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# Russia-Ukraine War and the Global Crisis: Impacts on Poverty and Food Security in Developing Countries

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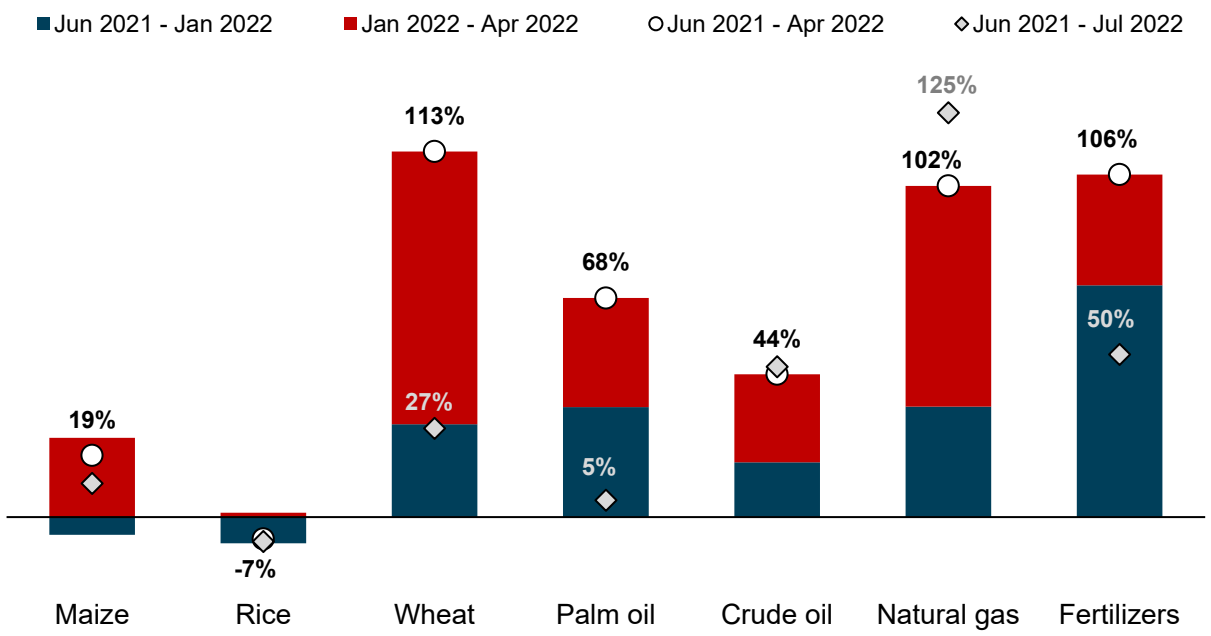
Global food, fuel, and fertilizer prices have risen rapidly in recent months, driven in large part by the fallout from the ongoing war in Ukraine and the sanctions imposed on Russia. Other factors, such as export bans in response to concerns about commodity shortages, have also contributed to rising prices. Figure 1 examines price changes in key food and nonfood commodities between June 2021 and June 2022. The period of interest for this study is June 2021 to April 2022. Over this period, palm oil and wheat prices increased by 68 and 113 percent in nominal terms, respectively. When deflated by the US Consumer Price Index, these price changes equate to 56 and 100 percent in real terms. Wide variation exists across food products, with nominal maize prices increasing by 19 percent (or 11 percent in real terms), and rice prices *declining* by 13 percent (or 7 percent in real terms) over the same period. Prices of nonfood commodities also rose substantially. Whereas crude oil prices rose 44 percent (or 34 percent in real terms), natural gas and fertilizer prices both doubled (or 88 and 101 percent in real terms, respectively). As shown in the breakdown in the bar chart, most of the price growth occurred after the start of the war in Ukraine, except for fertilizer.

[1] This country summary brief is based on the 19 country case studies 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 funders of CGIAR's Foresight and Metrics and National Policies and Strategies Initiatives. The Bangladesh, Nepal, and Cambodia case studies benefited from working with IFPRI's South Asia Office. The Egypt, Ethiopia, Ghana, Kenya, Myanmar, Malawi, Nigeria, and Rwanda case studies benefited from working with IFPRI's country strategy support programs in the countries and with national partners. For further information, please contact Xinshen Diao (x.diao@cgiar.org), Paul Dorosh (p.dorosh@cgiar.org), and James Thurlow (j.thurlow@cgiar.org).

***Figure 1. Percentage changes in nominal world 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: The figure reports changes in nominal prices in US dollars. For the modeling analysis, which considers the effects of price changes between June 2021 and April 2022, nominal price changes are converted to real price changes, which account for the overall increase in world prices over this period deflated by the US Consumer Price Index (CPI). The US CPI rose by 7.2 percent between June 2021 and April 2022.

Since April 2022, prices of some commodities have declined again. By June 2022, nominal wheat price growth stood at 27 percent compared to one year before, and palm oil price growth at 5 percent. Fertilizer prices also fell by half between April and June 2022, more than offsetting the supposed effect of the war in Ukraine. Crude oil prices, however, remained unchanged between April and June 2022, while natural gas prices increased even further. Although price growth appears to be easing, many developing countries and their development partners remain concerned about the implications of substantial price shocks for economic stability, food security, and poverty. This study employs models to examine the likely effects of real price changes experienced between June 2021 and April 2022 on developing country economies.

## 1. Measuring Impacts of the Crisis on Economies and Populations

We use economywide models for 19 developing countries to assess the impacts of the global price shocks on countries' economic sectors, workers, and populations.[2] The models allow us to capture a range of considerations that determine the overall impact of the crisis. We focus on the potential impacts of the global shocks without taking into consideration governments' responses or new policies to be implemented. Thus, the potential effects of higher world prices on the respective economies mainly depend on how important the affected product is in the total supply of each commodity and whether local producers and consumers can readily substitute away from higher-priced imports.

Although maize, wheat, and edible oils are consumed in all the countries included in the analysis, the reliance on imports varies by crop and by country. African countries are largely self-sufficient in maize, a major staple. On the other hand, most countries depend heavily on imports for wheat grain supply, although wheat is not a major staple crop in most countries. Exceptions include Egypt,

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

where bread is the most important staple, and Ethiopia, where wheat not only makes up a larger share than maize in the food basket but is also produced at scale domestically.

The international price for rice decreased marginally in recent months, thus benefiting consumers in the Asian countries included in our analysis, where rice is a major staple. Most of these Asian countries are also large producers of rice and rely less on imported rice. Rice is more widely consumed than wheat in many African countries, including the Democratic Republic of the Congo (DRC), Ghana, and Senegal. Although rice is a relatively important crop in Ghana and Senegal, a large proportion of domestic supply still comes from imports.

In most countries the share of edible oil imports – mostly palm oil – in domestic supply is smaller than wheat imports but larger than maize imports. On the other hand, imported edible oil products are close substitutes for domestically produced and consumed edible oils. Many countries grow various oilseeds and some even export oilseeds, including Ethiopia, Tanzania, and Uganda. Therefore, the net effect of global food price movements is not immediately evident for many countries.

Turning to nonfood products, almost all oil products, that is, crude oil and processed petroleum, are exclusively imported in the studied countries. Exceptions include Nigeria, one of the largest African oil exporters, as well as Egypt and Ghana, which both export natural gas and crude oil, and in the case of Egypt, refined petroleum. Others, such as DRC, Niger, and Uganda, produce crude oil at a small scale, but still mainly rely on imports. While crude oil producers in exporting countries will benefit from rising global oil prices, the net impact of higher oil and petroleum prices on their economies is ambiguous. Moreover, the impact of higher oil prices on households is harder to assess as direct consumption of oil products is limited. Instead, oil products are primarily used as an intermediate input into the production of other goods and services. For example, input use accounts for around 70–90 percent of total demand for oil products, with significant demand from the transport sector. Therefore, price increases indirectly affect the prices 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.

Impacts on households also depend on the importance of the affected commodities in their consumption baskets. Shares of cereals and edible oils in total food expenditure vary significantly across countries, ranging between 15 and 35 percent. Root crops are also important staples in most countries, allowing consumers to switch to these nontraded foods when cereals prices rise. IFPRI's models measure incomes and food and nonfood expenditures for different population groups, and link to survey-based microsimulation models that track consumption patterns of individual households. Unpacking populations is crucial since expenditure patterns vary by population subgroups. Cereals and edible oils, for example, are often important in the consumption baskets of poorer or rural households.

Unless existing fertilizer subsidy programs are designed to cushion the effect of price shocks, rising fertilizer prices will likely 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 lower their fertilizer application rates. Farm survey data and informed views of national agricultural experts show that fertilizer adoption rates vary significantly across countries. Farmers in Asian countries such as Bangladesh and Cambodia tend to have higher fertilizer adoption rates than their African counterparts. Adoption rates also vary widely among African countries, with relatively higher adoption rates in Ethiopia, for instance, and very low adoption rates in Uganda. Fertilizer adoption rates also vary significantly across crops within a country. In most countries included in our analysis, adoption rates are generally higher for major grain crops and export crops compared to root crops. This reflects the higher

commercial value of grain and export crops. In some countries, it is also a result of fertilizer subsidy programs that target key staples or export crops. Taking Ethiopia as an example, the fertilizer adoption rate for maize, wheat, and teff is around 90 percent, while the adoption rate is only around 30 percent for sorghum and millet.

In addition to the direct impact of higher fertilizer prices on production costs, we model an additional impact channel where changes in fertilizer quantities affect productivity (or crop yields) directly. Since the precise quantities of fertilizer applied to crops and yield responses to changes in fertilization rates are difficult to estimate, especially for smaller crops or on plots that are intercropped, we adopt a conservative set of assumptions to estimate potential yield losses associated with the rise in fertilizer prices. First, we assume a price elasticity of farmers' demand for fertilizer of −0.15, meaning a 100 percent increase in the price of fertilizer leads to a 15 percent decline in fertilizer use. Second, we assume crop yields on plots that are fertilized are 20 percent higher than on unfertilized plots. Given crop-specific estimates of the share of land that is fertilized, we can estimate the change in fertilizer use and yields on fertilized plots as well as the average productivity change in each agricultural subsector under the assumption that yields on unfertilized plots are unaffected.[3]

A key variable in this equation is the fertilizer price change. While in the initial simulation shock the international (real) price for fertilizer is doubled for all countries (Figure 1), the change in the domestic price of fertilizer differs by country depending on whether fertilizer is also produced domestically. Domestically produced fertilizer accounts for a small amount of fertilizer supply in most countries. Zambia, for instance, relies entirely on imported fertilizer, and hence the domestic price of fertilizer also doubles. In Egypt, on the other hand, about 96 of fertilizer supply is from local production, resulting in domestic fertilizer prices rising by only 27 percent, on average.

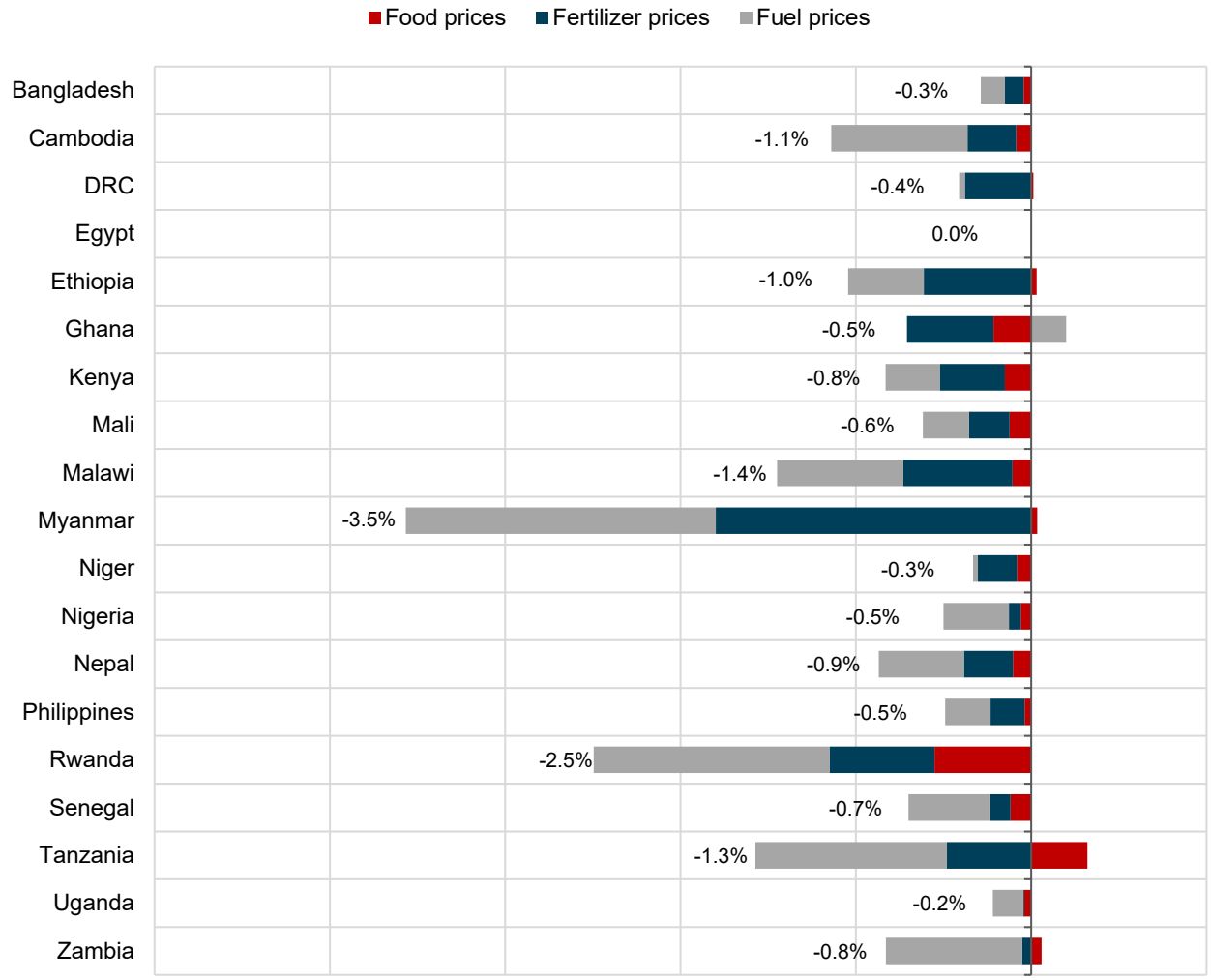
Several scenarios are designed to simulate the effects of higher world prices (see Figure 1) and productivity losses from reduced fertilizer use (as discussed above). These are: (1) *food price shocks*: rising import and export prices for maize, wheat, and edible oils, and declining import and export prices for rice; (2) *fuel price shocks*: rising import and export prices for crude oil and oil products; and (3) *fertilizer price shocks*: rising fertilizer import prices combined with lower crop yields due to the resulting reduction in fertilizer use. The combined effect of all three impact channels is also simulated. The simulation results apply to the current growing season in 2022. As such, the results should be interpreted as "medium-term" impacts, that is, the period after the initial direct and indirect (spillover) effects across sectors and households have occurred but before government introduces any mitigative policies or the private sector adjusts its investments in response to the crisis. Simulation results are presented next.

## 2. Impacts on Economies and Agrifood Systems

**The impact of the world price shocks on GDP varies across countries but is generally modest**. Figure 2 presents changes in GDP associated with the various impact channels. Real GDP falls by less than 1 percent in 12 of the 19 countries and has a negligible and close to zero impact in Egypt, a country that exports natural gas, refined petroleum products, and fertilizer. The biggest losses occur in Rwanda (2.5 percent) and Myanmar (3.5 percent). On average, fuel price increases are the biggest contributor to GDP losses, followed by fertilizer price increases and their associated productivity shocks. Higher fuel prices cause domestic costs of production to increase, resulting in a decline in demand for domestically produced goods.

[3] 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].

***Figure 2. Percentage change in national GDP due to world price shocks, by country***

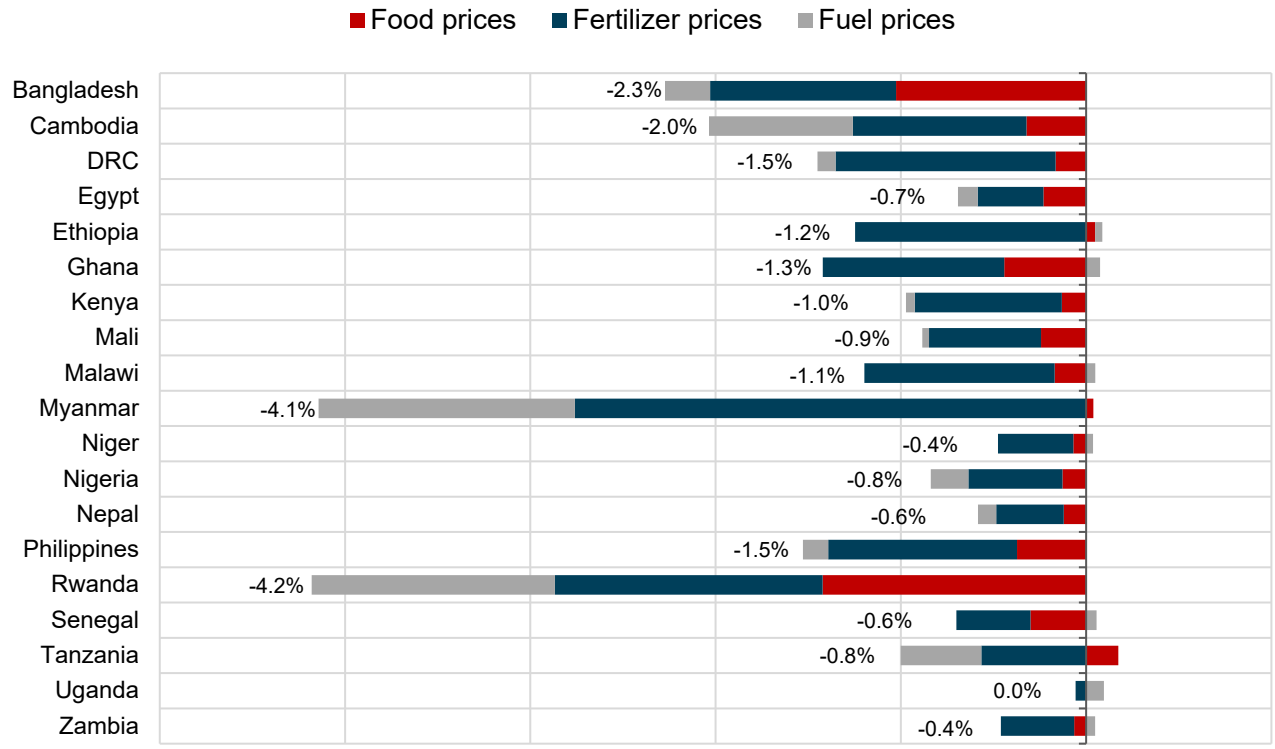



Source: Simulation results from IFPRI's RIAPA model.

**Rising food prices only have a minimal impact on GDP**. On average, food price shocks cause less than a 0.1 percentage point decline in GDP, while in countries that export maize, wheat, or oilseeds, or where agricultural exports are an important source of foreign exchange earnings (for example, Ethiopia or Tanzania), rising food prices contribute positively to GDP. Of course, rising fuel and fertilizer prices will cause agricultural costs of production to increase and productivity to decline, and hence contribute indirectly to domestic food price increases. Therefore, even though the *direct* impact of global food price shocks is limited, the combined effect of global food, fuel, and fertilizer price increases on domestic food prices is likely to be significant. We revisit food prices further below when we discuss impacts on undernourishment and diet quality.

**Global price shocks have a larger impact on agrifood system GDP than on total GDP**. Figure 3 shows the changes in agrifood system GDP. The agrifood system includes primary agriculture, agro-processing, and food-related trade, transport, and other services. With a few exceptions, the decline in agrifood system GDP is generally larger, in relative terms, than the decline in total GDP. Whereas 10 countries experience declines in agrifood system GDP of more than 1 percent, only 6 countries see their total GDP fall by more than 1 percent.

***Figure 3. Percentage change in agrifood system GDP due to world price shocks, by country***



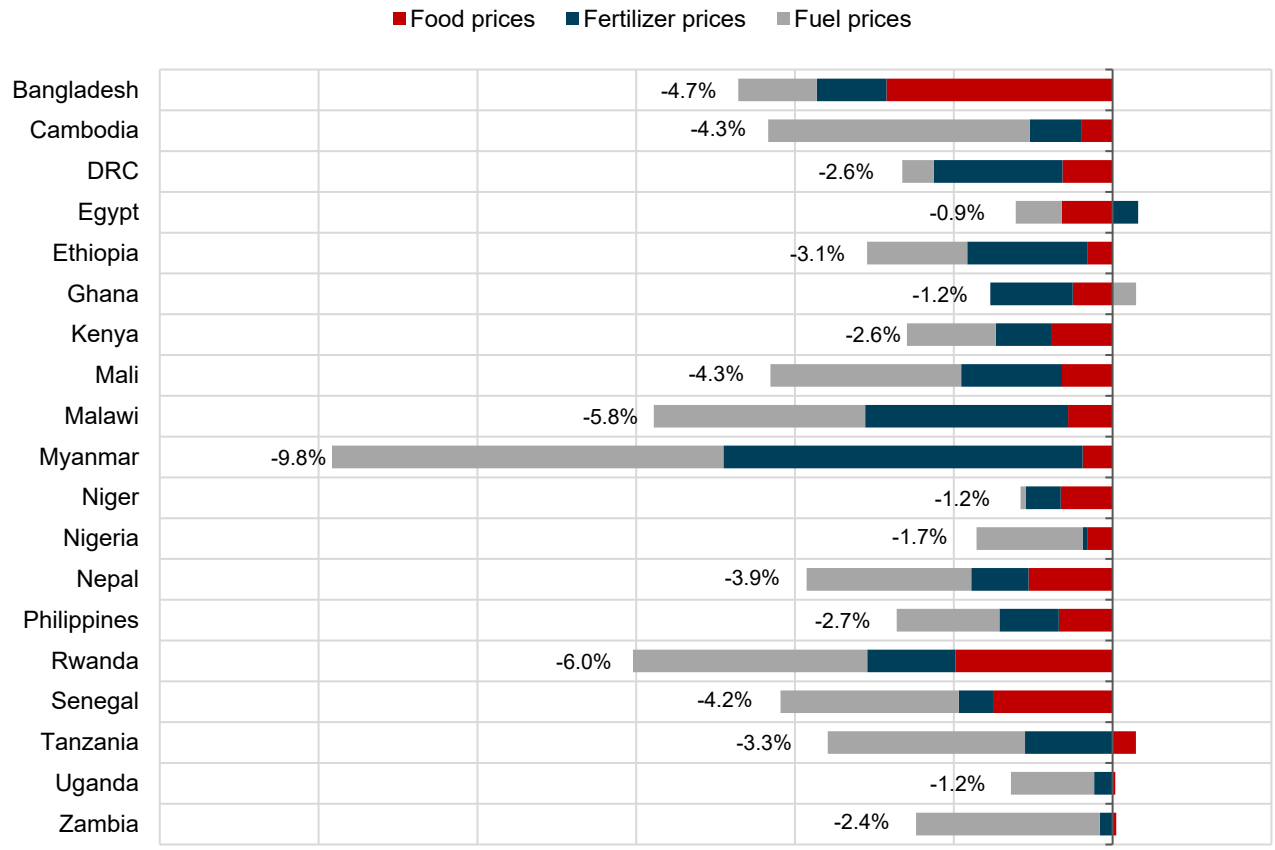

Source: Simulation results from IFPRI's RIAPA model.

**Different impact channels affect different parts of the agrifood system**. On average, the fertilizer shock is the most important driver of agrifood system GDP losses, mainly because this impact channel entails direct shocks to agricultural costs of production and productivity. This indirectly leads to disruptions in downstream agrifood supply chains. By comparison, the impacts through the fuel and food price channels are more concentrated in other parts of the agrifood system. For instance, food price shocks have a disproportionate impact on agro-processing as they raise costs of imported inputs (for example, wheat grain that is milled domestically). Rising fuel prices, on the other hand, will likely have a disproportionate effect on the food transport sector. In some instances, however, primary agriculture may also be affected by these impact channels. For example, rising food prices may *benefit* primary agriculture as consumers and processors switch to locally produced agricultural outputs. Conversely, in countries where agriculture is characterized by intensive use of fuel-powered tillers, tractors, or irrigation, fuel prices may have a direct negative impact on agricultural production costs.

## 3. Impacts on Household Consumption

**Household consumption falls by more than GDP.** National consumption spending, which includes the value of home consumption, falls in all 19 countries. The percentage decline in consumption is larger than that in GDP because many households are hit twice, by rising prices and falling incomes. Moreover, food expenditure accounts for a much larger share of household consumption than food production accounts for in GDP. Because of this, rising food prices are relatively more important in explaining declines in consumption than in explaining GDP losses. The combined effect of food, fuel, and fertilizer shocks causes household consumption to fall by more than or close to 3 percent in 13 countries (Figure 4).

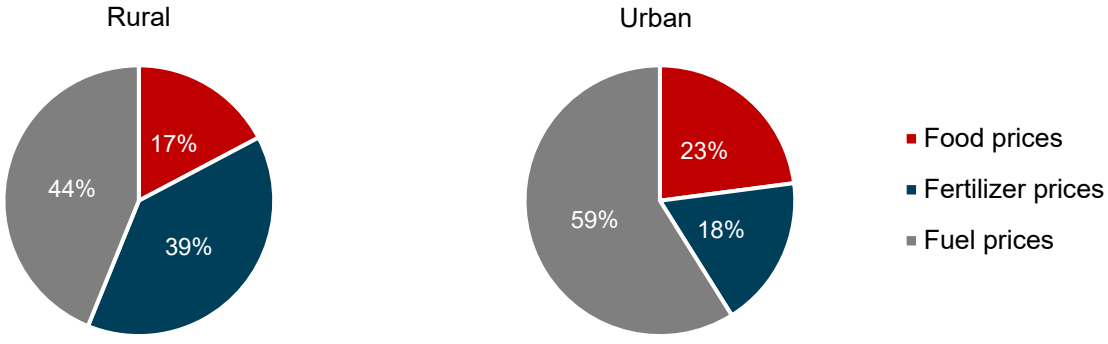
***Figure 4. Percentage change in real household consumption due to world price shocks, by country***




Source: Simulation results from IFPRI's RIAPA model.

Although both rural and urban households are negatively affected by global price shocks, rural households suffer larger consumption losses in most countries. Around 39 percent of rural households' consumption loss is caused by the fertilizer shock, compared to just 18 percent for urban households. This reflects rural households' reliance on agriculture as a source of income. On the other hand, rising fuel prices explain 59 percent of the consumption loss experienced by urban households, compared to only 44 percent for rural households. This is because urban households' consumption baskets are more energy intensive (Figure 5).

***Figure 5. Average contribution of world price shocks to declines in household consumption in rural and urban areas (average across all countries)***



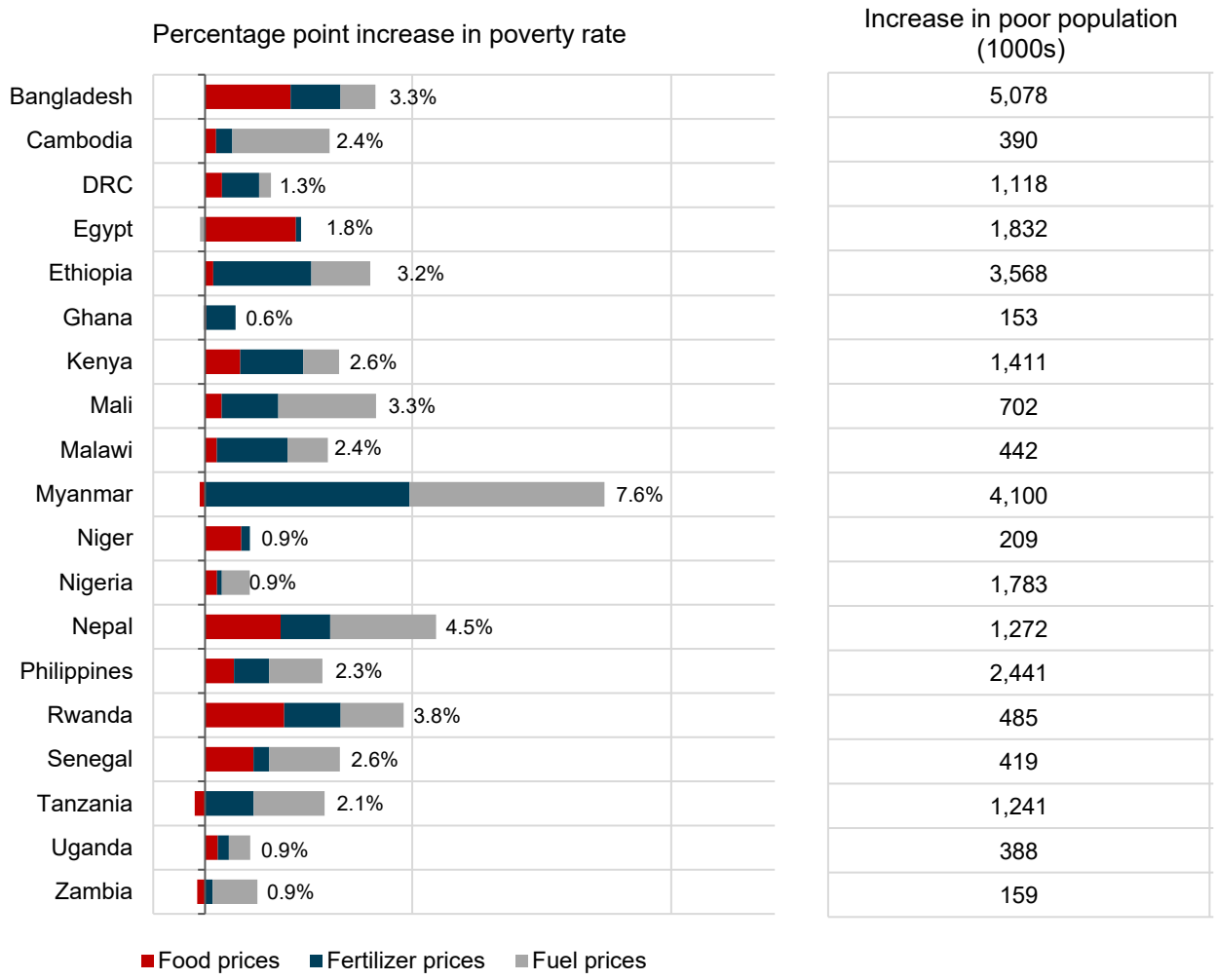

Source: Simulation results from IFPRI's RIAPA model.

## 4. Impacts on Poverty

**Falling household consumption contributes to a rise in poverty in all countries.** The poverty assessment in this study is done using survey-based microsimulation models linked sequentially to the economywide models. Each country's economywide model has 15 representative household groups, grouped into rural farm, rural non-farm, and urban households, and split by expenditure quintile. Sampled households in a household income and expenditure survey are mapped to the 15 representative household groups in the model. The modeled impacts of the global price shocks on consumption expenditure of the 15 representative household groups are then transferred to the individual households in the survey, and the microsimulation model computes associated changes in the poverty status of individual households. The US$1.90 international poverty line is used for all countries to facilitate cross-country comparisons.

The global price shocks raise national poverty headcount rates in all countries, by as much as 7.7 percentage points in Myanmar, and less than 1 percentage point in Ghana, Niger, Nigeria, Uganda, and Zambia (Figure 6). These increases in poverty equate to an additional 27.2 million people falling below the poverty line across the 19 countries covered in the analysis.

***Figure 6. Impact of world price shocks on national poverty headcount rates and associated increase in poor population, by country***

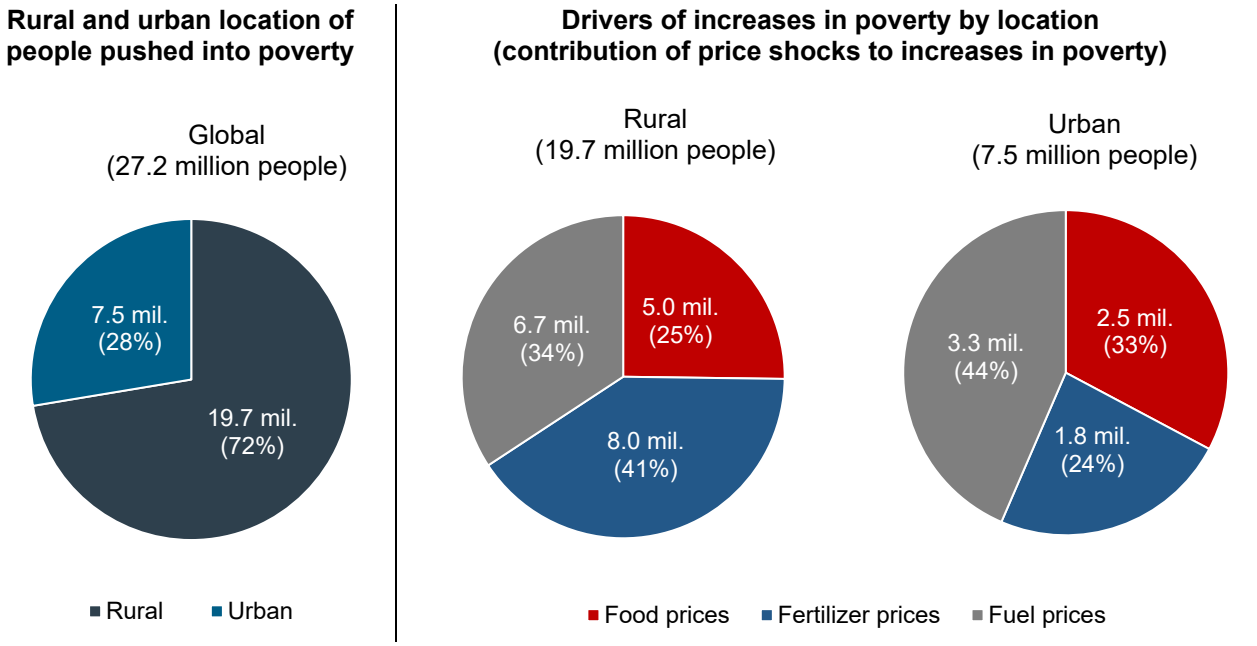



Source: Simulation results from the survey-based microsimulation module within IFPRI's RIAPA model.

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

Across the 19 countries, around 72 percent of the 27.2 million people who fall into poverty live in rural areas (Figure 7). This partly reflects the higher rural population share, as well as the higher initial rural poverty rate. Consistent with the consumption shocks discussed earlier, the drivers of changes in poverty differ between rural and urban areas. Across the 19 countries, increases in rural poverty are driven relatively more by the fertilizer shocks, while in urban areas, the fuel shocks play a relatively more important role.

***Figure 7. Increase in poor population by rural-urban location and drivers of poverty globally across all countries***

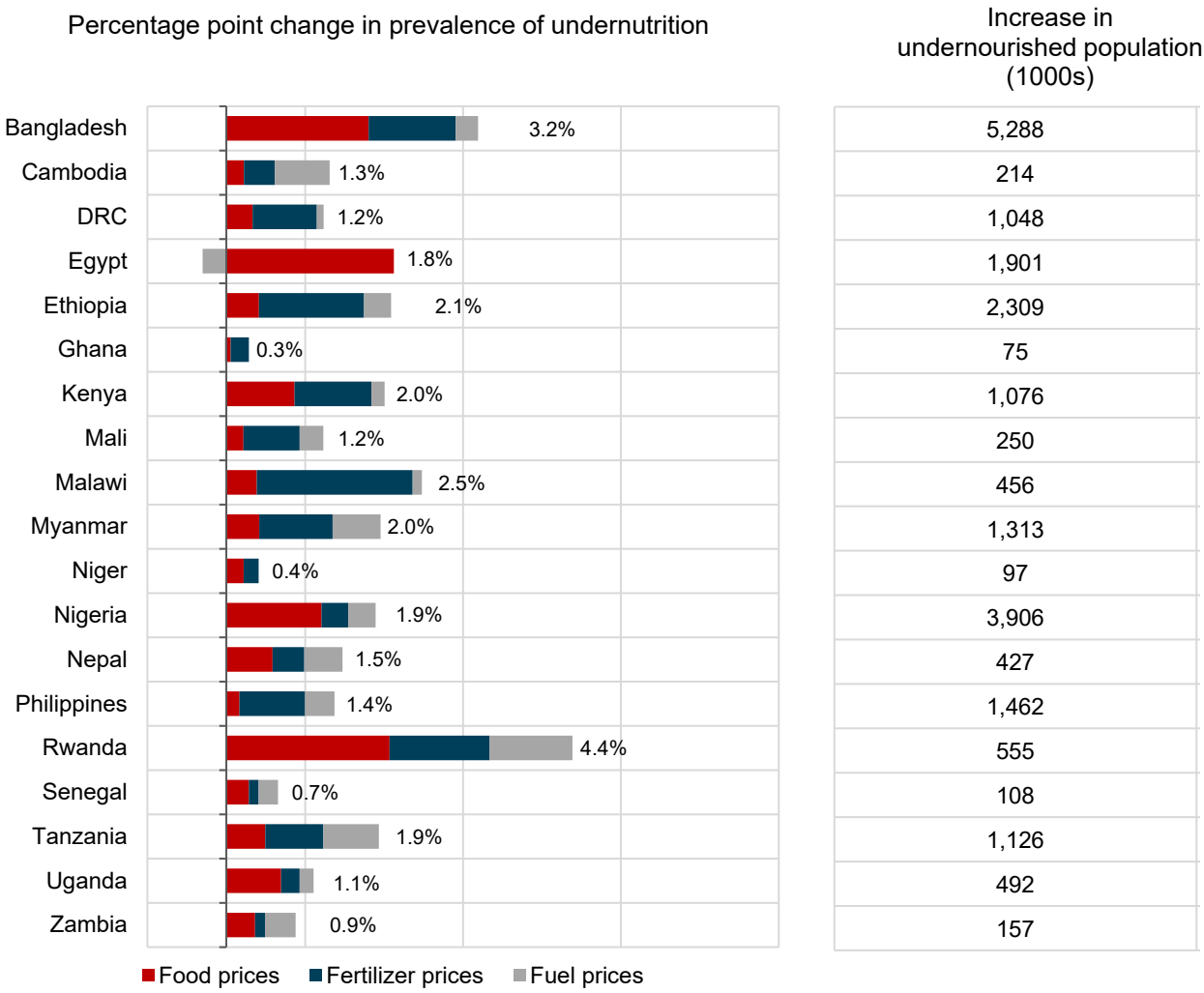



Source: Simulation results from the survey-based microsimulation module within IFPRI's RIAPA model.

## 5. Impacts on Food Security and Diets

**Hunger becomes more pervasive.** A person is deemed undernourished when he or she consumes fewer calories than what is required for a healthy life. With falling household consumption and rising poverty, the prevalence of undernourishment rises in all 19 countries, with increases in the range of 0.3 to 4.4 percentage points (Figure 8). In total, 22.3 million additional people become undernourished due to the global price crisis.

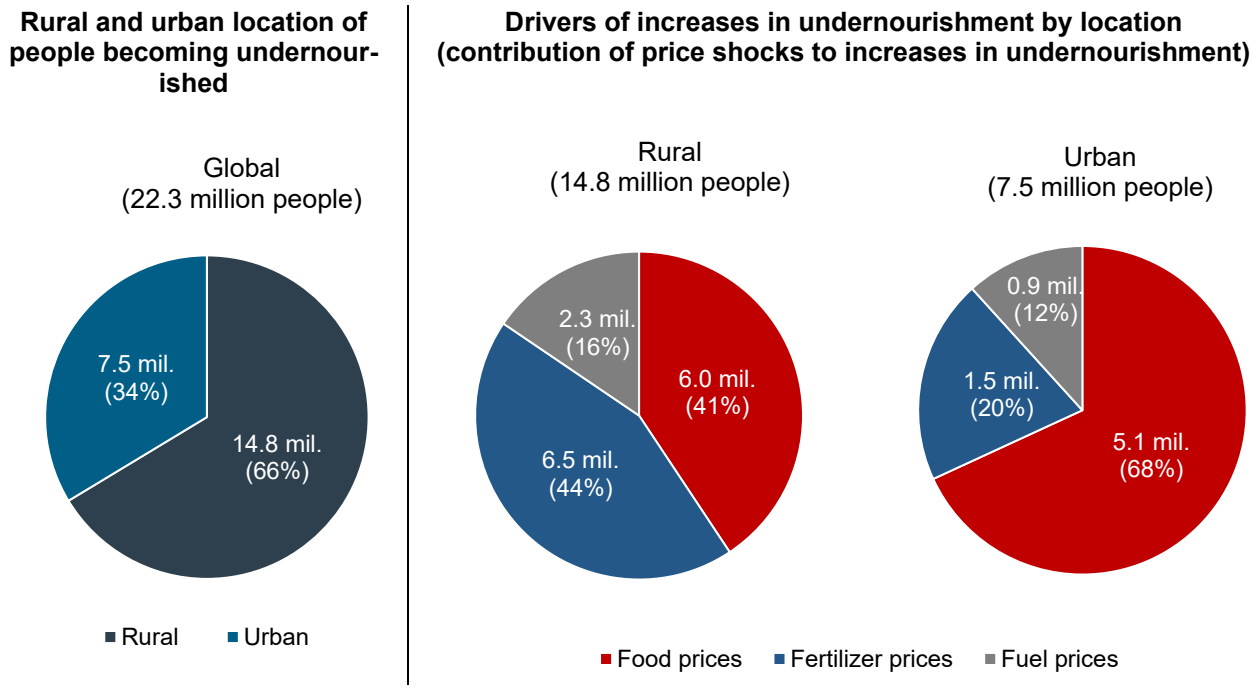
***Figure 8. Impact of world price shocks on prevalence of undernutrition and associated increase in undernourished population, by country***




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

As in the case with poverty, most people who become undernourished (66 percent) live in rural areas (Figure 9). Rising food prices are an important driver of rising undernourishment in both rural and urban areas. They are also more important in explaining increases in undernourishment than they are in explaining declines in consumption and rising poverty, especially in urban areas, where they explain 68 percent of the increase in undernourishment. This reflects urban households' greater reliance on imported and processed foods. As in the case of poverty, higher fertilizer prices are an important driver of the rise in prevalence of undernourishment in rural areas, explaining around 44 percent of the increase.

***Figure 9. Increase in undernourished population by rural-urban location and drivers of undernourishment globally across all countries***




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

**Diet quality deteriorates for many households.** Diet quality is another important indicator of households' food and nutrition security status. The diet quality indicator used in this analysis is based on whether a household's food consumption meets the recommended calorie intakes for six food groups. These reference calorie intakes are defined by the healthy reference diet developed by the EAT-Lancet Commission.[4] The food groups include staples (cereals and roots), fruits, vegetables, dairy, protein foods (animal-sourced and plant-based) and added fats (which includes edible oils). As with the poverty assessment, a survey-based microsimulation tool measures changes in the number of people who are diet deprived. 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 accessed a healthy diet, with most failing to consume enough calories from food groups such as vegetables, dairy, and protein foods. Many households also consume more than the recommended number of calories from staple foods. Households may therefore be deemed to have poor quality diets even if they are not undernourished. In Ghana, for example, the average person suffers an average of 4.3 deprivations out of the 6 required food groups. Diets might deteriorate for several reasons. First, a decline in disposable incomes will make healthy diets less affordable and cause more people to be diet deprived. Likewise, an increase in the relative price of food will negatively affect the affordability of food, leading to an increase in diet deprivation. Lastly, relative changes in the costs of different food groups may cause changes in food consumption patterns. As consumers shift consumption away from more expensive food groups and toward relatively cheaper groups, the rates of diet deprivation will change in the respective food groups. The net effect of diet quality depends on the relative magnitude of the consumption shifts relative to the calorie thresholds.

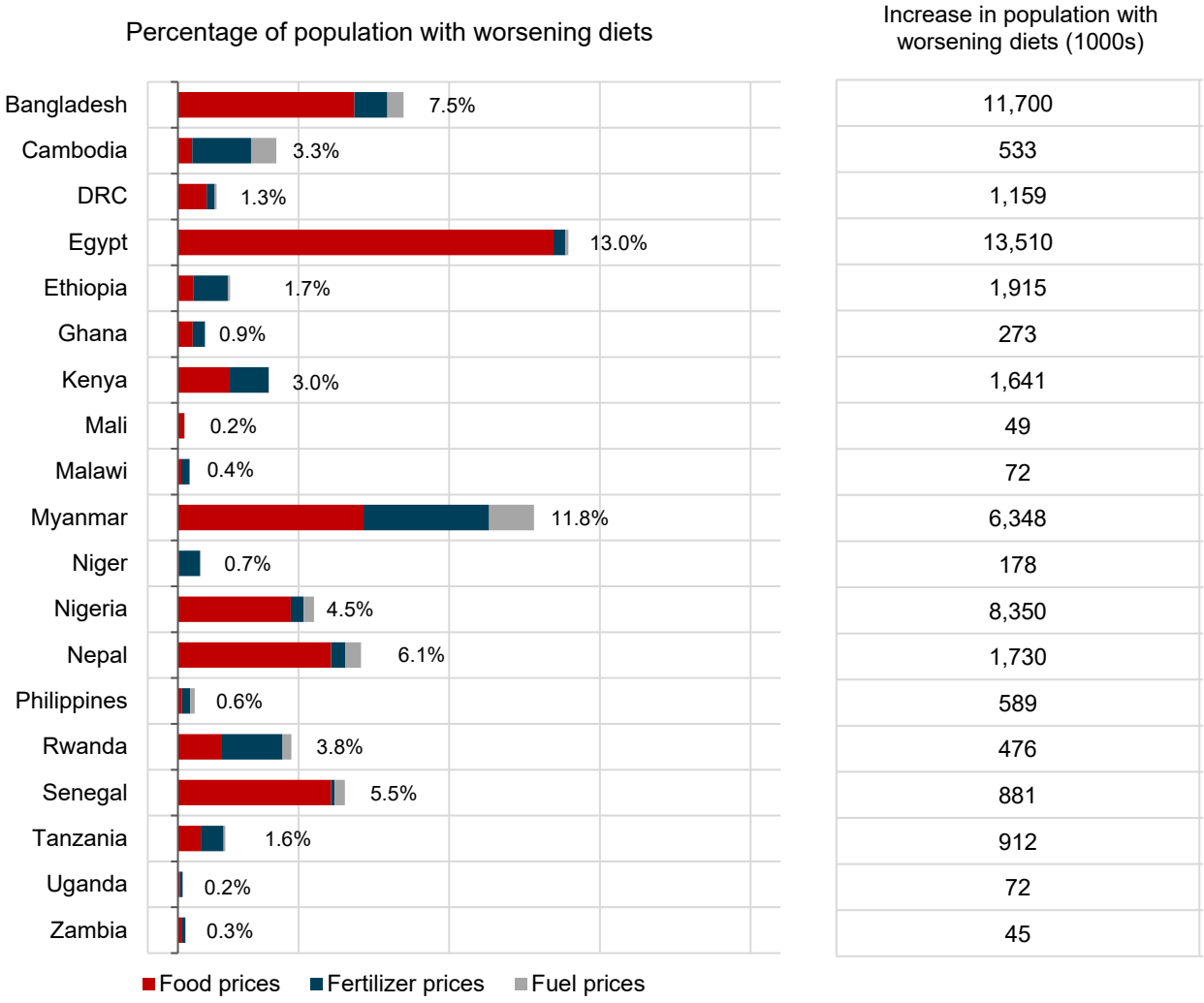
As previously highlighted, household disposable incomes decline across all countries. The diet analysis reveals that the cost of a healthy diet also increases in real terms in most of the countries studied, with the largest increase in the Philippines (4.7 percent). Exceptions are Bangladesh, Mali,

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

Myanmar, and Nepal, where real diet costs decline slightly (that is, food prices decline relative to nonfood prices). The largest decline is in Myanmar, where the real cost of a healthy diet declines 2.4 percent. The cost of the added fats food group consistently increases across all countries due to the edible oils price shock and is an important driver of the increase in the cost of the healthy reference diet. There is no consistency across countries in terms of movements in the cost of other food groups, except that in all countries the real cost of at least one food group, but typically three or four food groups, declines relative to the other food groups.

The expectation is that the combined effect of declining disposable incomes and increases in diet costs (in most countries) will cause diet quality to deteriorate. Relative food price changes, in turn, will further encourage shifts in food consumption, which may or may not contribute further to a decline in diet quality. Figure 10 reports the percentage of the population in each country that experiences worsening diets, that is, these are the shares of the population that become deprived in at least one additional food group because of the crisis. The figure also shows the associated number of people who experience worsening diets. Across the 19 studies included in the analysis, an additional 50.4 million experience a decline in diet quality because of the global food price shocks.

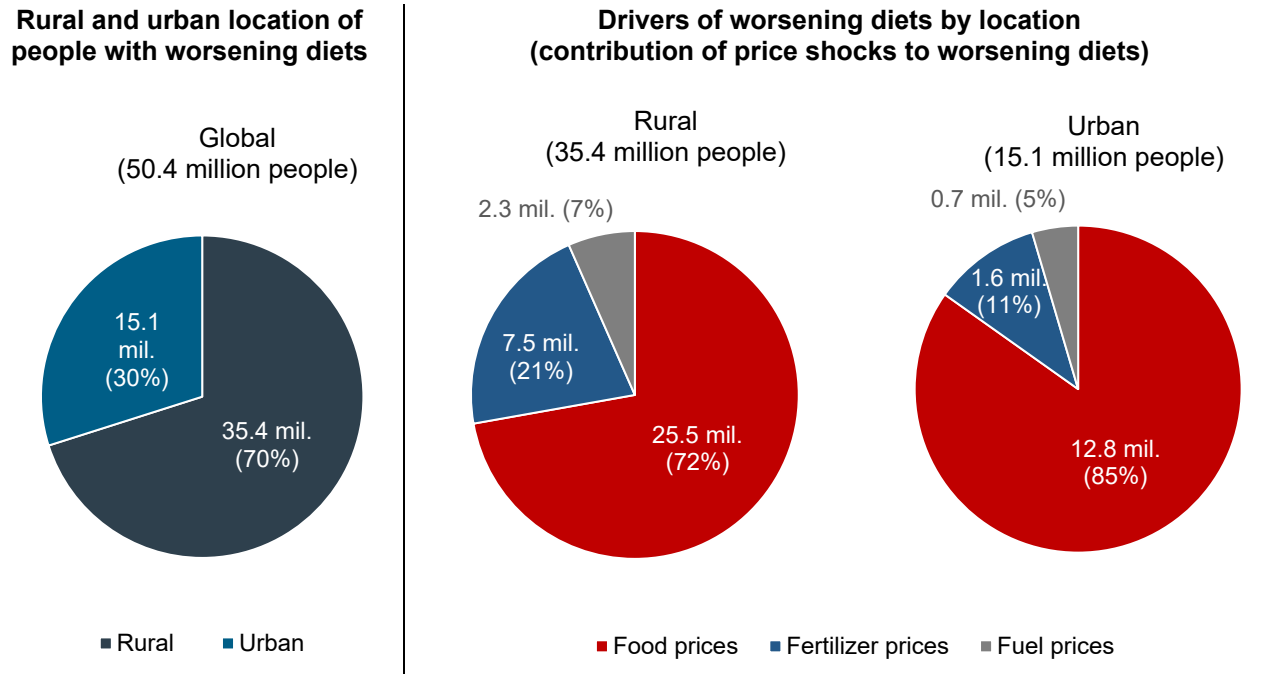
***Figure 10. Impact of world price shocks on worsening diets and associated population estimates, by country***




Source: Simulation results from the survey-based microsimulation module within IFPRI's RIAPA model.
Note: A household's diet, defined in terms of consumption in six food groups, is deemed to have worsened if the household becomes deprived in at least one additional food group. Deprivation in a food group implies the household fails to achieve a reference quantity of calories from that food group. Reference calorie intakes are based on the EAT-Lancet healthy reference diet.

Around 70 percent of those who experience worsening diets live in rural areas (Figure 11). Rising global food prices overwhelmingly contribute to worsening diets, explaining about 72 percent of the increase in the population with worsening diets, and 85 percent in urban areas. The fertilizer shock is a relatively important driver of worsening diets in rural areas.

***Figure 11. Increase in population with worsening diets by location and drivers of worsening diets globally across all countries***




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

## 6. 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 individual countries' economies and populations. Results from 19 country studies, each published as an individual country brief, were synthesized in this brief. The populations of these countries make up about 45 percent of the global population in low-income and lower-middle-income countries (excluding India).

The economywide models allow us to trace the direct and indirect effects of rising world prices on domestic economies, taking account of structural features and characteristics of those economies that ultimately determine the severity of the shock and help explain differences in impacts across countries. Some of the important economic characteristics driving results include, for example, the share of imports in total product supply; the importance of affected sectors and commodities for employment, income, and consumption; and farmers' responses to rising fertilizer prices and the knock-on effect this may have in future agricultural cropping seasons.

We find that there is large variation across countries in the impact of the recent global crises on total GDP. In most countries, national GDP losses are modest. GDP losses, however, are more significant within the agrifood system of the economy. The agrifood system includes primary agriculture as well as off-farm food processing and food-related trade, transport, and services sectors. In most countries, rising fuel prices and fertilizer shocks are the most important drivers of losses in national and agrifood GDP, with rising food prices playing a less important role. This reflects the fact that

wheat and edible oils, with some exceptions, are not typically important items in households' consumption baskets in the countries assessed. In fact, in some countries, particularly those that export maize, wheat, oilseeds, and other agricultural products, rural farmers may even benefit from higher prices for agricultural products, although the net effect on their welfare is consistently negative once we also account for the effects of higher fertilizer prices, reduced fertilizer use, and lower agricultural productivity.

With respect to household consumption, the country studies show that consumption falls in all countries, including the countries that benefit modestly from exporting natural gas and crude oil. Moreover, consumption impacts are generally larger than the impact on national GDP, with both rural and urban households adversely affected by the crisis. In contrast to what we observed for GDP, rising food prices are an important driver of declines in consumption in most countries, while rural populations are generally also affected by the fertilizer shocks, which impact directly on agricultural productivity and rural incomes. Fuel prices, on the other hand, have a relatively stronger adverse impact on nonagricultural sectors and urban households' consumption.

Falling household consumption leads to greater poverty in all countries, with an additional 27.2 million people being pushed into poverty by the global crisis across the 19 countries. The majority of those that fall into poverty live in rural areas, although urban poor populations are also impacted. Consistent with the consumption result, rising food prices are an important driver of rising poverty in both rural and urban areas. Similar results are seen for food security. An additional 22.3 million people become undernourished, that is, they fail to obtain sufficient calories, mainly because of rising food prices. We further find that 50.4 million people – approximately 4 percent of the total population across all 19 countries – become deprived in at least one additional food group, which we interpret as a deterioration in diet quality.

The analysis presented here represents the first phase of a larger study. This phase does not take into consideration any government interventions designed to mitigate the effects of these shocks. Instead, this phase is meant to gauge the vulnerability of countries and population groups across many developing countries with significant differences in terms of economic structure and population welfare levels. In a second phase of the analysis, we simulate the mitigating effects of different policy and investment options, including fertilizer policies designed to lower costs or raise efficiency of fertilizer use; tax policies that eliminate import tariffs and reduce domestic taxes on key food items; and cash transfers targeting the poor. The second phase also considers possible synergies and trade-offs between these policy responses and what they imply for government budgets and longer-term development goals.

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