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Covid-19 Bulletin

Impact of COVID-19 on hidden hunger in Senegal

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The COVID-19 pandemic could have damaging effects on food security through avenues including production disruptions, logistics bottlenecks and reduced market access

While many analyses have focused on the effects of the pandemic on overall food intake, its impacts on micronutrient consumption have been much less studied. However, micronutrient deficiencies, or hidden hunger, can have devastating effects on bodily function and can lead to diseases which themselves raise the risk of severe complications from COVID-19 infection. In this bulletin, we examine the impacts of the pandemic on hidden hunger in Senegal by analyzing the effects of COVID 19-related food price changes on consumers' demand for micronutrients. First we examine income and price elasticities for nutrients in Senegal, which indicate the responsiveness of nutrient demand to income and price changes. We then use these elasticities to estimate the effects on nutrient demand and consumption resulting from actual price changes during the COVID-19 pandemic in the second quarter of 2020.

Senegal reported its first confirmed COVID-19 case on March 2. With the progressive lifting of preventive measures (state of emergency, full school closure, curfews, border closures, etc.), the epidemic gradually spread to semi-urban and rural areas. In fact, the number of health districts with recorded cases has increased from 60 on June 9 to 70 on September 7 (out of 79 health districts in the country). The country has also recorded a considerable increase in the number of positive cases and deaths; however, there was a decrease in the weekly number of deaths and also of confirmed cases over the last 4 weeks compared to the previous 4 weeks.

Income and price elasticities of food nutrients

We estimate two types of elasticities: income elasticities, which measure the responsiveness of demand for food nutrients to changes in consumers' incomes,

GETTING AHEAD OF THE CURVE

The Covid-19 pandemic has disrupted lives across the globe in just a few months. And yet, there are no effective vaccine or treatment to contain its spread. A very likely scenario for African countries is a continued battle with the disease over the next year at least, with steady spread of infections to larger parts of countries, including into more remote areas. While we are dealing with the immediate and multifaceted effects, we need to also look ahead to bolster preparedness to tackle the crisis in likely future hot spots. An important part of country strategies and readiness in fighting the pandemic is therefore to anticipate where the pandemic is most likely to spread and ,more critically, where there is least capacity to absorb the shock if and when it hits.

Crises like the current one often only bring to the fore the manifestation of long term, chronic vulnerability. Most communities that bear the brunt of the suffering from crises are communities that have been plagued by chronic threats to their livelihoods long before the shocks occur. These pre-existing conditions erode the communities' absorption capacity and magnify the impact of shocks. Early identification of such communities and a better understanding of the nature of their vulnerability, particularly with respect to specific shocks, in this case the Covid-19 pandemic, make it possible to craft response strategies long before the crisis hits.

In the current work stream of the AKADEMIYA2063 Covid-19 program, we rank communities across regions and countries against a range of key livelihood and threat indicators to determine the ones that are likely to suffer the most, should the pandemic reach them. The findings can help governments, non-state actor organizations and the development community to forge proactive responses to contain the propagation of the disease and mitigate its effects.

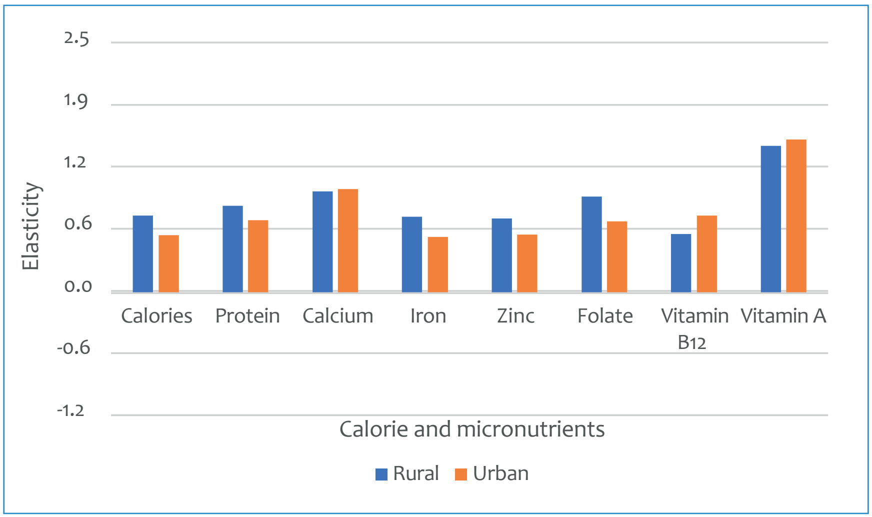
Ousmane Badiane, Executive Chairperson and price elasticities, which measure the responsiveness of demand for nutrients to changes in the prices of common foods. We use household survey data collected through the Projet d'Appui aux Politiques Agricoles (PAPA project) in Senegal in 2017-2018. It covers 2,231 households in 19 major Senegalese cities and 4,338 rural households living in 45 departments. Our estimation uses a variation on the Lancaster model (1971).[1]

how their respective demands for food nutrients change with respect to changes in income. Rural households tend to be more sensitive to changes in income with regard to calories, protein, iron and folate. Moreover, while vitamin B12 is the least elastic to income change among rural households, iron is the least elastic among urban households.

Price elasticities of food nutrients

We measure price elasticities of nutrients by examining how

Figure 1: Income elasticity of food nutrients



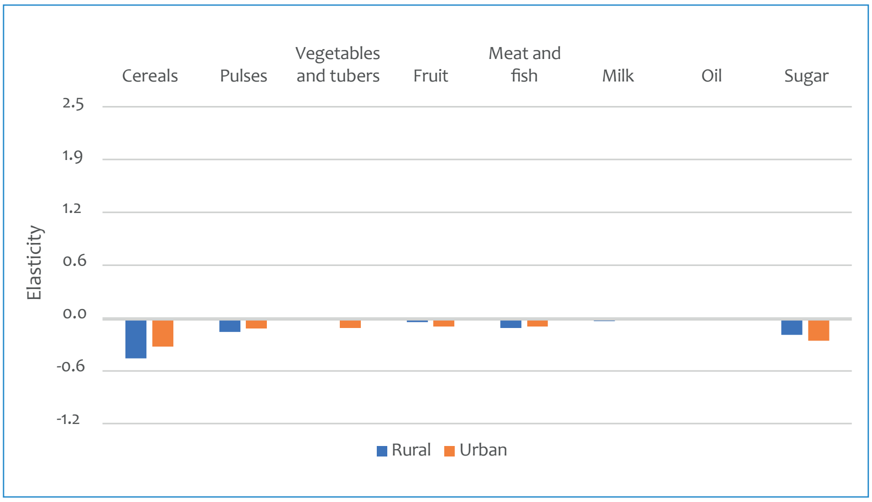
Estimated income elasticities for calories and several micronutrients are shown in Figure 1. Elasticity values of less than 1 indicate that a given percentage change in income is associated with a smaller percentage change in demand; values of greater than 1 indicate that the percentage change in demand exceeds the percentage change in income. Overall, while all the other nutrients can be characterized as normal goods (with income elasticity between 0 and 1), calcium in urban areas and vitamin A in both urban and rural areas behave like luxury goods, with income elasticity above 1 (Figure 1). Except for calcium, there is a significant difference between rural and urban households in

demand for nutrients changes when food prices change, looking at common food categories separately. Price elasticities are expected to be negative for most goods, meaning that demand increases when prices decline. The interpretation of the absolute values of price elasticities is the same as the interpretation of income elasticities: values of less than 1 indicate that the change in demand is proportionally smaller than the change in price.

Calories (Figure 2). Except for vegetables and tubers and oil in rural areas, and milk and oil in urban areas, estimated price elasticities of demand for calories fall between 0 and 1 in absolute terms (i.e. the percentage change in demand for calories is smaller than the percentage change in price). However, there are significant differences between rural and urban households; for example, increases in the prices of cereals, pulses and meat and fish are expected to affect rural households more than their urban counterparts. On the other hand, urban households are more sensitive to changes in fruit and sugar prices than rural households.

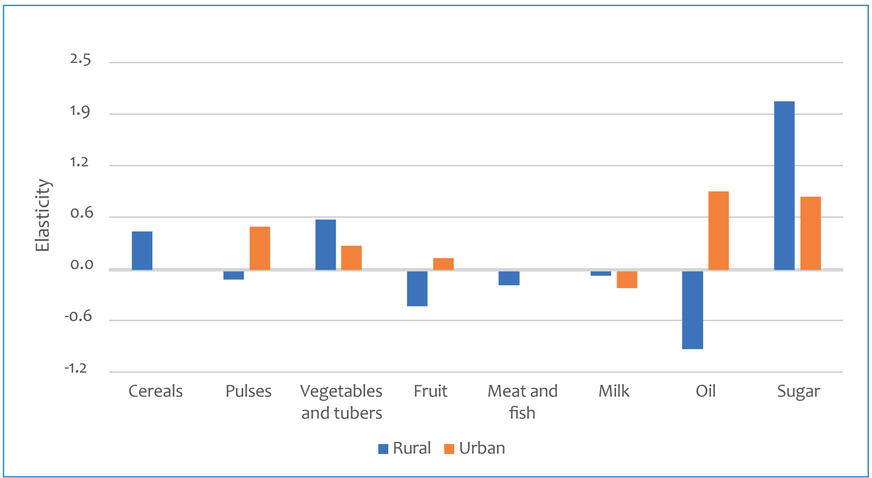
Vitamin A (Figure 3). Estimated price elasticities suggest that vitamin A is a good for the poor, or Giffen good, meaning that the demand adjusts in the same direction as the price change, rather than in the opposite direction as is normally expected. This behavior is more consistent among urban households compared to rural households. However, these positive price elasticities may also result from complementarity and substitution effects. Indeed, households go to the market to buy food rather than nutrients; as a result, they might substitute one food item for another without accounting

Figure 2: Price elasticities of calories



1 Further methodological details and detailed estimation results are available in the AKADEMIYA2063 COVID-19 Portal at: https://akademiya2063.org/vulnerability-hot-spots.php#data-charts-maps

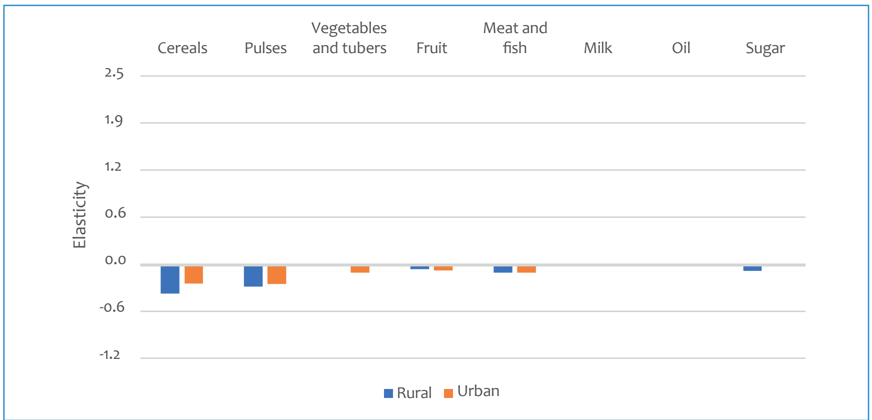
Figure 3: Price elasticities of vitamin A



for nutrient content. This makes it difficult to accurately track the direction of changes in the demand for nutrients as a result of price changes.

Zinc (Figure 4). The demand for zinc is perfectly inelastic to changes in the prices of milk and oil in both urban and rural areas, and sugar in urban areas as well as vegetables and tubers in rural areas. Households' demand response in rural areas outweighs that of their urban counterparts for cereals, pulses, fruit and sugar.

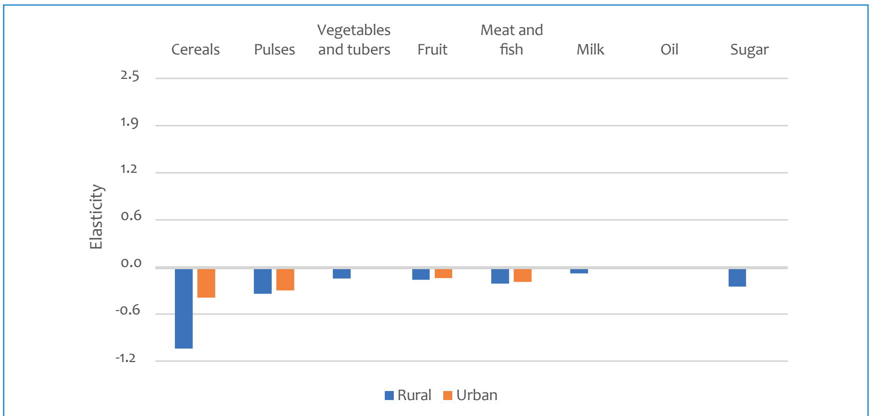
Figure 4: Price elasticities of zinc



Iron (Figure 5). The demand for iron is more responsive to price changes in rural areas compared to urban areas. The difference between the two locations is more pronounced for cereals, pulses and sugar. Urban consumers do not significantly adjust their iron intake to changes in the prices of vegetables and tubers, milk, oil and sugar. The same pattern is observed in rural areas for oil.

Calcium (Figure 6). The demand for calcium tends to be perfectly inelastic with respect to prices of fruit, meat and fish, milk, oil, and sugar in rural areas, and vegetables and tubers, oil, and sugar in urban areas. Price elasticities are the highest for cereals, pulses, and vegetables and tubers in rural areas, and meat and fish, pulses, and fruit in urban areas. In urban areas, the demand for calcium increases with an increase in the price of milk. This too may be the result of complementarity and substitution effects.

Figure 5: Price elasticities of iron



Protein (Figure 7). The demand for protein is perfectly inelastic with respect to milk, oil, and sugar prices in both urban and rural areas. Cereal and pulse price elasticities of demand for protein are higher in rural areas than in urban areas, while the inverse is observed for fruit and meat and fish, for which urban consumers are more sensitive to price changes than their rural counterparts. In rural areas, consumers increase their demand for protein following an increase in the price of vegetables and tubers.

Vitamin B12 (Figure 8). Vitamin B12 has the most uncharacteristic demand patterns of all food nutrients considered in this study. Except for meat and fish and oil prices (in rural areas), demand tends to rise when prices rise and fall when prices fall.

Folate (Figure 9). Prices of cereals, pulses and oil in rural areas have the highest elasticities of demand for folate. It is worth noting that the price elasticity is positive for oil in rural areas. In urban areas, pulses, vegetables and tubers, and meat and fish have the highest price elasticities.

Price dynamics and COVID-19

The price elasticities shown above can be applied to price changes observed during the COVID-19 crisis to estimate the effects of the pandemic on demand for and consumption of food nutrients. Price data are obtained from Senegal's Market Information System.

Figure 6: Price elasticities of calcium

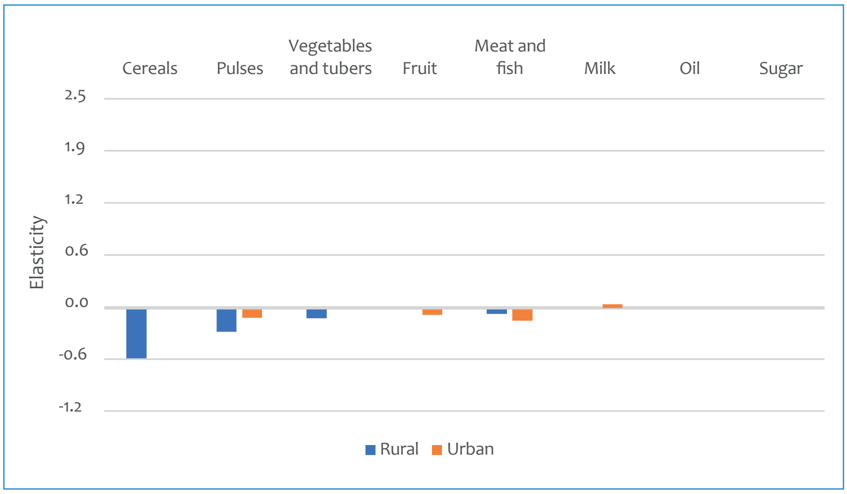


Figure 7: Price elasticities of protein

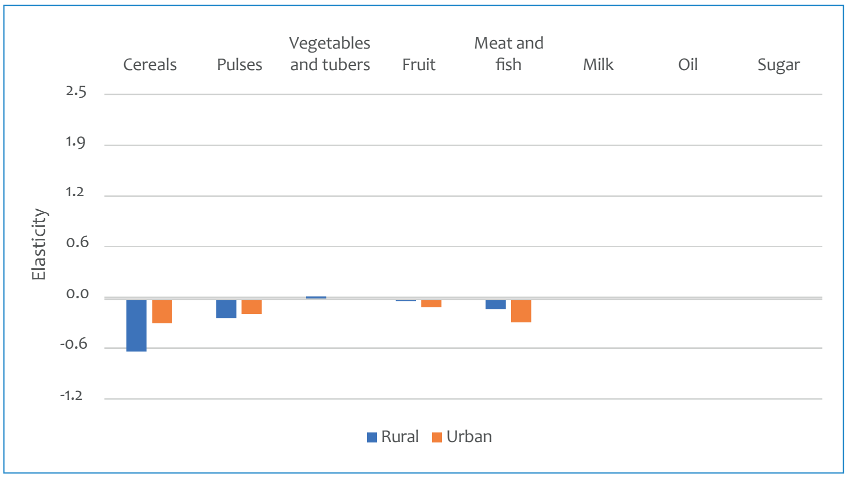


Figure 8: Price elasticities of vitamin B12

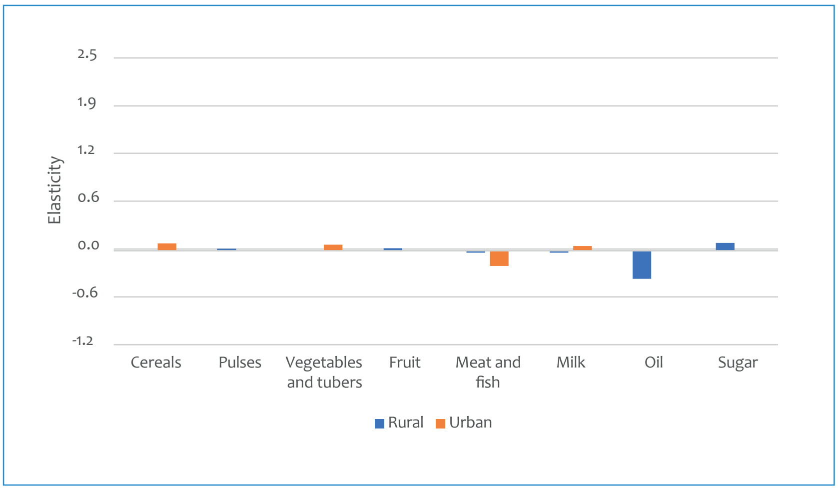
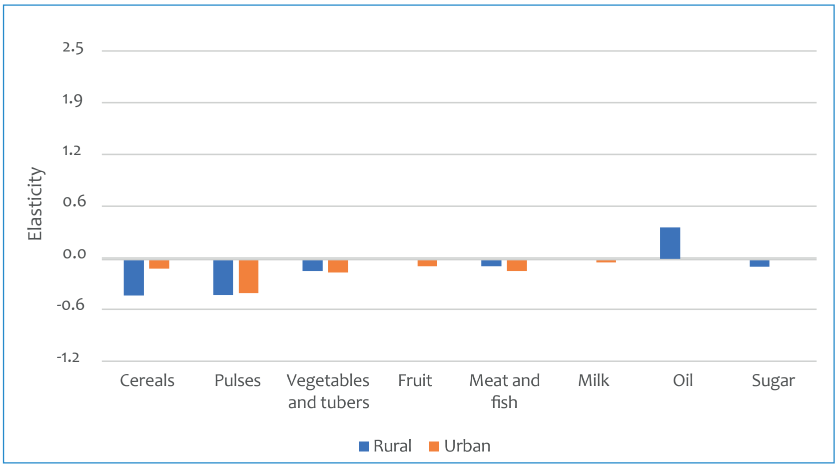


Figure 9: Price elasticities of folate



In this bulletin, we consider only major cereals whose prices have been tracked regularly since the beginning of the COVID-19 outbreak. As a result, our assessment of the impact of price changes on nutrient consumption is partial and does not include the effects of income losses due to the pandemic.

In rural areas (Figure 10), changes in cereal prices during the period April – June 2020 have been consistently higher than the corresponding period in 2019 for millet, imported maize and sorghum; the opposite is true for rice (local, broken ordinary and perfumed) and local maize. The COVID-19 effect, if any, is more felt in urban areas (Figure 11) where, except for local maize and rice (broken ordinary and local), price changes are much higher in 2020 than in 2019. Sorghum, imported maize and millet post the highest wedges in prices between the two periods. For ordinary broken rice, the price variation between April and June 2020 was downward, while the variation was upward over the same period in 2019.

The aggregate impact of changes in prices of cereals on nutrient demand are reported in Figure 12 (rural areas) and Figure 13 (urban areas). In rural areas, except for vitamin B12 and vitamin A, increases in prices of cereals are expected to reduce the demand for key food nutrients, especially iron, protein and calcium. Similarly, in urban areas the negative effect of price changes is significant for calories, protein, iron, zinc and folate.

Given the overall rather small magnitude of changes in the prices of cereals (1.8% in urban areas against 2.9% in rural areas) over the second quarter of 2020 with a clear indication of a COVID-19 effect, it is not surprising that the effects on food nutrient demand, although significant, are within acceptable ranges. However, given the already pervasive nutrient deficiency in Senegal,

Figure 10: Changes in cereal prices in rural areas between April and June 2019 and 2020 (%)

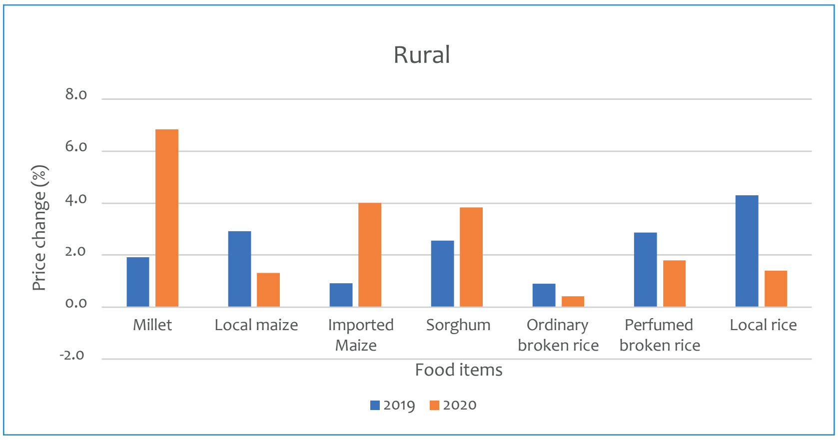


Figure 11: Changes in cereal prices in urban areas between April and June 2019 and 2020 (%)

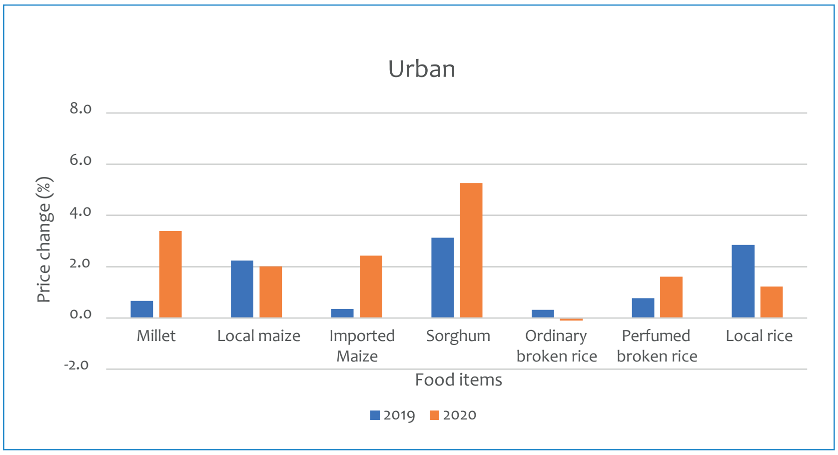


Figure 12: Impact of changes in prices of cereals in the second quarter of 2020 on food nutrient demand in rural areas (%)

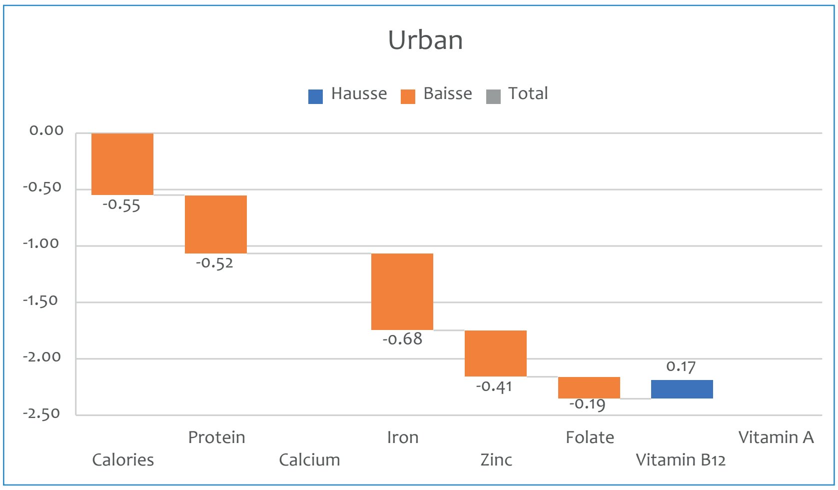
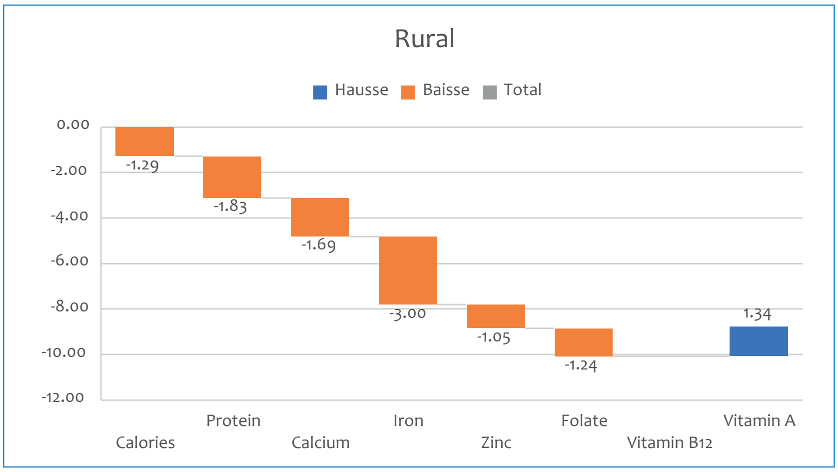


Figure 13: Impact of changes in price of cereals in the second quarter of 2020 on food nutrient demand in urban areas (%)



every negative shock increases households' vulnerability to COVID-19 or other similar shocks.

Using the same dataset, a study by Ulimwengu et al. (2019) highlights significant inadequate consumption of micronutrients in both rural and urban areas in Senegal (Table 1). Compared to calories and proteins, for which Senegalese households consume at least three fourths of the recommended levels on average, micronutrient intake is far below recommended benchmarks with the exception of vitamin A. Consumption adequacy for urban households is less than 60% of the recommended intake for zinc and folate and is as low as 41% for vitamin B12, 31% for iron and 26% for calcium. Vitamin A adequacy for urban families is much higher, with levels close to 86%. Except for iron, for which adequacy levels reach 47%, and zinc and folate, for which adequacies are roughly the same as in urban areas, rural families perform considerably worse for vitamin A (56%), vitamin B12 (19%), and calcium (18%).

Conclusion

COVID-19 is expected to affect both the supply and demand sides of food markets. On the supply side, movement restrictions could cause logistics breakdowns and labor shortages at different stages in the value chain. Disruptions to input markets and reduced labor mobility may result in the delay of planting and harvesting activities which would likely reduce the supply of major crop and livestock products. In addition, trade restrictions such as export or import bans may lead to shortages in some countries, and large-scale food purchases by price speculators could reduce the amount of food that reaches markets. On the demand side, the pandemic has triggered a short-term spike in food demand due to panic buying and hoarding of food by consumers, primarily among

Table 1: National food energy and nutrient adequacy levels based on consumption and recommended intake

	Total consumption (per day, AME)			Consumption adequacy (%)	
	Urban	Rural	Recommended intake	Urban	Rural
	(1)	(2)	(3)	(4)	(5)
Kilocalories (kcal)	2561.1	2307.1	2750	82.6	76.0
Proteins (g.)	62.7	60.8	50	89.7	87.5
Calcium (mg.)	254.1	177.3	1000	25.5	17.8
Iron (mg.)	8.5	13.1	27.4	31.3	46.7
Zinc (mg.)	8.4	8.3	14	58.7	57.2
Folate (mcg.)	244.1	235.4	400	58.0	54.6
Vitamin B12 (mcg.)	1.0	0.4	2.4	41.1	18.5
Vitamin A (mcg.)	2094.9	739.3	600	85.5	56.1

Source: Ulimwengu et al. (2019) Note: AME—Adult Male Equivalent

those who have enough income to over-buy food for storage in their homes. Food access through social assistance has also been affected, especially for children relying on school meals when schools close down. Most impact assessments of COVID-19 focus on changes in quantities consumed and produced. Although we do not question the relevance of these approaches, by design they tend to miss hidden hunger in the form of food deficiencies which have the potential to exacerbate pre-existing health conditions.

Although partial, our findings confirm the importance of monitoring the impact of changes in income and prices on nutrient deficiencies. We also highlight the heterogeneity of such impacts across locations and types of food nutrients.

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