilizer adoption in Ghana varies significantly by crop, with 71 percent of maize land cultivated using fertilizers, compared to only 36 percent for sorghum and millet. 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 who do.⁵

Figure 5. Share of cropland using chemical fertilizers in Ghana



Source: Authors' estimates using data from EGC-ISSER Ghana Socioeconomic Panel Survey (GSPS) Wave 3 (2017/18).

Cereal production is concentrated in Ghana's forest and transition agroecological zones in the center of the country and the savannah zone in the north. The north has a unimodal rainfall pattern, with planting typically beginning in May to June. Further south, planting begins earlier, typically in March to April, and a bimodal rainfall pattern allows for secondary (minor) season starting in August or September.⁶ As such, the bulk of fertilizer is usually imported in the second quarter of each cal-

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].

⁶ See <https://www.fao.org/giews/countrybrief/country.jsp?code=GHA>

endar year. Thus, fertilizer use and production costs for the current growing season will have already been affected by the fertilizer price spike between June and December 2021, and possibly also by the recent price increases between January and April 2022, depending on when procurement contracts were signed (recall Figure 1). The link between world fertilizer prices, local fertilizer use, and agricultural productivity is therefore an important impact channel for the current crisis.

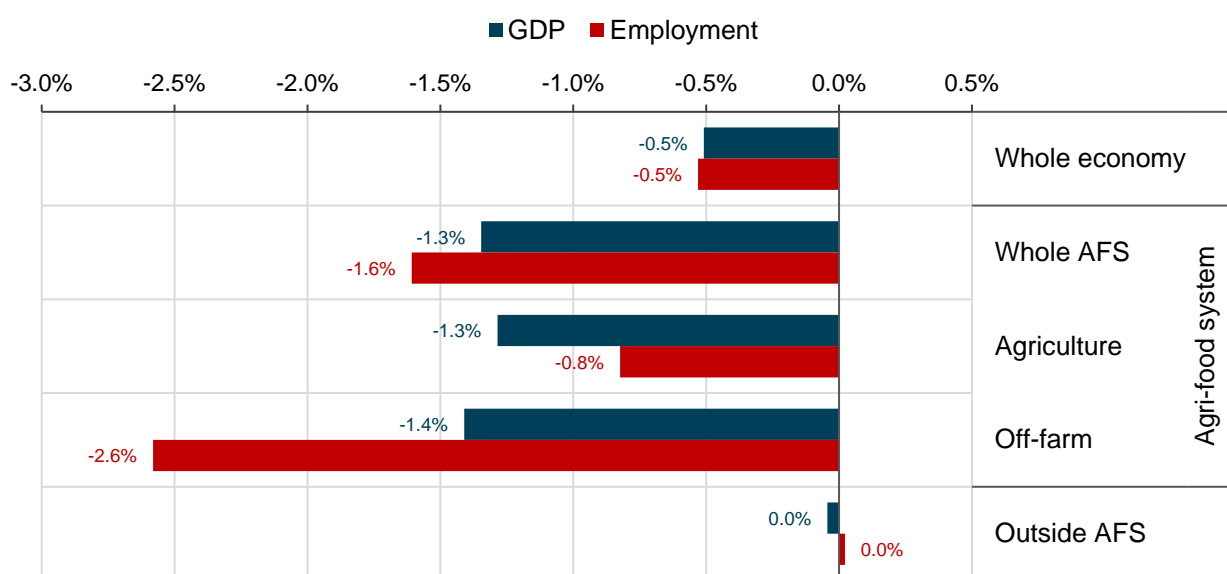
We simulate the effects of both higher world prices (recall Figure 1) and the potential productivity losses from reduced fertilizer use in the current growing season. Simulation results should be interpreted as “medium-term” impacts, that is, after the immediate spillover effects across sectors and households 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 Ghana’s Economy and Agrifood System

The effects of the world price and fertilizer shocks on GDP and employment are modest compared to the size of the overall economy. Real GDP falls by 0.5 percent due to the combined effects of a modestly negative terms-of-trade shock (that is, the negative effect of higher food and fertilizer import prices slightly outweighs the positive effect of higher oil export prices) and rising import costs that reduce spending on domestically produced goods (Figure 6). Employment also declines by 0.5 percent nationally, as falling production leads to job losses.

GDP and employment losses are driven entirely by losses within the agrifood system, which comprises on-farm (primary agriculture) and off-farm (food processing, food trade and transport, and food services) components. The on-farm and off-farm components are roughly similar in size, both in terms of GDP and employment. Whereas GDP losses are similar in relative and absolute terms between the two agrifood components, employment losses are much larger in the off-farm components (–2.6 percent), accounting for about three-quarters of employment losses nationally. These losses are concentrated in the food processing and food trade and transport subsectors.

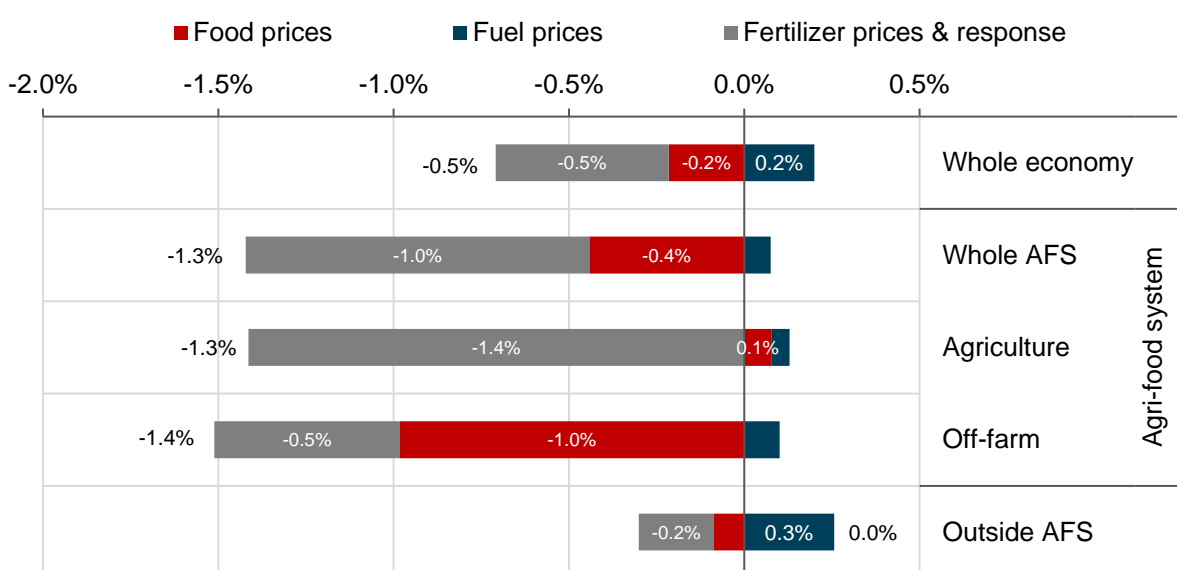
Figure 6. Percentage change in GDP and employment due to food, fuel, and fertilizer shocks



Source: Simulation results from IFPRI’s Ghana RIAPA model.

Fertilizer shocks drive most of the decline in agricultural GDP, while losses in the off-farm component of the agrifood system are largely associated with food price shocks. Fertilizer shocks, including reduced fertilizer use in response to higher prices, account for around three-quarters (or 1.0 percentage points) of the fall in agrifood GDP (Figure 7). The remaining losses associated with rising food prices are partially offset by fuel price shock. Fertilizer and food price shocks have different impacts on the two components of the agrifood system. Losses within primary agriculture (–1.4 percentage points) are entirely due to fertilizer shocks, while in the off-farm component, rising food prices explain 70 percent (1.0 percentage points) of the overall loss, because higher food prices increase the production cost of food processing and food-related services and lower demand for them. Outside of the agrifood system, GDP gains from rising fuel prices, which benefit Ghana’s crude oil and gas sector. However, such gains are offset by the losses associated with food and fertilizer shocks.

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



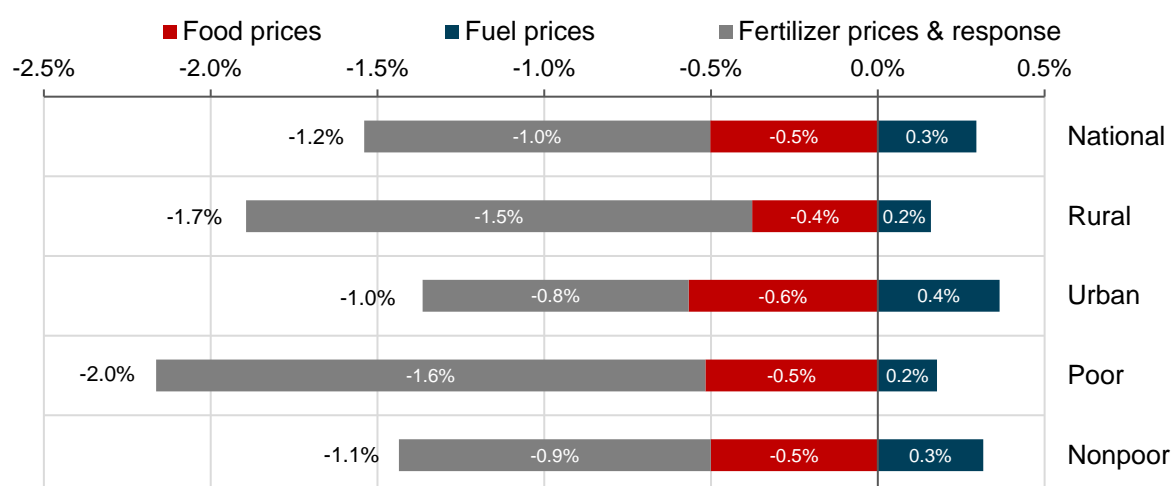
Source: Simulation results from IFPRI’s Ghana RIAPA model.

Note: About 45 percent of the effect on agriculture GDP under “fertilizer prices and response” is directly from rising fertilizer prices, while the remaining 55 percent is from the productivity shock caused by reduced use of fertilizer.

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

Household consumption falls due to the crises, with larger losses for poorer and rural households. National consumption spending, including the value of home consumption, falls by 1.2 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. While the fuel price shock benefits some households, their overall consumption is negatively affected by food price and fertilizer shocks. Overall, the fertilizer shocks account for over 80 percent of the absolute decline in household consumption. As expected, the fall in consumption is larger for poorer and rural households. 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 the food supply, since food makes up a larger share of poor households’ consumption baskets. On the other hand, rising food prices have a larger negative effect on urban households’ consumption, as urban households have a more import-intensive food basket (Figure 4).

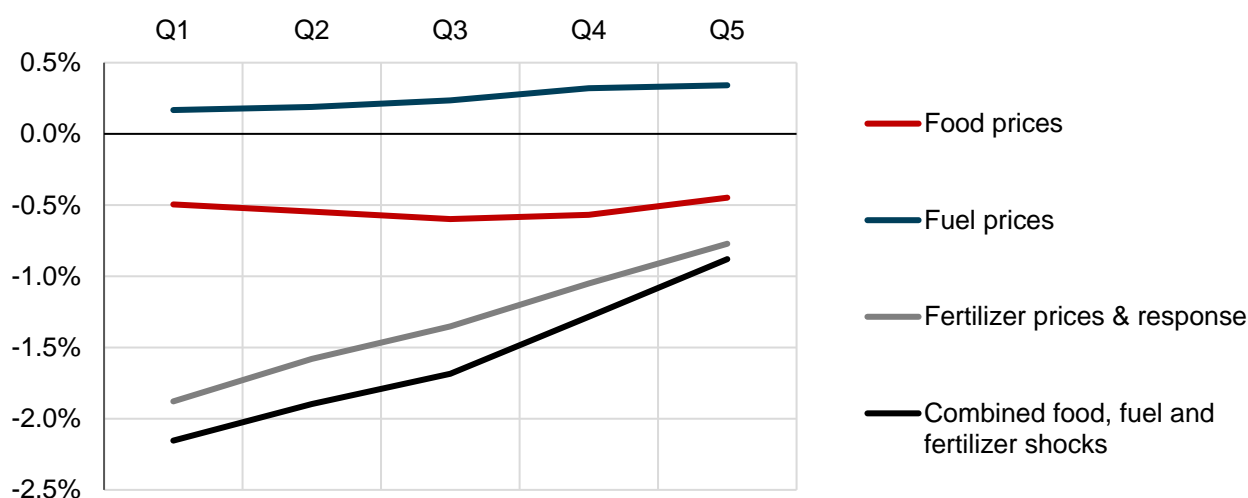
Figure 8. Percentage change in real household consumption due to food, fuel, and fertilizer shocks



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

Inequality worsens, although all households are adversely affected. The food, fuel, and fertilizer shocks have different implications for (income) inequality in Ghana. The increase in fuel prices benefits all households, but those in the top quintile, who are more likely linked to the oil and gas sector through employment, benefit more than poorer households (Figure 9). Conversely, the fertilizer shock is most detrimental for poorer households, which, as discussed, rely more heavily on agriculture for their incomes and spend a larger share of their incomes on food. The effect of higher world food prices is fairly similar across all households. However, middle-income households experience a slightly larger decline in consumption because these households consume more imported food products than poorer households (such as wheat, rice, and palm oil), and they also spend more of their income on foods than do higher-income households. 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 Ghana.

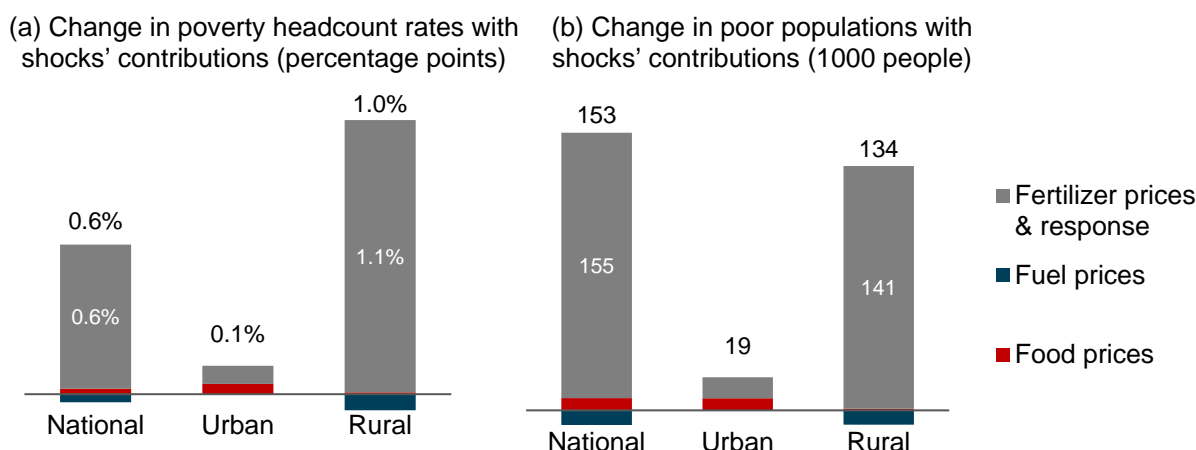
Figure 9. Percentage change in real household consumption across per capita expenditure quintiles



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

Falling household consumption leads to greater poverty, particularly in rural areas. According to the most recent household survey in Ghana, 13 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 Ghana by 0.6 percentage points (Panel A in Figure 10), which is equivalent to an additional 134,000 people falling below the poverty line (Panel B). The increase in poverty is caused almost entirely by the fertilizer shocks. This is consistent with the consumption changes for poor households shown in Figure 8. Impacts on rural poverty rates are significantly larger, both in terms of the percentage-point increase in the poverty rate and the number of poor; 87 percent of those that fall into poverty are in rural 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 Ghana 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.

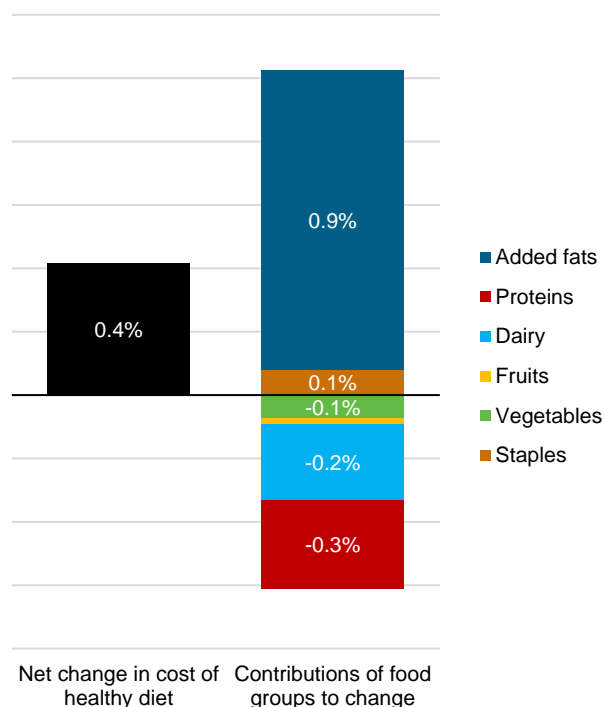
The cost of a healthy diet increases modestly for Ghanaian households. The model tracks changes in the real cost of a “healthy” reference diet (CoRD) with six major food groups as defined by the EAT-Lancet Commission.⁷ The combined food, fuel, and fertilizer shocks increases the CoRD modestly by 0.4 percent in real terms (the first bar in Panel A in Figure 11).⁸ 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 palm oil import prices (the second bar in Panel A in Figure 11). However, falling household income reduces demand for vegetables, fruits, dairy products, and protein foods (meats and fish), and thus, lowers their costs slightly. The “staples” food group includes cereals and root crops, with wheat only a small component of this group in Ghana. Rising maize and wheat prices are compensated for by the falling cost of other staple foods such as rice. 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 makes a modest contribution to the changing cost of a healthy diet. On the other hand, consumption levels of vegetables, fruits, dairy products, meats, and fish products are far below those required for a healthy diet among many households in Ghana. The falling costs of these food groups mask households' deteriorating access to these foods due to falling incomes.

⁷ For further information on the RIAPA model's diet module and indicators, see [Pauw et al. \(2021\)](#).

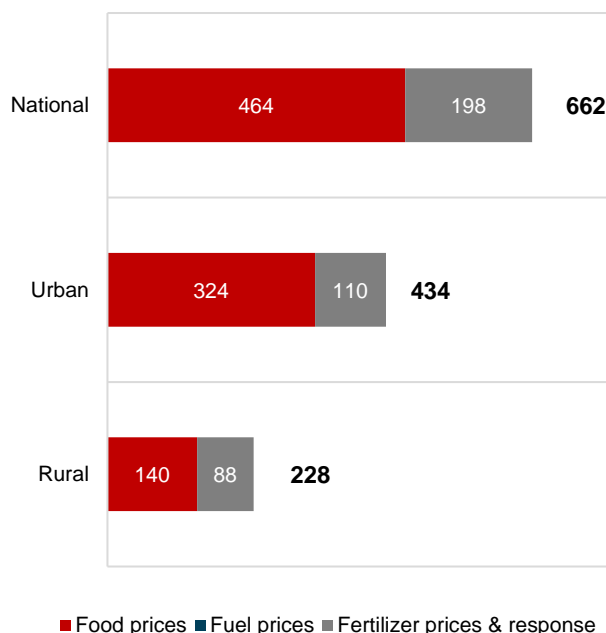
⁸ The CoRD is estimated using calorie targets from EAT-Lancet (for major food groups) and the World Bank's International Comparison of Prices (IPC) dataset. The estimated budget shares for the healthy diet include: Staples (5.4 percent), vegetables (11.7), fruits (12.1), dairy (24.6), proteins (34.7), and added fats (11.5).

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 Ghana RIAPA model.

Diet quality worsens for many households. The survey-based micro-simulation tool also measures the change in the 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 in Ghana could access a healthy diet, with the average person suffering deprivations in an average of 4.3 out of 6 food groups. Rising food and fertilizer prices cause 660,000 people to become deprived in at least one additional food group. Interestingly, around two-thirds of these people live in urban areas (Panel B in Figure 11), reflecting the fact that rural households already suffer more food deprivations than urban households, thus providing little scope for a further increase in food deprivations.

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 Ghana'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 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 Ghana to contract, but that these declines are not large compared to the size of the economy. Because Ghana is a crude oil exporting country, all the losses in total GDP come from the agrifood system and are driven by rising food prices and fertilizer shocks. While rural farmers benefit from higher prices for agricultural products, 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, national household consumption falls in Ghana. Impacts are larger on poorer and rural households, leading to an increase in inequality. That said, 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 Ghanaian 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 Ghana'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 country 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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