

Contents

| | |
|---|----|
| Food Security Challenges in the Times of COVID-19 | 1 |
| Need Assessment for Agriculture Sector in Pakistan | 1 |
| Acknowledgments | 3 |
| List of Tables | 3 |
| List of Figures | 3 |
| List of Box: | 3 |
| List of Appendixes: | 3 |
| List of Acronyms | 4 |
| Executive Summary | 5 |
| 1. Introduction: | 7 |
| 1.1 Loss to food system in Pakistan amid COVID-19 pandemic | 8 |
| 2. Data collection and methods: | 13 |
| 3. COVID-19 and rural areas: spread, perceptions and responses | 14 |
| 3.1 COVID-19 pandemic: Individual and community experiences and responses | 15 |
| 3.2 COVID-19 related SOPs: status and limitations for implementation in agriculture sector . | 16 |
| 4. Impact of COVID-19 on food supply and agriculture | 18 |
| 4.1 Impact on farming: | 18 |
| 4.2 Impact on agro-processing firms: | 21 |
| 4.3 Impacts on food prices and shifting consumer behaviour: | 22 |
| 4.5 Impacts on farmworkers: | 22 |
| 4.4 Migration returnees: | 23 |
| 5. Conclusion: Needs and opportunities for agriculture sector amid the pandemic | 24 |
| Policy Recommendations | 26 |
| References: | 29 |
| Appendixes | 31 |

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List of Tables

| | |
|--|----|
| Table 1: COVID-19 related government policies and actions for agriculture and the rural sector. | 12 |
| Table 2: Impacts of COVID-19 on agriculture and rural population in Pakistan..... | 19 |

List of Figures

| | |
|--|----|
| Figure 1: SDPI researcher interviews a farmer in Sindh. Staff photo | 14 |
| Figure 2: Online consultation with Mr Muhammad Israr, Secretary Agriculture, Livestock, Fisheries, and Cooperative Department, KP; Dr Aurangzeb, DG Livestock, Extension Wing; Dr Bashir DG, Agriculture Research, KP; Mr Yasin, DG Soil and Water Conservation Department,KP..... | 17 |
| Figure 3: Interview with Director Food, Sindh Mr Khalid Qaimkhani. Staff photo | 20 |

List of Box:

| | |
|--|----|
| Box 1: Proposed SOPs guidelines for Agriculture sector | 25 |
|--|----|

List of Appendixes:

| | |
|--|----|
| Appendix 1: List of public and private sector semi-structured interview participants | 31 |
| Appendix 2: Interview Schedule: Dealing with food system amid COVID-19 in Pakistan..... | 33 |

List of Acronyms

ADB: Asian Development Bank

COVID-19: **C**orona**V**irus **D**isease of 20**19** (SARS-CoV2)

FAO: Food and Agriculture Organization

FCDO: Foreign, Commonwealth and Development

GDP: Gross Domestic Product

GoP: Government of Pakistan

KP: Khyber Pakhtunkhwa

MNFSR: Ministry of National Food Security and Research

NCOC: National Command Operation Centre

PKR: Pakistani Rupee

PASSCO: Pakistan Agricultural Storage and Services Corporation

SDPI: Sustainable Development Policy Institute

SMEDA: Small and Medium Enterprises Development Authority

SOPs: Standard Operating Procedures

UNDP: United Nation Development Programme

WFP: World Food Programme

Executive Summary

The study discusses as to how the COVID-19 related mobility restrictions caused disruptions in the food supply chain and shaped up the consumer purchasing behaviour of people during the pandemic in Pakistan. It also highlights the way people responded to Standard Operating Procedures (SOPs) and restrictions, particularly those living in rural areas. Likewise, the study also assesses the pandemic impact on the agricultural labour market, consumer behaviour as well as the potential needs of farmers and rural communities, when it comes to policy gaps, challenges, and government support in the times of COVID-19.

The study identifies that COVID-19 related mobility restrictions have largely adversely impacted the food supply chains across the country, causing widespread unemployment and food inflation. The most vulnerable part of the food supply chain during the pandemic was the lack of storage facilities, particularly for perishable food commodities. The production of fruits and vegetables, livestock, poultry, and dairy products not only affected at farm level, but also traders and exporters were unable to manage the losses due to lack of transport, labour, and decreasing food demand both at the domestic and international level.

Farm labour shortages during the peak COVID-19 pandemic were more noticeable. The strict lockdown restrictions almost halted the seasonal mobility of informal farm labour. This, on the one hand, adversely affected the sowing, harvesting and other farm operations, and on the other, caused farm labour to struggle for basic food items due to the loss of farm incomes and labour. Another distressing factor for farmers was the limited access and higher prices of seed, fertilizers, and other farm inputs. The (small) farmers faced the brunt of major losses in terms of reduced farm incomes, livelihood assets and increasing indebtedness.

Likewise, the loss of (internal) remittances due to a large influx of migrant returnees to their hometowns, coupled with the erosion of farm incomes caused to reduce economic well-being of rural household's. In this regard, the ability of the public departments and institutions to secure food supply chains and to support the most vulnerable of the rural population during the pandemic was particularly low.

Owing to the prolonged pandemic situation, the study identifies some key policy recommendations that can contribute to better managing food supply chains and the agriculture sector in the country. The recommendations include developing a food security digital dashboard at district level for essential food commodities indicating the status of food production, consumption, stocks, and prices across Pakistan for effective and informed decision-making. Meanwhile, the government should improve access to the internet and better communication technologies in rural areas so as to promote the digitalization of food supply chains. Moreover, it is important to develop the capacities of local and provincial government

officials for better risk assessment related to the COVID-19 pandemic for effective local-level food supply chain responses and support. This is particularly vital to ensure access to farm inputs and stabilization of their prices to keep the food supply moving during the pandemic. In this regard, the role of agricultural cooperatives should be revitalized.

Most importantly, there is a need to design and promote post-harvest value addition and improve (cold) storage facilities and logistics system (particularly for perishable food items) to reduce losses, improve income, and sustain food supply during partial or complete mobility restrictions. In this regard, the focus should be given to encourage private sector investments and innovations for the effective functioning of food supply chains. The government may devise an informal farm labour registration system across different administrative boundaries to increase understandings regarding internal seasonal labour flows and patterns, which is essentially required for developing income support programmes during extreme shocks such as COVID-19.

I. Introduction:

Food security is a very critical aspect of life that is under strain since centuries. Despite Pakistan is an agricultural country, ensuring food security is one of the longstanding issues. In a pre-COVID-19 scenario, the high prevalence of hunger and food insecurity had already posed significant challenges for the policy and decision-makers. A national nutrition survey conducted in 2018 presents alarming figures in terms of food insecurity. In a country comprising 207.7 million people, over 37 per cent are food insecure, 14 per cent malnourished, and 40 per cent of children under five years of age have stunted growth (GoP, 2018). Anaemia, which is usually caused by iron deficiency remains a real public health problem in Pakistan. Around 54 per cent of children under five suffer from severe to moderate anaemic problem (GoP, 2018). Such statistics are worrying for the country as the livelihood of millions of people is under duress due to multiple social, economic, environmental, and demographic factors.

COVID-19 pandemic has made an additional adverse impact on agriculture and food systems in Pakistan (Suleri, 2020a). Transportation restrictions, shortage of labour, and farmers' limited access to markets are some of the key challenges. Supplies of some food items such as pulses and oil may also be compromised due to export restrictions imposed by producing countries. The impact of COVID-19 on food security is even worse. The factors which are mainly contributing to worsening the situation are decline in purchasing power due to unemployment and loss of livelihoods.

To make the food system resilient, policy makers, professionals, and researchers need a better understanding of the implications posed by the pandemic on national to local food systems. Under these circumstances, it is essential to look at how to respond to vulnerabilities of food supply chain? How to ensure sustainable agriculture and food system's recovery in the times of COVID-19 through short- and medium-term policy steps? And, how to sustain agri-businesses, create and retain jobs in agro-industry and trade, while paving the way for farmers for better access to market and institutional support?

During October-November 2020, Sustainable Development Policy Institute (SDPI) in collaboration with the Foreign, Commonwealth and Development (FCDO) conducted a rapid need assessment survey in Pakistan with the objective to understand key disruptions in crop production (particularly during wheat harvest and sowing of Kharif crops) and food supply chain due to mobility restrictions, which agricultural commodities are more susceptible to damage and how did farmers cope up with market channels closure. Likewise, how did it impact the agricultural labour market, consumer behaviour and what are the potential needs of farmers and rural communities as a whole when it comes to policy gaps, challenges, and government support in the times of COVID-19.

The report consists of five sections. The first section comprises a short literature review to see the loss to food system in Pakistan amid COVID-19. The second and third sections present data collection and methodology and COVID-19 spread, perceptions and responses in rural areas. The fourth section provides a thorough discussion on the impact made on farming, agro-processing firms, food prices, workers, and migration returnees. The last section furnishes conclusion and policy recommendations.

I.1 Loss to food system in Pakistan amid COVID-19 pandemic

Food security has already been the most daunting challenge for the successive governments in Pakistan (Suleri and Haq, 2009; Suleri and Iqbal., 2019). However, during the COVID-19 pandemic, vulnerabilities of the food system become more visible. These vulnerabilities exposed both the supply and demand side of the food system, along with key gaps in policies, institutional capacities, and response strategies at all levels. The food system assessed in the report as defined by FAO (2018) “*encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption, and disposal of food products that originates from agriculture, forestry or fisheries, and part of the border economic, societal, and natural environment in they are embedded*”.

The first and foremost issue that emerged during the pandemic was the job losses and lack of physical access to food. Various studies claim lockdowns and mobility restrictions the key reasons behind poor access to food items (Moeen et al., 2021; FAO, 2020ab; WFP and FAO, 2020; Shafi et al., 2020; Asghar et al., 2020; UNDP, 2020; Salik and Suleri, 2020; Suleri, 2020b). However, delayed government actions, improper planning, lack of data about agro-markets, and disruption in food supply chains further aggravated the situation.

On the supply side, though the government did not impose restrictions on farming and agricultural activities during the pandemic, farmers faced multiple challenges in crop sowing, cultivation, harvesting and taking the produce to market for selling purpose (Table 2). Several studies reported unavailability of farm labour, machinery and transport, high input prices such as fertilizers, and seed and limited access to middlemen and traders as the key issues that negatively affected the farm production and incomes, and thus reducing the well-being of rural households and increasing the financial losses at macro-level (ADB, 2020ab; Moeen et al., 2021; FAO, 2020a; ; Suleri, 2020c). Moeed et al., (2021) estimate US\$1 billion agricultural losses during the initial period of lockdown (mid-March to end June). These losses negatively impacted (-2.1 per cent) the GDP through rippled down effect on other sectors of the economy.

Furthermore, the pandemic impacts may also vary at regional scale. In Sindh and Balochistan, when complete lockdown was imposed in the 3rd week of March, wheat and tomato harvesting

was underway, which was later completed during the last week of the month. However, the negative effect was occurred that caused due to the shortage of labour and unavailability of threshers under COVID-19 related mobility restrictions. Moreover, wheat is mostly sold in an open market in Sindh, therefore, most of the farmers were unable to reach markets. In the case of the Punjab, wheat harvesting and selling to the open market (or the government) was least affected due to the pandemic. The partial lockdown during the wheat harvesting period (April-May) in the Punjab helped the farmers to access market and manage transport and labour (ADB, 2020b). The tomato (another rabi crop) farmers in Sindh were unable to complete their harvest; some of them abandoned their produce amid lower prices, or they were unable to manage transport, or faced closure of markets (ADB, 2020a).

The sowing of Kharif crops, vegetables and fruits were largely impacted during the lockdown and mobility restrictions. The fruits and vegetable producers in the Punjab faced financial losses in terms of low farm prices, as they were unable to find middlemen or traders to market their produce (ADB, 2020b). In this regard, losses in fruits and vegetable crops harmed a GDP of about US\$ 40 million (Moeed et al., 2021). In addition, Moeed et al., (2021) calculate a loss of US\$ 630 million to GDP due to disruption in traditional export crops such as rice and cotton.

The lack of availability of farm inputs and increasing prices were also a major concern during the COVID-19 pandemic (WFP and FAO, 2020; ADB, 2020ab). ADB (2020a) quoted in a study that 97 per cent of sampled farmers of the study areas in Sindh mentioned disruption in purchase and delivery of seed, 36 per cent pesticide, 22 per cent diesel, 14 per cent farm machinery, while 44 per cent mentioned unavailability of fertilizer. Furthermore, most of these farmers also mentioned that the increase in prices of these farm inputs (particularly prices of seed and fertilizers) occurred due to COVID-19 (ADB, 2020a).

In the case of the Punjab, only 27 per cent of the farmers mentioned hike in farm input prices and disruption in supply chain (ADB, 2020b). The rice-growing districts of central Punjab mostly faced difficulties in obtaining seed, while in southern districts of mixed cropping zone, the farmers were unable to access pesticide and diesel fuel. However, the availability of farm labour was not a major issue in the Punjab as compared to Sindh and Balochistan (ADB, 2020b).

The livestock sector was most affected during the COVID-19 pandemic (FAO, 2020b; Suleri, 2020). According to the Asian Development Bank reports (2020ab), the lockdowns caused decline in dairy income due to limited access to markets or intermediate traders. This also led to decrease in price of milk and other dairy products. A large reduction in dairy incomes was mostly observed in Sindh, where 81 per cent of the sample dairy farmers either found it difficult or were unable (11.7 per cent) to market their milk on daily basis (ADB, 2020a). In the Punjab, only 65.5 per cent of the sample dairy farmers found it difficult or were unable to market their milk during the early months of the COVID-19 pandemic. The loss to GDP due to disruption in

the livestock and dairy sector during the initial period of lockdown was about US\$330 million (Moeed et al., 2021).

Overall, the major threats to national food security, food supply chain and GDP during the pandemic were caused due to disruption in food trade and transport, adverse impact on farming activities (particularly during Kharif season) and the food services sector (Moeed et al., 2021). However, the food processing sector (i.e., flour and sugar mills, confectionery and beverages, meat and dairy, cooking oil-related industries) was least affected during the same lockdown period (Moeed et al., 2021).

On the demand side, the loss of income and livelihoods led to lowering economic access to food. In Sindh, Asian Development Bank (2020a) reported that the reduction in food consumption during the pandemic reached up to 58 per cent among the sample rural household, whereas non-food expenditure reduced among 45.4 per cent households. Return migration from urban areas counts 39.5 per cent among rural households that led to reduction in non-farm wages and earning among 37.3 per cent sample households.

In the case of the Punjab, the pandemic impact on rural household remained low. According to the Asian Development Bank report (2020b), only 9.8 per cent of the sample households reported reduction in food consumption, whereas 11.2 per cent reduced non-food expenditure. Return migration in the Punjab was also low as compared to Sindh (i.e. 22.6 per cent) that caused to reduce the wages and non-farm earnings among 33.3 per cent of households. In the Punjab, southern districts are more vulnerable in terms of reduction in food consumptions, wages, and income losses due to more migrant returnees (ADB, 2020b; Moeed et al., 2021).

At the national level, unemployment raised to 20 per cent in April, which later declined to 6.56 per cent in June during the lockdown restrictions. However, unemployment in the agriculture sector remained modest (Moeed et al., 2021). For instance, during May, only 0.7 million workers were unemployed in agriculture sector compared to 2.3 million in industrial and 3.8 million in services sectors. At the national level, loss of income is more pronounced (i.e., US\$ 4.7 billion) in urban areas compared to US\$ 3.3 billion in rural areas (Moeed et al., 2021).

Moreover, the income reduction was more observed among the wealthiest of the society, however, poverty also increased manifold (UNDP, 2020). During lockdown months, poverty rate raised to 53 per cent (from 48.1 per cent pre-COVID) in rural areas, which later declined to 35.9 per cent in June, when economic activities resumed and the government launched interventions through its Ehsaas program (Moeed et al., 2021). Overall, COVID-19 related strict lockdown and mobility restrictions (April, May, and June) caused to decline in national GDP of about 26.4 per cent, like many other countries of the region. For instance, India's GDP

declined to 24 per cent during the same period, where public interventions benefit the people and the economy to recover (Varshney et al., 2020).

During the lockdown, food prices increased significantly. WFP and FAO, (2020) reported an increase of 4 per cent and 1.9 per cent in wheat and wheat flour respectively in Pakistan. In the Punjab, the rise in wheat price was highest, e.g., 33 per cent in Gujranwala. In KP, wheat flour prices increased up to 14 per cent in April compared to prices in February. Similarly, prices of rice, pulses, vegetables, fruits, cooking oil and other household items increased substantially.

Finally, some gaps also appeared in national food security and agricultural planning during the pandemic. Apart from conventional macro and micro determinants of food security (such as food production, consumption, yields, and climate, income and access to credit, education, etc.), some additional factors also emerged. The role of (internal) migrant labourers/workers on family well-being and food security, dynamics of farm labour markets and mobility patterns, the importance of storage, small-scale food processing for value addition (particularly for perishable commodities) were the key determinants to the national food systems during COVID-19 pandemic.

Table 1: COVID-19 related government policies and actions for agriculture and the rural sector in Pakistan.

| Date | COVID-19 Policy Actions/ responses | Policy | Scale |
|----------------|---|--|-----------------------|
| March 2020 | Strict lockdown and closure of business activities (Restaurants, shopping mall, and markets), however, exemption for grocery stores, pharmacies, and ports. | Lockdowns Curfews | Sindh, Balochistan |
| | State Bank of Pakistan announced a moratorium of all agricultural loans for one year | Defer loan payments | All Pakistan |
| | Ehsas programme cash transfer to 12 million households for poor and daily wage workers | Cash transfer | Federal |
| | KP announced PKR 6.4 billion cash grant for 1.6 million households | Cash transfer | KP |
| | Punjab announced PKR 10 billion for 2.5 million (PKR 4000 per) households | Cash transfer | Punjab |
| | Announced PKR 50 billion for Utility stores for providing PKR 3000/family | Food aid | Federal |
| | International and domestic flights and public transport suspended | Travel ban | All Pakistan |
| | Punjab imposed section 144 for three weeks across the province to check to hoard of food items (+sanitizer) | Food price control | Punjab |
| | Wheat procurement doubled to 8.25 MMT from 4.25 MMT to stimulate the rural economy | Price support | All Pakistan |
| April 2020 | Reduction of tax on import of pulses | Trade policies | Federal |
| | Ordinance against hoarding and smuggling of food items during a pandemic | Food price control | Punjab |
| | A platform for food aid through philanthropists | Food aid | Federal |
| | Exemption of restaurants from lockdown but only for home food deliveries | Restrictions on businesses | All Pakistan |
| | The federal government banned the export of all edible items | Export ban | Federal |
| | Scheme for financing wages for three months (April-June) to avoid layoffs of employees | Wage support | All Pakistan |
| May 2020 | Partial opening of shopping malls and formal markets as well as the textile industry | Restrictions on businesses | All Pakistan |
| | Resumption of domestic flights and public transport | Travel control | All Pakistan |
| | Subsidy on 19 food items at all Utility stores during Ramazan (including wheat flour, sugar, pulses, and cooking oil) | Consumer food Subsidy | All Pakistan |
| July 2020 | Economic Coordination Committee (ECC) approved a subsidy of about PKR 49 billion for agriculture and Housing. For agriculture: 1.5 billion for fertilizers and tractor; 6.8 billion for waving markup on agriculture loans for 12.5 ha landholders. | Targeted rural income support / Farm input subsidies | All Pakistan |
| August 2020 | The complete reopening of business activities (including restaurants dine-in) | Restrictions on businesses | All Pakistan |
| September 2020 | KP government-approved subsidy on certified seed and fertilizers | Farm input subsidies | KP |
| | MNFSR announced subsidy on the pesticide (PKR 300 per pack of pesticide for cotton pests) | Farm input subsidies | Federal |
| November 2020 | Smart lockdowns | Targeted lockdowns | All Pakistan |

Source: Information extracts from IFPRI CPR portal (website: <https://public.tableau.com/profile/ifpri.td7290#!/vizhome/CPRPORTAL/Overview>)

2. Data collection and methods:

The study was conducted in four provinces of Pakistan, i.e. Balochistan, Sindh, Punjab and Khyber Pakhtunkhwa. The data was collected by using qualitative approaches. A total of 35 key semi-structured interviews and 3 online experts' discussions were conducted with key public and private stakeholders. The public sector stakeholders include provincial secretaries of food, agriculture, industries, finance; assistant commissioners, and deputy commissioners; managing director of SMEDA; directors of food, agricultural extension and crop reporting departments and agri-scientist; and academic professionals of agriculture universities. The stakeholders from private sector include farmers engaged in cropping, poultry, livestock businesses (see appendix I for the complete list of stakeholders).

The purpose of the consultation was to seek information regarding COVID-19 impact on agricultural activities, labour market, consumer behaviour and policy need assessment for the agriculture sector. For this, an interview guideline/schedule was developed. Part I of the schedule mainly focused on the assessment of food security situations amid COVID-19, discuss current and future activities and decisions taken to mitigate the impact, and identification of key indicators for the proposed food security dashboard or data facility (food security dashboard results were presented in a sperate report). Part 2 deals with need assessment for the agriculture sector with particular focus on farmers and migrant returnees (see appendix 2 for detail). Interviews were conducted in Urdu which were later transcribed in English and analyzed using NVivo software.

3. COVID-19 and rural areas: spread, perceptions and responses

The rural Pakistan is very much familiar with natural catastrophes such as floods, droughts, earthquakes, heatwaves, and other biophysical and climatic changes. Such experiences have gradually enabled them to develop and acquire skill sets to counter somehow the negative outcomes of these events. Therefore, the rural population respond or position their lives, actions, and behaviour according to the circumstances they face. COVID-19 was a different threat to human life and livelihood, which they never experienced or observed in their recent past. When COVID-19 cases started to report in urban areas, particularly in Karachi, during February 2020, the rural population did not anticipate the gravity of the situation, therefore, people were critical about the existence of the coronavirus. People mostly made fun of those, who followed the pandemic related Standard Operating Procedures (SOPs) announced by the government. In the beginning, people were not willing to keep social and physical distancing, restrict their mobility, wear masks, and avoid gatherings and handshake. One of the respondents of the survey said: “wearing a mask is difficult, it feels like a person is living in a prison”.



Figure 1: SDPI researcher interviews a farmer in Sindh. Staff photo

People in rural areas were mostly suspicious about the COVID-19 spread, its impacts on health, economy, and livelihoods. For instance, a farmer in Sindh, during the interview, argued:

“We (the farmer) sold our wheat at PKR 1200-1300 per 40 kg, but wheat prices in the market raised steeply to about PKR 1800-2000 per 40 kg, so COVID-19 is just an illusion or deception to buy wheat at a low price from the farmers.”

However, the study finds that the rural population started recognizing the COVID-19 pandemic as a threat to their lives and livelihoods in three different ways. First, when the government announced strict lockdowns (particularly in urban areas) and farmers found it difficult to transport their farm produce to the market and thus faced economic losses. Second, a large influx of migrant returnees (including daily-wagers and white-collar workers, students, businessmen, traders, etc.) to rural areas subsequently reduced household incomes and well-being. Third, COVID-19 positive cases were also reported in rural areas and people observed the deaths of their relatives and neighbours. Such circumstances created fear among the rural population, so they started taking precautionary measures.

The spread of COVID-19 in rural areas is relatively modest. However, when we talk to the rural communities, they mention substantial COVID-19 cases in their proximate areas. An orchard farmer in Ziarat, Balochistan, said:

“Many residents, mostly the elderly people, died of coronavirus in the village. The virus spread occurred through students, who returned to home from urban areas after the closure of their educational institutions.”

In Sindh, COVID-19 spread not only occurred through returned migrants and labourers but also through regularly visiting shrines and relatives. When inquired about the ratio of positive cases in rural areas, a university professor at Sindh Agriculture University Tando Jam stated that COVID-19 cases in rural areas were about 1.5 times less compared to urban areas. However, in the Punjab and KP, the COVID-19 spread was limited due to restricted labour mobility and better isolation practices for migrant returnees from other urban areas or abroad.

3.1 COVID-19 pandemic: Individual and community experiences and responses

Given the economic impact and increased COVID-19 cases in the area, people have started taking precautionary measures. Social and electronic media also provided essential information regarding SOPs for COVID-19. The study finds that during the peak COVID-19 pandemic months (April to June) people became terrified that caused to halt social, economic, and cultural activities in the rural areas. A rural resident in Khyber Pakhtunkhwa said:

“We have stopped meeting our friends and relatives; people maintained physical distancing, as they are really afraid of the situation; we were feeling ourselves like ‘*achoot*’ (untouchables) because we were not even shaking hands with each other.”

A rural resident of the Punjab shared his experience while saying that:

“Strict lockdowns scared us if anyone from the family goes out for shopping or earnings, we suspect him of bringing the virus with him, so we avoided getting close to each other, even we stopped offering prayers in our mosque.”

The use of hand sanitizers and face mask was more common among landholding rural class during peak COVID-19 months compared to landless farm labour and rural poor. About half of the population was not practicing any precautionary measures. In fact, lack of awareness and information mainly caused people not to follow COVID-19 related SOPs.

In rural Sindh, the study finds that the majority was not following the COVID-19 related SOPs. A researcher from Pakistan Agriculture Research Council (PARC), Tando Jam, said people were not aware of the causes, symptoms, and prevention measures of the virus. Based on the survey conducted in Nawabshah, Sukkur and Ghotki, the respondents mentioned that awareness regarding COVID-19 SOPs among rural women was more limited compared to men. The lack of awareness was mainly due to limited access to public information, and illiteracy. However, when contacted women were seemed more receptive to learning about the COVID-19 and its related SOPs.

3.2 COVID-19 related SOPs: status and limitations for implementation in agriculture sector

The study also investigates the status and opportunities for potential agriculture specific SOPs. It highlights as to how agricultural activities can be more effectively carried out amid the pandemic and how the market can function considering multiple challenges to food supply and demand.

Status: At the time of the survey, only general SOPs (such as wearing masks, social distancing, hand sanitizing) were propagated and implemented in the rural areas. About specific SOPs for agriculture, the government officials said that a draft SOPs covering agriculture, food security, poultry and other related sectors has been prepared by National Command Operation Centre (NCOC), which is currently in review process. NCOC supports federal and provincial governments in preparing SOPs, updates and advisories related to the pandemic.

In Sindh, the food department has set up a committee to enforce SOPs among the staff of food warehouses, flour mills and other food processing units. However, only general SOPs were implemented, and no risk assessments were taken for the workers about the fitness of working conditions, premises (entry/exit) decontamination. In rural areas, during the peak pandemic months, some villages built temporary check-posts, where voluntary services were provided to check the fever or flu of farm labours or visitors coming from outside.

Likewise, Khyber Pakhtunkhwa government, besides implementing general SOPs, installed decontamination gates outside the main food markets to disinfect vehicles and goods. A similar practice was carried out for animal markets before Eid ul Azha. The provincial government also provided portable threshers for harvesting wheat to reduce dependence on farm labour. Moreover, the government established 'farm services centres' where around 1500-2000 farmers per district were registered for designing and preparing support programmes for rural areas.

In the case of the Punjab, the provincial government developed general SOPs with the help of the Punjab Health Department for food-related SMEs, food processing units, flour mills, and food markets. For implementation, the government also constituted teams and established control rooms in the major food markets of the province. As regards Balochistan, the provincial government found it difficult to implement COVID-19 related SOPs because people were not inclined to accept the existence of any virus. Although, a comprehensive campaign was launched to create awareness about the causes, symptoms and precautionary measures, people only followed some SOPs during the lockdown in peak COVID-19 pandemic months.

Limitations: The major limitations to implement SOPs (or design sector-specific SOPs) was the lack of knowledge and capacity of the (provincial and local) government departments to respond to the pandemics like COVID-19. The government officials lack skill sets that enable them to prepare plans and policies that can improve surveillance, enforcement, targeting the farmers and most vulnerable during the pandemic. The government departments also lack financial and human resources to properly implement lockdown, monitor and restrict mobility and track positive cases at the local level.

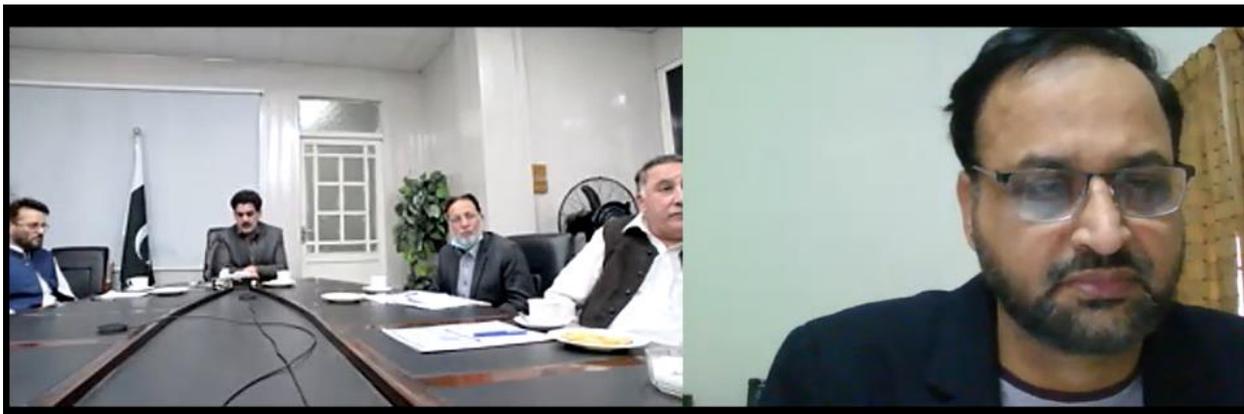


Figure 2: Online consultation with Mr Muhammad Israr, Secretary Agriculture, Livestock, Fisheries, and Cooperative Department, KP; Dr Aurangzeb, DG Livestock, Extension Wing; Dr Bashir DG, Agriculture Research, KP; Mr Yasin, DG Soil and Water Conservation Department, KP.

4. Impact of COVID-19 on food supply and agriculture

This section seeks to understand the key impacts on food production, processing, distribution, prices and changing consumer food purchasing behaviour in four provinces of Pakistan after the first wave of the COVID-19 pandemic. Furthermore, the study explores how does it impact farmworkers and the role of migrant returnee on the overall well-being of rural households. Table 2 provides a summary of the key study findings related to food supply and demand-side constraints during the pandemic in the country.

4.1 Impact on farming:

The study finds that farmers were dealing with multiple challenges simultaneously after the coronavirus outbreak. The losses to crop production were incurred not only because of climatic events but also due to COVID-19 pandemic related mobility restrictions and lockdowns. In Sindh and Balochistan, Kharif (vegetable) crops were most affected as a result of heavy rains, lack of storage and shortage of farm inputs and farm labour. In addition, there was a substantial impact of locust attack on crops during the same period.

In the Punjab and Khyber Pakhtunkhwa, the farmers were dealing with a shortage of farm machinery for the harvesting of wheat crop. The problem was related to timely access to the farm machinery which was affected due to COVID-19 related mobility restrictions and climatic events. In the Punjab, most of the private wheat harvesting contractors belong to the districts of central Punjab, i.e. Gujranwala, Hafizabad, and Chiniot. They were involved in contracts with farmers across the Punjab. Owing to unfavourable weather conditions, the wheat harvesting season of 2020 in central Punjab districts was delayed and coincide with the districts of southern Punjab. Apart from the climate factor, many contractors were unable to reach timely for harvesting in south Punjab districts due to mobility restrictions, and the closure of repair and maintenance shops in the Punjab. This had delayed the sowing of Kharif crops in the province.

Lack of access to market for selling farm produce was most challenging during the pandemic. Many farmers, particularly small farmers, and livestock, poultry, and dairy farms were most affected due to the closure of transport during the lockdowns. In Khyber Pakhtunkhwa, for instance, out of 3600 poultry farms, nearly half were closed during the pandemic. This problem was caused not only due to inaccessibility to the markets but also due to the nonpayment of rents and utility bills of these farms. COVID-19 pandemic also impacted rural household income diversification. Several farmers who were also involved in livestock, dairy and poultry business as a labourer or trader, lost their jobs and investments, thus caused increase in rural poverty and reduction in overall household well-being.

Table 2: Impacts of COVID-19 on agriculture and rural population in Pakistan

| Sector/Category | Key impacts | Region |
|---------------------------------|--|--------------------------------|
| Food availability | Lockdowns affected the supply of food items (particularly wheat flour and sugar) and thus increased the food prices manifold. | Balochistan, Punjab, KP, Sindh |
| Crop production | Impact on wheat production was limited. | Balochistan, Punjab, KP, Sindh |
| | COVID-19 related restrictions coupled with climate factors and locust attack badly affected the agriculture production. | Balochistan, Sindh |
| | Crop production during Kharif season was affected in areas of high number of COVID-19 cases. | Punjab |
| Farm operations | Harvesting was affected due to the immobility of farm machinery from one region to another and the closure of repair and maintenance shops. | Punjab, Sindh |
| Food processing | Lockdowns affected the production of wheat flour due to lack of transport and labour as well as an intra-provincial ban on wheat procurement and trading. | KP |
| | Following the SOPs, agro-food processing firms did layoffs reducing their labour to half and thus production declined. | Punjab, Sindh |
| | Meat export doubled during the pandemic. | Punjab |
| Food supply chains/Agri-markets | Perishable crops (such as tomato) and dairy products were affected due to market closures | Balochistan, KP, Sindh, Punjab |
| | Online food (fruit and vegetables) delivery was operationalized in 12-13 districts. | KP |
| Food consumption | Consumption of food (such as dairy products and vegetables) were halved due to shocks on household incomes and food supply shortages. | Punjab, KP, Sindh |
| Social system shocks | People denied getting grocery on credit from local shops and markets. This has compelled them to sell livelihood assets to meet daily expenditures on food, health, and education. | KP, Sindh, Punjab |
| | Social support from friends and relatives for obtaining loans declined, particularly for the poor and daily wage earners. | KP, Punjab, Sindh |
| Farm inputs | Farm inputs (such as feed, fodder, seed, and fertilizer) are either unavailable when required or prices become doubled due to supply shortages | KP, Punjab, Sindh |
| | Farmers are unable to pay utility bills | KP, Punjab, Sindh |
| Livestock and Dairy business | The impact on the livestock sector was huge due to the unavailability of feed, fodder, transport, vet medicine, and decreased demand. 47 % of poultry farms closed after the pandemic in KP alone. | KP, Punjab, and Sindh |
| | Mortality of livestock due to inaccessibility to vet. doctors or hospitals for vaccinations | KP, Punjab |
| Farm income/prosperity | High uncertainty and instability in farm incomes | Balochistan, Punjab, KP, Sindh |
| | Delayed payments by consumers, particularly dairy products (such as milk) | KP |
| Migrant returnees | Direct adverse impacts on those families who were receiving internal remittances | KP, Sindh, Punjab |

Source: Author's own



Figure 3: Interview with Director Food, Sindh Mr Khalid Qaimkhani. Staff photo

Another major impact of the COVID-19 related restrictions was seen on prices of farm inputs, which were increased substantially. Likewise, access to farm inputs was also severely affected. For instance, livestock farmers in Khyber Pakhtunkhwa (mostly located in peri-urban areas) experienced shortage of fodder as many feed shops were closed. The supply of fodder from the rural areas was also reduced due to strict lockdown. Similarly, the study finds that feed for poultry farms was also not available or available at a significantly higher price. The unavailability and higher prices of animal feed substantial reduced farm incomes and profits or unable to meet current and previous financial losses and costs. During the pandemic, the retail prices of chicken meat in the Punjab reduced to as low as PKR 60 per kilogram, whereas the cost of rearing chicken including transportation and middlemen charges was about PKR 170 per kilogram. The wide-spread rumour of transmission of coronavirus through chicken meat was one of the reasons for such a decline in the prices. To mitigate such losses, dairy farmers took loans from friends and relatives, which increased stresses on their household's daily expenditure on food and education.

Moreover, due to the closure of veterinary hospitals and clinics, livestock and dairy owners were not able to vaccinate or got treatment for their sick animals. A dairy farmer in Khyber Pakhtunkhwa shared his experience as:

"I have a cow which I brought for PKR300,000. It got sick during the pandemic and I could not find any veterinary doctor for its treatment; therefore, I

slaughtered the cow and sold its meat for only PKR27000. I also sold my other three cows only for PKR 100,000 due to the non-availability of fodder."

Another distressing factor for farmers was the limited access and higher prices of seed and fertilizers. In Sindh, farmers said that fertilizer prices increased up to PKR400 to 600 per bag during the peak pandemic months. The seed prices of vegetable crops were also raised, and according to one of the respondents from rural Sindh, the cost of seed contributed about 30 per cent to the total cost of production.

After lockdown restrictions were relaxed in August 2020, there was an improvement in access to farm inputs and markets. However, pandemic impact on small farmers (including livestock and dairy farmers) was still lingering and they were facing higher production costs, shortage of animal feed (particularly poultry feed), limited support from the government in terms of access to credit and subsidies on inputs.

4.2 Impact on agro-processing firms:

The impact of COVID-19 pandemic on agro-based¹ and food processing² firms was modest in terms of business closure during the lockdown and mobility restrictions. According to the SDPI's firm-level survey, about 62 per cent of sampled agro-based and food processing industries were open during the peak pandemic months (i.e., April, May, and June). However, within agro-based firms, 43 per cent were closed, which were mostly related to the trading of fruit and vegetables. These firms kept closed their business operations at least for two to three months. Rice and flour mills mostly continued their functions during the pandemic. In Khyber Pakhtunkhwa, flour mills were closed due to an intra-provincial ban on wheat transportation by the Punjab government.

Most of the agro-based firms reported a low turnover of their businesses that goes up to 50 per cent. The loss was due to the decrease in export orders, shifts in consumer demand, transport unavailability, lack of financing and other damages to the perishable products. However, disruption in logistics and production losses were the main COVID-19 related impacts. Agro-based firms also reported an increase of cost to about 20-30 per cent or more in material, labour, staff wages, production supplies, packaging, middlemen commissions, and hygiene during the pandemic.

However, to mitigate the costs impact, most of the agro-based firms did lay-offs or reduced the salaries and incentives of their workers. The firms also received financial burden to follow the

¹ Agro-based industries: output from the cultivation of agricultural and horticultural crops, vegetables and post-harvest operation on all fruits and vegetables

² Food processing industries: activity converting fresh foods into food products. This includes washing, chopping, pasteurising, freezing, fermenting, packaging, and cooked food etc.

SOPs related to COVID-19, which included masks, handwash facilities, sanitisers, face protectors, sprays, decontamination gates, and installation of air filters in the manufacturing areas.

4.3 Impacts on food prices and shifting consumer behaviour:

During the pandemic, food prices were very volatile due to disruption in food supply chains. The prices of basic food items, including wheat flour, rice, cooking oil, sugar, and vegetables, were increased manifold during the lockdown restrictions. In rural areas, the prices of perishable commodities such as vegetables, meat and milk were reduced to half due to market closure and low local demand.

Daily-wagers and poor household were the most vulnerable during the pandemic. They were not able to meet the basic food requirements of their families and were faced with hunger and malnutrition. In Khyber Pakhtunkhwa, the price of wheat flour was increased up to 60 per cent. Although, the government supplied wheat flour at lower prices, however, access was limited due to shortage, long queues, and quality of the flour. The study finds that most of the people reduced their food consumption up to 50 per cent. For instance, one of the respondents said that he used to purchase one litre of milk daily before the pandemic, but now he has reduced it to half due to loss of income and increased prices of milk.

The study also finds that people have started selling their livelihood assets (such as livestock, jewelry) and they are borrowing loans from friends and family members to meet their daily food requirement during the pandemic. People said that before the pandemic they used to buy food items and other household consumables on credit from a local shopkeeper, but now the shopkeepers only sell grocery through cash payments.

4.5 Impacts on farmworkers:

The study finds that labour shortages were the main causes of delay in farm operation particularly during sowing and harvesting periods during the pandemic. The impact of labour shortages was more pronounced in Sindh, Balochistan and Khyber Pakhtunkhwa provinces during peak months of COVID-19 pandemic. In the Punjab, the situation was however, less sensitive due to high labour market density. Most Punjabi farmworkers were seasonally migrated from adjacent districts to Sindh and Balochistan to work in vegetable and orchard farms on daily basis. The mobility restrictions caused to cease such seasonal migrant worker movements. For instance, in Khyber Pakhtunkhwa, during peach harvesting in Swat district, many daily wage workers from Charsadda, Peshawar, and Mardan were not able to migrate and ultimately lost their seasonal incomes.

Most of the informal workers engaged in the transport and services sector (such as hotel, restaurants, salesmanship, etc.) along the food supply chain were also lost their work and

returned to their home districts. In the Punjab, the situation was quite opposite. The dairy and poultry owners did labour layoffs amid strict SOPs implementation, decreasing demand, and high production costs. A dairy businessman said he had 10 labourers in his dairy farm, but he reduced to 5 to follow SOPs and also to minimize increasing costs such as rents, utility bills, and taxes.

4.4 Migration returnees:

When a strict lockdown was announced by the government during March 2020, a large flux of migrant workers, students, businessmen, traders, professionals, formal and informal factory workers returned to their hometowns and villages. An overwhelming number of return migrants was observed in Khyber Pakhtunkhwa and Sindh. When migrants lost their (domestic) jobs or work, particularly from Karachi, Lahore, Faisalabad, and Islamabad, no official record was maintained in this regard. It was particularly important to record that in what conditions they travelled (either symptomatic or asymptomatic COVID-19 carrier) and later what economic stresses they were faced while their stay in hometowns.

The study finds that migrant returnees have caused a substantial financial burden on their families at origin areas. As (internal) remittances were the key off-farm incomes for most of the rural families, which they lost unexpectedly due to the COVID-19 pandemic. These (internal) remittances were generally used to secure food, health, and education in a pre-COVID-19 scenario. Later, in August, when strict lockdown situations were softened from most of the urban centres of the country, it was observed that migrant workers again travelled back to find work or to rejoin their jobs.

5. Conclusion: Needs and opportunities for agriculture sector amid the pandemic

The study provides evidence of the pandemic impact on rural economy and population from February to September 2020. The study findings show that agriculture and rural communities were largely impacted due to mobility restrictions during the early and peak pandemic months. On the one hand, the study comes out with the wide-spread impacts that caused food insecurity, disruption in food supply chains and poverty in the country, and on the other, the study highlights some key weaknesses and gaps in national food security planning and institutional performance.

First, the ability of the public departments and institutions to secure food supply chains during the pandemic was particularly low. Even in a pre-COVID period, the government departments lack data and information about how much food is produced, what are the consumption gaps, when and where food shortages may emerge, who are most vulnerable in the society and what are their specific food requirements to avoid hunger and malnutrition. Moreover, what are the current food stock, particularly in the private sector, and who is hoarding and thus influence market supply and food prices? Most of the food-related data collected and managed by the departments concerned were based on the self-reported assessments of a few wholesaler and distributors based on their current level of food stocks. A comprehensive food stock position assessment for the whole market and ability to track essential food items along the supply chain was lacking. Furthermore, the collected data was scattered among the departments concerned that rarely collated for proper food supply management. During the COVID-19 pandemic, such deficiencies in food-related data gathering and sharing become more visible, particularly at the intra-provincial level.

Second, the most vulnerable part of the food supply chain during the pandemic was the lack of storage facilities, particularly for perishable food commodities. The study finds that the production of fruits and vegetables, livestock, poultry, and dairy products not only affected at farm level, but also traders and exporters were unable to manage the losses due to lack of transports, labour, and decreasing demand both at domestic and international level. The (small) farmers faced the brunt of major losses in terms of reduced farm incomes, livelihood assets and increasing indebtedness. Any short, medium, and long-term public and private sector strategies to reduce these shortcomings during the pandemic related restrictions were missing.

Third, COVID-19 related disruptions to food supply and insufficient public responses to cater for the needs of small farmers and vulnerable non-farm rural households highlighted the lack of financial and human resources to mitigate the risks and impacts. The capacities of current government officials were also limited. To counter COVID-19 related challenges, digital

innovative solutions are required to manage shortages in farm inputs and ensuring sustainable functioning of national to local level food systems.

Forth, public information and data were limited regarding the spread of COVID-19 in rural areas of Pakistan. This information gap is alarming due to two important reasons. *Firstly*, the majority of the poor and food-insecure population of Pakistan resides in rural areas with limited access to proper health facilities. The lack of credible estimates of COVID-19 spread in rural areas may enhance the health and income vulnerabilities of the poor. *Secondly*, the study learns that awareness about COVID-19 symptoms, precautionary measures and information regarding SOPs was largely nonexistent among small landholder, landless farm labour, non-farm rural households. Furthermore, effective awareness campaigns (related to the COVID-19 pandemic) in rural areas were also low.

Fifth, farm labour shortages during the peak COVID-19 pandemic were more noticeable. The strict lockdown restrictions almost halted the seasonal mobility of informal farm labour. This, on the one hand, adversely affected the sowing, harvesting and other farm operations, and on the other, caused farm labour to struggle for basic food items due to the loss of farm incomes and labour. The government support programmes during the pandemic (see table 1) mainly provided support to medium to large farmers and labour working in the formal sector.

Lastly, the role (internal) remittances in rural household food security, health and education become more evident during the pandemic. The study finds that the degree to which rural household experienced food insecurity and a decrease in consumption of other non-food items was largely connected to migrant returnees, the rather increased financial burden on the family. Although the loss of remittances was a temporary shock, migrants started to return to their work and jobs soon after the lockdown restrictions were lifted.

Box 1: Proposed SOPs guidelines for Agriculture sector

Crop production:

- Conduct risk assessments for (Rabi and Kharif) crop specific SOPs to incorporate issues such as gender specific and labour-intensive farm operations, farmers capacities and resources for SOPs compliance.
- Entry and exit areas of villages should be demarcated and monitored for the labour arriving from outside. Decontamination measures should be devised and implemented.
- Decontamination of farm machinery and tools.
- Spurring digital communication in the purchase and sale of off-farm inputs (such as seeds, fertilisers, pesticides, and farm machinery) and outputs (farm harvest).

Dairy and Poultry farming:

- Conduct risk assessment for dairy and poultry farming to identify vulnerable area for pandemic spread and resources required for effective response and precautions.

- Ensure timely livestock and poultry vaccination. Moreover, public departments concerned should ensure sufficient stock of vaccination and its efficient distribution to different areas during mobility restrictions and lockdowns.
- Keep emergency contact details for veterinary hospital/doctor.
- Ensure safe transportation of livestock/poultry birds (including drivers, labour, and handlers) according to the public decontamination procedures.
- Devise effective awareness campaigns (by highlighting the sensitivity of pandemic spread and its impacts on farm outputs and livelihoods) among workers for better compliance of SOPs and precautions.
- Improve ventilation of dairy and poultry farms.
- Increase digital communication for business transactions, ordering and delivery and cash transfers.

Agro- and food processing firms:

- Risk assessment should be conducted at firm level regarding potential sources of contamination and its spread, personal and overall hygiene procedures during packaging, handling, and transport.
- Appoint health and safety officer or delegate responsibilities to the existing staff for monitoring SOPs compliance and practice.
- Personal protective equipment (PPE) should be used for food processing and transport.
- Firms should maintain records for regular decontamination and disinfection of buildings, storage facilities, employees working and rest areas.
- Solid and liquid waste removal from the factory/building areas should be done regularly and effectively.
- Establish digital system for firm's operations and staff meetings and digital access to office buildings and warehouses.
- Liaison with public officials/departments for pandemic updates and compliance with SOPs and other strategic government decisions.

Source: Author's own based on key informant interviews

Policy Recommendations

Based on the study findings, some key recommendations are as follows.

- **Digital food security dashboard:** A food security digital dashboard should be developed at district level for essential food commodities indicating the status of food production, consumption, stocks, and prices across the country for an effective and informed decision-making. In this regard, MNSFR (at federal level) should develop the dashboard and regulate it with coordination of provincial level food, agriculture and public administrative departments for effective decision making, managing data and actions require to ensure smooth supply of essential food items in the country.

Moreover, improve coordination among federal, provincial, and district level departments concerned for sharing information and data related to food stocks and intra-provincial trading and transport.

- **Improve digital connectivity and communication in rural areas:** There is a need to improve access to internet and better communication technologies in rural areas so as to promote digitalisation of food supply chains as already proposed in Digital Pakistan (2018) and Broadband (2004) policies. In this regard, Ministry of National Food Security and Research, Ministry of Information Technology and Telecommunication, and provincial ministries and departments concerned should align efforts to improve agricultural information (regarding farm inputs prices and availability, spread of pests and diseases, meteorological and water related updates, market information, etc.) and support along the food supply chains.
- **Improved access to farm inputs and credit through cooperative farming:** The provincial governments should ensure access to farm inputs and stabilisation of their prices to keep the food supply moving during the pandemic. In this regard, the role of agricultural cooperatives should be revitalized by provincial agriculture and extension departments. This would help to improve cashflow issues of the (small and subsistence) farmers through better disbursement of agriculture credit under different government initiatives during extremes like floods, droughts, and COVID-19 pandemic.
- **Small-scale food processing and value addition:** There is a need to design and promote post-harvest value addition (particularly for perishable food items) to reduce losses and improve income during the restricted mobility, lack of transport and traders and reducing consumer demands. With support of provincial agriculture departments, the public sector social protection programmes such as Ehsaas, Benazir Income Support Program, Pakistan Poverty Alleviation Fund should promote and strengthen rural entrepreneurship (particularly for rural women) through devising training programmes and access to micro-credit for improving capacities for value addition, small-scale food processing and marketing.
- **Better market infrastructure:** Improve (cold) storage facilities and logistics system at local to the provincial level, particularly for the perishable food commodities. To achieve this, a strong public-private partnership is required to devise a network for efficient, affordable, and accessible storage facilities for farmers, small-scale traders and middle-men to secure food supply chains. In this regard, the MNFSR, PASSCO, and concerned provincial departments should enhance policy dialogues with agro-based and food processing industries and traders for removing financial, skills and technological barriers for building and maintaining modern storage and logistics facilities.

- **Securing non-farm rural livelihoods and incomes:** The rural non-farm economic activities (small-scale trading, business and transport, and services such as education, healthcare, etc.) that make up majority of rural livelihoods and businesses should be supported by enhancing access to credit, institutional and public sector social protection schemes, particularly for rural poor, landless, non-farm households.
- **Improved role of the private sector:** The public national and provincial level food and agriculture institution should enhance consultation with private sector food supply chain actors (such as farmers, industries, businessmen, media) for better decision-making regarding allocation of development funds, income support programmes, subsidies, food prices control.
- **Informal labour registration and support programmes:** Set up an informal farm labour registration system across different administrative boundaries by the provincial and local governments to increase understandings regarding internal seasonal labour flows and patterns for developing support programmes during extreme shocks such as COVID-19.
- **The national agricultural census should be updated.** to identify the status of land use, farm machinery, irrigation, livestock, and dairy development. In this regard, Pakistan Bureau of Statistics should align efforts with provincial agriculture, revenue, livestock and dairy development and agricultural extension departments and develop a roadmap for updating agricultural information, particularly under post 18th constitutional amendments scenario.
- **Capacity building of public officials:** develop the capacities of local and provincial level food, agricultural and public administrative departments officials for better and timely risk assessment related to COVID-19 pandemic for proper local-level responses and support.
- **SOPs for agriculture sector:** NCOC should prepare (in collaboration with provincial agriculture and public administration departments) sector specific SOPs for agriculture sector to safeguard lives and livelihoods from the impacts of pandemic. Moreover, address the issues regarding SOPs compliance and develop effective awareness campaigns in rural areas. Likewise, NCOC should develop or improve COVID-19 testing and reporting in rural areas to reduce risks along the food supply chain and rural livelihood and well-being.

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Appendixes

Appendix 1: List of public and private sector semi-structured interview participants

| Sr. No | Name | Designation | Department/ Organization | Province |
|--------|------------------------------|--|---|--------------------|
| 01 | Mr. Noor ul Haq Baloch | Secretary | Finance | Balochistan |
| 02 | Mr. M. Akhtar Buzdar | Director | Crop Reporting | Balochistan |
| 03 | Mr. Noor Ahmed Pirkani | Secretary | Food | Balochistan |
| 04 | Mr. Qambar Dashti | Secretary | Agriculture | Balochistan |
| 05 | Mr. Ghulam Murtaza | Focal Person IT | Agriculture | Balochistan |
| 06 | Mr. Saqib Khan Kakkar | Additional Deputy Commissioner (General) | Quetta | Balochistan |
| 07 | Mr. Aurangzaib Badini | Deputy Commissioner | Quetta | Balochistan |
| 08 | Mr. Muhammad Israr | Secretary | Agriculture | Khyber Pakhtunkhwa |
| 09 | Mr. Khushal Khan | Secretary | Food | Khyber Pakhtunkhwa |
| 10 | Mr. Haji Muhammad Afzal | Ex-President | Sarhad Chamber of Commerce & Industry | Khyber Pakhtunkhwa |
| 11 | Dr Muhammad Anjum Ali | Director General | Agriculture Extension | Punjab |
| 13 | Mr. Muhammad Hussain Khokhar | Additional Director | Food | Punjab |
| 12 | Ms. Nadia Jahangir Seth | General Manager | SMEDA, Lahore | Punjab |
| 14 | Mr. Sheharyar Tahir | Deputy General Manager | SMEDA, Lahore | Punjab |
| 15 | Mr. Qazi Saddam Naseer | Assistant Manager/Agro Food | SMEDA, Lahore | Punjab |
| 16 | Mr. Khalid Qaimkhani | Director | Food | Sindh |
| 17 | Mr. Akbar Niyami | Acting Deputy Commissioner | Hyderabad | Sindh |
| 18 | Dr Aijaz Hussain Soomro | Director, | Institute of Food Sciences and Technology, Sindh Agriculture University Tando Jam | Sindh |
| 19 | Mr. Rehan Ali | Assistant Director | Bureau of Supply and Prices | Sindh |
| 20 | Mr. Naveed Ahmed | Assistant Director | Hyderabad | Sindh |
| 21 | Mr. Ali Hayder Arian | Assistant Director Price | Karachi | Sindh |
| 22 | Mr. Waqar Hussain | Assistant Director | Badin | Sindh |
| 23 | Mr. Amjad Ali | Assistant Director | Tando Allahayar | Sindh |

| | | | | |
|----|------------------------|-------------------------------|-----------------------|-------------|
| 24 | Mr. Mir Shahnawaz | Assistant Director Industries | Karachi | Sindh |
| 25 | Mr. Jume Khan Bajkani | Director | SSRI, PARC, Tando Jam | Sindh |
| 26 | Farmer (Dairy) | | | Sindh |
| 27 | Farmer (Dairy+Poultry) | | | Sindh |
| 28 | Farmer (Crop) | | | Sindh |
| 29 | Farmer (Dairy) | | | KP |
| 30 | Farmer (Poultry) | | | KP |
| 31 | Farmer (Crop) | | | KP |
| 32 | Farmer (Dairy) | | | Punjab |
| 33 | Farmer (Poultry) | | | Punjab |
| 34 | Farmer (Crop) | | | Punjab |
| 35 | Farmer (Orchard) | | | Balochistan |

Appendix 2: Interview Schedule: Dealing with food system amid COVID-19 in Pakistan

Getting started/Warming session: Discuss the purpose of the visit, get the consent for an interview (verbal or written) and permission for audio recording, give an overview of questions that we plan to ask, and inform how much time the conversation would likely to take place.

Purpose of the visit/interview: To understand 1) What is the status of the food chain, particularly concerning a vulnerable population (small farmers); 2) How can the sustained functioning of the local market be ensured? 3) What should be the innovative solutions (such as an online dashboard) for food chains and systems amid COVID-19? 4) How can the safety of people, working along the food supply chains, be ensured from a pandemic? 5) How can the producers and processors implement SOPs around COVID-19?

PART I: Identification of dashboard indicators/variables

| Questions | Follow-up questions/descriptions | Respondent/type of Organisation |
|--|---|---|
| Diagnosing the problem | | |
| What is the current state of food security? Can you please identify the pandemic impact on the food system/security after the COVID-19 outbreak in Pakistan? | <p>What are the major food systems related risks that emerged during the outbreak of COVID-19 in Pakistan?</p> <p>-e.g., the impact of COVID-19 on 1) farm operations; 2) food prices; 3) storage and logistic; 4) overall on food supply chain at different levels (federal, provincial and district levels).</p> <p>In your opinion, what is the most vulnerable part of the food supply chain (farmer-processors-wholesalers-transporters-retailers)? Which part of the food system is one fine (green), which is vulnerable (amber), which is in danger (red)? in the wake of COVID-19 spread and lockdown situation? Can you please share any specific example in this regard?</p> <p>(Further probe: Do you think issues like food availability, affordability (impact on food demand and purchasing behaviour), safety, quality and access, and dietary needs prevail at the consumer level during (and after) the COVID-19 pandemic?)</p> <p>In your opinion, why does persist the (above-mentioned) problem(s), particularly during every disaster (like COVID-19, floods, locust attack, etc.)?</p> | Ministries, public departments and Agri-professionals |

| Questions | Follow-up questions/descriptions | Respondent/type of Organisation |
|--|---|--|
| | Do you think the food system is too complex to handle or comprehend? If yes, what are those complexities or bottlenecks? What are the uncertainties in the food system? | |
| What could be the impact on food supply chains if the second round of COVID-19 hits us? | Which part of the food system will remain fine (green), which becomes more vulnerable (amber), and which one may become worse (red)? | As above |
| Developing a response strategy | | |
| What are/were the key personal and institutional learnings while combating food insecurity and disruption in food-supply chains during the COVID-19 outbreak? | <p>What are the current policies or strategies to deal with the situation? For example, hoarding, food inflation, shortage, strategic reserves, etc.</p> <p>KEY LEARNINGS: Do you find any (management) gaps in addressing the food security issues, while assessing the available capacity and resources? What financial and human resources are available or (additional resources) are needed to counter the risks and impact of such disasters?</p> <p>What are the other factors that may require immediate action and response?</p> <p>In your opinion, what type of limitations regarding federal-to-provincial (and province-to-province) coordination you observed while addressing food security (what is required to counter it)?</p> | Ministries, public departments, farmers |
| Retrospect: Can you please identify/suggest any safe agriculture practices for farmers (for sowing/harvesting to contain COVID-19 spread in rural areas?) | <ul style="list-style-type: none"> • During Smart lockdown situation • During a Complete lockdown situation | As above |
| Developing a monitoring and information platform | | |
| Do you think an online dashboard for food security could help the government in decision-making? How? | In a business-usual-scenario, how decisions are made? (note: discuss any external factors, such as political, economic, social, or cultural, that may influence decision-making) | Ministries, public departments, Agri-professionals |

| Questions | Follow-up questions/descriptions | Respondent/type of Organisation |
|---|---|---------------------------------|
| | <p>What are the formal and informal channels of communication to implement food-related decisions or actions?</p> <p>In your opinion, what should be the key features of such an online data facility? How it can improve decision-making at your level?</p> <p>What transformational (sustainable) changes are required in planning and implementation processes to reduce food security-related stresses and pandemic impact on a food-supply chain? In this regard, what policies, financial mechanism, business models and technological innovations are needed to make the food system sustainable during extreme situations (like COVID-19, floods, earthquake, etc.)?</p> <p>How can such information be collected? Discuss data availability and access issues.</p> | |
| How should online dashboard information be managed? | <p>Do you think that such knowledge and information can be managed at your level? Do you have any innovative idea or model? How do you think it is a better way to improve decision-making at different levels of the government?</p> <p>What uncertainties do you see while focusing on key stakeholders (such as growers, processors and consumers)?</p> | As above |

PART 2: Need assessment for agriculture

| Questions | Follow-up questions/descriptions | Respondent/type of Organisation |
|--|---|---------------------------------|
| Farmers perspective | | |
| Can you please describe the impacts you have faced during the COVID-19 outbreak? | <p>Do you face any difficulty accessing farm outputs (such as farm labour, fertilizers, pesticides) from the market? (particularly for sowing rabi crops)</p> <p>Do you face any difficulty in accessing farm loans during pandemic situations?</p> | Farmers |

| | | |
|--|---|-----------------|
| | <p>Please describe any difficulty in selling farm outputs (including vegetables, livestock products and wheat harvest). Can you please share any specific event or example?</p> <p>What are other issues that are mainly impacting agricultural activities (such as locust) that coincide with the COVID-19 outbreak?</p> <p>What kind of support is needed from the government to avoid any of the issues due to the COVID-19 outbreak?</p> | |
| <p>Can you please describe your as well as people's response, impacts and precautions in the area during the COVID-19 outbreak?</p> | <p>What are the key impacts on non-farm related activities in rural areas? Do you experience any food-related impacts?</p> <p>What are your actions (for preventing the COVID-19 spread) at home and farm?</p> <p>Do you find any difference in your or people's response during the COVID-19 outbreak?</p> <p>It is reported (in news) that many migrant workers have returned to villages from urban areas (during lockdown); do you think it is true? If yes, how did the migrants' return impact people's lives (particularly on-farm operations)? Do you think they caused to spread of COVID-19 in your area?</p> | <p>As above</p> |
| <p>Ethical considerations: In the end, we may offer the respondents to ask questions to clarify anything relevant to the discussion or if they want to add or delete some aspects/details of the discussion. We may also request them to contact us in case of any change (i.e. inclusion or deletion) in the information collected during the interview. We'll also ensure to leave the respondents in a good state after the interview, greet, and say goodbye.</p> | | |