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covid-19 Brief

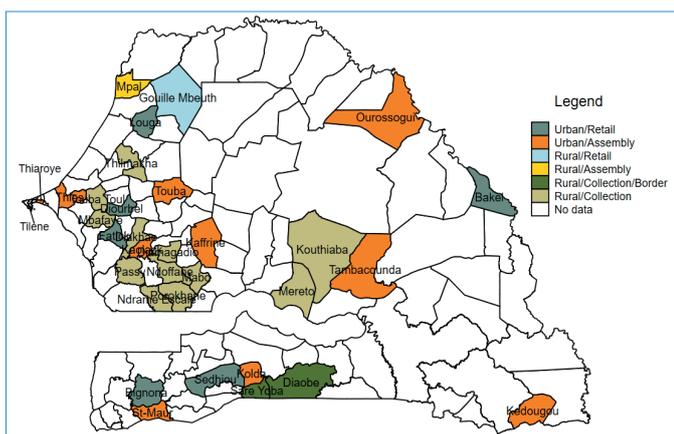
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Millet market coverage and networks in Senegal.

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The purpose of this Bulletin is to assess the conduct of local staples food price markets and how they operate during times of crisis. Thirty-five of the Forty-seven millet markets for which continuous price data is available over the period January 2010 to June 2020 are analyzed, and are shown in **Figure 1** below.

Figure 1: Market distribution and types



Source: National Markets Information System (Senegal)

The 35 markets - in rural as well as in urban areas - are widely distributed across the country, and can be categorized into three types: collection, assembly, and retail markets. Collection markets tend to be the first place where farmers seek to sell their produce, while assembly markets are mainly used by traders to store products purchased from surrounding collection markets. Both, collection and assembly markets, are often located in rural towns. In contrast, retail markets are generally found in larger urban centers. Thus, the supply chain

for staple foods generally runs from the village-level collection markets to assembly markets, before reaching retail markets in major cities.

Figure 2: Millet markets interconnectedness in Senegal

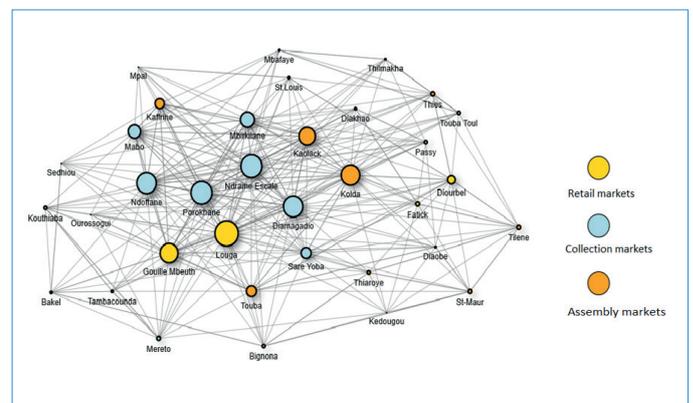
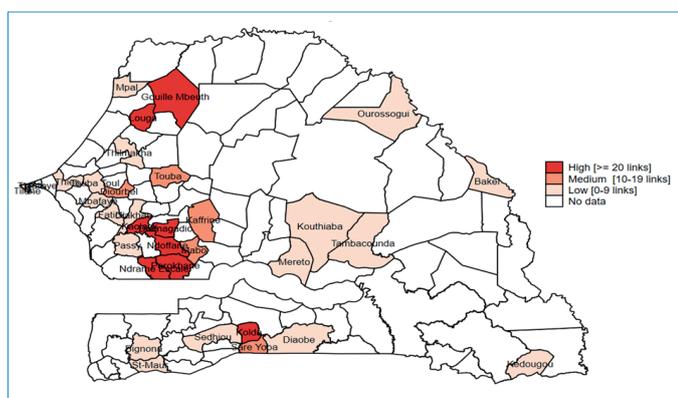


Figure 2 illustrates the network and degree of interconnectedness among the 35 millet markets covered in this study. Circles represent different markets, while the lines connecting a given pair of markets highlight a strong correlation between the two respective markets. For each market, its top 10 most correlated markets are identified based on the price correlation. The number of times a given market is identified among the top 10 most correlated markets by others is used here as the weight of that market (size of circles). The size of the circle denotes the central role of the considered market within the network. **Figure 2** thus shows that the most connected millet market in Senegal is Louga market in the North-West of the country (**Figure 1**), with 30 top ranked links of a total of 34 possible links, followed by the Ndrame

Escalé and Porokhane markets near the border with the Gambia, with 27 links each. The least connected markets are Ourossoqui in the North-East with no links, followed by Kedougou in the South-East, Mpal in the North-West and Sedhiou in South, each with one strong link.

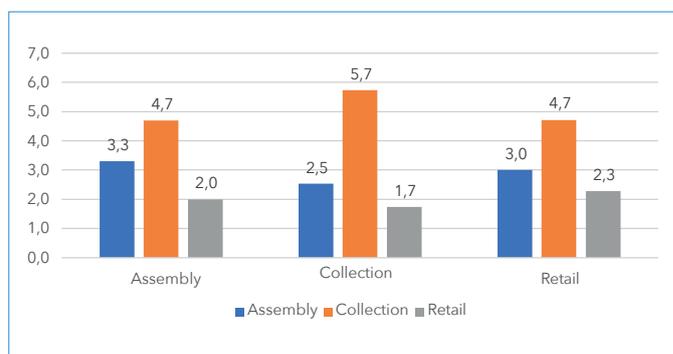
Figure 3 presents a map of the different millet markets grouped into three categories: (i) markets with a low degree of interconnectedness characterized by less than ten strong interconnections, (ii) markets with a medium degree of interconnectedness, characterized by ten to nineteen interconnections, and (iii) highly interconnected markets that have more than nineteen interconnections. Data shows that the most connected millet markets are all located along a corridor ranging from the surplus production areas of the South and the Center of the country towards the assembly and dispatching platforms in the North-West.

Figure 3: Market distribution by degree of interconnections



To complement the network analysis, we compute for every market the distribution of the 10 most networked markets across all market types. The results presented in **Figure 4** show that on average six of the 10 most connected markets to a given collection market are made of other collection markets. In addition, collection markets account for nearly half of the 10 most connected markets to any given retail or assembly market. This reveals the central role of collection markets - which are generally located in surplus areas - in the millet supply chain in Senegal.

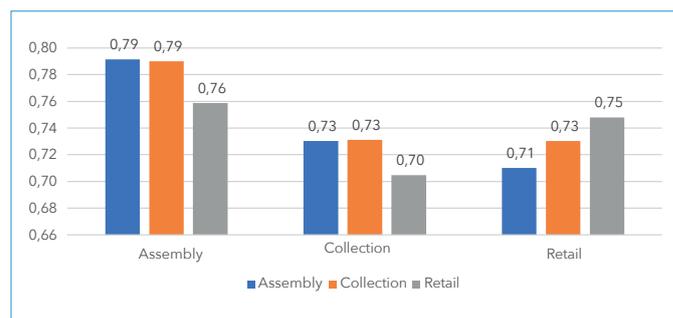
Figure 4: Average number of types of relationships in the millet market network



Note: For every given market, we have identified the 10 most connected markets. The bars denote the average share of individual market types in the 10 most interconnected markets for every market category.

The significance of collection markets within the millet supply chain is highlighted in **Figure 5**. Although millet markets in Senegal tend to be fairly interconnected, collection markets are by far the most networked. The average price correlation between collection markets is close to 80 percent. Moreover, collection markets show a stronger price correlation with the other types of markets than the latter with one another or among themselves.

Figure 5: Average correlation across various types of relationships in the millet market network



Note: The bars denote the average value of the coefficients of correlation across market types for each market category.

The relatively high degree of interconnectedness among millet markets in Senegal means that the effects resulting from confinement and other measures to control the Covid-19 pandemic that interfere with the normal operation of local markets are certain to be transmitted widely across the country. Safeguarding the proper functioning of markets in the remote areas of Senegal, not just in major urban areas, ought to be a key priority when designing and implementing interventions to fight the pandemic in order to avoid major disruptions to food supply chains.



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