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Impact of COVID-19 on fresh produce supply chains

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- Farming remains the predominant occupation and source of income for 48% of the population of Punjab, Pakistan.
- Recent studies have provided suggestive evidence on the exploitation of farmers by middlemen through low offer prices and informal loans.
- Very little research has been done to investigate this influential position occupied by the different tiers of middlemen in the agriculture supply chain in Pakistan.
- This study examines how COVID-related restrictions affected the price shares of farmers and middlemen.
- The findings reveal that farmers' price shares reduced significantly by 12% during COVID lockdowns. Middlemen, on the other hand, increased their share of retail price by 6% from a baseline share of 65%.

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Overview of the research

The agriculture sector in Pakistan is vital to the economy, contributing 18.9% of GDP and employing 42.3% of the workforce. It is also a significant source of foreign currency exchange earnings and promotes economic growth in other industries. Potatoes are a major cash crop for Pakistan and one of the country's primary exportable horticultural commodities. It is the fourth most important crop in terms of production volume. Punjab grows over 93% of the potato crop grown in the country, and therefore, farmers in the area are heavily dependent on it as a means of income.

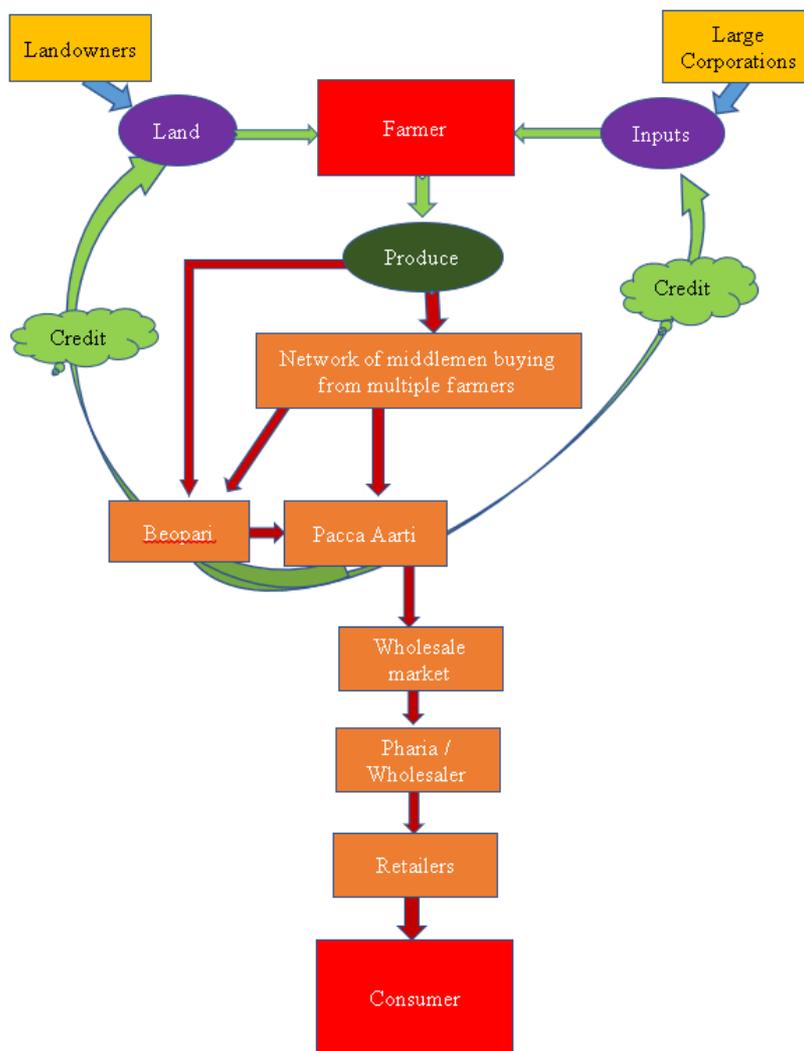


Figure 1. Fresh produce supply chain.

Fresh produce supply chains in Pakistan, like in other developing countries, are complex and involve a chain of agents from the farmer to the final consumer (see Figure 1). Some key players that are directly involved in the fresh produce supply chains are farmers, middlemen (beopari, kaccha aarti, and pacca aarti), and consumers.

Given the importance of the supply chains in influencing food security of masses and prices of essential commodities, it is important to understand, to better prepare for such disruptions, how shocks such as COVID-19 impacted various players in the supply chains. More specifically, it is important to understand what role middlemen played in the supply chains and how the effects of COVID-19 are spread across various players in the chain.

Given this backdrop, the study primarily explores two main questions:

1. What was the impact of COVID-related restrictions on various agents in the supply chain of potatoes?
2. What was the impact of COVID related restrictions on per unit prices received by potato farmers and how that varies with farmers' market linkages?

To answer the first question, the study uses administrative data and examines how price shares of farmers and middlemen are affected due to COVID-related restrictions. We construct the relevant variables by combining information on farmgate, auction and retail prices from the harvest price data, AMIS auction data, and DSSI data, respectively (Table 1). To answer the second question, the study uses survey data of more than a thousand farmers from Okara and Kasur districts.

Table 1. Administrative data sources.

Data Source	Explanation
Harvest Price Survey	Provides data on farmgate prices received by the potato farmers of Punjab.
Agriculture Marketing Information Service (AMIS)	Provides data on auction price in all the wholesale markets of Punjab. Provides data on arrival sources that links the source of the produce to a destination.
Decision Support System for Inflation	Provides data on retail prices.
Mouzza Census 2020	Provides data on mouzzas to select sample for Farmer Survey.
Farmer Survey	Collects information on output and sale transactions.
Google COVID-19 Open Data repository	Provides COVID compliance index by utilising the Government Response Tracker dataset and the Regional Mobility Reports.

Overview of findings

The study combines the three sources (Harvest Price Survey Data, AMIS Data, and DSSI data) to provide comparison of per kilogram prices received by farmers, middlemen, and the retailers in Figure 2. The red vertical line indicates the start of COVID. There is a clear wedge between the three prices with farmers getting, on average, less than half of the retail price. Furthermore, after COVID started spreading in Pakistan, there is a steep decline in all three prices followed by gradual recovery after July, 2020.

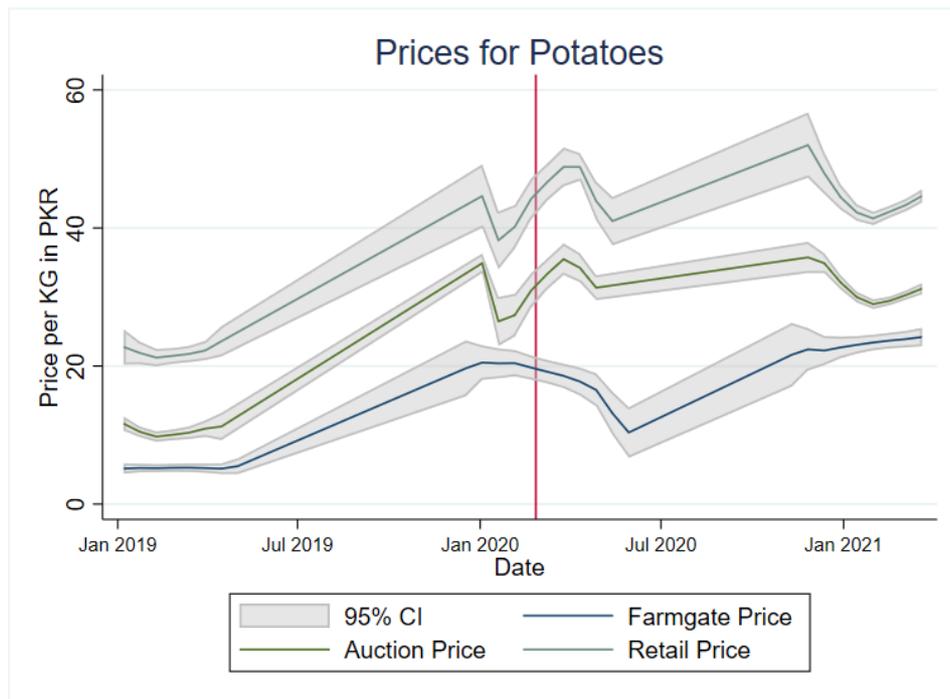


Figure 2. Crop prices received by farmers, between Jan. 2019 and Jul. 2021.

COVID lockdowns may lead to disparate incidences for various agents. Figure 2 presents the share of prices received by farmers (of auction price) and middlemen (of retail price). The Figure exhibits a steep decline in the farmer share after the first case of COVID was identified in Pakistan while the middlemen share slightly increased after COVID. The analysis reveals that farmers received 57% of the auction price on average which reduced by a significant 12% during COVID lockdowns. Middlemen, on the other hand, were able to take advantage of the COVID related lockdowns and compliances by increasing their price shares. Middlemen were able to increase their price share of retail price by 6% (statistically significant) during lockdowns from the baseline share of 65%.

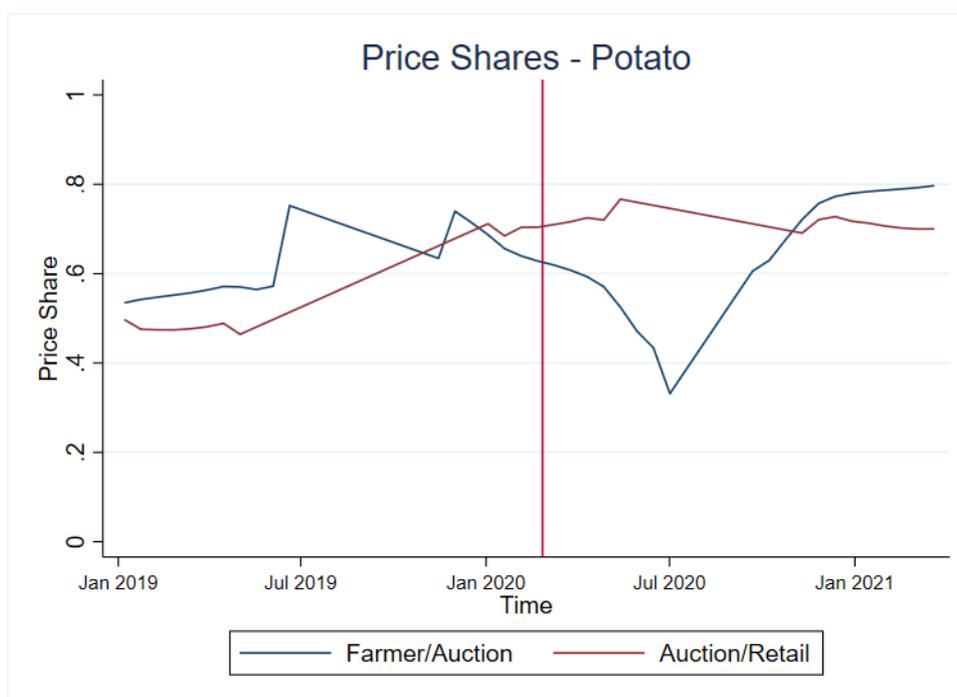


Figure 3. Changing potato prices via varying markets, between Jan. 2019 and Jul. 2021.

Effect of COVID-19 by farmers' market linkages

Farmers selling outside the market are negatively affected during the lockdowns. The farmers that could sell in the market (via licensed agent or self) did not experience a decline in the prices that they received. This could be due to the fact that farmers that sell in the market have better market linkages and are able to search for the best prices even during the time of lockdowns. In contrast, the farmers that sell to agents outside the market are probably more dependent on the respective agents and are therefore more susceptible to exploitation. We investigate this in more detail in the next subsection.

Effect of COVID and farmers' dependence on middlemen

Farmers who sell to licensed agents outside the markets receive significantly lower prices than those who sell to unlicensed agents. Additionally, those who obtain additional services sell for lower prices than those who do not. In view of these findings, the farmers who are the worst off are the ones who harvest during periods of lockdown, sell to licensed agents, and obtain additional services. An interesting finding is that the decrease in prices due to COVID-related lockdowns was larger for the case of sales made to unlicensed agents outside of markets. This points to the fact that farmers who have lesser market linkages have a higher vulnerability than those who have access to the market via licensed agents.

Policy recommendations

- Middlemen play an important role in the potato supply chains and are the essential link in determining welfare for consumers and incentives for producers. Any attempt at ensuring price stability must begin by ensuring that middlemen are not playing an exploitative role.
- It is not only the licensed commission agents in the wholesale markets that play an important role for determining consumer and producer surpluses, rather it is the unlicensed middlemen such as beopari and kacha aartis that are equally important in the upstream supply chain.
- Farmers that are better connected with markets are able to manage the pandemic more effectively than farmers with limited access. This implies that efforts should be made to improve market linkages of the farmers. Better market linkages will allow farmers to attract better prices and therefore provide incentive to improve agricultural practices.
- A significant proportion of farmers are dependent on middlemen for services such as informal credit and transport. Consequently, these farmers have limited market access and are most susceptible to fluctuations in market conditions. There is a need to relax farmers' constraints so that these farmers are able to fare better during difficult economic times.
- This research has focused on the upstream supply chain. It is equally important to understand the downstream effects in granular detail.