

THE IMPACT OF COVID-19 AND LOCUST INVASION ON FARM HOUSEHOLDS IN PUNJAB AND SINDH

ANALYSIS FROM CROSS-SECTIONAL SURVEYS IN PAKISTAN

Takashi Yamano, Noriko Sato, and Babur Wasim Arif

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ABBREVIATIONS

ADB	– Asian Development Bank
COVID-19	– coronavirus disease
ESCAP	– Economic and Social Commission for Asia and the Pacific
FAO	– Food and Agriculture Organization of the United Nations
GDP	– gross domestic product
IRRI	– International Rice Research Institute
kg	– kilogram
km ²	– square kilometer
MNFSR	– Ministry of National Food Security & Research
PBS	– Pakistan Bureau of Statistics
UK	– United Kingdom

EXECUTIVE SUMMARY

To combat the coronavirus disease (COVID-19) outbreak, provincial and federal governments in Pakistan introduced non-pharmaceutical interventions, including restrictions on movements of people and lockdowns of cities during March–May 2020. Anticipating that the lockdowns and movement restrictions would have negative impacts on the marketing of agricultural and food products, they were exempted from the restrictions. However, anecdotal evidence suggests that marketing of agricultural and food products was negatively affected despite the exemptions.

To gather reliable empirical evidence on the issue, the Asian Development Bank (ADB) conducted two mobile phone surveys with 429 farmers in Punjab province in May 2020 and 410 farmers in Sindh province in June 2020. The surveys collected information about how COVID-19-related measures and disruptions affected (i) the harvesting and marketing of *rabi* crops (crops that are sown and harvested from about November to April) and milk, (ii) the availability and price of inputs, and (iii) farmers' financial needs.

The two surveys found that the COVID-19 pandemic had significant negative impacts on farm households in Punjab and Sindh. In both provinces, one-third of farm households experienced losses in wages and nonfarm earnings, and almost one-quarter reported that at least one family member had returned from urban or other areas. Thus, farm households needed to support more family members but with decreased wages and nonfarm earnings. About 10% of farm households in Punjab and more than half the farm households in Sindh reported reduced food and nonfood expenditures.

Regarding agricultural impacts, farmers in both provinces cited market closures and traders' unavailability due to movement restrictions among their main difficulties. Furthermore, as many restaurants and markets closed, the demand for high-value agricultural products, such as milk and tomatoes, collapsed, resulting in low market prices. In addition, farmers faced acute problems for *kharif* crops (crops that are sown and harvested during the monsoon season, which lasts from about June to November) because of the limited availability and increased prices of farm inputs, particularly seeds. Overall, the COVID-19 pandemic impacted Sindh farm households' marketing of agriculture products more heavily than was the case in Punjab. Some farm households in Sindh suffered from locust invasion and crop damage during the *kharif* season.

Although the transport and marketing of agricultural and food products was exempted from the movement restrictions and lockdowns, this working paper found the COVID-19 pandemic had negative impacts on rural households, including reduced cash nonagricultural income and difficulties with marketing agricultural products in Punjab and Sindh. In addition, they faced increased prices of agricultural inputs. These findings suggest the need for better monitoring and support for agricultural marketing, supplies, and services during movement restrictions under the pandemic. As Pakistan and other countries struggle under the pandemic and prepare for recovery, it is critical to maintain normal flows of agricultural and food products in the markets to secure food availability during the pandemic.

Key Findings

- In May–June 2020, more than 830 farmers were surveyed by phone in Punjab and Sindh provinces, Pakistan, on the impact of the nationwide lockdown in response to the coronavirus disease (COVID-19) pandemic and the locust invasion.
- In both provinces, one-third of farm households experienced losses in wages and nonfarm earnings. More than half of the surveyed farm households in Sindh and about one-tenth in Punjab reported reduced food and nonfood expenditures because of the pandemic.
- Farmers faced difficulties in marketing of vegetables, fruits, and milk in Punjab and Sindh, and tomatoes, especially in Sindh.
- Supply chain disruptions directly resulted in economic losses for farmers and increased food prices for consumers. Despite the government's efforts to minimize the disruptions in the food supply chain, the survey results indicate that farmers still suffered economic losses.
- Almost all respondents from upper Sindh reported locust swarms, with over a third of lower Sindh respondents state they had also been affected. In Punjab, locust swarms were reported in two southern districts in the surveyed areas, resulting in production losses for farmers who have already been suffering from the COVID-19 pandemic.

Recommendations

- As the COVID-19 pandemic continues, more farmers and low-income consumers become highly vulnerable due agricultural income losses and declining cash income. The provincial and federal governments need to continue close monitoring of agricultural production, storage availability, and domestic and international market conditions. Greater preparedness is required to assist farmers and to ensure national food security.
- Farmers in Punjab and Sindh reported limited government response as a source of information about locust swarms or relief in the form of surveys and spraying. Early warning systems, supported by digital technologies, and effective locust response plans need to be prepared by federal government in coordination with the provinces against future locust invasions.
- Evidence-based policy making and greater emphasis on a more rigorous provincial monitoring program should be adopted by the government agencies. This will enable preemptive and informed decision making to tackle future pest infestations, and overall market disruptions.
- The Asian Development Bank (ADB) and other development partners are providing urgent responses to support government agencies, specifically ADB's knowledge and support technical assistance: Strengthening Food Security Post-COVID-19 and Locust Attacks (TA 6663-PAK, which aims to help Pakistan improve its resilience and sustainability in the food security system and agriculture sector.



I. INTRODUCTION

1. The agriculture sector in developing countries is no stranger to external shocks such as extreme weather and price volatilities. However, the shock caused by the coronavirus disease (COVID-19) outbreak is at a different magnitude altogether. Beginning in early 2020, many governments introduced non-pharmaceutical interventions, including restrictions on movements of people and lockdowns of cities (Castex et al. 2020; Imai et al. 2020). While limiting the spread of the virus, these restrictions disrupted agricultural marketing and production by constraining the transport of agriculture products, inputs, machines, and workers. Although the restrictions exempted grocery stores, food markets, and food supply chains in some countries to minimize food supply chain disruptions, the negative impacts remained (Organisation for Economic Co-operation and Development 2020). As the COVID-19 pandemic continues, the impacts of these disruptions on agricultural incomes and food security could be grave.

2. In Pakistan, the agriculture sector holds an important place in the economy. It contributes 19% of the gross domestic product (GDP) and employs 39% of the labor force (Pakistan Bureau of Statistics [PBS] 2020). Agriculture is the backbone of the rural populace, which constitutes 63% of the country's total population (PBS 2017) and supplies a large share of Pakistan's exports (Economic Adviser's Wing 2020). Before the COVID-19 outbreak, Pakistan's GDP growth for 2019–2020 was projected at 3.2%, and the agriculture sector's growth at 2.9% (Economic Adviser's Wing 2020). However, the COVID-19 outbreak adversely affected Pakistan's economy, slowing it down. Consequently, the country's GDP growth for 2019–2020 was –0.4% (PBS 2020a). In addition, in early 2020, Pakistan experienced one of the largest locust attacks since 1993, which contributed to farm sector losses and risks (Food and Agriculture Organization of the United Nations [FAO] 2020b, FAO 2020c).

3. For Pakistan, the dual challenge of responding to the health crisis while mitigating widespread economic devastation is severe because of its fragile economic and political base. The lockdown acutely affected the informal sector and daily wage earners.¹ Using the data of the Pakistan Labor Force Survey 2017–2018 conducted by the PBS, Gallup Pakistan analyzed and assessed the risk of joblessness because of COVID-19-related lockdowns. For agriculture, an estimated 32% of workers employed in the sector risk losing their jobs: 25% of the workers are at high risk and 53% are at medium risk (Gallup Pakistan 2020). However, few studies have measured the impact of the COVID-19 pandemic on agricultural marketing, employment, and farm household welfare in Pakistan.

4. The Asian Development Bank (ADB) conducted two mobile phone surveys with farmers in May and June 2020 in two provinces (Punjab and Sindh) in Pakistan.² The focus was on these two provinces because Punjab has the largest share of population among Pakistan's provinces, and Sindh has the second largest share. Punjab alone contributes about 57% of the value of agricultural production in Pakistan, and produces more than 70% of the country's wheat and cotton, almost two-thirds of its sugarcane, and about half of its maize. Punjab's horticultural output represents 67% of national production (Government of the Punjab 2018). Sindh has the country's second largest total cropped area, at 3.6 million hectares (Ministry of National Food Security & Research [MNFSR] 2019). Sindh also contributes significantly

¹ The informal sector is estimated to support 72% of employment (World Bank 2020c).

² The survey in Punjab was done under ADB technical assistance to Pakistan for Enhancing Technology-Based Agriculture and Marketing in Rural Punjab (ADB 2019), with the Punjab Agriculture Department as the executing agency. Phone interviews were conducted by staff members of Centre for Agriculture and Bioscience International, Pakistan. See also ADB (2020a) and ADB (2020b). Phone interviews were conducted by staff members of the Research and Development Foundation, Sindh, Pakistan. Appendix 1 provides raw survey results.

to the country's overall agricultural production of major crops: 41% of rice, 31% of sugarcane, 21% of wheat, and 15% of cotton. Less than half (47%) of Sindh's population lives in rural areas (PBS 2017), which is considerably less than the share of the rural population in other provinces. However, 65% of the labor force in rural Sindh is engaged in agriculture, which is the highest agriculture labor share among Pakistan's provinces (PBS 2018).

5. In Punjab, ADB contacted 668 farmers for a survey across 10 districts and interviewed 429 farmers in May 2020. In Sindh, ADB contacted 721 farmers across 8 districts and interviewed 410 farmers in June 2020. The surveys collected information about how COVID-19-related measures and disruptions affected (i) the harvesting and marketing of *rabi* crops (crops that are sown and harvested from about November to April) and milk, (ii) the availability and price of inputs, and (iii) farmers' financial needs. The surveys also sought to determine the impact of the locust invasion in these two provinces.

6. The two surveys found significant negative impacts of the COVID-19 pandemic on farm households in Punjab and Sindh, as discussed in detail in this working paper. In Sindh, locust swarms exacerbated the negative impacts on rural households. On policy measures against the COVID-19 pandemic and locust swarms, the surveys asked farmers for their preferred policy measures (paras. 72–76). As the pandemic persists and hampers the movement of goods and people, it is important to facilitate the movement of agricultural and food products to protect people's food security, especially for vulnerable groups.

II. COVID-19, RESTRICTIONS, AND CENTRAL AND WEST ASIAN ECONOMIES

7. Globally, countries produced various policy responses designed to limit the proliferation of COVID-19 and alleviate the pressure on health systems. The measures ranged from very drastic lockdown policies in Asia and Southern Europe to less stringent approaches elsewhere (Mendolia, Stavrunova, and Yerokhin 2020). The varying policy measures aimed to cope with the pandemic's ill effects continue to be the topic of debate around the world. Discussions are focused on evaluating the costs and benefits of varying levels of lockdown measures. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) (ESCAP 2020) has calculated the stringency level of lockdown in Central and West Asian countries (Table 1).³ The stringency levels are coupled with the countries' average community mobility and GDP growth, which helps to assess and understand the impact that the measures have on the economies.⁴

8. Nepal exercised the most stringent lockdown methods. Nepal has been swamped with complaints regarding the loss of business, income, and even lives because of harsh public movement restrictions (*The Statesman* 2020). However, other Central and West Asian economies have not been far behind in the stringency of their policy levels during the pandemic. Average community movement was limited across all Central and West Asian economies. In India, Nepal, and Sri Lanka, community mobility was more restricted than during the reference period (3 January–6 February 2020), but in Afghanistan, Bangladesh, and Pakistan, community mobility was increasing during the same period

³ The stringency index was calculated by ESCAP considering several containment measures implemented by governments. The measures include closing schools and workplaces, banning public gatherings, requiring people to stay at home, closing public transport, and limiting domestic and international travel.

⁴ A comparison of growth estimates before and after the beginning of the crisis shows a range of –2.7% to 6.1% for Central and West Asia (ESCAP 2020). This is a very substantial loss of 8.8% of income for the Central and West Asian countries, posing severe consequences for livelihoods.

to allow the resumption of normal economic operations. Moreover, after lockdown measures were implemented, mobility declined sharply, triggering unprecedented supply disruptions. These, in turn, impacted incomes and amplified risk aversion, which reduced demand across all sectors (The World Bank, 2020f). Although all countries' levels of community mobility have remained very low during the lockdowns, most of the economies have slowly started to open.

Table 1: Stringency Policy Levels, Community Mobility, and Gross Domestic Product Growth

Item		Afghanistan	Bangladesh	India	Nepal	Pakistan	Sri Lanka
Stringency level		84	82	79	93	80	77
Average community mobility (%)		9.3	2.8	(17.7)	(16.3)	1.8	(17.0)
GDP growth (%)	2019	3.0	7.9	4.2	7.1	3.3	2.3
	2020	(5.5)	1.6	(3.2)	1.8	(2.6)	(3.2)

() = negative, GDP = gross domestic product.

Sources: University of Oxford, Blavatnik School of Government. COVID-19 Government Response Tracker. <https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker#data> (accessed 12 October 2020); Google. COVID-19 Community Mobility Reports. <https://www.google.com/covid19/mobility/> (accessed 11 October 2020); and World Bank. 2021. *Global Economic Prospects, January 2021*. Washington, DC. <https://openknowledge.worldbank.org/bitstream/handle/10986/34710/9781464816123.pdf>.

9. Owing to such stringent lockdown measures and their detrimental impact on the supply chain, official GDP growth has decelerated significantly. All the economies display a downward trajectory in annual growth of GDP. GDP growth in the most severely impacted economies—Afghanistan, India, Pakistan, and Sri Lanka—has turned negative. Bangladesh, Bhutan, and Nepal may still see their economies grow even at marginal rates. These projections hint that the pandemic could be contained while reviving economic activities. A World Bank report (2020e) on Central and West Asia's economies dated 12 April 2020 revised its regional GDP growth forecast for 2020 from 6.3% to the range of 1.8%–2.8%. The prediction has been true in the case of Bangladesh and Nepal. However, in the remaining countries, the GDP decline has been more severe than anticipated. This has been Central and West Asia's worst annual economic performance since 1981.

10. In addition to the disruptions of domestic food supply chains and loss of incomes and remittances, the COVID-19 pandemic has elevated food security risks. Despite stable global food prices, numerous countries are experiencing varying food price inflation levels at the retail level, reflecting supply disruptions because of COVID-19 (FAO 2020e). This has affected low-, and middle-income countries more than high-income countries, as a larger share of income is spent on food in the low- and middle-income countries. Moreover, the World Bank (2020e) has revealed that COVID-19 will leave lasting scars on Central and West Asia's economies. The FAO (FAO et al. 2019) notes that before COVID-19 hit, 820 million people globally were undernourished, of which 135 million people were experiencing acute food insecurity (World Food Programme 2020). In Central and West Asian economies, 254.3 million people were undernourished (World Bank—accessed 15 October 2020), and about 51% of the population was already suffering from food insecurity. As incomes fall, malnutrition will worsen with long-lasting impacts, as 40 million to 60 million more people will be living in extreme poverty, depending on the scale of the economic shock (World Bank 2020a).

11. The global pandemic started as a health emergency but has transformed into a humanitarian crisis that has endangered hundreds of millions of people. Real growth will continue to slow in the face of a reversal of globalization and falling working populations (Goodhart and Pradhan 2020). About 68.2% of the employed population in Central and West Asia make their living in the informal economy, and 94.7% of agricultural employment is informal in the region (International Labour Organization 2018).

12. As a large proportion of workers in Central and West Asia have no access to formal social protection because of the informal nature of their jobs (Table 2), they are at a high risk of falling into extreme poverty. The crisis has accentuated inequalities while creating new forms of exclusion. In Afghanistan, Bangladesh, Nepal, and Pakistan, more than 96% of the workforce has no security of employment (Table 2). In India, 89.7% of the workforce lacks security and in Sri Lanka it is 75.9% of the workforce (ESCAP 2018). In addition, about 47.4% of Central and West Asia's labor force without social security is employed in agriculture (Liu et al. 2020). Such workers are vulnerable to economic shocks that affect their livelihoods.

Table 2: Security of Employment
(%)

Security of Employment	Afghanistan	Bangladesh	India	Nepal	Pakistan	Sri Lanka
With security	3.7	2.5	10.3	3.4	3.9	24.1
Without security	96.3	97.5	89.7	96.6	96.1	75.9

Source: United Nations Economic and Social Commission for Asia and the Pacific. 2018. *Achieving the Sustainable Development Goals in Central and West Asia: Key Policy Priorities and Implementation Challenges*. https://www.unescap.org/sites/default/files/publications/UNESCAP%20-%20SRO-SSWA%20SDG%20Report_Sep2018.pdf.

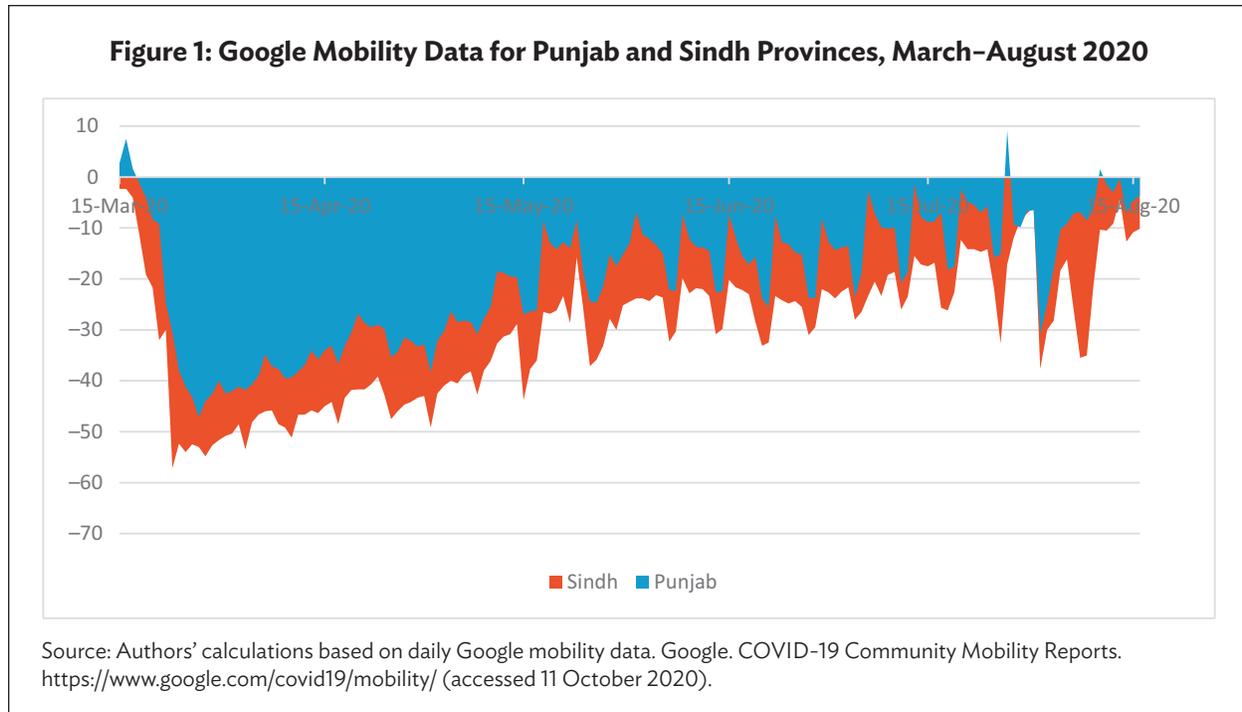
13. Given the urgency of the COVID-19-induced challenges and the limitations on the abilities of agriculture-dependent countries to cope with the disruptions, international agencies have prioritized the agriculture and food sectors while developing assistance programs. For example, \$96 million allocated in Bangladesh will include cash transfers to vulnerable dairy and poultry farmers for business continuation (World Bank—Food Security and COVID-19). In Pakistan, the World Bank has financed projects that provide direct livelihood support to 18,000 female-headed households to develop kitchen gardens, small-scale livestock, and agricultural activities (World Bank—Food Security and COVID-19).

III. COVID-19 AND RESTRICTIONS ON FOOD SUPPLY CHAINS IN PAKISTAN

14. Pakistan's first confirmed case of COVID-19 was reported on 26 February 2020 in Sindh province. By 18 March 2020, COVID-19 cases had been registered in all four of Pakistan's provinces, the two autonomous territories, and the federal capital of Islamabad. The governments of Balochistan and Sindh announced province-wide lockdowns on 24 March 2020. The federal government followed soon after, imposing on 1 April 2020 a nationwide lockdown, which lasted until 9 May 2020. Lockdown restrictions brought mobility in Pakistan down by about 65% as early as 11 April, according to Google mobility data (Google—accessed 11 October 2020).⁵ Figure 1 shows mobility data for March–August 2020 in Punjab and Sindh provinces.

15. At the provincial level, the lockdown was stricter in Sindh than in Punjab. On average, Sindh experienced 11% more restricted mobility after 15 March 2020 when cases increased strikingly across Balochistan and Sindh.

⁵ The daily aggregate mobility was computed by taking the ordinary average percentage change in mobility from the baseline period (15 February 2020) for retail and recreation, groceries and pharmacies, parks, transit stations, workplaces, and residential.



16. The nationwide lockdown because of COVID-19 halted most economic activities (except for essential services such as grocery stores, pharmacies, and hospitals) and had a detrimental impact on food supply chains. Pakistan relies largely on the interprovincial movement of food to balance supply and demand across the seasons and to take advantage of different agro-ecological zones (FAO 2020a). Because wheat is the main commodity associated with food security through interprovincial trade, the COVID-19 disruptions raised concerns over wheat marketing. The International Rescue Committee conducted a rapid needs assessment in April 2020. The assessment noted that district government officials were concerned about food supply—a significant proportion of respondents at the community level reported food shortages at home and unavailability of food items in markets (International Rescue Committee 2020).⁶

17. The lockdown took place just as the wheat harvesting season and sowing of *kharif* crops began. The sowing of *kharif* crops and harvesting of *rabi* crops starts earlier in Balochistan and Sindh (March–April) than in Khyber Pakhtunkhwa and Punjab (April–May). Two types of disruption occurred at the time: (i) the marketing of the recently harvested wheat was disrupted by the difficulty of continuing interprovincial trade; and (ii) the area subsequently sown for the *kharif* crop cycle decreased because of a labor shortage, a decline in input availability, and an increase in input prices. While machinery service providers, input providers, markets, and other agriculture sector components were exempted from COVID-19-related restrictions, farmers still faced disruptions such as higher rental charges, labor shortages, and limited access to markets (FAO 2019). Anecdotal evidence suggests farmers faced severe difficulties getting their produce to the market during April and May (Jamal 2020; Action Against Hunger 2020). Farmers in Pakistan supply their products primarily to wholesale markets (Siddiq and Basher 2019), but reports suggested that mobility restrictions prevented some farmers from taking their crops to market (Latif and Niazi 2020).

18. Food crops in Pakistan are classified primarily into two groups: (i) cereals such as wheat, rice, and maize; and (ii) fresh produce such as vegetables and fruits. Fresh produce faced a much higher risk of disruption than cereals, which are less perishable and whose production is more mechanized. Fresh produce

⁶ The International Rescue Committee rapid needs assessment was conducted remotely and covered 12 districts across the country. The assessors interviewed 252 households, 54 “key informants” in communities, and 25 government officials.

requires more labor, and therefore a labor shortage could adversely affect it. Because fresh produce is highly perishable, disruptions and delays in its distribution to the market can cause farmers to suffer huge losses. Similarly, the livestock sector, with a 60.6% share of agriculture and an 11.7% share of the overall economy, is also vulnerable to restriction of movement, as livestock produce is also highly perishable (PBS 2020a).

IV. LOCUST SWARMS AND FOOD SECURITY IN PAKISTAN

19. Locusts are considered to be the most destructive migratory pest in the world. They are highly mobile and can form swarms containing millions of the insects, leading to devastating impacts on crops, pasture, and fodder (World Bank 2020b). The desert locust threat to food security and livelihoods is increasing in Central and West Asia. Before the onset of the monsoon rains, many of the spring-bred swarms migrated to the India–Pakistan border. The FAO (2020c) noted,

“An upsurge [of locusts] developed in 2019 as a result of two cyclones that brought heavy rains to the Empty Quarter on the Arabian Peninsula in May and October 2018 that was exacerbated by Desert Locust outbreaks along the Red Sea coast during the winter of 2018/2019. The cyclones allowed at least three generations of unprecedented breeding in the Empty Quarter that was not detected. Swarms emigrated from these areas to spring breeding areas in the Central and Eastern regions from January to March 2019. Two generations of spring breeding occurred that spread to the Horn of Africa and to the Indo–Pakistan border in June. Three more generations occurred in the latter area as a result of the best monsoon rains in 25 years, leading to locust attacks in June 2020.”

In Pakistan, the locust swarms hit Balochistan and Khyber Pakhtunkhwa provinces first and then moved to Sindh and southern Punjab.

20. A report by the United Nations Office for the Coordination of Humanitarian Affairs estimated that 1.5 million people were affected by the locust infestation in Pakistan, noting that 46 districts in Pakistan (11 in Balochistan, 14 in Khyber Pakhtunkhwa, 13 in Punjab, and 8 in Sindh) are prone to desert locust infestation and 12 districts (10 in Balochistan and 2 in Sindh) had the infestation (United Nations Office for the Coordination of Humanitarian Affairs 2020). As of 1 November 2020, 636,280 square kilometers (km²) had been surveyed, and 11,345 km² had been treated for locusts in Pakistan in an ongoing control operation using aircraft, vehicle-mounted sprayers, power sprayers, and manual sprayers (Government of Pakistan, National Locust Control Centre 2020). Furthermore, the FAO estimated that, without effective measures, locust infestations would cause up to PRs688.5 billion (\$4.3 billion as of May 2020) in damage to the *kharif* crops and PRs705.8 billion (\$4.4 billion as of May 2020) to the *rabi* crops, assuming 25% damage to crops (FAO 2020f). An infestation of such magnitude has not occurred since 1993, and the outdated government infrastructure for locust control is ill-equipped to fight the new locust attacks.

21. The Office for Coordination of Humanitarian Affairs has reported that losses because of the desert locust were expected to range from \$3.4 billion to \$10.2 billion during the agricultural seasons in 2020 and 2021. More than 3 million people in Pakistan are facing severe acute food insecurity. An estimated 34,000 households will need emergency livelihood and food security assistance because of crop losses. The actual number of people affected by crop losses leading to price hikes in essential commodities could be more than reported (United Nations Office for the Coordination of Humanitarian Affairs 2020). The National Disaster Management Authority reported that desert locusts in 43 of Pakistan’s districts were alarming farmers and the local population. The swarms engulfed several Punjab and Sindh cities, including Muzaffargarh, Rahim Yar Khan, and Sukkur, threatening vegetable and other crops (FAO 2020c).

22. Because the locust crisis overlaps with the COVID-19 pandemic, it has created a crisis within a crisis. The COVID-19 pandemic alone could create a severe food security crisis in Pakistan, as agricultural production contracts and food imports decline. The combined impacts of the COVID-19 pandemic and locust swarms raise grave concerns about agricultural production and food security in Sindh province, which was the most severely hit. Together, the two crises could generate the conditions for famine, disease, and increased poverty.

23. Local agri-food supply chains are already experiencing disruptions, including reduced access to inputs and services, labor movement, transport, and credit or liquidity because of the COVID-19 pandemic. In particular, the pandemic is disrupting the supply chains for pesticides and other equipment necessary to control the spread of locusts. Border closures and delays posed by quarantine measures are restricting the movement of personnel and equipment needed for the locust response (World Bank 2020b).

V. SAMPLED FARMERS

A. Punjab

24. Punjab province has five cropping zones: (i) rice-wheat, (ii) mixed cropping, (iii) cotton-wheat, (iv) rain fed or arid, and (v) low intensity (FAO 2019). In 2017, ADB conducted a survey of 350 farmers in 8 districts in the rice-wheat zone.⁷ Among them, phone numbers were collected only from 256 respondents. Similarly, a list of 369 farmers from 4 districts—2 (Hafizabad and Sheikhpura) in the rice-wheat zone and 2 (Okara and Pakpattan) in the mixed cropping zone—and their contact details were compiled as part of ADB project activities through farmer listing or with the help of the agriculture extension services.⁸ In addition, 43 farmers' names and contact details were collected from initial respondent farmers, for a total of 668 farmers from 10 districts of Punjab. The study team successfully completed phone interviews with 429 farmers.⁹

B. Sindh

25. Sindh province is divided into three zones based on climatic and soil conditions and suitability for different crops: Siro (the upper part), Wicholo (the middle part), and Lar (the lower part). In 2016, the International Rice Research Institute (IRRI) conducted a rice monitoring survey of 420 farmers from 8 of Sindh's rice-producing districts: 6 districts in upper Sindh and 2 in lower Sindh. Of the 420 farmers IRRI surveyed, phone numbers were available for only 326. Phone numbers of an additional 395 farmers were collected from initial respondent farmers through "snowballing."¹⁰ In total, the IRRI study team contacted 721 farmers and successfully completed computer-assisted phone interviews with 410 farmers.¹¹

⁷ The survey was done under ADB technical assistance to Pakistan for the Punjab Basmati Rice Value Chain (ADB 2013).

⁸ The list was compiled under ADB technical assistance to Pakistan for Enhancing Technology-Based Agriculture and Marketing in Rural Punjab (ADB 2019).

⁹ Of the 668 target farmers, 80 had their phones switched off or did not answer despite several (at least five) attempts to call on different days, the contact numbers of 118 farmers were incorrect or the person contacted was not a farmer and not the same person listed, and 41 farmers declined to participate in the survey.

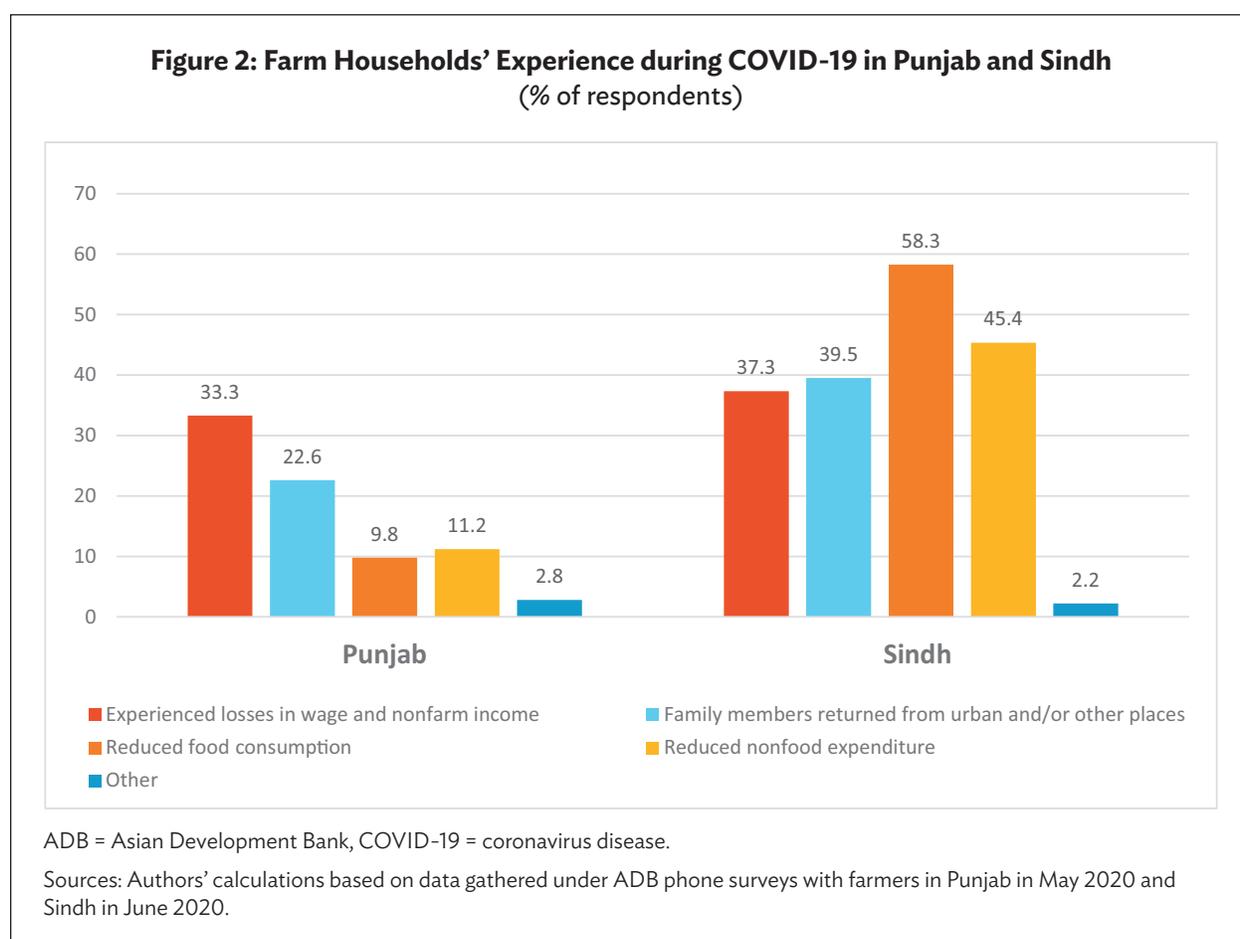
¹⁰ Snowballing or chain-referral sampling is a method that involves a primary data source nominating other potential data sources that will be able to participate in the study or research.

¹¹ Of the 721 target farmers, 228 had their phones switched off or did not answer despite several (at least five) attempts to call on different days, the contact numbers of 59 farmers were incorrect or the person contacted was not a farmer and not the same person listed, and 24 farmers declined to participate in the survey.

VI. SURVEY RESULTS AND DISCUSSION

A. COVID-19 Impacts on Households

26. Among farm households in Punjab, one-third experienced losses in wages and nonfarm earnings, more than 22% reported that at least one family member had returned from urban and/or other areas, more than 11% reported reduced nonfood expenditures, and just under 10% reported lower food consumption (Figure 2). These percentages were slightly higher in the rice-wheat zone than in the mixed cropping zone. Among farm households in Sindh, more than one-half reported lower food consumption, nearly one-half reported reduced nonfood expenditures, more than one-third reported that at least one family member had returned from urban and/or other areas, and more than one-third reported losses in wages and nonfarm earnings (Figure 2).



27. This loss in livelihood can have a detrimental impact on decades of gains from development. In addition, the loss casts a shadow over food security of households involved in agriculture, because of reduced income. Further, loss of income can lead to financial distress for farming households during the interval from sowing to harvesting, in the absence of income support from the government.

B. COVID-19 Impacts on Crops, Dairy, and Farm Inputs

28. **Crops grown during the 2019 *rabi* season.** In Punjab, the predominant *rabi* season crop is wheat, which was produced by 96.7% of survey respondents. Berseem, a fodder crop for livestock, was

the second most frequently grown crop, produced by 49.9% of respondents. In addition, 12.8% grew maize, which is used widely for poultry feed; 11.7% raised vegetables; 5.1% grew fruit; and 6.1% planted miscellaneous other crops.

29. In Sindh, the predominant *rabi* season crop is also wheat, as reported by 90.0% of respondents. Oilseed was grown by 27.3% of respondents, followed by tomatoes at 25.6%. Sindh farmers also produced a substantial quantity of two fodder crops: lucerne (20.0%) and berseem (19.3%). In addition, farmers grew onion (as indicated by 9.3% of respondents), melon (5.1%), sugarcane (3.9%), and banana (1.2%). A few (2.2%) grew miscellaneous fruits, and some (7.8%) planted other crops. Finally, 20.2% of producers grew a variety of vegetables.

30. **COVID-19 impact on the wheat harvest.** In Punjab, 97.3% of respondents reported having completed harvesting wheat—for a majority of them, the harvesting period started from the last week of April to the second week of May 2020.¹² Although 50.7% of farm households in Punjab reported a delayed wheat harvest, the main cause cited was rain, not the COVID-19 pandemic. Looking together at Google mobility data and harvesting dates, the number of farmers who completed their harvest remained minimal during the restrictions, but the number increased as mobility restrictions were eased.

31. In Sindh, all but one respondent reported having completed harvesting wheat. The majority had completed their harvest by the fourth week of March, although this was much more prevalent in upper Sindh (81.7%) than in lower Sindh (57.1%). In lower Sindh, 39.0% of respondents had completed their wheat harvest by the fourth week of March, with the rest completing their harvest later. One-third of the respondents felt that their wheat harvest had been delayed compared with the past years; of these, 38.6% cited rain as the reason, 26.8% stated that harvesting machines were not available on time, and 18.9% noted a shortage of labor during harvest time. The share of respondents reporting unavailability of labor was higher in lower than in upper Sindh. Respondents who did not cite rain as a reason for delay were asked whether the COVID-19 pandemic had an impact on the delay of their wheat harvest—84.3% of them answered that the harvest delay was caused by the pandemic.¹³

32. Although the harvest time in Sindh is earlier than in Punjab, the COVID-19 pandemic struck Sindh before it hit the rest of Pakistan. Sindh went into lockdown on 22 March 2020, while the rest of the country imposed a nationwide lockdown on 1 April 2020. By the third week of March, community mobility was largely restricted in Sindh, coinciding with the time when 16.2% of crops were harvested.

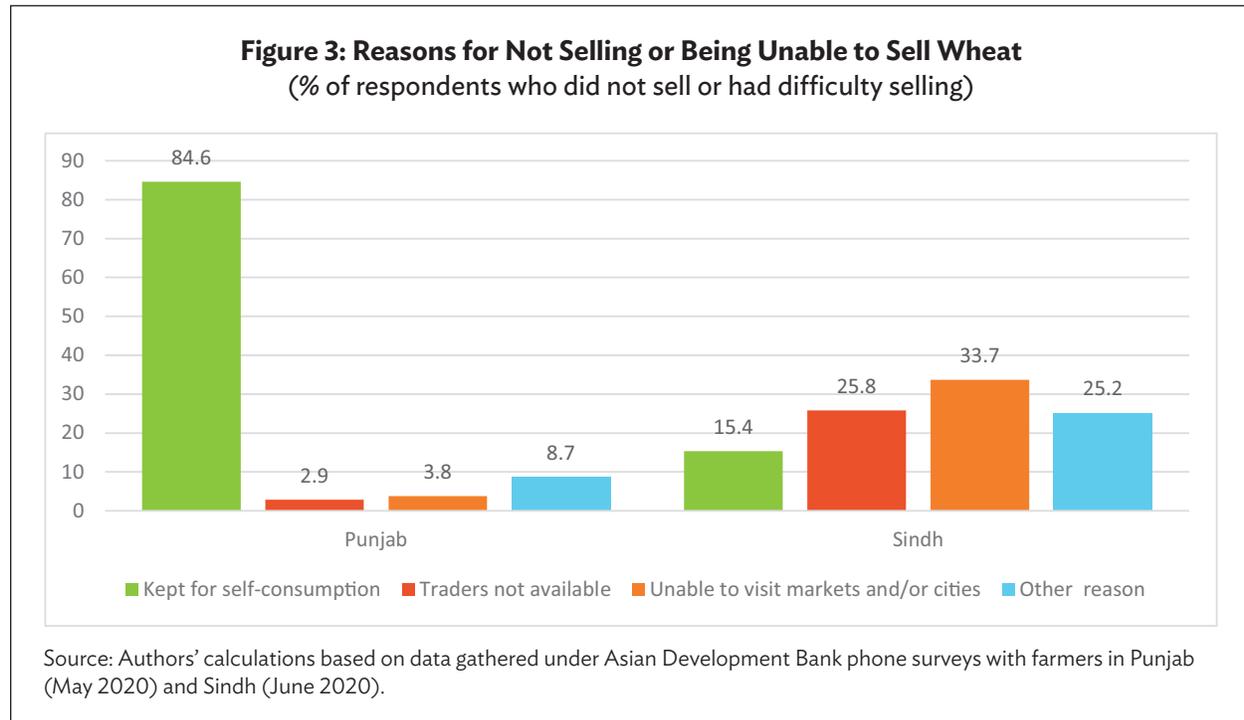
33. **COVID-19 impact on wheat marketing.** Of the respondents who had completed their harvest at the time of the survey in Punjab, 74.6% reported that they were able to market wheat without difficulty.¹⁴ Most of those who did not sell wheat kept the produce for self-consumption (Figure 3). Only a few respondents faced difficulty selling their wheat. Asked to identify their major wheat crop buyers, 40.1% of respondents cited the government as their primary buyer; the remaining 59.9% sold their harvest in the open market. By area, the proportion of sales in the open market in the rice-wheat zone was 61.2%,

¹² Only five respondents reported not having completed their wheat harvest at the time of the survey and stated that they would complete harvesting by the fourth week of May. Six more respondents could not harvest their wheat crop mostly because of waterlogging resulting from excessive rains. About 83.9% of respondents felt that their harvests were delayed relative to previous years, mostly because of late rain.

¹³ During interviews, farmers explained that combine harvesters used in Sindh largely come from Punjab and, because of the lockdown, machines were not allowed to move from one province to another. Some farmers also noted that every season, machines need repair before going into the fields and, again because of the lockdown, workshops were closed and that is why machines were delayed in reaching Sindh.

¹⁴ The food department under the Government of Pakistan's MNFSR provided price support in buying wheat from farmers at PRs1,400 per 40 kilograms (kg), which was higher than the prices offered by local traders. The government also exempted agriculture businesses from lockdown restrictions. However, disruptions were reported in some places. Appendix 2 provides information about the government crop procurement policy.

while it was 44.0% in the mixed cropping zone. Respondents who sold in the open market reported an average price of PRs1,367 (\$8.5 as of May 2020) per 40 kilograms (kg) of wheat.



34. In Sindh, of the respondents who had completed their harvest at the time of the survey, 65.3% reported that they were able to market wheat with difficulty, 20.1% marketed it without any difficulty, and 14.6% were unable to market their wheat. Of those who were unable to market wheat or had difficulty doing so, one-quarter stated that they were unable to visit markets and cities, one-fourth noted that traders were not available, and more than 15% kept the produce for self-consumption. Most respondents who were unable to sell or were able to sell with difficulty stated they felt it was because of COVID-19.

35. Asked to identify their major wheat crop buyers, 95.4% of respondents in Sindh said they sold their harvest in the open market, and only 4.6% cited the government as their primary buyer.¹⁵ Respondents who sold in the open market reported an average price of PRs1,278 (\$7.9 as of May 2020) per 40 kg of wheat.

36. Of the respondents who sold wheat to the market, 65.3% in Sindh reported they were able to sell it with difficulty, versus none in Punjab. The main reasons noted for the difficulty were that traders were unavailable, and farmers were unable to visit markets or cities. These numbers coincide with Sindh having more restricted mobility than was the case in Punjab. Furthermore, 40.1% of the Punjab respondents reported that the government was the primary buyer of wheat, but this figure was reported to be only 4.6% in Sindh.

¹⁵ The food department under the Government of Pakistan's MNFSR provided price support in buying wheat from farmers at PRs1,400 per 40 kg, which was higher than the prices offered by local traders. However, farmers reported that the government did not provide the necessary jute bags, and therefore they had to sell wheat in the open market. Although the government also exempted agriculture businesses from lockdown restrictions, disruptions were reported in some places.

37. Policies adopted by the Punjab and Sindh provincial governments caused disruptions in wheat marketing:

- (i) On 5 April 2020, the Government of Sindh decided not to procure grain largely because of the panic buying created by the rapid spread of COVID-19 and the countrywide lockdown (*Dawn* 2020b). The economic disruptions caused by the COVID-19 pandemic were blamed for severe wheat flour shortages and the consequent sharp price spike in the province. As a result, the interprovincial ban on wheat transport from Sindh was expected to lead to flour shortages in Punjab because four major mills in Punjab largely depended on wheat purchased from Sindh, where the harvest is earlier in the year than in Punjab. The Sindh provincial government delayed transport of wheat purchased by Punjab mills to first meet its own procurement target of 1.4 million tons from the harvest (Jamal 2020).
- (ii) Consequently, the Government of the Punjab restricted the movement of wheat in the districts of Punjab (*Dawn* 2020c). Simultaneously, the Punjab provincial government decided to set a wheat procurement target of 4.5 million metric tons; PRs158 billion (\$985 million as of May 2020) were to be spent to benefit the farmers and uplift the rural economy, while ensuring food security of the province (*The Express Tribune* 2020b).

As a result, farm households in Sindh were left worse off than those in Punjab.¹⁶

38. **COVID-19 impact on vegetable and fruit harvests.** The COVID-19 pandemic impacted perishable food items first and then the staple foods (Pakistan Institute of Development Economics 2020). Perishable food items need to be picked, packed, and shipped daily, which demands continuity of farm labor supply and human-to-human interaction. Thus, the COVID-19 pandemic could disrupt the supply chain.

39. In Punjab, 65 respondents had grown vegetables or fruit in the previous *rabi* season (November 2019–May 2020). Of those, 29.2% stated they had completed their entire harvest for the season, and a further 53.8% reported having completed at least one harvest.¹⁷ In Sindh, 128 respondents had grown vegetables or fruit other than tomatoes in the previous *rabi* season. At the time of the survey, 81.3% of those who had grown vegetables or fruits stated that they had completed the entire harvest for the season, and a further 17.2% reported having completed at least one harvest.¹⁸ One-third of the vegetable and fruit farmers (32.5%) felt their harvest had been delayed compared with the past years; 41.5% of them cited labor unavailability as the primary reason for the delay and a further 14.6% noted that they were waiting for a better market price. When asked if the COVID-19 pandemic had contributed to the delay, all responded affirmatively.

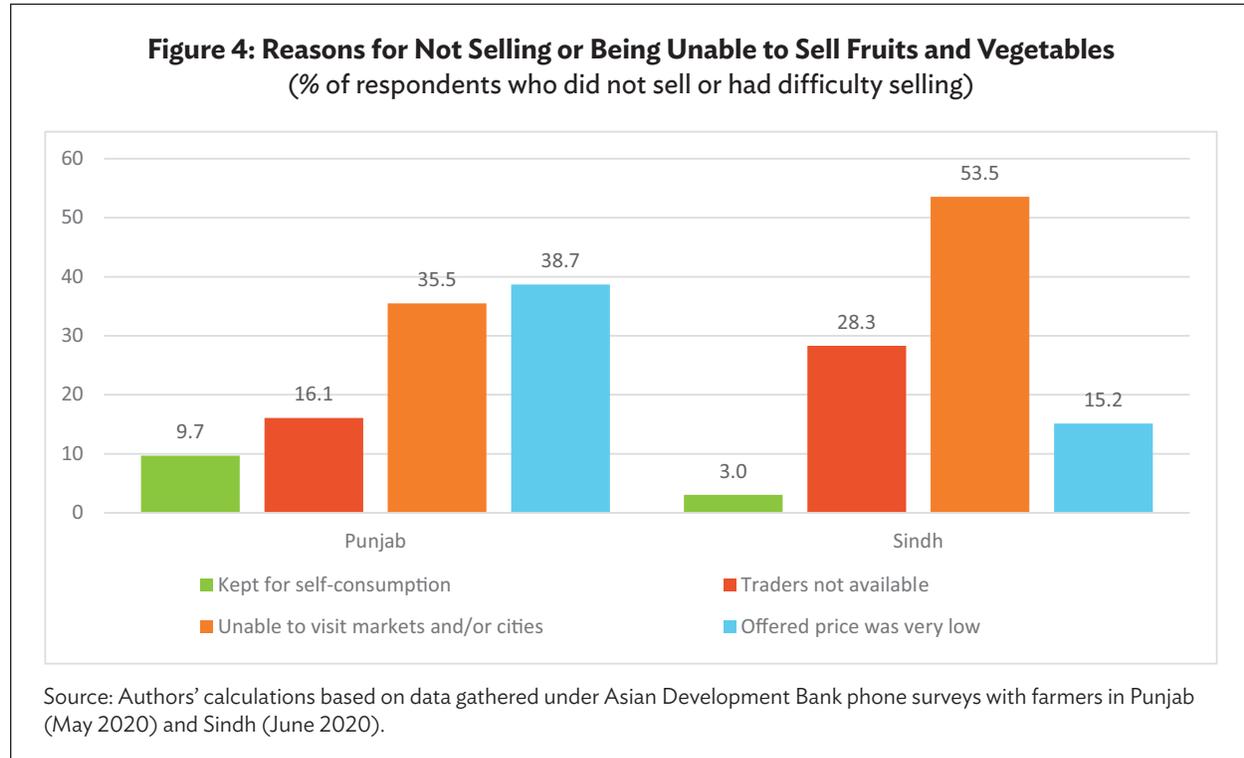
40. **COVID-19 impact on vegetable and fruit marketing.** Unlike the experience of wheat farmers, large proportions of vegetable and fruit farmers in Punjab reported difficulties with marketing their produce. About 39% of the vegetable and fruit growers found offered prices too low, 36% could not visit

¹⁶ Although the support price offered by both provincial governments was the same at PRs1,400 per 40 kg bag, 60% of farmers in Punjab and 95% of those in Sindh had to sell wheat at markets because of procurement issues. The average prices received by those who sold at markets were PRs1,378 in Punjab and PRs1,247 in Sindh.

¹⁷ A small proportion of respondents from the rice–wheat zone reported that they would harvest in the near future; only two respondents stated they would not be able to harvest largely or completely because of rain damage. Almost half of the harvesting was completed by the second week of April, with another surge in the second week of May. Most of those who had yet to complete their harvests and the majority of respondents who were yet to start harvesting stated that they would be able to do so after the fourth week of May.

¹⁸ Only two respondents stated they would not be able to harvest largely or completely because of damage to the crops from rain and locusts. Much of the harvesting was completed after the fourth week of March (56.7%), with about one-quarter of respondents (26.9%) having completed their harvest by the fourth week of March. Most of those who had not completed or started harvesting said that they would be able to do so by the fourth week of June (68.2%), with the remaining 31.8% stating that they would be able to complete it after the fourth week of June.

markets, and 16% could not find traders to sell their produce (Figure 4). In the rice–wheat zone, slightly less than one-quarter of the vegetable and fruit growers found offered prices too low, and another quarter could not visit markets. In the mixed cropping zone, all respondents who did not sell their produce found offered prices were too low, and most of them stated the COVID-19 pandemic as the main reason for the problems they faced.



41. In Sindh, 67.5% of farmers were able to market their produce but with difficulty; only 21.4% were able to market without difficulty. The inability to visit markets and cities was cited by 58.6% of farmers from upper Sindh and 41.4% of farmers from lower Sindh as the primary obstacle, while the unavailability of traders was cited by 24.3% of farmers from upper Sindh and 37.9% of farmers from lower Sindh as the secondary obstacle. Almost all respondents (97.9%) stated the COVID-19 pandemic as a main reason for their difficulties with marketing.

42. Comparatively, 21.1 percentage points more farmers in Sindh than in Punjab reported that they faced difficulties with marketing fruits and vegetables or were unable to sell them. In Sindh, the two primary reasons reported by respondents who did not sell or sold with difficulty were that (i) traders were not available on time, or (ii) they could not visit markets and/or cities. In Punjab, the two primary reasons reported were that (i) they could not visit markets and/or cities, or (ii) they were offered very low prices for the produce.

43. Reasons such as traders not being available and the inability to visit markets and/or cities are consistent with the mobility restrictions in the provinces. In terms of low prices in Punjab resulting from the restrictions imposed because of the COVID-19 pandemic, a differential in demand and supply has been created across the country: a food surplus in one region lowers the prices for the harvest while another region simultaneously faces excess demand and increased prices, which has caused a looming crisis of unequal distribution (Jamal 2020). The COVID-19 Pakistan: Socio-Economic Framework revealed short-term fluctuations in the prices of major food items in different parts of the country (United Nations Development Programme 2020). While the price of most food items has increased by

about 10%, the price of vegetables has been lower since the outbreak. Further analysis of data from the PBS Sensitive Price Indicator for the week of 7 May 2020 indicated an increase of 0.4% over the previous week. Among food items, the significant increases were for poultry (23.7%) and bananas (7.4%), while significant decreases were for onions (9.2%), tomatoes (3.1%), garlic (1.2%), wheat flour (0.5%), and sugar (0.1%) (PBS 2020b). These facts and figures agree with the initial predictions that food prices across the country would be volatile because of the COVID-19 pandemic, with perishable items such as tomatoes and onions at a higher risk of decreased prices. The decreases have impacted the farm households negatively.

44. The FAO noted that the increasing prices of wheat and other crops since the second half of March 2020 have resulted from an upsurge of on-demand and transport disruptions related to the COVID19 pandemic. Harvest delays because of above-average rains provided further upward pressure on prices (FAO 2020e). Overall, prices in March remained well above levels a year earlier and were at near record highs in some markets. Evidently, the COVID-19 pandemic has had a negative impact associated with reduced economic activities and the adverse effects on the food supply chain, thus heightening concern for food security in the country.

45. **The case of tomato production in Sindh.** The impact of tomato production is different in Punjab and Sindh. As of 2018, in Punjab, tomato production accounted for only 7.8% of the province's total vegetable production, but in Sindh, the figure was 59.6% (MNFSR 2019). Looking at the percentage of tomatoes in the total production of vegetables per district in Punjab, the figures remain negligible.¹⁹ However, in Sindh, tomato is an important crop. During 2015–2018, farmers grew tomatoes on an average of 27,600 hectares yearly, the largest area among Pakistan's provinces, and they produced an average of 204,400 tons annually during the same period, making Sindh the country's largest tomato producer (MNFSR 2019). As tomatoes are an important source of livelihood for farmers in Sindh, the Sindh respondents were asked separately about their tomato harvest.

46. Most respondents (61.0%) were unable to complete their tomato harvest, and 6.7% were unable to harvest at all. The proportion of respondents who had completed their harvest was higher in upper Sindh (40.5%) than in lower Sindh (27.0%). Most respondents (65.3%) who had completed the harvest said they had done so after the fourth week of March, with a further 22.4% noting they had finished harvesting by the fourth week of March.

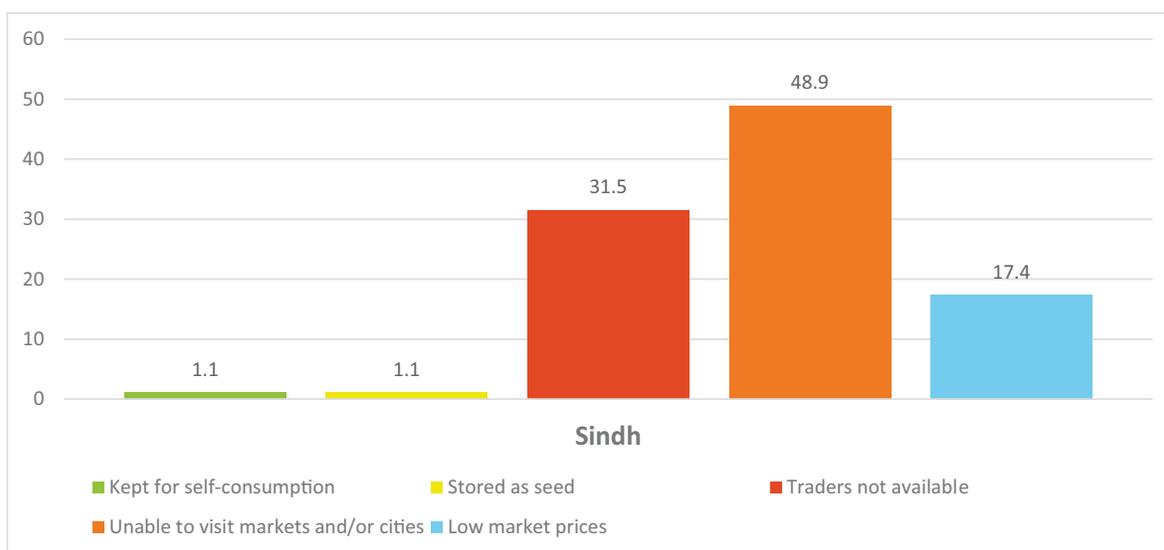
47. Most respondents who had not completed their harvest or were unable to harvest at all stated that they instead plowed their produce under as green manure. The majority of farmers (76.5%) who did so cited their reason as the low price because of decreased demand, while the rest said they had difficulty accessing the market. Farmers who had plowed their produce under cited the COVID-19 pandemic as the reason for their decision.

48. Of the 98 respondents who were able to harvest their tomatoes, only 6.1% were able to market their produce without difficulty. Most respondents were able to market but with difficulty (61.2%) and the remaining 32.7% were unable to market at all.

49. Those who were not able to market their tomatoes or faced difficulties marketing them stated the following reasons: almost half were unable to visit markets and cities, nearly one-third stated traders were not available, and 17% cited low market prices. Almost all respondents (97.8%) cited the COVID-19 pandemic as a reason for not being able to sell their produce or their difficulty selling it (Figure 5).

¹⁹ In Gujranwala district, tomatoes comprise 0.300% of the total vegetable production. This figure is reported to be 0.001% for Gujrat, 0.020% for Mandi Bahuddin, 0.200% for Nankana Sahib, 0.008% for Narrowal, 0.030% for Sialkot, 0.030% for Hafizabad, 1.200% for Shiekhpora, 0.090% for Okara, and 0.130% for Pakpattan.

Figure 5: Reasons for Not Selling or Being Unable to Sell Tomatoes
(% of respondents who did not sell or had difficulty selling)



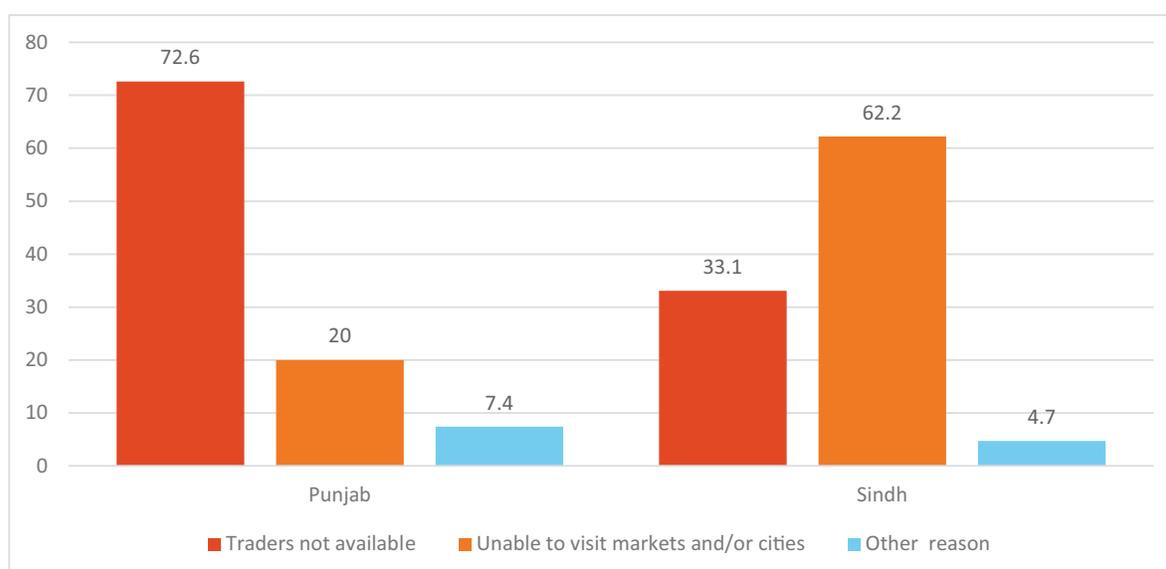
Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

50. **COVID-19 impact on dairy marketing.** Respondents in Punjab and Sindh who raise livestock and sell milk cited difficulties with selling their milk (Figure 6). Of the 145 respondents who reported having livestock for milk production and selling milk in the market in Punjab, about two-thirds reported that they had been unable to market or faced difficulty marketing their milk daily in the previous few months. Of those who reported difficulties in marketing milk or were unable to market it, about three-quarters cited unavailability of traders as the reason, followed by one-fifth who reported they could not visit markets. When asked whether the COVID-19 pandemic was a contributing factor, nearly all answered affirmatively. Furthermore, three-quarters of all respondents reported that the price of milk had decreased because of the COVID-19 pandemic.

51. In Sindh, of the 137 respondents raising livestock for milk and selling it in the market, 81% reported difficulty marketing their milk daily in the past few months, and a further 12% were unable to market their milk at all. Of those who reported difficulties with marketing milk or who were unable to market it, about two-thirds said it was because they could not visit the market, followed by one-third who cited unavailability of traders as the reason. When asked whether the COVID-19 pandemic was a contributing factor, 99.2% of respondents who were unable to market their milk answered affirmatively. Furthermore, 89.1% of respondents reported that the price of milk had decreased because of the COVID-19 pandemic.

52. In both provinces, the majority of the farm households either did not have livestock or, if they had livestock, did not sell milk. However, among farmers who did sell milk, it was more difficult to do so in Sindh than in Punjab. About 14 percentage points more farmers in Sindh than in Punjab reported a drop in the price of milk. While in Punjab, 34.5% farmers were able to sell milk without difficulty, this figure was only 7.3% in Sindh. In Sindh, the primary reason farmers gave for not being able to sell milk was their inability to visit markets and/or cities; in Punjab, the dominant reason was that traders were not available. Again, the reasons remain a by-product of the COVID-19 lockdown's restriction on mobility, with 99.2% of farmers in Sindh and 98.9% in Punjab agreeing that the difficulty of selling milk was because of COVID-19.

Figure 6: Reasons for Not Selling or Being Unable to Sell Milk
(% of respondents who did not sell or had difficulty selling)



Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

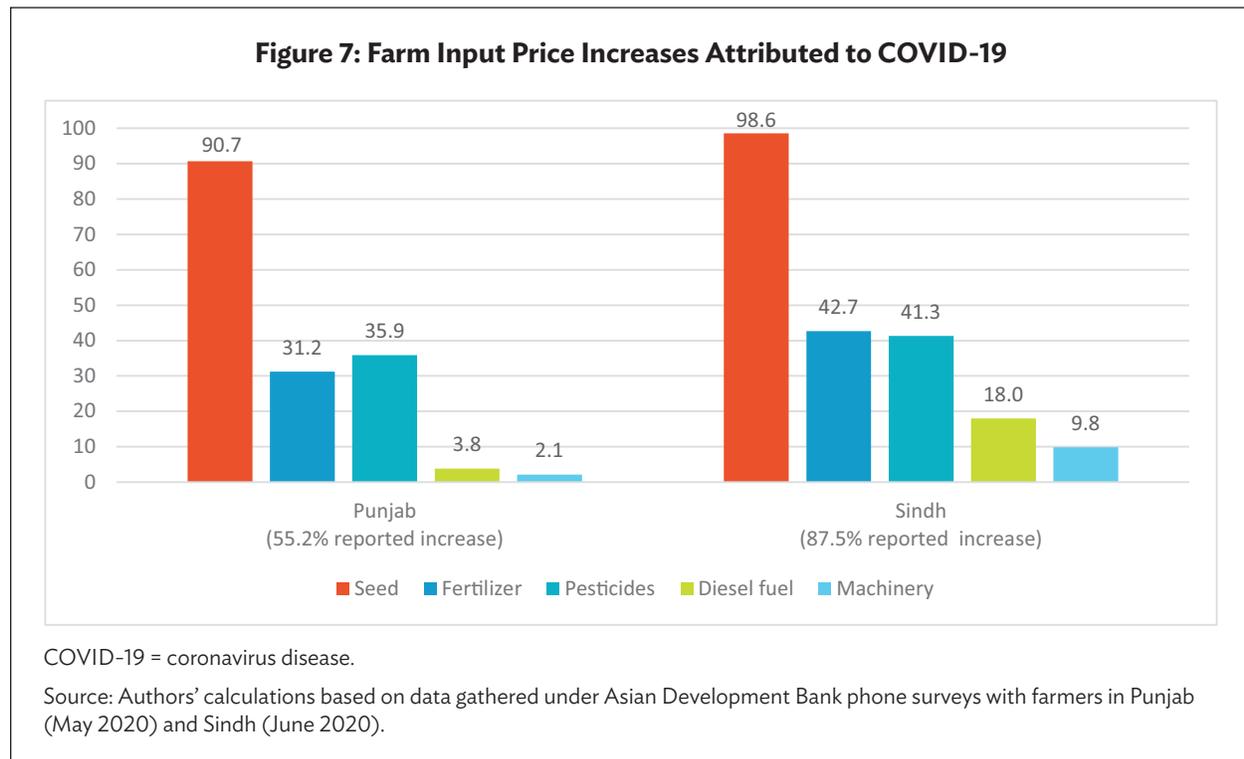
53. **COVID-19 impact on farm inputs.** The respondents to the phone surveys were asked a series of questions about the impact of the COVID-19 pandemic on their farm inputs and the availability of labor and machines for the next sowing. They were also asked to assess their personal financial capacity after the onset of the pandemic and its subsequent economic impact.

54. In Punjab, more than 27% of respondents reported facing disruptions related to the COVID-19 pandemic when purchasing or receiving farm inputs for the next cycle of sowing; 45% said they faced no disruption; and the rest (28%) were unsure. Farmers indicated that seed purchases were most affected by the COVID-19 pandemic, followed by fertilizers, pesticides, and diesel fuel. Respondents in the mixed cropping zone faced considerably more disruptions to the input of pesticides and diesel fuel, whereas rice-wheat zone farmers had difficulty securing seed. This raises concern for future crop production.

55. In Sindh, 78.9% of respondents reported facing COVID-19-related disruptions when purchasing or receiving farm inputs for the next cycle of sowing; only 19.9% said they encountered no disruption. Farmers indicated that seed purchases were most affected by the COVID-19 pandemic, followed by fertilizers, pesticides, diesel fuel, and machinery. Respondents in lower Sindh faced considerably more disruptions to the inputs of fertilizer, pesticides, diesel fuel, and machinery than those in upper Sindh. Figure 7 shows the inputs for which farmers in the two provinces noted price increases.

56. Overall, more than half of respondents from Punjab reported an increase in the cost of their farm inputs because of COVID-19, nearly 30% reported no increase, and about 15% were unsure. Among those who observed input price increases, most said that the cost of seed had increased, and roughly one-third noted increases in the costs of pesticides and fertilizer (Figure 7). A few respondents reported an increase in the cost of diesel fuel, machinery, and miscellaneous inputs. More than three-quarters of the respondents reported not having difficulty finding machines for land preparation or sowing of their crop. Similarly, almost three-quarters of respondents stated they did not have problems finding workers for the next crop cycle.

57. In Sindh, 87.5% of respondents reported an increase in the cost of their farm inputs because of COVID-19. Among them, 99% said that the cost of seed had increased, 43% noted an increase in fertilizer cost, and 41% noted a rise in the cost of pesticides (Figure 7). Some respondents also reported an increase in the cost of diesel fuel and machinery. Regarding the availability of machines and their parts, 20.1% stated that they had trouble finding them.²⁰ About half of respondents (49.6%) also stated they faced problems finding workers for the next crop cycle.



58. While the pattern is the same in Punjab and Sindh, Sindh was found to be worse off than Punjab in terms of reduced market linkages and a reduced transport network because of restricted mobility: 51.6 percentage points more respondents in Sindh reported they had faced COVID-19-related disruptions to the purchase or delivery of farm inputs for the next planting. The main input disruptions were, in order of most to least, seed, fertilizers, pesticides, diesel fuel, and machinery. These results are consistent with the predictions of FAO (FAO 2020a), which determined that lack of community mobility would hinder farmers from accessing farm inputs, supplies, and equipment. The disruption was more evident in Sindh, which experienced more mobility restrictions than was the case in Punjab.

59. In addition, more respondents in Sindh than in Punjab stated that the cost of their farm inputs increased because of the COVID-19 pandemic. The main inputs with increased price were, in order of most to least, seed, fertilizers, pesticides, diesel fuel, and machinery.

60. In Punjab, 12.1% of the respondents experienced problems finding machines or spare parts for land preparation or sowing as a result of the COVID-19 pandemic, while in Sindh, 20.1% of respondents reported experiencing these same problems. Similarly, 49.6% of the farmers in Sindh experienced problems finding workers for the next crop, compared to only 8.6% in Punjab.

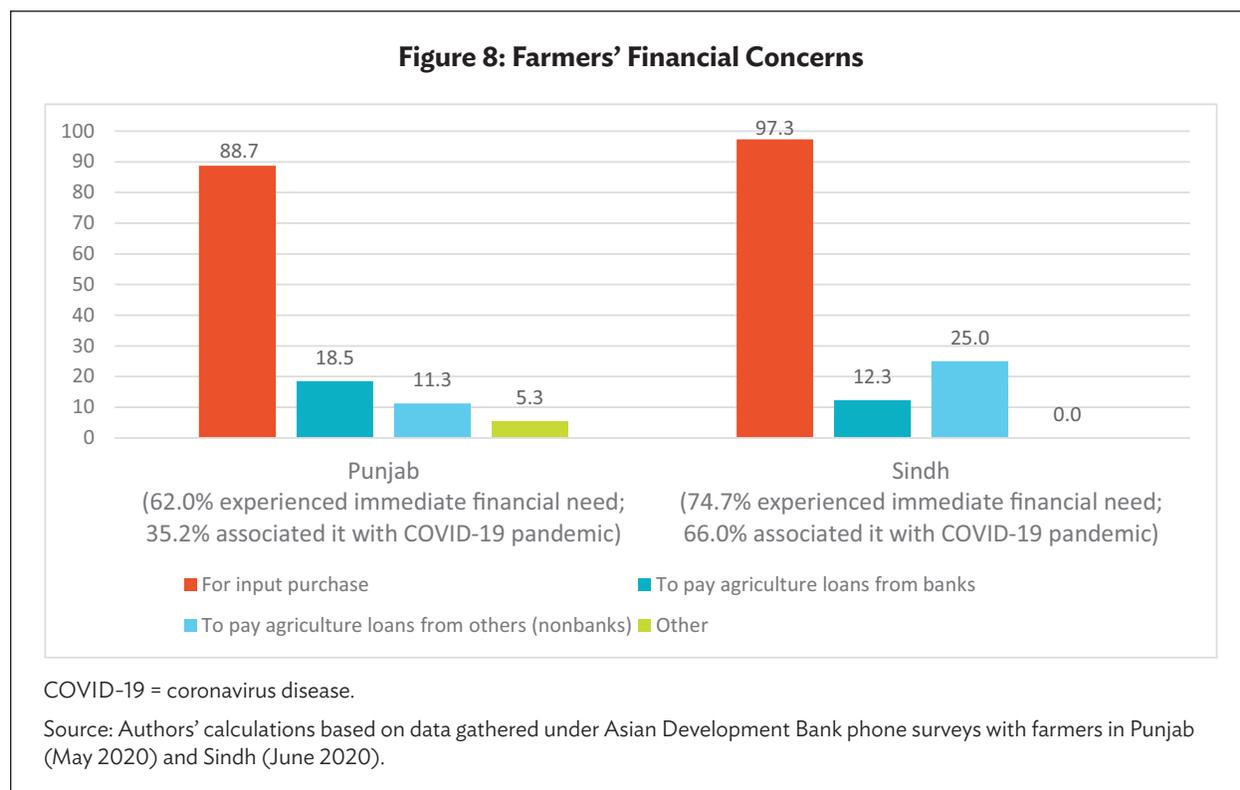
²⁰ Field researchers conducting the survey commented that combine harvesters are not commonly available in Sindh. Some farmers normally rent them from the nearby districts of Punjab, but they were unable to obtain them in 2020 for the wheat harvest.

61. There is a chance that farmers who reported increased input prices and limited availability of machine services may have experienced a decline in their production during the 2020 *kharif* season, while the farmers who had applied the usual amount of inputs might have fallen into debt before the harvest, leaving them highly vulnerable and dependent on the weather and output prices. However, this needs to be investigated.

62. **Farmers’ financial needs to maintain farm operations.** All respondents to the phone survey were asked a series of questions pertaining to their personal financial capacity after the onset of the pandemic and its subsequent economic impact. Figure 8 compares the responses of farmers in the two provinces regarding their financial concerns.

63. About 62% of total respondents in Punjab reported financial difficulties in recent months. When asked whether this was because of the COVID-19 pandemic, more than half of those who reported financial difficulties agreed that it was. Furthermore, among respondents who faced financial difficulties, 88.7% pointed to the purchase of inputs as their primary concern, while 18.5% cited liabilities and loans from banks, and 11.3% cited liabilities and loans from nonbank lenders.

64. In Sindh, three-quarters of respondents reported having financial difficulties in recent months. When asked whether this was because of the COVID-19 pandemic, most of them said that it was. Furthermore, among respondents who faced financial difficulties, 97.3% pointed to the purchase of inputs as their primary concern, 12.3% cited liabilities and loans from nonbank lenders, and 25.0% cited liabilities and loans from banks.



65. Many respondents in both provinces experienced immediate financial needs to maintain farm operations, but this figure was 13 percentage points higher in Sindh (74.7%) than in Punjab (62.0%). Of those who experienced financial need, 28.7 percentage points more respondents in Sindh attributed it to the COVID-19 pandemic (85.5%) than in Punjab (56.8%). In both provinces, the main financial need was to purchase inputs. However, 8.6 percentage points more respondents in Sindh needed the money

to purchase inputs than in Punjab. The second source of financial need was to repay agricultural loans. In Punjab, more respondents needed to repay loans to an agricultural bank than in Sindh, while more farmers needed to return the loan to a nonbank source in Sindh than in Punjab.

C. Impacts of Locust Swarms

66. **Knowledge of locust swarms.** According to the Punjab Agriculture Extension Services, about 300,000 km² of farmland was vulnerable to the locust outbreak in 2020; 25% of that area was in Sindh and only 15% was in Punjab (FAO 2020c). Limited locust swarm cases were reported in Punjab, while locust attacks were reported in upper, central, and lower Sindh in 2019 and early 2020 (FAO 2020f). The ADB surveys showed that 73.7% of the respondents in Sindh reported locust swarms, while only 10.7% reported them in Punjab. Thus, Sindh remains the focal point of investigation regarding locust swarms.

67. With regard to early warning and other sources of information about the locust swarms, a minority of respondents in Punjab (34.3%) received an early warning from the government or alternative sources. Among respondents who were aware of the locust swarms in Punjab, the main sources of information include the provincial agriculture department (45.1%), media (33.3%), and local community sources (29.3%). Only a few respondents cited local government and the district administration as sources.

68. In Sindh, a minority of respondents (42.9%) received early warning about the locusts from the government or another source. Among respondents who were aware of the locust swarms, their main sources of information included media (88.1%), local community sources (55.7%), and the provincial agriculture department (3.4%), with a few respondents citing local government and the district administration as well.

69. A majority of the respondents in both provinces did not receive early warning about the desert locusts, but 8.6 percentage points more farmers in Sindh received early warning than in Punjab. The provincial agriculture department was the main source of information in Punjab but not in Sindh. Local people and media were a vital source of early warning for both provinces. More respondents in Sindh reported local people to be their source of information about the locusts than in Punjab, and about 55 percentage points more respondents in Sindh reported media to be a source of information on the desert locust than in Punjab.

70. **Impacts of locust swarms on crops and precautions taken.** In Sindh, where a higher rate of locust invasion was reported than in Punjab, respondents were asked an additional set of questions regarding the locusts' impact on crops and what measures were taken to prevent crop damage because of locusts. More than 70% of the people who had observed locusts had experienced partial or complete damage in their fields.

71. Almost all respondents stated that their area had not been surveyed to assess the locust presence (Table 3). Similarly, 91% stated that their area had not been sprayed. Across both upper and lower Sindh, 21 respondents (7%) stated they had sprayed their area themselves, and 5 respondents stated that their area had been sprayed by government teams. Handheld sprayers were the most commonly used equipment (71%), followed by vehicle-mounted sprayers (21%).²¹ More than 91% of respondents stated that their area had been attacked by locusts at least once before spraying. Three-quarters of respondents reported that locusts still attacked their area at least once even after spraying, although the frequency of the attacks had been significantly reduced (with 73.8% reporting at least two or more attacks before spraying, compared with 35.7% after spraying). Nearly half of the respondents stated that their fields had been partly damaged by locusts, and an additional 23% reported that their fields had been largely or completely destroyed.

²¹ More than 90% of farmers who sprayed their areas themselves used handheld sprayers; where the government did the spraying, 80% of farmers reported that vehicle-mounted sprayers were used.

Table 3: Locust Impacts and Preventive Measures in Sindh

Item		Sindh Zones		
		Upper Sindh	Lower Sindh	Overall Sindh
Respondents (no.)		284	126	410
Reported their area had been surveyed (% of respondents)	No	96.1	95.2	95.9
	Yes, by government teams	2.8	0.8	2.2
	Yes, by pesticide companies	0.7	1.6	1.0
	Yes, by NGOs	0.0	0.8	0.2
	Yes, by others	0.4	0.0	0.2
	Don't know	0.0	1.6	0.5
Reported their area been sprayed (% of respondents who noticed a desert locust invasion in their area)	No	90.6	91.5	90.7
	Yes, by government teams	1.6	2.1	1.7
	Yes, by themselves	7.1	6.4	7.0
	Yes, by NGOs	0.0	0.0	0.0
	Yes, by other organizations	0.4	0.0	0.3
	Don't know	0.4	0.0	0.3
Method of spray (% of respondents who reported their area had been sprayed)	Handheld sprayers	70.8	75.0	71.4
	Vehicle-mounted sprayers	20.8	25.0	21.4
	Aerial sprayers	0.0	0.0	0.0
	Other	8.3	0.0	7.1
Frequency of desert locust attack (% of respondents)	Never	6.3	21.3	8.6
	Once	16.1	25.5	17.5
	Twice	38.0	38.3	38.1
	Three times or more	39.6	14.9	35.8
	Don't know	0.0	0.0	0.0
Frequency of desert locust attack (% of respondents who reported their area had been sprayed)	Never	25.0	25.0	25.0
	Once	45.8	0.0	39.3
	Twice	12.5	50.0	17.9
	Three times or more	16.7	25.0	17.9
	Don't know	0.0	0.0	0.0
Level of damage done by locusts in respondents' fields (% of respondents who noticed a desert locust invasion in their area)	Field was not attacked by locusts	7.5	12.8	8.3
	Field was attacked but no damage was done	16.9	31.9	19.2
	Field was partly damaged	51.0	40.4	49.3
	Field was largely or completely damaged	24.3	14.9	22.8
Average percentage of damage done in respondents' field by level (Average of respondents who reported partial or large or complete damage in their fields)	Field was partly damaged	37.0	41.3	37.6
	Field was largely or completely damaged	62.4	67.1	62.9

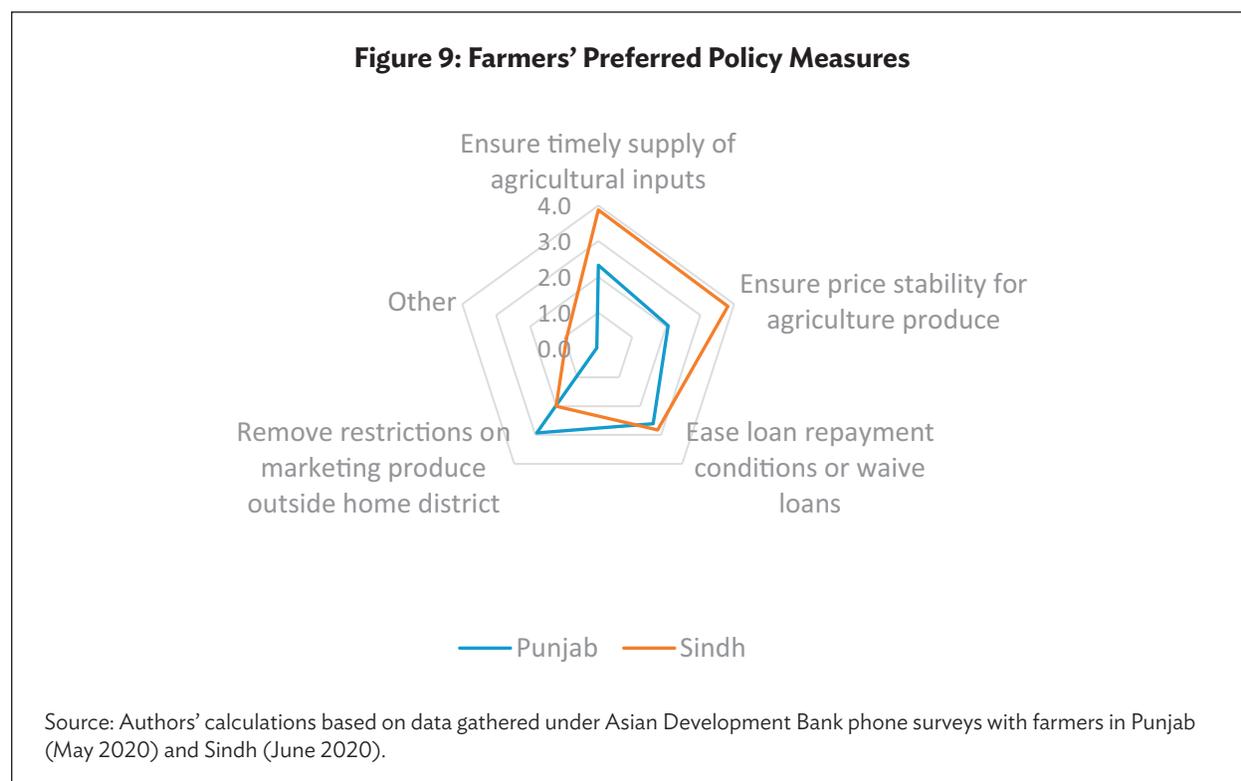
NGO = nongovernment organization.

Note: Numbers may not sum precisely because of rounding.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

D. Farmers' Preferred Policy Measures

72. Respondents were asked to suggest and rank in order of preference a series of policy measures that the government should take (Figure 9). A priority index was developed to identify the policy measures that farmers preferred the government to take (Appendix 3). The index is based on the proportion of total respondents who identified a policy measure for government action and the priority rank respondents assigned to the suggested policy measure.



73. Respondents from Punjab selected the following policy measures, in order of preference, that the government should take:

- (i) ensure price stability for agricultural produce,
- (ii) ease loan repayment conditions or waive loans,
- (iii) remove restrictions on marketing in districts beyond where the produce was raised,²²
- (iv) ensure timely supply of agricultural inputs, and
- (v) other policy measures.

74. The largest number of respondents (75.3%) selected ensuring price stability for agriculture produce, followed by 66.9% who selected easing of loan repayment conditions or waiving loans.

²² Every year during wheat harvesting season, the government imposes a ban on the sale of wheat in districts other than where it is grown. The purpose of the ban is for the government to procure wheat and control the price and smuggling of wheat. In 2020, the ban was imposed on 19 March (Government of Pakistan, Press Information Department 2020b; and Dawn 2020a) and lifted on 10 June (Government of Pakistan, Finance Division 2020; Government of Pakistan, Press Information Department 2020a; and The Nation 2020). The government does not restrict the mobility of other agriculture produce. The suggested policy measure to remove restrictions on marketing in districts beyond where the produce is raised should be interpreted in the context of wheat, as more than 90% of survey respondents had grown wheat during the previous *rabi* season.

The needs to remove restrictions on the supply of agricultural inputs and the marketing of agricultural produce in districts other than the farmers' home district were each identified by 54.3% of respondents.

75. Respondents from Sindh selected the following policy measures, in order of preference, that the government should take:

- (i) ensure timely supply of agricultural inputs,
- (ii) ensure price stability for agricultural produce,
- (iii) ease loan repayment conditions or waive loans,
- (iv) remove restrictions on marketing in districts beyond where the produce was raised, and
- (v) other policy measures.

76. Among respondents in Sindh, the largest number (97.1%) selected the need to ensure timely supply of agricultural inputs, followed by the need to ensure price stability for agricultural produce (96.8%), and the need to either ease loan repayment conditions or waive loans (80.7%). Among respondents, 68.8% identified the need to remove restrictions on the supply of agricultural inputs and allow the marketing of agricultural produce in districts other than the farmers' home district. About half of the respondents (50.7%) suggested other policy measures.

VII. GOVERNMENT ACTION

77. The Government of Pakistan has introduced several policies to assist farm households since the onset of the COVID-19 pandemic in the country. The Economic Coordination Committee approved a PRs100 billion (\$600 million as of 20 September 2020) coronavirus relief package for small and medium-sized enterprises and the agriculture sector. PRs17.1 billion (\$10.3 million as of 20 September 2020) has been allocated to provide some benefits to farmers. This includes a subsidy on fertilizers, reduced bank markups on agriculture loans, a subsidy on cottonseed and whitefly pesticides, and a sales tax subsidy on locally manufactured tractors. On a similar note, the Government of Pakistan has provided employment opportunities to daily wage workers for planting trees as part of the government initiative to plant billions of trees to combat climate change (World Economic Forum 2020). All restrictions on the interprovincial movement of wheat and wheat flour were removed with effect from 8 June 2020 (*The Nation* 2020).

78. To tackle locust swarms, several measures were taken. As of 13 January 2021, the Government of Pakistan had surveyed about 61.4 million km² and treated almost 1.1 million km² across the country in an ongoing control operation using 5 aircraft, 156 vehicle-mounted sprayers, 1,697 power sprayers, and 2,484 manual sprayers (Government of Pakistan, National Locust Control Centre—accessed 3 January 2021). International aid has been readily available to tackle locust invasion in affected areas, the FAO has given the MNFSR 20 ultra-low volume pesticide micro sprayers for vehicles, 1,303 personal protective equipment kits, and 100 Global Positioning System satellite communicator devices (FAO 2020d). Similarly, the Department for International Development of the United Kingdom (UK) has offered £1.0 million (\$1.29 million as of 29 April 2020) for control operations through the FAO. Pakistan has received 20 micro sprayers from the UK. The FAO will oversee and monitor the delivery of 50 sprayers and 1,300 personal protective equipment kits from UK funding to Pakistan for locust surveillance and control operations to assist 18,000 vulnerable farmers (Government of the UK, British High Commission Islamabad 2020). Additionally, the People's Republic of China has provided 50 vehicle-mounted sprayers and 300,000 liters of pesticide to Pakistan (Government of Pakistan, National Disaster Management Authority 2020).

79. The FAO (FAO 2020d) indicated that the government's measures are aligned to ensure enough domestic availability of needed supplies and to preempt disruptions because of COVID-19 and the locust attack. Similarly, the government's measures and the policy measures suggested by the ADB survey respondents are in harmony. The government has acted on all fronts, but the policy measures will only be effective if they are not impeded by bureaucratic red tape and are adequately implemented.

VIII. CONCLUSION

80. Based on surveys conducted in Pakistan's Punjab and Sindh provinces in May and June 2020, this working paper found that the COVID-19 pandemic and the economic and transport disruptions negatively affected the marketing of vegetables, fruits, and milk in both Punjab and Sindh, and tomatoes specifically in Sindh. The negative impact on the marketing of wheat was less than that on the marketing of other products. Unlike cereals, fresh produce is highly perishable. Supply chain disruptions directly resulted in economic losses for farmers and increased food prices for consumers. Despite the government's efforts to minimize the disruptions in the food supply chain, the survey results indicate that farmers still suffered economic losses.

81. The rising input prices and limited availability of machine services gave rise to grave concerns over rice production in the 2020 *kharif* season. Rice production may decline because of the increased cost of rice production inputs, which has limited their use. Moreover, the ADB surveys indicate that farmers' cash income has decreased and, in some cases, has been nonexistent during the COVID-19 pandemic. Coupled with higher input prices, some rice farmers may fall into deep debt before the harvest, leaving them highly vulnerable and dependent on the weather and output prices.

82. Almost all respondents from upper Sindh reported locust swarms, with more than one-third of lower Sindh respondents stating they had also been affected. In Punjab, locust swarms were reported in two southern districts in the surveyed areas, resulting in production losses for farmers who have been suffering from the COVID-19 pandemic. Farmers from both Punjab and Sindh reported almost complete government unresponsiveness in providing information about the swarms, information through surveys, or relief from spraying.

83. The market disruptions caused by the response to the COVID-19 pandemic in its early stages have stabilized. The locust swarms had subsided by the summer of 2020, although they may return to Pakistan in the future.²³ As the COVID-19 pandemic continues, more farmers and low-income consumers become highly vulnerable because of agricultural income losses and declining cash income. The government needs to continue closely monitoring agricultural production, storage, and domestic and international market conditions, and to be prepared to assist farmers and protect food security in the country.

²³ The National Disaster Management Authority noted that the locust swarms were no longer severe by June and July 2020, as expected (*Dawn* 2020d), and that they were gone by early October (*Al Jazeera* 2020).

APPENDIX 1: SURVEY RESULTS TABLES

Table A1.1: COVID-19 Impacts on Households in Punjab and Sindh

Item	Punjab Zones			Sindh Zones		
	Rice–Wheat	Mixed Cropping	Overall Punjab	Upper Sindh	Lower Sindh	Overall Sindh
Respondents (no.)	381	48	429	284	126	410
No difficulty (%)	49.9	50.0	49.9	20.4	29.4	23.2
Lost wage and nonfarm income (%)	33.6	31.3	33.3	38.0	35.7	37.3
Family members returned from urban and other areas (%)	22.0	27.1	22.6	38.4	42.1	39.5
Reduced food consumption (%)	10.5	4.2	9.8	59.5	55.6	58.3
Reduced nonfood expenditure (%)	11.5	8.3	11.2	49.3	36.5	45.4
Other (%)	2.6	4.2	2.8	2.5	1.6	2.2

COVID-19 = coronavirus disease.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

Table A1.2: Respondents' Crops during the 2019 Rabi Season in Punjab^a

Item	Punjab Zones		
	Rice–Wheat	Mixed Cropping	Overall Punjab
Respondents (No.)	381	48	429
Wheat (%)	96.9	95.8	96.7
Maize (%)	7.3	56.3	12.8
Berseem (%)	51.7	35.4	49.9
Oil seed (%)	0.5	2.1	0.7
Vegetables (%)	11.5	12.5	11.7
Fruits (%)	5.5	2.1	5.1
Other crops (%)	6.3	4.2	6.1

^a The *rabi* season lasts from about November to April.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020).

Table A1.3: Respondents' Crops during the 2019 Rabi Season in Sindh^a

Item	Sindh Zones		
	Upper Sindh	Lower Sindh	Overall Sindh
Respondents (No.)	284	126	410
Wheat (%)	98.2	83.3	93.7
Berseem (%)	15.8	27.0	19.3
Lucerne (%)	23.2	12.7	20.0
Sugarcane (%)	0.7	11.1	3.9

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Table A1.3 continued

Item	Sindh Zones		
	Upper Sindh	Lower Sindh	Overall Sindh
Oilseed (%)	23.9	34.9	27.3
Tomato (%)	14.8	50.0	25.6
Onion (%)	10.9	5.6	9.3
Other vegetables (%)	19.7	21.4	20.2
Mango (%)	0.4	0.0	0.2
Banana (%)	0.0	4.0	1.2
Melon (%)	6.7	1.6	5.1
Other fruits (%)	3.2	0.0	2.2
Any other crop (%)	6.3	11.1	7.8

^a The *rabi* season lasts from about November to April.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Sindh (June 2020).

Table A1.4: Impacts of COVID-19 on the 2020 Wheat Harvest in Punjab

Item		Punjab Zones		
		Rice–Wheat	Mixed Cropping	Overall Punjab
Respondents who grew wheat in the 2019 <i>rabi</i> season ^a (No.) ^b		369	46	415
Status of harvest at survey time (% of respondents)	Completed	97.3	97.8	97.3
	In progress	1.1	2.2	1.2
	Will harvest in near future	0.0	0.0	0.0
	No harvest because of crop damage	1.6	0.0	1.4
Week harvest was completed (% of respondents who had completed their harvest)	By the second week of April	1.1	11.1	2.2
	By the third week of April	3.9	8.9	4.5
	By the last week of April	27.0	37.8	28.2
	By the first week of May	42.9	31.1	41.6
	By the second week of May	25.1	11.1	23.5
When the farmer anticipated completing the harvest (% of respondents who were in the process of harvesting)	By the third week of May	25.0	0.0	20.0
	By the fourth week of May	75.0	100.0	80.0
	After the fourth week of May	0.0	0.0	0.0
Is your harvest delayed compared with previous years? (% of respondents who had completed or were in the process of harvesting)	Yes	82.4	95.7	83.9
	No	17.6	4.3	16.1
Reasons for the delayed harvest (% of respondents noting the 2020 harvest was delayed compared with previous years) ^a	Crop not ready for harvest	1.7	2.3	1.7
	Labor not available on time	0.3	0.0	0.3
	Machines not available on time	4.7	0.0	4.1
	Because of rain	96.7	97.7	96.8
	Other	2.3	0.0	2.0

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Table A1.4 continued

Item		Punjab Zones		
		Rice– Wheat	Mixed Cropping	Overall Punjab
Was the delay related to COVID-19? (% of respondents reporting delayed harvest other than "crop not ready for harvest" or "because of rain")	Yes	59.1	0.0	59.1
	No	40.9	0.0	40.9
	Don't know	0.0	0.0	0.0
Reasons for crop damage (% of respondents who did not harvest because of crop damage)	Lodging because of excessive rain	83.3	0.0	83.3
	Locust invasion	0.0	0.0	0.0
	Other insect and/or disease infestation	0.0	0.0	0.0
	Other	16.7	0.0	16.7

COVID-19 = coronavirus disease.

^a The *rabi* season lasts from about November to April.

^b Multiple response question; numbers may not sum precisely because of rounding.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020).

Table A1.5: Impacts of COVID-19 on the 2020 Wheat Harvest in Sindh

Item		Sindh Zones		
		Upper Sindh	Lower Sindh	Overall Sindh
Respondents who grew wheat in the 2019 <i>rabi</i> season ^a (No.) ^b		279	105	384
Status of harvest at survey time (% of respondents)	Completed	99.6	100.0	99.7
	In progress	0.0	0.0	0.0
	Will harvest in near future	0.0	0.0	0.0
	No harvest because of crop damage	0.4	0.0	0.3
Week harvest was completed (% of respondents who had completed their harvest)	By the last week of February	0.7	1.9	1.0
	By the first week of March	1.1	1.9	1.3
	By the second week of March	1.8	19.0	6.5
	By the third week of March	3.6	5.7	4.2
	By the fourth week of March	11.2	14.3	12.0
Is your harvest delayed compared with previous years? (% of respondents who had completed or were in the process of harvesting)	Yes	35.3	27.6	33.2
	No	64.7	72.4	66.8
Reasons for the delayed harvest (% of respondents noting the 2020 harvest was delayed compared with previous years) ^a	Crop not ready for harvest	34.7	34.5	34.6
	Labor not available on time	14.3	34.5	18.9
	Machines not available on time	26.5	27.6	26.8
	Because of rain	40.8	31.0	38.6
	Other	8.2	6.9	7.9
Was the delay related to COVID-19? (% of respondents reporting delayed harvest other than "crop not ready for harvest" or "because of rain")	Yes	83.3	86.7	84.3
	No	11.1	6.7	9.8
	Don't know	5.6	6.7	5.9

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Table A1.5 continued

Item		Sindh Zones		
		Upper Sindh	Lower Sindh	Overall Sindh
Reasons for crop damage (% of respondents who did not harvest because of crop damage)	Lodging because of excessive rain	0.0	0.0	0.0
	Locust invasion	0.0	0.0	0.0
	Other insect and/or disease infestation	100.0	0.0	100.0
	Other	0.0	0.0	0.0

COVID-19 = coronavirus disease.

^a The *rabi* season lasts from about November to April.

^b Multiple response question; numbers may not sum precisely because of rounding.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Sindh (June 2020).

Table A1.6: Impacts of COVID-19 on Marketing of Wheat Crop in Punjab and Sindh

Item		Punjab Zones			Sindh Zones		
		Rice–Wheat	Mixed Cropping	Overall Punjab	Upper Sindh	Lower Sindh	Overall Sindh
Respondents who had completed harvesting (No.)		359	45	404	280	103	383
Were you able to market the wheat? (% of respondents)	Yes, without difficulty	77.1	54.3	74.6	18.2	25.2	20.1
	Yes, with difficulty	2.5	0.0	2.2	67.5	59.2	65.3
	No	20.4	45.7	23.2	14.3	15.5	14.6
Reasons for not selling or difficulty selling (% of respondents who did not sell or had difficulty selling)	Kept for self-consumption	81.9	95.2	84.6	13.6	20.5	15.4
	Traders not available	3.6	0.0	2.9	24.6	29.5	25.8
	Unable to visit markets and/or cities	3.6	4.8	3.8	33.8	33.3	33.7
	Other	10.8	0.0	8.7	28.1	16.7	25.2
Were the difficulties related to COVID-19? (% of respondents who reported a reason other than "kept for self-consumption")	Yes	40.0	100.0	43.8	80.2	87.1	81.9
	No	60.0	0.0	56.3	15.2	12.9	14.7
	Don't know	0.0	0.0	0.0	4.6	0.0	3.5
Farmers' crop buyers (% of those who sold produce with or without difficulty)	Government	38.8	56.0	40.1	4.2	5.6	4.6
	Open market	61.2	44.0	59.9	95.8	94.4	95.4
Average price respondents received on the open market (PRs)	Price per 40 kilograms	1,366	1,381	1,367	1,278	1,278	1,278

COVID-19 = coronavirus disease.

Source: Authors' calculation based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

Table A1.7: Impacts of COVID-19 on Vegetable and Fruit Harvests in Punjab

Item	Punjab Zones			
	Rice–Wheat	Mixed Cropping	Overall Punjab	
Respondents who grew vegetables or fruit in the last <i>rabi</i> season ^a (No.) ^b	58	7	65	
Status of harvest at survey time (% of respondents)	Completed	24.1	71.4	29.2
	One or more harvests completed	56.9	28.6	53.8
	Will harvest in near future	15.5	0.0	13.8
	Will not harvest because of crop damage	3.4	0.0	3.1
Week harvest was completed (% of respondents who had completed their harvest)	By the second week of April	35.7	80.0	47.4
	By the third week of April	7.1	20.0	10.5
	By the last week of April	21.4	0.0	15.8
	By the first week of May	7.1	0.0	5.3
	By the second week of May	28.6	0.0	21.1
When do you anticipate completing the harvest? (% of respondents in the process of harvesting)	By the third week of May	0.0	50.0	2.9
	By the fourth week of May	12.1	0.0	11.4
	After the fourth week of May	87.9	50.0	85.7
When do you anticipate starting to harvest? (% of respondents who had not started harvesting)	By the third week of May	11.1	0.0	11.1
	By the fourth week of May	11.1	0.0	11.1
	After the fourth week of May	77.8	0.0	77.8
Is your harvest delayed compared with previous years? (% of respondents who had completed their harvest or were in the process of harvesting)	Yes	46.4	71.4	49.2
	No	53.6	28.6	50.8
Reasons for the delayed harvest (% of respondents who noted the 2020 harvest was delayed compared with previous years) ^b	No reason (including crop not ready for harvest)	50.0	20.0	45.2
	Labor not available on time	0.0	20.0	3.2
	Other	50.0	60.0	51.6
Was the delay related to COVID-19? (% of respondents reporting delayed harvest other than because "crop not ready for harvest")	Yes	38.5	0.0	29.4
	No	61.5	100.0	70.6
	Don't know	0.0	0.0	0.0
Reasons for crop damage (% of respondents who did not harvest because of crop damage)	Excessive rain and water ponding in field	0.0	0.0	0.0
	Locust invasion	0.0	0.0	0.0
	Other insect and/or disease infestation	50.0	0.0	50.0
	Other	50.0	0.0	50.0

COVID-19 = coronavirus disease.

^a The *rabi* season lasts from about November to April.

^b Multiple response question; numbers may not sum precisely because of rounding.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020).

Table A1.8: Impacts of COVID-19 on Vegetable and Fruit Harvests in Sindh

Item		Sindh Zones		
		Upper Sindh	Lower Sindh	Overall Sindh
Respondents who grew vegetables or fruit other than tomato in the last <i>rabi</i> season ^a (No.) ^b		91	37	128
Status of harvest at survey time (% of respondents)	Completed	82.4	78.4	81.3
	One or more harvests completed	16.5	18.9	17.2
	Will not harvest because of crop damage	1.1	2.7	1.6
Week harvest was completed (% of respondents who had completed their harvest)	By the last week of February	5.3	6.9	5.8
	By the first week of March	4.0	6.9	4.8
	By the second week of March	4.0	0.0	2.9
	By the third week of March	4.0	0.0	2.9
	By the fourth week of March	29.3	20.7	26.9
	After the fourth week of March	53.3	65.5	56.7
When do you anticipate completing the harvest? (% of respondents in the process of harvesting)	By the fourth week of June	80.0	42.9	68.2
	After the fourth week of June	20.0	57.1	31.8
Is your harvest delayed compared with previous years? (% of respondents who had completed their harvest or were in the process of harvesting)	Yes	35.6	25.0	32.5
	No	64.4	75.0	67.5
Reasons for the delayed harvest (% of respondents who noted the 2020 harvest was delayed compared with previous years) ^b	Crop not ready for harvest	46.9	33.3	43.9
	Labor not available on time	37.5	55.6	41.5
	Waiting for better market price	15.6	11.1	14.6
Was the delay related to COVID-19? (% of respondents reporting delayed harvest other than because "crop not ready for harvest")	Yes	100.0	100.0	100.0
	No	0.0	0.0	0.0
	Don't Know	0.0	0.0	0.0
Reasons for crop damage (% of respondents who did not harvest because of crop damage)	Excessive rain and water ponding in field	100.0	0.0	50.0
	Locust invasion	0.0	100.0	50.0
	Other insect and/or disease infestation	0.0	0.0	0.0
	Other	0.0	0.0	0.0

COVID-19 = coronavirus disease.

^a The *rabi* season lasts from about November to April.

^b Multiple response question; numbers may not sum precisely because of rounding.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Sindh (June 2020).

Table A1.9: Impacts of COVID-19 on Marketing of Vegetables and Fruits in Punjab and Sindh

Item		Punjab Zones			Sindh Zones		
		Rice- Wheat	Mixed Cropping	Overall Punjab	Upper Sindh	Lower Sindh	Overall Sindh
Respondents who had completed at least one harvest (No.)		47	7	54	90	36	126
Were you able to market vegetables or fruits? (% of respondents)	Yes, without difficulty	38.3	71.4	42.6	22.2	19.4	21.4
	Yes, with difficulty	55.3	28.6	51.9	67.8	66.7	67.5
	No	6.4	0.0	5.6	10.0	13.9	11.1
Reasons for not selling or difficulty selling (% of respondents who did not sell or had difficulty selling)	Kept for self-consumption	10.3	0.0	9.7	2.9	3.4	3.0
	Traders not available	12.2	0.0	16.1	24.3	37.9	28.3
	Unable to visit markets and/or cities	37.9	0.0	35.5	58.6	41.4	53.5
	Offered price was very low	39.5	100.0	38.7	14.3	17.2	15.2
Was the difficulty related to COVID-19? (% of respondents who reported a reason other than "kept for self-consumption")	Yes	92.3	100.0	92.9	98.5	96.4	97.9
	No	7.7	0.0	7.1	1.5	0.0	1.0
	Don't know	0.0	0.0	0.0	0.0	3.6	1.0

COVID-19 = coronavirus disease.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

Table A1.10: Impacts of COVID-19 on the 2020 Tomato Harvest in Sindh

Item		Sindh Zones		
		Upper Sindh	Lower Sindh	Overall Sindh
Respondents who grew tomato in the 2019 rabi season ^a (No.)		42	63	105
Status of harvest at survey time (% of respondents)	Completed	40.5	27.0	32.4
	Could not complete	57.1	63.5	61.0
	No harvest	2.4	9.5	6.7
Week last harvest was completed (% of respondents who had completed at least one harvest)	By the last week of February	2.4	5.3	4.1
	By the first week of March	4.9	1.8	3.1
	By the second week of March	2.4	0.0	1.0
	By the third week of March	2.4	5.3	4.1
	By the fourth week of March	19.5	24.6	22.4
	After the fourth week of March	68.3	63.2	65.3
Average number of harvests by status of harvest (Average % of respondents who had completed at least one harvest)	Completed all harvests	9.5	12.2	10.9
	Could not complete all harvests	5.8	4.5	5.0
Reasons for not doing a single harvest (% of respondents who did not do any picking)	Crop was completely damaged	0.0	0.0	0.0
	Ploughed as green manure	100.0	100.0	100.0

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Table A1.10 continued

Item		Sindh Zones		
		Upper Sindh	Lower Sindh	Overall Sindh
Reasons for not completing all pickings (% of respondents who could not complete all harvests)	Crop was partly damaged after few harvests	4.2	5.0	4.7
	Ploughed as green manure	95.8	95.0	95.3
Reasons for damage of tomato crop (% of respondents whose crop is completely or partially damaged)	Excessive rain and water ponding in field	0.0	100.0	66.7
	Locust invasion	0.0	0.0	0.0
	Insect and/or disease infestation (other than locust)	100.0	0.0	33.3
	Other	0.0	0.0	0.0
Reasons for ploughing tomato crop as green manure (% of respondents who ploughed the crop as green manure)	Difficulty accessing market	33.3	18.2	23.5
	Low price because of decreased demand	66.7	81.8	76.5
Were the reasons for ploughing tomato crop as green manure related to COVID-19 (% of respondents who ploughed the crop as green manure)	Yes	100.0	97.7	98.5
	No	0.0	2.3	1.5
	Don't know	0.0	0.0	0.0

COVID-19 = coronavirus disease.

^a The *rabi* season lasts from about November to April.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Sindh (June 2020).

Table A1.11: Impacts of COVID-19 on Marketing of Tomato Crop in Sindh

Item		Sindh Zones		
		Upper Sindh	Lower Sindh	Overall Sindh
Respondents who had completed at least one harvest (No.)		41	57	98
Were you able to market the tomato? (% of respondents)	Yes, without difficulty	2.4	8.8	6.1
	Yes, with difficulty	63.4	59.6	61.2
	No	34.1	31.6	32.7
Reasons for not selling or difficulty in selling (% of respondents who did not sell or had difficulty selling)	Kept for self-consumption	2.5	0.0	1.1
	Stored as seed	0.0	1.9	1.1
	Traders not available	27.5	34.6	31.5
	Unable to visit markets and/or cities	55.0	44.2	48.9
	Other	15.0	19.2	17.4
Were the difficulties related to COVID-19? (% of respondents who reported a reason other than "kept for self-consumption")	Yes	100.0	96.2	97.8
	No	0.0	3.8	2.2
	Don't know	0.0	0.0	0.0

COVID-19 = coronavirus disease.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Sindh (June 2020).

Table A1.12: Impacts of COVID-19 on Sale of Milk in Punjab and Sindh

Item		Punjab Zones			Sindh Zones		
		Rice–Wheat	Mixed Cropping	Overall Punjab	Upper Sindh	Lower Sindh	Overall Sindh
Respondents (No.)		381	48	429	284	126	410
Do you have livestock, do you sell milk? (% of respondents)	No	16.5	10.4	15.9	32.7	34.9	33.4
	I have livestock but do not sell milk	49.6	56.3	50.3	47.5	46.0	47.1
	Yes	33.9	33.3	33.8	19.7	19.0	19.5
Has the price of milk changed because of COVID-19? (% of respondents who sell milk)	Yes, the price decreased	72.9	93.8	75.2	86.0	95.5	89.1
	Yes, the price increased	2.3	0.0	2.1	3.2	0.0	2.2
	No	24.8	6.3	22.8	10.8	4.5	8.8
Have you been able to market milk every day in the last few months? (% of respondents who sell milk)	Yes, without difficulty	36.4	18.8	34.5	7.5	6.8	7.3
	Yes, with difficulty	62.0	81.3	64.1	83.9	75.0	81.0
	No	1.6	0.0	1.4	8.6	18.2	11.7
Reasons for not being able to sell or difficulty selling (% of respondents with difficulty selling milk)	Traders not available	73.2	69.2	72.6	27.9	43.9	33.1
	Unable to visit markets and/or cities	19.5	23.1	20	66.3	53.7	62.2
	Other	7.3	7.7	7.4	5.8	2.4	4.7
Was the difficulty related to COVID-19? (% of respondents who could not sell milk or had difficulty selling milk)	Yes	98.8	100.0	98.9	98.8	100.0	99.2
	No	1.2	0.0	1.1	1.2	0.0	0.8
	Don't know	0.0	0.0	0.0	0.0	0.0	0.0

COVID-19 = coronavirus disease.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

Table A1.13: COVID-19-Related Disruptions to the Purchase or Delivery of Farm Inputs in Punjab and Sindh

Item		Punjab Zones			Sindh Zones		
		Rice–Wheat	Mixed Cropping	Overall Punjab	Upper Sindh	Lower Sindh	Overall Sindh
Respondents (No.)		381	48	429	282	125	407
Have you experienced COVID-19-related disruptions to the purchase or delivery of farm inputs for the next planting? (% of respondents)	Yes	28.1	20.8	27.3	77.3	82.4	78.9
	No	46.7	35.4	45.5	21.6	16.0	19.9
	Don't know	25.2	43.8	27.3	1.1	1.6	1.2
Inputs disrupted (% of respondents who experienced disruption) ^a	Seed	83.2	60.0	81.2	97.2	97.1	97.2
	Fertilizer	23.4	30.0	23.9	38.5	54.4	43.6
	Pesticides	16.8	50.0	19.7	27.5	54.4	36.1
	Diesel fuel	15.9	30.0	17.1	17.0	33.0	22.1
	Machinery	3.7	0.0	3.4	11.0	21.4	14.3
	Other	0.9	0.0	0.9	0.0	2.9	0.9

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Table A1.13 continued

Item		Punjab Zones			Sindh Zones		
		Rice- Wheat	Mixed Cropping	Overall Punjab	Upper Sindh	Lower Sindh	Overall Sindh
Did the cost of your farm inputs increase as a result of COVID-19? (% of respondents)	Yes	56.4	45.8	55.2	84.4	94.4	87.5
	No	29.1	31.3	29.4	11.3	5.6	9.6
	Don't know	14.4	22.9	15.4	4.3	0.0	2.9
Inputs with increased cost (% of respondents who experienced a cost increase for farm inputs) ^a	Seed	92.1	77.3	90.7	98.3	99.2	98.6
	Fertilizer	32.6	18.2	31.2	41.6	44.9	42.7
	Pesticides	35.8	36.4	35.9	36.6	50.8	41.3
	Diesel fuel	4.2	0.0	3.8	13.4	27.1	18.0
	Machinery	2.3	0.0	2.1	7.1	15.3	9.8
	Other	5.1	9.1	5.5	0.0	0.0	0.0
Did you experience problems finding workers for the next crop because of COVID-19? (% of respondents)	Yes	9.4	2.1	8.6	45.0	60.0	49.6
	No	74.0	77.1	74.4	41.8	24.0	36.4
	Don't know	16.5	20.8	17.0	13.1	16.0	14.0
Did you experience problems finding machines for land preparation or sowing as a result of COVID-19 for the next crop? (% of respondents)	Yes	13.1	4.2	12.1	22.0	16.0	20.1
	No	76.4	77.1	76.5	69.9	75.2	71.5
	Don't know	10.5	18.8	11.4	8.2	8.8	8.4

COVID-19 = coronavirus disease.

Note: Percentages may not total 100% because of rounding.

^a Multiple response question.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

Table A1.14: COVID-19 Impacts on Farmers' Financing of Farm Operations in Punjab and Sindh

Item		Punjab Zones			Sindh Zones		
		Rice- Wheat	Mixed Cropping	Overall Punjab	Upper Sindh	Lower Sindh	Overall Sindh
Respondents who had grown or were planning to grow crops in <i>kharif</i> ^a (No.)		381	48	429	282	125	407
Did you experience any immediate financial needs to maintain your farm operations? (% of respondents)	Yes	61.9	62.5	62.0	75.2	73.6	74.7
	No	38.1	37.5	38.0	24.8	26.4	25.3
Did the need arise because of COVID-19? (% of respondents who experienced immediate financial needs to maintain farm operations)	Yes	56.4	60.0	56.8	87.7	80.4	85.5
	No	43.6	40.0	43.2	12.3	19.6	14.5

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Table A1.14 continued

Item		Punjab Zones			Sindh Zones		
		Rice–Wheat	Mixed Cropping	Overall Punjab	Upper Sindh	Lower Sindh	Overall Sindh
Source of financial need because of effects of COVID-19 (% of respondents who experienced immediate financial need to maintain their farm operations)	For input purchase	88.0	94.4	88.7	97.3	97.3	97.3
	To pay agriculture loan from bank	18.8	16.7	18.5	9.7	18.9	12.3
	To pay agriculture loan from others (nonbank)	12.0	5.6	11.3	18.3	41.9	25.0
	Other	5.3	5.6	5.3	0.0	0.0	0.0

COVID-19 = coronavirus disease.

Note: Percentages may not total 100% because of rounding.

^a The *kharif* season spans the monsoon season and lasts from about June to November.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

Table A1.15: Knowledge of the Locust Invasion in Punjab and Sindh

Item		Punjab Zones			Sindh Zones		
		Rice–Wheat	Mixed Cropping	Overall Punjab	Upper Sindh	Lower Sindh	Overall Sindh
Respondents (No.)		381	48	429	284	126	410
Saw a desert locust invasion (% of respondents)	Yes	5.5	52.1	10.7	89.8	37.3	73.7
	No	94.5	47.9	89.3	10.2	62.7	26.3
Received early warning or information regarding the desert locust (% of respondents)	Yes	31.8	54.2	34.3	51.8	23.0	42.9
	No	68.2	45.8	65.7	48.2	77.0	57.1
Source of information regarding the desert locust (% of respondents who received early warning or information)	Provincial agriculture extension department	35.5	69.2	41.5	4.1	0.0	3.4
	District administration (e.g., deputy or assistant commissioner)	3.3	0.0	2.7	1.4	3.4	1.7
	Local government (town administration)	3.3	7.7	4.1	0.7	3.4	1.1
	Locals	32.2	15.4	29.3	56.5	51.7	55.7
	Media	37.2	15.4	33.3	86.4	96.6	88.1
	Other	0.8	0.0	0.7	2.8	6.8	3.4

Note: Percentages may not total 100% because of rounding.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020) and Sindh (June 2020).

Table A1.16: Locust Impacts and Spraying in Sindh

Item		Sindh Zones		
		Upper Sindh	Lower Sindh	Overall Sindh
Respondents (No.)		284	126	410
Reported whether their area had been surveyed (% of respondents)	No	96.1	95.2	95.9
	Yes, by government teams	2.8	0.8	2.2
	Yes, by pesticide companies	0.7	1.6	1.0
	Yes, by NGOs	0.0	0.8	0.2
	Yes, by others	0.4	0.0	0.2
	Don't know	0.0	1.6	0.5
Reported whether their area had been sprayed (% of respondents who noticed desert locust invasion in their area)	No	90.6	91.5	90.7
	Yes, by government teams	1.6	2.1	1.7
	Yes, by themselves	7.1	6.4	7.0
	Yes, by NGOs	0.0	0.0	0.0
	Yes, by other organizations	0.4	0.0	0.3
	Don't know	0.4	0.0	0.3
Method of spray (% of respondents who reported their area had been sprayed)	Handheld sprayer	70.8	75.0	71.4
	Vehicle-mounted sprayer	20.8	25.0	21.4
	Aerial sprayer	0.0	0.0	0.0
	Other	8.3	0.0	7.1
Frequency of desert locust attack (% of respondents)	Never	6.3	21.3	8.6
	Once	16.1	25.5	17.5
	Twice	38.0	38.3	38.1
	Three times or more	39.6	14.9	35.8
	Don't know	0.0	0.0	0.0
Frequency of desert locust attack (% of respondents who reported their area been sprayed)	Never	25.0	25.0	25.0
	Once	45.8	0.0	39.3
	Twice	12.5	50.0	17.9
	Three times or more	16.7	25.0	17.9
	Don't know	0.0	0.0	0.0
Level of locust damage in respondents' fields (% of respondents who noticed desert locust invasion in their area)	Field not attacked by locusts	7.5	12.8	8.3
	Field attacked but no damage done	16.9	31.9	19.2
	Field partly damaged	51.0	40.4	49.3
	Field largely or completely damaged	24.3	14.9	22.8
Average percentage of locust damage in respondents' fields by level (Average respondents who reported partial or large or complete damage in their fields)	Field partly damaged	37.0	41.3	37.6
	Field largely or completely damaged	62.4	67.1	62.9

NGO = nongovernment organization.

Note: Percentages may not total 100% because of rounding.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Sindh (June 2020).

Table A1.17: Farmers' Preferences for Policy Measures in Punjab

Punjab Zone	Suggested Policy Measure	Policy Measure Identified by Rank (No. of respondents)						Identification Rate (%)	Priority Index	Priority Rank
		1st	2nd	3rd	4th	5th	Total			
Rice-wheat	Remove restrictions on marketing agricultural produce in other districts	107	47	28	19	0	201	52.8	2.2	3
	Ensure timely supply of agricultural inputs	45	92	63	11	0	211	55.4	2.1	4
	Ensure price stability for agriculture produce	92	96	74	22	0	284	74.5	2.9	1
	Ease loan repayment conditions or waive loans	105	67	44	41	0	257	67.5	2.6	2
	Others ^a	1	1	1	0	6	9	2.4	0.0	5
Mixed cropping	Remove restrictions on marketing agricultural produce in other districts	26	6	0	0	0	32	66.7	3.2	1
	Ensure timely supply of agricultural inputs	2	11	7	2	0	22	45.8	1.6	4
	Ensure price stability for agriculture produce	10	13	12	4	0	39	81.3	3.0	2
	Ease loan repayment conditions or waive loans	8	10	8	4	0	30	62.5	2.3	3
	Others ^a	0	0	0	0	0	0	0.0	0.0	5
Overall Punjab	Remove restrictions to market agricultural produce in other districts	133	53	28	19	0	233	54.3	2.3	3
	Ensure timely supply of agricultural inputs	47	103	70	13	0	233	54.3	2.1	4
	Ensure price stability for agriculture produce	102	109	86	26	0	323	75.3	2.9	1
	Ease loan repayment conditions or waive loans	113	77	52	45	0	287	66.9	2.6	2
	Others ^a	1	1	1	0	6	9	2.1	0.0	5

^a“Others” refers to additional policy measures suggested by respondents.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Punjab (May 2020).

Table A1.18: Farmers' Preferences for Policy Measures in Sindh

Sindh Zone	Suggested Policy Measure	Policy Measure Identified by Rank (No. of respondents)						Identification Rate (%)	Priority Index	Priority Rank
		1st	2nd	3rd	4th	5th	Total			
Upper Sindh	Remove restrictions on marketing agricultural produce in other districts	18	26	65	70	0	179	63.0	1.86	4
	Ensure timely supply of agricultural inputs	118	87	45	24	0	274	96.5	3.95	1
	Ensure price stability for agriculture produce	76	119	56	21	2	274	96.5	3.76	2
	Ease loan repayment conditions or waive loans	52	45	70	53	0	220	77.5	2.66	3
	Others ^a	19	3	27	8	79	136	47.9	1.00	5
Lower Sindh	Remove restrictions on marketing agricultural produce in other districts	7	14	37	45	0	103	81.7	2.32	4
	Ensure timely supply of agricultural inputs	33	48	25	18	0	124	98.4	3.71	2
	Ensure price stability for agriculture produce	47	41	27	8	0	123	97.6	3.94	1
	Ease loan repayment conditions or waive loans	38	22	22	29	0	111	88.1	3.19	3
	Others ^a	1	0	9	5	57	72	57.1	0.79	5
Overall Sindh	Remove restrictions on marketing agricultural produce in other districts	25	40	102	115	0	282	68.8	2.00	4
	Ensure timely supply of agricultural inputs	151	135	70	42	0	398	97.1	3.88	1
	Ensure price stability for agriculture produce	123	160	83	29	2	397	96.8	3.81	2
	Ease loan repayment conditions or waive loans	90	67	92	82	0	331	80.7	2.82	3
	Others ^a	20	3	36	13	136	208	50.7	0.93	5

^a "Others" refers to additional policy measures suggested by respondents.

Source: Authors' calculations based on data gathered under Asian Development Bank phone surveys with farmers in Sindh (June 2020).

APPENDIX 2: PAKISTAN’S POLICIES ON CROP PROCUREMENT AND PRICE CONTROL

1. **Procurement and price control policies for crops.** The only major crop for which the Government of Pakistan is directly involved in procurement is wheat. Every year before the sowing season starts, the government announces a support price for farmers in consultation with federal and provincial food departments. After harvesting the wheat, the Pakistan Agricultural Storage and Services Corporation at the federal level and food departments at the provincial level procure wheat from farmers. Farmers in Pakistan retain about 60% of local wheat produce to meet their seed and household consumption needs. The rest is marketed and is termed a “marketable surplus.” During 2017–2019, the government procured about two-thirds of the marketable surplus. The price support and procurement policy’s intent is to ensure sufficient returns to farmers and to maintain adequate stocks with procurement agencies so that they can intervene to stabilize prices when needed.
2. For sugarcane, national or provincial government involvement is limited to announcing a minimum price that sugar mills are legally bound to pay farmers for the cane. Government agencies are not involved in crop procurement. For both wheat and sugarcane, the decision to allow export and/or import rests with the Economic Coordination Committee on the advice of the Ministry of National Food Security and Research. If market conditions allow, the government authorizes the Trading Corporation of Pakistan to import these commodities. Private traders and/or mills are authorized to export wheat and sugar on their own after approval from the Economic Coordination Committee.
3. In contrast to wheat and sugarcane, no direct or indirect measures are in place to control the supplies and prices of rice and maize; the markets for these crops run purely on a commercial basis. For minor food crops, such as pulses, vegetables, and fruits, the government does not announce support prices or indicative prices, or become directly involved in procurement or trading. Commercial traders usually import and export these items based on the demand and supply in the domestic market (Khalid and Sabahat 2020).
4. **The government wheat procurement policy and its outcomes.** Based on the importance of wheat to Pakistan’s economy and food security, the government has been deeply involved in the wheat subsector since the 1950s. The procurement prices paid to farmers, the prices at which mills sell flour, and the interprovincial movement of wheat are all controlled by the government at the federal, provincial, and district levels.
5. To promote the domestic production of wheat, every year before the wheat sowing season starts, the federal government announces a procurement price for wheat (which is normally set higher than the international price of wheat) along with procurement targets for the provincial and federal governments. Wheat stocks are procured and maintained by provincial food departments and the Pakistan Agricultural Storage and Services Corporation on behalf of the federal government. During the wheat harvesting season, the government bans the interprovincial movement of wheat to help each province meet its procurement target. As the ban is executed by district administrations within each province, it ultimately results in a ban on the interdistrict movement of wheat during the harvesting season. Laws also prevent most private enterprises from carrying out large-scale wheat procurement and storage until government agencies have completed their purchases. Exceptions are made for wheat procurement, such as by flour millers and local middlemen who provide farmers with credit and accept wheat in payment of farmers’ outstanding debts.

6. Wheat purchased by the government is transported by the private sector, with the government providing financing to offset the costs of transporting the wheat to deficit areas. As the moisture content of wheat at the time of harvest is about 10%, procurement and transport of wheat can start immediately after the harvest without delays for grain drying. Following the procurement in April and May, the government stores the wheat in its own or rented private godowns (horizontal or flat shed storage facilities) or open-air *ganjies* (open-air storage facilities that use tarpaulins or other covers to protect the wheat). The government usually releases the wheat to millers from early October to the following year's harvest in April and May. When the government sets the procurement prices, it also sets release prices, which can be adjusted later during the marketing year.

7. The wheat procurement policy is not helping the country meet any of the policy objectives for the following reasons: (i) it has not helped to increase wheat productivity, which remains lower than that in countries with similar climatic conditions; (ii) the policy benefits banks, large farmers, millers, and intermediaries but penalizes the urban consumers and rural poor who are net purchasers of wheat or wheat flour; (iii) the government rationale of taking the responsibility for supplying wheat to flour mills is flawed and costly; (iv) the system imposes a huge financial burden on the government on a recurring basis; (v) the system crowds out the private sector; (vi) the system poses serious governance challenges in terms of inefficiencies, adulteration, misappropriation, and rent-seeking; and (vii) the opportunity cost of tying resources up in wheat procurement is far too high—it not only captures federal and provincial governments' fiscal space, but also compromises development expenditures (International Food Policy Research Institute 2020).

APPENDIX 3: INDEX USED TO IDENTIFY PREFERENCES FOR SUGGESTED POLICY MEASURES

1. Authors developed a priority index to identify the farmers' preferences for policy measures that they believed the government should take. The index values range from 0 to 5, with the higher value denoting a greater preference for the policy measure. Based on the index value, policy measures were ranked from the most preferred to the least preferred. The index is based on (i) the percent of total farmer respondents who suggested a policy measure for government action, and (ii) the priority rank (from 1 as top priority to 5 as the lowest priority) that farmers assigned to the suggested policy measure.

2. The priority index is a product of the identification rate (*IR*) and the aggregate ranking score (*ARS*). The *IR* is the simple percentage of farmers who suggested a policy measure for government action regardless of priority rank. Assume that a total of N farmers were interviewed, and that N_{ij} denotes the number of farmers who suggested policy measure j at priority-rank i where $i=1,2,3,4,5$. It is important to mention here that $\sum_{i=1}^5 N_{ij} \leq N$, as some farmers may not identify policy measure j among their top five suggested policy measures. The *IR* for policy measure j is calculated as follows:

$$IR_j = \frac{\sum_{i=1}^5 N_{ij}}{N}$$

3. The *ARS* of policy measure j is calculated by taking the average of scores assigned to ranks 1–5, weighted by the number of farmers who identified a policy measure j at rank 1–5. To give more mass to a policy measure identified as the most preferred, a score of 5 is assigned to rank 1, 4 to rank 2, 3 to rank

3, 2 to rank 4, and 1 to rank 5. Assume that N_{ij} denotes the number of farmers who identified policy measure j at priority rank i , and S_i is the score assigned to rank i . Then the *ARS* of policy measure j is calculated as follows:

$$ARS_j = \frac{\sum_{i=1}^5 N_{ij} S_i}{\sum_{i=1}^5 N_{ij}}$$

4. As *ARS*s are based only on the results of the farmers who identified a specific policy measure j (i.e., $\sum_{i=1}^5 N_{ij}$), these scores cannot be used to rank policy measures for all N farmers. *ARS*s have to be corrected for those who did not identify a specific policy measure. Therefore, the priority index (*PI*) for each policy measure is calculated by multiplying its *ARS* with its *IR*, as follows:

$$PI_j = ARS_j \times IR_j$$

5. Based on values of the priority index, each policy measure is ranked in priority order.

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The Impact of COVID-19 and Locust Invasion on Farm Households in Punjab and Sindh

Analysis from Cross-Sectional Surveys in Pakistan

This paper presents the results of two mobile phone surveys conducted by the Asian Development Bank among farmers in Punjab and Sindh provinces in Pakistan in mid-2020 during the coronavirus disease (COVID-19) pandemic. The surveys collected information about how COVID-19-related measures and economic and transport disruptions affected farmers' harvests, marketing efforts, input prices, and financial needs. The surveys found that the COVID-19 pandemic had significant negative impacts on farm households in both provinces. The paper provides additional context on COVID-19-related effects on local and regional economies and food supply chains. It also covers a simultaneous locust invasion along the India–Pakistan border, which has created “crisis within a crisis” in the surveyed provinces and exacerbated conditions that could lead to famine, disease, and increased poverty.

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