

COUNTRY BRIEF 26

Poverty Impacts of Food Price Increases in Nigeria

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The prices of staple grains on international markets began to rise in mid-2020 in response to higher fertilizer prices and supply constraints associated with the Covid-19 pandemic. They further spiked in early 2022 following the invasion of Ukraine by Russia. This brief examines the impact of these events on poverty in Nigeria. It is part of a series of six such briefs that estimate the poverty impact of higher world prices for staple grains. The other briefs cover Kenya, Ethiopia, Burkina Faso, Niger and Mali (see Minot and Martin, 2023a and 2023b; Martin and Minot, 2023a, 2023b, and 2023c).

The methodological approach is similar in all six country studies. First, we examine the effect of the increases in international cereal prices on the real price of key grains in the domestic markets of the country. Second, we estimate the impact of the changes in domestic grain prices on the real income of each household using nationally-representative survey data, taking into account the importance of the commodities in consumption and as a source of income for each household. Finally, we estimate the changes in headcount poverty (the share of people living below the poverty line) based on the changes in real income for each household in the sample. We focus on the prices of maize, wheat, and sorghum for reasons discussed below.

1. Trends in international grain prices

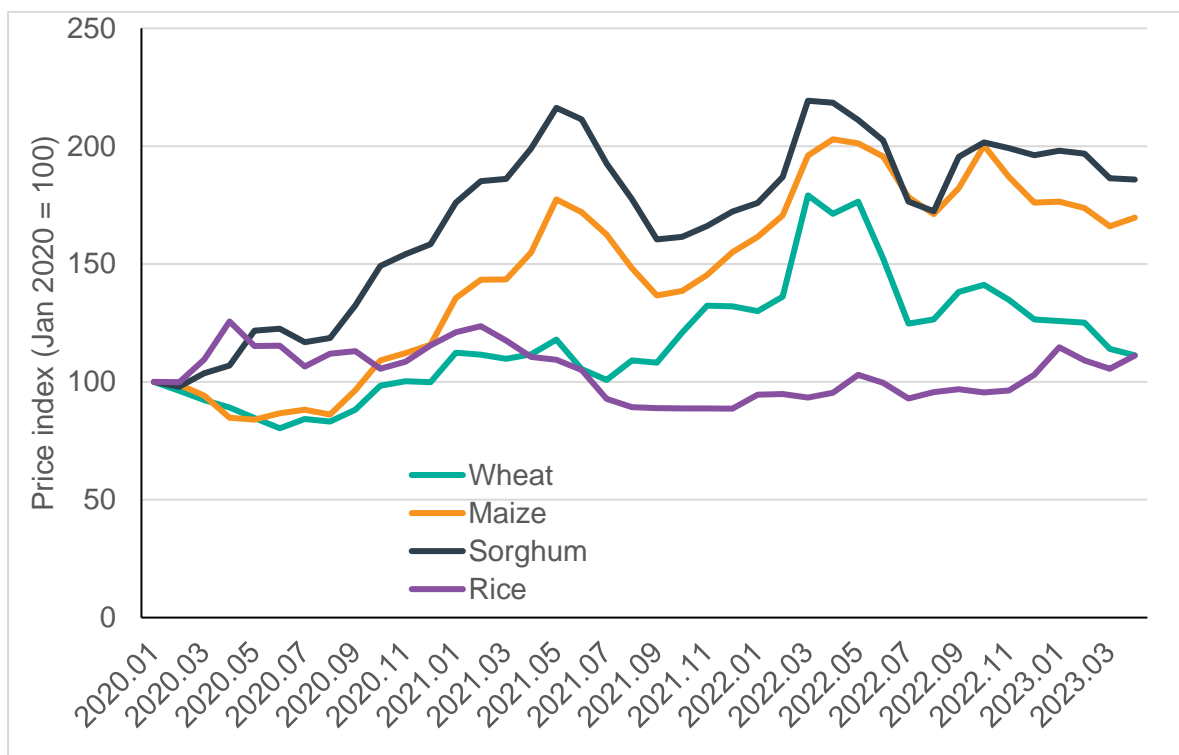
After a period of relative stability, commodity prices began to rise in the wake of the Covid-19 epidemic, although the pattern and timing differed across commodities. Figure 1 shows trends for reference prices of wheat, maize, sorghum, and rice in exporting countries. The price of US soft red winter wheat fell somewhat in the first half of 2020, but then rose fairly steadily over the next 18 months. By February 2022, it was 36 percent above the pre-pandemic level (January 2020). In March, following the invasion of Ukraine by Russia, the wheat price spiked to 79 percent above the pre-pandemic level based on the fear that the war would impede exports from both countries, which together account for 25 percent of world wheat exports. Prices remained high for several months but began to decline in June 2022, as it became apparent that war-related effects on grain exports were less than expected. By April 2023, the international price of wheat was just 11 percent above the pre-pandemic level.

Maize prices, represented by US No 2 yellow maize, followed a similar pattern, though the increase was greater, as shown in Figure 1. It spiked once in May 2021 at 77 percent above the pre-pandemic level, and again after the invasion of Ukraine, when it reached double the pre-pandemic price. Unlike the wheat price, the maize price has remained high. As of April 2023, the maize price was still 70 percent above the pre-pandemic level.

The international price of sorghum rose even more than wheat or maize, reaching 116 percent above the pre-pandemic price in May 2021 and again in March 2022 following the invasion. Although the price has declined somewhat since then, it was still 86 percent above the pre-pandemic price in April 2023. Russia and Ukraine are not important exporters of sorghum, but sorghum prices typically follow maize prices because they are close substitutes as animal feed.

Somewhat surprisingly, the price of Thai 100% B rice has remained relatively stable throughout the Covid-19 pandemic and during the war in Ukraine. The war had little effect on the production or transport of rice in world markets, much of which is centered on Asia. Rice prices began to creep up in early 2023 but were just 11 percent above the pre-pandemic level in April 2023.

Figure 1. World prices of selected grains (January 2020=100)



Source: FAO Global Information and Early Warning System. FAO (2023). Note: Wheat prices are for US soft red winter wheat. Maize prices are for US No. 2 yellow maize. Sorghum is represented by US sorghum prices at Gulf Ports. Rice prices are for Thai 5% broken rice.

2. Grain prices in Nigeria

What matters to farmers and consumers in Nigeria is not the trends in international markets, but the prices they face in domestic markets. Thus, the question is how much of the shocks in international markets are transmitted to domestic grain markets in Nigeria? Without an international price shock, we would expect domestic prices to rise at the rate of inflation in the country. An increase in international prices should cause domestic prices to rise faster than inflation; that is, it causes the real

(inflation-adjusted) domestic price to rise. Econometric analysis suggests that shocks in international food prices are generally not fully transmitted to domestic markets, implying that domestic prices generally rise by a smaller proportion than the increase in international prices of the same commodity (Minot, 2011; Ceballos et al., 2017). There are several reasons for this. First, if the marketing margin between international and domestic prices is fixed in monetary terms, the domestic prices in an importing country (which are generally higher than international prices) will rise by a smaller percentage than the international price. Second, local and imported grains may be somewhat different to consumers, making them imperfect substitutes for each other. Third, the government may reduce tariffs when world prices increase, thus insulating domestic consumers from the full shock (Martin and Minot, 2022).

Table 1 shows the changes in the world price (expressed in US\$), local nominal prices, and the local real price for three staple grains: wheat, maize, and sorghum. Rice is not included in the analysis because international prices have been relatively stable. The analysis covers four time periods: February 2020 (pre-pandemic), January 2022 (pre-invasion), May 2022 (peak international prices), and July 2022 (post-peak). The analysis does not extend beyond July 2022 because, as shown in Figure 1, the world prices of wheat, maize, and sorghum in the second quarter of 2023 have remained in the same broad range as they were in July 2022.

Because wheat prices are not available for Nigeria, we use the retail price of bread. Between February 2020 and May 2022, when international prices peaked, the world price of wheat rose 76 percent, before falling back somewhat, remaining 25 percent above the pre-pandemic price.

Table 1. International and domestic cereal prices in Nigeria

Commodity	Price type	Price index (100 = February 2020)				Price transmission ratio
		Pre-Covid (Feb 2020)	Pre-invasion (Jan 2022)	Peak (May 2022)	Post-peak (July 2022)	
Wheat	World (US\$)	100	130	176	125	--
	Local nominal	100	86	102	104	--
	Local real	100	64	71	70	-120%
Maize	World (US\$)	100	161	201	178	--
	Local nominal	100	215	244	239	--
	Local real	100	160	170	162	79%
Sorghum	World (US\$)	100	205	229	190	--
	Local nominal	100	222	235	229	--
	Local real	100	165	164	156	62%

Source: IMF (2022) for international sorghum price. FAO (2023a) for others. The international prices are the US soft red winter wheat price, the US No 2 yellow maize price, and the US International Grain Council price of sorghum. The local prices are the retail price of bread in Damaturu, the wholesale price of white maize in Lagos, and the wholesale price of white sorghum in Lagos.

Over this period, the nominal price of bread in Nigeria was relatively stable, dipping prior to the Ukraine war and then rising back to the pre-pandemic level. Given that the inflation rate in Nigeria rose from 12 percent in early 2020 to over 20 percent in early 2023, this implies that the real (inflation-adjusted) price of bread actually fell by about 30 percent over the period. Because the world price of wheat increased and the domestic real price of bread fell, the price transmission ratio was -120 percent. The government of Nigeria faces considerable pressure from urban consumers to keep the price of bread low. Because Nigeria depends on imports for 90 percent of wheat products, both import and foreign exchange policies affect bread prices. Wheat and flour can be imported at the official exchange rate, which has become increasingly overvalued in recent years. Because exchange rate overvaluation creates shortages of foreign exchange, reflected in high parallel market exchange rates, a policy of supplying enough foreign exchange to meet market demand at the official exchange rate requires a strong bias in foreign exchange allocation in favor of wheat imports. This may have occurred and played a role in dampening price increases for bread.

In the case of maize and sorghum, the international price more than doubled between February 2020 and July 2022. The nominal price of these commodities in Nigeria also more than doubled, and the domestic real prices of maize and sorghum rose by 62 percent and 56 percent, respectively. As a result, the price transmission ratio was 79 percent for maize and 62 percent for sorghum, reflecting incomplete transmission of the international price shocks to domestic markets. This is not surprising given that Nigeria is essentially self-sufficient in both commodities, importing less than 2 percent of domestic requirements.

3. Income and spending patterns

How do staple food price changes affect household income? These impacts vary widely across households depending on the importance of the commodity as a source of income and its share in the household budget. Households that produce and sell the commodity gain from higher prices, while those that are net buyers lose. The percentage change in income will be proportional to the magnitude of the price change and the net sales of the commodity (positive or negative) as a share of income (Deaton, 1989).

The first column of Table 2 shows the importance of maize, sorghum, and wheat in the Nigerian diet. Maize is the most important of the three, contributing 12.3 percent of the calories on average. Maize is the second most important food in terms of caloric intake, after yams. After maize, cassava and rice are third and fourth in caloric contribution. The analysis does not consider yams and cassava because there is no international trade in yams and cassava for human consumption. Rice is excluded from the analysis because, as discussed earlier, international rice prices have been relatively stable over the period under consideration. Sorghum and wheat are the fifth and sixth most important items in the Nigerian diet in terms of caloric intake.

The second and third columns show the importance of each commodity as a source of household income and as a component in household budgets. The last column gives the net benefit ratio, defined as the income share minus the expenditure share, that is, net sales as a proportion of household income. The net benefit ratio can be interpreted as the short-run elasticity of real income with respect to price changes.

Table 2. Importance of selected commodities in caloric intake, income, and expenditure in Nigeria

	Caloric contribution to the diet (%)	Budget shares		
		Income share (%)	Expenditure share (%)	Net benefit ratio (%)
Maize	12.3	2.2	2.3	-0.1
Wheat	7.6	0.0	2.8	-2.8
Sorghum	8.3	1.1	1.6	-0.6

Sources: Caloric contribution from FAO Food Balance Sheets, 2021 (FAO, 2023). Budget shares from the Povana database (Mamun and Laborde, 2021). Includes derived products such as flour and bread.

Maize and sorghum show rough parity between income and expenditure shares, reflecting the fact that Nigeria neither imports nor exports large quantities of these commodities. On the other hand, wheat is important in expenditure but negligible as a source of income, which is expected given that 90 percent of the wheat and wheat products consumed in Nigeria are imported. Thus, average

household income is much more sensitive to changes in bread prices than changes in maize and sorghum prices. For maize and sorghum, the losses of consumers due to higher prices are offset by the gains to farmers who grow and sell it.

The impact of price changes on the incidence of poverty is particularly sensitive to the net benefit ratio of households near the poverty line. For these households, a price change may affect their income enough to nudge them above or below the poverty line. Low-income households generally spend a larger share of their budget on staple grains, but they are also more likely to be farmers. The effect on the net benefit ratio is, therefore, mixed.

4. Poverty impact of grain price increases

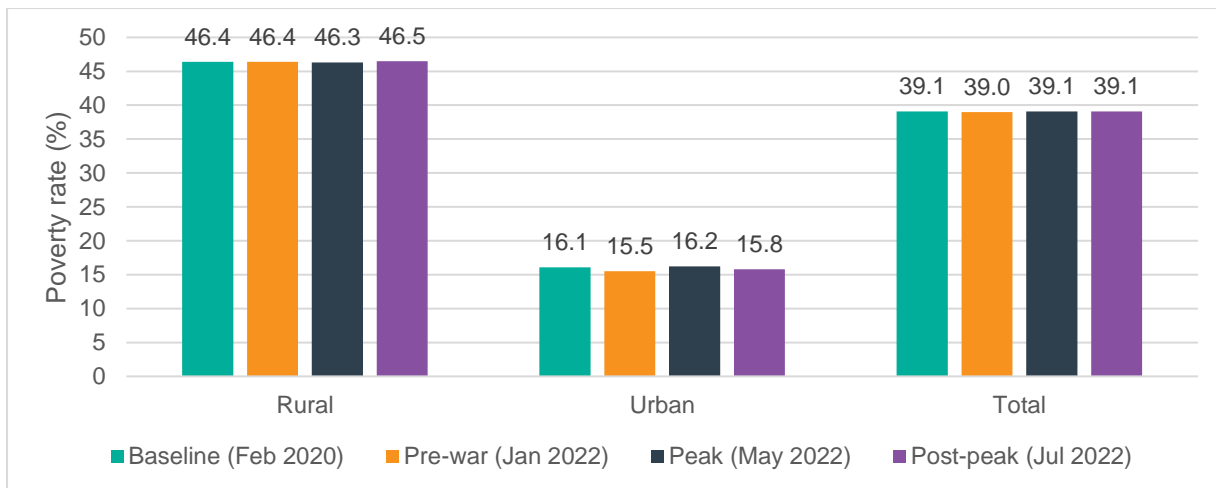
The simulation of the impact of staple food price changes on poverty in Nigeria is based on the real price changes of maize, sorghum, and wheat products in domestic markets combined with information about the income and expenditure patterns of each household in a nationally-representative survey. Real (inflation-adjusted) price changes are used to capture the impact of the rise in grain prices relative to the prices of other goods. The analysis does not attempt to measure the welfare impact of general inflation. Such an analysis would be challenging because of the need for data on which incomes and prices rise with inflation (such as agricultural prices) and which ones tend to lag behind inflation (such as formal-sector wages).

The results are shown below in Figure 2. Overall, the simulations indicate that the higher prices for maize, wheat, and sorghum in international markets have had little effect on the incidence of poverty in Nigeria. The national poverty rate remains close to 39.1 percent, while the rural poverty rate is stable close to 46.4 percent. The urban poverty rate actually declines slightly from 16.1 percent in the pre-pandemic period to 15.8 percent in July 2022. These results are unusual – in the other five countries where this analysis has been carried out, the poverty rate rises by 1-3 percentage points as a result of the higher staple food prices.

There are two explanations for these unexpected results. First, the net benefit ratios for maize and sorghum are close to zero for the average household and for households close to the poverty line. This means that the losses for consumers due to higher maize and sorghum prices are offset by benefits to farmers growing and selling these commodities. Second, in the case of wheat, the negative net benefit ratio suggests that higher prices for wheat products would reduce income and increase the prevalence of poverty. However, domestic policies have prevented the higher wheat prices from being transmitted to domestic Nigerian markets. More specifically, the government maintains the official exchange rate below the market rate, creating excess demand for foreign currency. It appears that wheat and flour importers may have been given valuable allocations of foreign currency at the low official rate, implicitly subsidizing bread prices. In September 2022, the official exchange rate was 460 naira/USD, while the parallel market rate was 715 naira/USD. Thus, the official rate was 64 percent below the market rate, the largest gap in six years (Mojeed, 2022).

These policies reduced the domestic real price of bread in spite of the rising international price of wheat. The lower price of bread is estimated to have actually reduced poverty in urban areas, thanks to the relative importance of bread in urban areas of Nigeria.

Figure 2. Impact of staple grain price changes on poverty in Nigeria



Source: Authors' calculations based on changes in real prices of maize, wheat, and sorghum and household income and expenditure patterns.

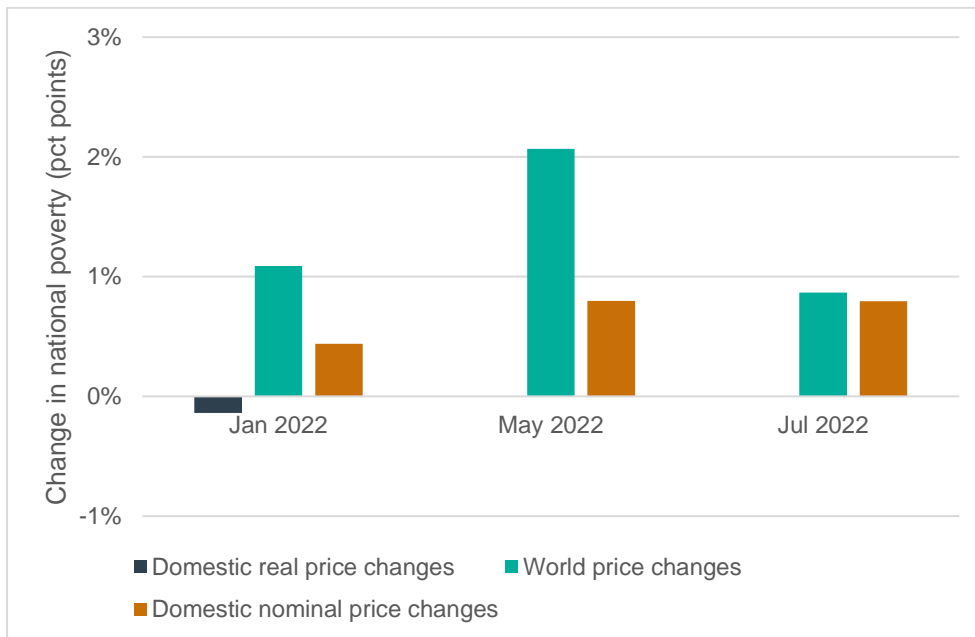
5. Sensitivity of results to alternative assumptions

In this section, we compare the main results from Figure 2 with the poverty impact under two alternative sets of assumptions. We estimate the impact on poverty 1) if the world price shocks in the three commodities had been fully transmitted to domestic markets and 2) if we included both the increase in the real price and the increase due to inflation for the three commodities, while also assuming that other prices and income are fixed in nominal terms.

As discussed earlier, the shocks in international prices are frequently not fully transmitted to domestic markets. What would the poverty impact be if the international price shocks were fully transmitted, that is, if the domestic real prices of wheat, maize, and sorghum rose in the same proportion as international prices did? Figure 3 compares the estimated actual change in poverty from Figure 2 (in green) with the hypothetical change in poverty assuming full transmission of shocks (in blue). While the estimated impact on poverty in Nigeria was almost negligible, if international price changes for the three staple food commodities had been fully transmitted to domestic markets, the impact on poverty would have been substantial. More specifically, the national poverty rate would have increased by 1 percentage point in February 2022, just before the invasion of Ukraine, and an additional 1 percentage point in May 2022, when world prices peaked, before subsiding as international prices declined. The bulk of this increase in poverty would have been due to the increase in the price of bread in Nigeria. As discussed earlier, income and poverty rates in Nigeria are not particularly sensitive to changes in the price of maize and sorghum.

Thus, the results suggest that the overvalued exchange rate and the prioritization of wheat and flour imports in allocating scarce foreign currency were successful in preventing higher international food prices from increasing poverty in Nigeria. However, this does not necessarily imply that the policy of currency controls and overvaluation is justified by this outcome. First, it does not take into account uncertainty, the misallocation of scarce foreign currency, and the risk of rent-seeking behavior associated with having the government allocate a scarce resource administratively, favoring some imports and importers over others. In addition, the implicit subsidy on bread was not well targeted, with a majority of the benefits accruing to non-poor households. The same level of poverty reduction could have been achieved in a more cost-effective manner through some form of targeted assistance such as a cash-transfer program.

Figure 3. Sensitivity of the poverty impact to alternative assumptions



Source: Authors calculations based on changes in real prices of maize, wheat, and sorghum and household income and expenditure patterns.

Note: Our best estimate of the poverty impact of international shocks uses domestic real price changes (in green). Full transmission of international shocks is represented by the world price changes (in blue). And the domestic nominal price increase (in red) describes the impact of both international shocks and inflation on the three commodities, while assuming other prices and income are fixed in nominal terms.

The overvalued exchange rate and prioritization of wheat and flour imports is a type of insulation policy, designed to protect domestic food markets from international price volatility. On a global level, insulation policies inhibit the adjustment of domestic food markets to changes in international prices, particularly grain prices. As such, they exacerbate the volatility in international grain markets. Martin and Minot (2023) found that insulation of domestic markets following the invasion of Ukraine likely doubled the spike in international wheat prices. A few large countries (notably India and China) were responsible for much of this magnification. Thus, insulation is a double-edged sword: it protects domestic markets from international shocks, while simultaneously exacerbating the size of those shocks.

The second alternative is to estimate the poverty impact of the increase in domestic *nominal* prices of the three commodities, which is the combination of the increase in the real price and the increase associated with domestic inflation, while assuming that all other prices and incomes are fixed in nominal terms over the being examined. The results are shown in red in Figure 3. In this scenario, the poverty rate would increase 0.4 percentage points by January 2022, 0.8 percentage points by the peak in April 2022, and remain at that level in July 2022. The poverty increase in this case is greater than in the main simulation, but less than in the hypothetical case of full transmission of the international price shock. As noted above, this likely overstates the poverty impact of the world grain price rise since it includes the effect of inflation on the three commodity prices and excludes the effect of inflation on incomes.

6. Summary

International commodity prices rose in the wake of the Covid-19 epidemic and spiked sharply in the first months of the war in Ukraine. This was particularly true in the case of wheat and maize because of the importance of Russia and Ukraine as exporters of these commodities. A critical

question was: will the higher prices for wheat, maize, and other staple grains have an adverse effect on poverty and food security in low-income countries?

In the case of Nigeria, we find that the real price of maize and sorghum increased over 2020-2022 but by less than the increase in world prices, as expected. In contrast, the real price of bread in Nigeria declined in real terms over this period, at least in part because of increasing overvaluation of the naira and the prioritization given to wheat and flour imports in allocating scarce foreign currency. When combined with information about the spending patterns and composition of income, these staple grain price changes had a negligible effect on national poverty rates. This is explained by the fact that poverty is not sensitive to increases in maize and sorghum prices, since gains to farmers offset the losses of consumers. Higher wheat prices would have increased poverty, but wheat prices were kept stable in nominal terms and pushed down in real terms. The analysis finds that if world price shocks were fully transmitted to domestic markets in Niger, the increase in poverty would have been in the range of 1-2 percentage points. The overvaluation and prioritization of wheat and flour imports prevented poverty from rising due to higher prices for staple foods on world markets, but it seems likely that alternative programs could have achieved this end without distorting the market for foreign currency and with less leakage of benefits to non-poor households.

This study is part of a series of case studies that IFPRI is undertaking to assess the impact of higher commodity prices on income and poverty in developing countries. The analysis presented is an initial impact assessment designed to estimate the impact of higher food prices on poverty in selected countries. The initial set of case studies covers Ethiopia, Kenya, Nigeria, Niger, Burkina Faso, and Mali. The analysis may be extended to cover other countries in the future.

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