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Impact of COVID-19 on agricultural production and distribution in South Asia

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Abstract

COVID-19 conveyed threats to the development of social life and the economy. Social distancing has changed the way of living, with a profound impact on food and agriculture. With this concern, the study was conducted to assess the impact of COVID-19 on agricultural production and distribution in South Asia. Bangladesh, India, and Pakistan were selected as the study countries since larger agricultural production countries with higher virus invasion numbers posed higher vulnerability than others. It is necessary to unfold the impacts and policy on the agricultural sector so that losses can reduce. The secondary data were taken from different sources. The study proved that limited transportation, shortages of agricultural labor, export, and import restriction hampered agricultural production and distribution in South Asia. Livestock, vegetable, fruit, and fishing sector were more affected than the crop sector. Small poultry farms were closed, milk was discarded, and rotted fruits and vegetables were a source of concern. Different policies were implemented by the governments to recover from production losses. Proper storage management and farm mechanization may reduce the loss of production. Decentralization efforts of government through local (political and co-operative association) leaders may place the agricultural product to the market at least health hazards.

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KEYWORDS
agricultural distribution, agricultural production, COVID-19, South Asia

1 | INTRODUCTION

COVID-19 is a disease called an emergency all over the world. The World Health Organization (WHO) declared COVID-19 as a pandemic on March 11, 2020 (Haque, 2020). COVID-19 was found in Wuhan, China, in December 2019. Within a short period, the virus was being spread all over the world. The healthcare sector has begun to suffer. Within a few months, confirmed cases and death tolls announced the breakdown of health system. Social distancing was the only measure to minimize infection. Many countries have announced national lockdowns, curfews, and emergencies in order to save their citizens. Lockdowns prompted the disruption of livelihoods in both the developed and developing world (Varshney et al., 2021).

The crisis of COVID-19 has posed serious challenges (Haque, 2020) particularly in developing countries. In developing economies, agriculture plays an indispensible role in economic development. Agriculture is unavoidable to ensure national food and nutritional security (Anik et al., 2017). South Asia consists of Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka with about 25% of the world's population. South Asia is the most densely populated region with an area of 5.2 million square kilometers (1% of the world's area). In the meantime, 57% of the total South Asia is arable land or agricultural land (AFA, 2019). In South Asia, agriculture offers livelihood to more than 70% of the people. Agriculture employs about 60% of the total labor force with a contribution of 22% of the regional domestic product (Aryal et al., 2020). Different reports stated that, before the pandemic, about 649 million people in South Asia were moderately or severely food-insecure (Rasul, 2021) and 271 million were severely food-insecure. Researchers are concerned about a worsening of the food insecurity situation as a result of COVID-19.

Apart from healthcare crisis, global economic pain has developed as people are asked to stay at home. Many sectors have been hit by this pandemic and food and agriculture are not outside the impact of COVID-19 (Anshumali et al., 2021). Social distancing, decreased transportation, reduction of the mobility of labor, and disruption of the entire food supply chain are (Zafrin, 2020) just a few of the problems. Food safety and security are a global concern in the present scenario. The level of impact of COVID-19 on food security differs from country to country, since it depends on the volume of agricultural production for every country (Mouloudj et al., 2020). Still, the impact of the COVID-19 pandemic is unfolding in South Asia and globally (Amjath-Babu et al., 2020). As an effort to gather more impacts of COVID-19 on agriculture, this study was prepared across the South Asian countries.

The broad objective of the study is to evaluate how COVID-19 affected the South Asian countries agriculture. This paper aims

- To grasp the impacts of COVID-19 in terms of agricultural production and distribution in South Asian countries;
- To identify the policies taken to minimizes the impact of COVID-19 on agriculture; and
- To recommend some policies based on the synopsis of COVID-19 impacts on agriculture.

2 | MATERIALS AND METHODS

2.1 | Study nature and data types

This research is descriptive in nature. Secondary sources of data have been used for this study. A number of reports from news agencies, national and international sites, web blogs, web newsletters, different agriculture research organizations' reports, articles, and journals have been used to write this paper.

2.2 | Country selection

All countries in the world have faced troubles due to COVID-19. Particularly, South Asian countries have had to deal with a more challenging situation because of their large population, weak health facilities, high poverty rates, low socio-economic conditions, poor social protection systems, limited access to water and sanitation, and inadequate living space. With all of these existing socioeconomic problems, maintaining physical distance and taking other required measures posed serious concern (Rasul et al., 2021). Every country of the South Asia could not be included in this study. On the basis of two indicators, the spread of the COVID-19 virus and the Annual Agricultural Production (2019) (WB, 2020a), three countries, Bangladesh, India and Pakistan, were selected (Figure 1). Larger agricultural production countries with a higher virus infestation rate are more vulnerable than others.

Therefore, the paper is organized into five sections. Section 1 deals with a brief introduction, including the objectives of the study. Materials and methods of the study are presented in the Section 2. Section 3 itemized the main body of the paper, the impact of COVID-19 on agricultural production and distribution, including the impact on the agricultural labor force and intermediary input supply, the impact on crops, livestock, fruits and vegetables, and others. The export and import restrictions and the related government measures to tackle the COVID-19 losses are also presented in Section 3. In Section 4, the summary and discussion are presented. Finally, in Section 5 of the paper, the conclusions and recommendations are stated.

3 | IMPACT OF COVID-19 ON AGRICULTURAL PRODUCTION AND DISTRIBUTION

Agricultural production depends on the four factors of production, including land, labor, capital and organization/enterprise. Among these factors, the study is trying to cover the impact of COVID-19 on agricultural labor forces, intermediary input supply, and export and import restrictions. Finally, the production and distribution situation were discovered, with government measures implemented to minimize the agricultural losses.

3.1 | Agricultural labor force

South Asian farmers are extensively dependent on rural migratory labor (Mottaleb et al., 2016) and agricultural machinery owners who are responsible for land preparation, planting, irrigation, harvesting, and postharvesting activities. Due to social distancing measures across

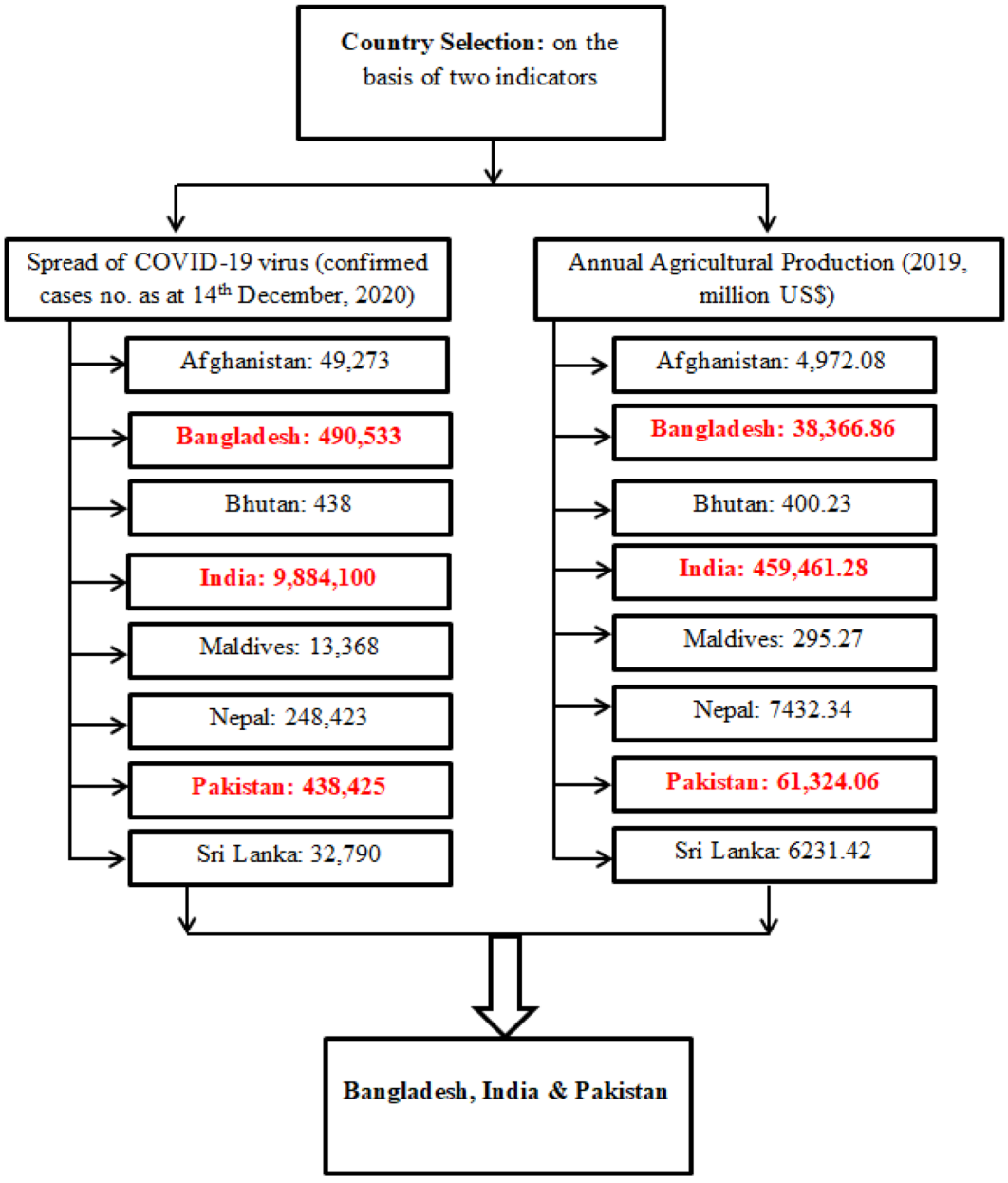


FIGURE 1 Selection procedure of the study areas (Bangladesh, India, and Pakistan). *Source*: Spread of COVID-19 in South Asia, as at 14 December (WHO, 2020); Annual Agricultural Production (2019), (WB, 2020a)

the countries (Bangladesh, India, and Pakistan), the agricultural labor forces could not move. It had two effects: The first was that it disrupted the agricultural production system, and the second one was that it harmed vulnerable livelihoods of agricultural laborers. Nonetheless, Figure 2 shows that the vulnerability of agricultural labors' livelihood will be higher in India (43.44%) than in other countries. Furthermore, in Bangladesh, India, and Pakistan, the sectorial employment share for the agricultural sector employs 41.14%, 43.44%, and 42.27%, respectively. A sudden COVID-19 infestation will make it more vulnerable than other sectors of labor.

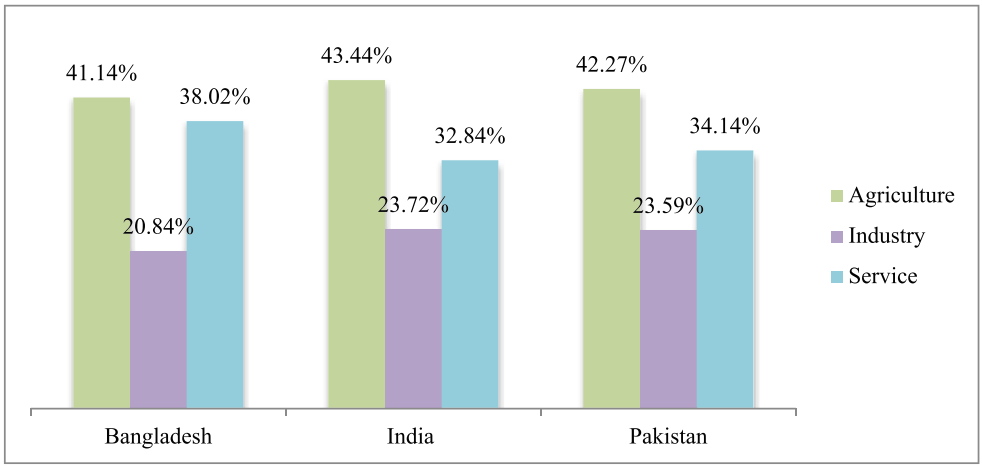


FIGURE 2 Sector-wise labor distribution. *Source*: World Bank, 2020b

Different studies have also shown the vulnerability of agricultural labor due to COVID-19. According to the report, titled "COVID-19 lockdown: Impact on Agriculture and Rural Economy", the lockdown has resulted in a severe crisis of livelihood for many daily laborers and wage earners in the countryside. It also noted that the lockdown was imposed when the country was already faced with an unprecedented situation with respect to rural employment in India. According to the most recent NSSO Periodic Labor Force Survey (PLFS) data, work participation rates among rural working-age men have decreased from 82% in 2011–2012 to 75% in 2017–2018, and work participation rates among rural working-age women have decreased from 37% in 2011–2012 to 22% in 2017–2018 (Rawal, Ankur, & Pais, 2020).

The Pakistan Institute of Development Economics authors also estimated that the most vulnerable employment sector would be the agriculture sector during different lockdown stages (selective restrictions-stage 1, partial restrictions-stage 2, and complete restrictions-stage 3). Figure 3 depicts the vulnerable agriculture employment sector, which would be highest for Khyber Pakhtunkhwa province at about 94.70% (PIDE, 2020). As a result, it demonstrates how agriculture farmers will face agricultural labor shortages during the Corona lockdowns in comparison to other sectors of employment.

The International Labor Organization (ILO) estimates that, in Pakistan, 2.9 million salaried workers involved in crop sowing and harvesting are in danger due to the restricted policy of the government (FAO, 2020a).

3.2 | Intermediary input supply

Intermediate inputs include fertilizer, pesticides, seeds, feeds, and power supply. During the COVID-19 pandemic, farmers were confronted with problems across the country when buying fertilizers, pesticides, diesel, and other inputs for growing cereal rice. Fish farmers, hatcheries, nurseries, traders, and feed dealers (World Fish, 2020) are realizing difficulties in reaching markets to purchase inputs and sell their production amid the COVID-19.

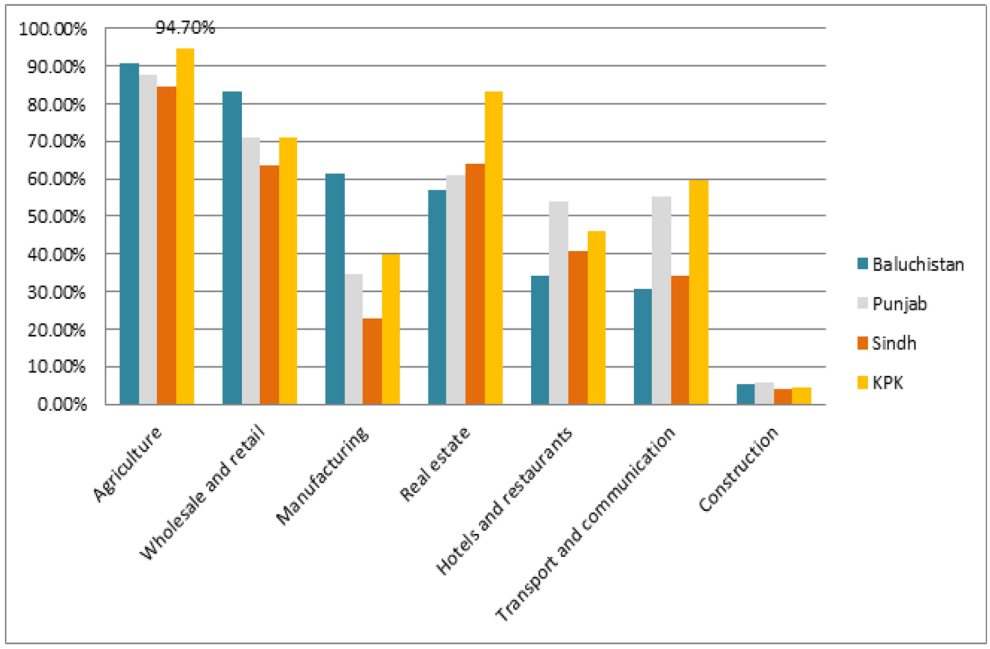


FIGURE 3 Share of vulnerable employment across provinces in Pakistan. *Source*: PIDE (2020)

Besides, the *Kharif* season is about to start. In this situation, if the supply chain of intermediary inputs like fertilizers, seeds, pesticides, and herbicides is cut off, then it would delay the production of vegetables and other crops (Technical Assistance Consultant's Report, 2020).

In Bangladesh, most of small-scale farmers harvest potatoes in March and also start planting early summer crops like maize, jute, vegetables, and pulses. But lockdown abridgment prevented farmers from buying agricultural inputs or getting their produce to the markets (FAO, 2020b). According to media report, a record amount of fertilizers was sold during the lockdown period in April for the *kharif* crop due to the figure of a typical rainstorm this year that would regularly build India's yield territory and compost utilization.

However, transportation offices are a significant issue of approach and relations in different parts of the nation (Agroberichten Buitenland, 2020). On the other hand, the restrictive environment of imported agricultural intermediary goods, especially High-Efficiency Irrigation Systems appliances, will likely put great stress on Pakistani farmers. Another simmering issue for farmers is their exploitation at the hands of agricultural industry importers who will mint good money in this pandemic crisis (Arab News, 2020).

3.3 | Agricultural production and distribution

Agriculture remains the most significant sector for the economy of Bangladesh, India, and Pakistan with a contribution of 12.7%, 16.0%, and 22.0%, respectively, of the national GDP (WB, 2020c). The sudden infestation of COVID-19 affected agricultural production and distribution across the country. Crops, livestock, vegetables, fruits, and fish are all affected from the farm to the fork.

3.3.1 | Major crops

The issue began with a nationwide lockdown. The scenario analysis for major food crops (Figure 4) during a lockdown demonstrates that restricted mobility and fewer transportation systems have an impact on the harvesting of major food crops in selected countries.

- During the recent times of pandemic, crop production has distorted demand–supply dynamics in the rice market of Bangladesh which ultimately has created an artificial price hike in the end market. The farmers have to count a 10 times higher cost for labor and transport compared with the normal time and are even selling their output at cost price or less to cut their losses (Kamol, 2020).
- In India, media report shows that producers and farmers may have lost at least INR 200 billion during the lockdown period (Rawal, Kumar, & Pais, 2020).
- A report titled "Desert Locust Situation in Pakistan" published by the FAO (FAO, 2020d) stated that *Rabi* crops like wheat, chickpea, and oilseeds could be severely damaged in the short run. Considering a 15% and 25% damage level for the production of wheat, gram, and potatoes, the estimated loss for the *Rabi* season could be PKR 205 billion and PKR 353 billion,

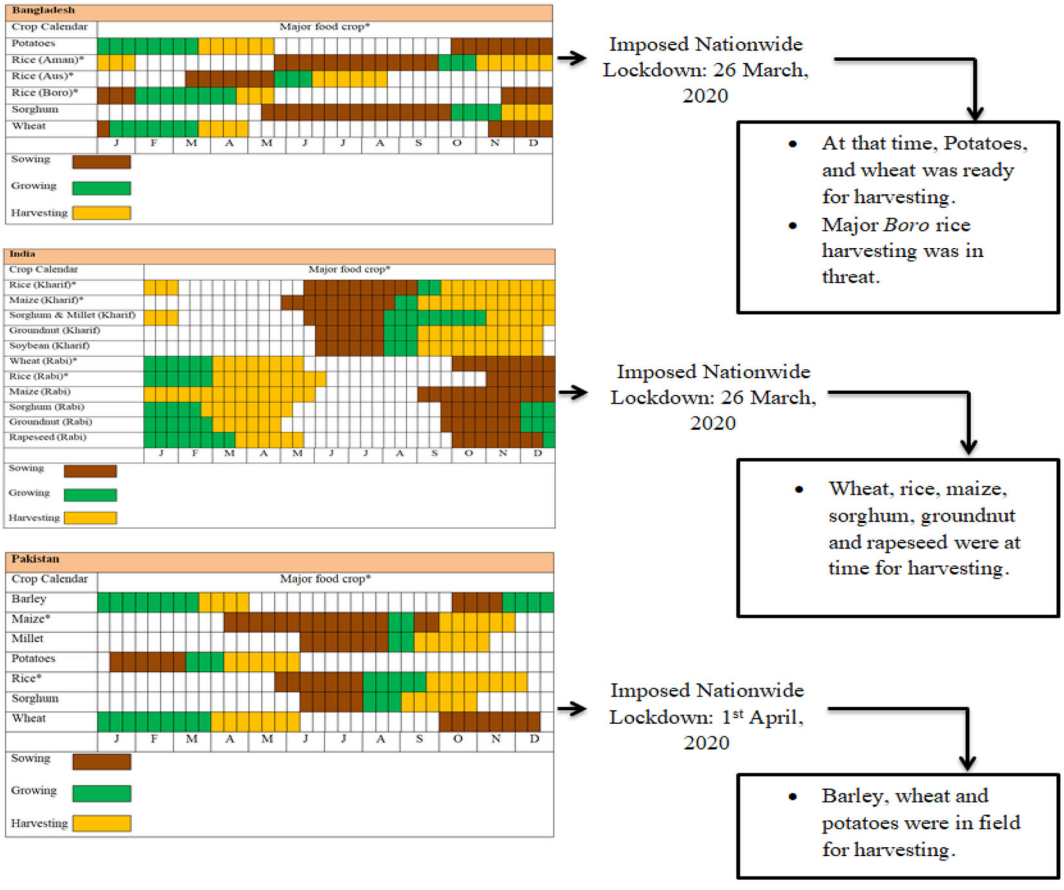


FIGURE 4 Impact of nationwide lockdown on harvesting of major food crops. *Source*: (ADB, 2020; Barkur et al., 2020; FAO, 2020c; Haque, 2020)

respectively. It is also estimated that PKR 464 billion is available for *Kharif* crops (assuming a 25% damage level). In the concentration of accompanying impacts by COVID-19 on health, livelihoods, and food security, it is high-handed to contain and control successfully the Desert Locust infestation. Already, the efforts to spray fields and reduce the potential locust invasion have been diluted given the focus on COVID-19.

3.3.2 | Livestock

Along with the major food crops, the livestock sector was affected severely. Due to the disruption of the supply chain, demand is falling. Farmers' losses have increased due to declining demand and the nature of perishability.

- In Bangladesh, about 350,000 dairy farmers are struggling to maintain their existence. Each day, 27,000 tonnes of milk go unsold. In some areas, the price of milk has fallen to that limit. They even cannot earn enough money for buying feed and medicine for their cattle (Kumar et al., 2020).
- The dairy area demonstrated a blended picture of India. Within 7 days of the lockdown declaration, milk prices began to plummet as office flasks, cafés, and sweet shops remain closed. Some milk was utilized to skim milk powder and spread it, of which there are presently enormous volumes in stock (Agroberichten Buitenland, 2020). Over 1,000,000 small poultry ranches have closed down and a large portion of the 1,000,000 people working in the area have become jobless. This likewise influenced the feed makers identified with poultry; farmers canceled orders and some farmers even buried their chickens alive.
- The livestock sector accounts for approximately 12% of Pakistan's GDP. Approximately 110 million farmers (directly and indirectly associated with the production and delivery of livestock milk and meat) have been affected by the falling consumption of milk and meat. Every day, thousands of liters of milk are wasted. Farmers suffer significant losses as a result of the suspension of milk sales. The cattle markets are closed and milk sales have dropped by 70% (The Express Tribune, 2020).

3.3.3 | Fruits, vegetables, and others

Countrywide lockdown throws vegetable farmers at vulnerable situation. Fruit and vegetable farmers are especially vulnerable as these perishable items cannot be stored for a long time.

- In Bangladesh, almost 8,500 tonnes of vegetables enter Dhaka city daily, but this has dropped to 200–300 tonnes now because of the coronavirus crisis and they are sold at a quarter of their normal price. Therefore, most of them are unable to even recover their investments in this present scenario of COVID-19 (Khan et al., 2020; Wardad, 2020).
- In India, the arrival of major cereals, fruits, and vegetables on the market decreased by about 5.55%, resulting in an increase in the average retail price of food items for domestic consumers and a decrease in price realization for farmers. This might affect the planting of summer and *kharif* fruits and vegetables (Joshi et al., 2019).
- In the absence of labor and means of transportation, millions of Pakistani farmers are staring at another disaster, watching their produce rot in their fields. Experts believe that the

phenomenon will have cascading effects on the region's food security (Horti Daily, 2020). Farmers are concerned that if they are unable to properly pluck mangoes and the supply chain is disrupted, they will suffer significant losses (World Asia, 2020).

Moreover, the Live Crab and Eel Fish Exporters Association estimated about 46.9 million US dollar loss due to COVID-19 breakout in Bangladesh (World Fish Center, 2020). India's fishing sector faces losses of around 28 million euros a day, according to the Central Institute of Fisheries Technology (CIFT) report. For this lockdown, about 700,000 tonnes of fish had to be thrown away (Agroberichten Buitenland, 2020).

3.3.4 | Export and import restrictions

Agricultural production and trade are expected to be affected by many policy measures (e.g., higher controls on cargo vessels) that aim to avoid the spread of COVID-19. Producers of fish, crab, and shrimp are facing significant economic losses as result of an export ban. To meet domestic demand, several governments around the world have imposed export restrictions on food products. Russia restricts grain exports, and Vietnam and India have already stopped exporting rice (World Bank, 2020d).

The discontinuation of rice grain exports from the world's biggest exporter is allowing rival countries such as Thailand to increase exports in the short term and lift global prices, which forces millions of poor consumers in Africa to pay higher prices (Maji et al., 2020). It is predictable that we are seeing the international prices of rice and wheat rise sharply. This is a chilling reminder of the global food price crisis of 2007–2008 (Agrilinks, 2020). On the other hand, many perishable fruits, vegetables, fish, and dairy products are facing a price-dropping problem due to shortages of buyers. Every export industry, for example, Pakistan's fruit and vegetable association (PFVA) fears the impact of the coronavirus, which has seen Pakistan close its borders, and international airlines suspend services, could cost the industry up to US$150 million (Asia Fruit, 2020). Approximately 70% of Bangladeshi crabs are exported to the Chinese market. Bangladesh's crab industry is suffering as a result of export bans in China and Europe (The Business Standard, 2020).

3.3.5 | Policy

Policy responses to the pandemic play a vital role in the outcome (Laborde et al., 2021). To address the impact of COVID-19 on the agricultural sector, the governments of South Asian countries implemented a variety of policy measures. Bangladesh has taken a new type of policy in the recent "National Agricultural Mechanization Policy-2020" in which the main vision was "Transition to efficient, profitable and commercial agriculture through agricultural mechanization and ensuring sustainable food and nutrition security" (National Agricultural Mechanization Policy, 2020). On the other side, the Indian government has kept its focus on the intersectorial linkages of the agricultural organizations, sustainability and natural resource management, greater investment priorities in rural areas, more incentives, and on risk management (Agriculture Policy: Vision 2020, 2020). Pakistan's new agricultural policy will focus on increasing innovation and technology based agriculture, focusing agriculture subsidies to socioeconomic groups, increasing public investments on infrastructure, and ensure food accessibility to all segments of the population (Agriculture and Food Security Policy, 2020). Policy has been

formulated to combat the pandemic crisis where these countries' main priority is to feed all the people. According to the measures taken by the country's government (Table 1), studies show that Bangladesh prioritizes agricultural mechanization. India is putting more emphasis on the development of allied enterprises' infrastructure, including market structure. On the other hand, Pakistan is trying to rehabilitate the farmers through different relief and subsidy packages.

TABLE 1 Government policy/measures for tackling the impact of COVID-19 on agricultural sector

Country	Budget allocated	Policy/measures
Bangladesh	USD 589 million	For ensuring smooth flow of capital for noncrop agriculture including seasonal fruit, flower cultivation, poultry, fisheries, dairy, and livestock.
	USD 1060 million	For boosting crop production.
	USD 15 million	For rehabilitation of farmers.
	USD 23.5 million	Distributing machineries and seeds among farmers. On emergency basis 180 combined harvesters and 137 reapers have been allocated during the *Boro* crop time.
	USD 12 million	Additionally, for mechanization of agricultural sector government announced this package.
India	USD 7 billion	Government announced incentive program transfer direct cash to farmers' account in three installments of USD 26 each.
	USD 13.33 billion	For enhancing the farm gate and aggregation points.
	USD 1.33 billion	For formalization of Micro food enterprises.
	USD 2.67 billion	For enhancing the production and productivity of the fisheries sector.
	USD 1.85 billion	To achieve 100% vaccination of all large and small ruminants (530 million animals).
	USD 2 billion	For supporting the private investment in dairy processing, cattle feed infrastructure and value addition.
	USD 533 million	Promotion of herbal cultivation by creating regional market places.
	USD 66.67 million	The allocated fund announced for help the farmers from distress sale of perishable items by subsidizing storage and transportation costs.
	USD 66.67 million	Develop beekeeping infrastructure including production, collection, storage and marketing.
Pakistan	USD 600 million	Relief package introduced by the federal government for agriculture.
	USD 223 million	Total subsidy provided for fertilizers.
	USD 13.88 million	Subsidy on cotton seeds and pesticides.
	USD 53.12 million	Subsidy on agricultural loans.
	USD 28.37 million	Providing relief for the poultry sector.
	USD 1.69 billion	To procure 8.2 million tonnes of wheat during the current season.
	USD 90 million	For giving interest-free loans to farmers, and 1.2 million sacks of seeds for the next wheat crop.
	USD 298 million	Has been assigned for government-run utility stores to guarantee the constant availability of food and other necessities.

Note: Islam et al. (2020), Srinivasan et al. (2020), FAO (2020a), and Shaikh (2020).

4 | COUNTRY COMPARISON

The pandemic and its measures have created significant problems in the agricultural sector. Due to lockdown and limited access of supply chain, the agricultural labor force and intermediary input supply both affected in three countries (Bangladesh, India, and Pakistan). COVID-19 lockdown affects the migrant seasonal agricultural labors in Bangladesh, India,

TABLE 2 Impact of COVID-19 on production and distribution

	Country		
Impact	**Bangladesh**	**India**	**Pakistan**
Major crops	The farmers have to count a 10 times higher cost for labor and transport compared with the normal time.	Producers and farmers may have lost at least INR 200 billion during the lockdown period.	The production of wheat, gram and potato the estimated loss can reach PKR 205 billion and PKR 353 billion respectively for the rabi crops.
Livestock	About 350,000 dairy farmers are struggling to keep their existence.	Over 1,000,000 little poultry ranches are closed down and over a large portion of 1,000,000 people working in the area have gotten jobless.	110 million livestock farmers affected for falling consumption of milk and meat. The cattle markets are closed and milk sales have dropped by 70%.
Fruits, vegetables and others	Farmers had to sell their vegetables at a quarter of their normal price. The live crab and eel fish exporters association estimated about 46.9 million US dollar loss in fishery sector.	In India, about 5.55% drop in arrivals which lead to an increase in average retail price of food items for domestic consumers and a decrease in price realization for farmers. India's fishery sectors are faced losses of around 28 million euros a day.	Millions of Pakistani farmers are staring at another disaster, watching their produce rotting in their fields. Experts believe that the phenomenon will have cascading effects on the region's food security.
Export import restrictions	**Fears to close borders and international airlines suspend services**		
Policy	Transition to efficient, profitable and commercial agriculture through agricultural mechanization and ensuring sustainable food and nutrition security.	Focus on the inter-sectorial linkages of the agricultural organizations, sustainability and natural resource management, greater investment priorities in rural areas, more incentives and on risk management.	Focus on increasing innovation and technology based agriculture, focusing agriculture subsidies to socio-economic groups, increasing public investments on infrastructure and ensure food accessibility to all segments of the population.

and Pakistan. For this reason, farmers face acute labor shortages for harvesting winter crops, fruit picking, and so forth. Table 2 summarized the impact of COVID-19 on agricultural production and distribution across all countries. In crop production, Pakistan is in a more vulnerable position than others. Along with COVID-19, the locust infestation was fatal in Pakistan. Livestock, vegetables, fruits, and fishing sector are more vulnerable than crops in this pandemic. Moreover, farmers and other market participants cannot assure their supply to the final consumer. As a result, the farm price falls and the retail price rises, potentially motivating framers to place less emphasis on agriculture. A survey study in Bangladesh (Malek et al., 2021) supported the findings where authors found that during COVID-19 period, the rural economy experienced adverse impacts, with delayed harvest, difficulty in selling farm produce, input disruptions, and cost increases. Another study (Alam & Khatun, 2021) also stated that decrease farmers' income enhanced the likelihood of vulnerability and posed a challenge to continue their produce which is similar to the study finding. The impact of COVID-19 on the agricultural sector demonstrates that South Asia requires more mechanization, more developed storage systems for perishable goods, and proper distribution of agricultural marketing information to farmers.

5 | CONCLUSION

The world is attempting to reduce the impact of COVID-19 on all sectors, given more priority on health, food, and agriculture. Because of disruptions in the agricultural labor movement, the global supply chain is under in threat of food insecurity, particularly in developing South Asian countries. The study mainly focuses on the impact of COVID-19 on agricultural production and distribution. Agricultural production is not only the result of one or two factors. Proper agricultural production depends on many factors, including intermediary inputs, agricultural labor force, and external and internal forces of country-to-country export and import situations. This study tries to acknowledge all these points. This study also shows how COVID-19 affects the distribution of agricultural products and the economic losses of farmers. The governments of South Asian countries have taken different measures and policies to save the agriculture sector. Moreover, to mitigate the long-term effect on the agriculture sector, the following recommendations from this study would support the government in taking necessary steps to feed the people:

- To maintain the upcoming production season, farmers' access to intermediary inputs must be more targeted.
- In the case of harvesting, the government may increase farm harvester machines to mitigate labor shortages.
- Livestock, vegetables, and fruits producers are more vulnerable as their products are perishable in nature. The government and private sectors must place a greater emphasize on the storage of these products, because storage management is required as demand is in decline in nature.
- For proper functioning of the supply chain, the government may use their local (political and co-operative association) leaders to procure the products and send them to the proper place for selling. In this case, the government may provide logistical support to them. This type of decentralized effort can place the agricultural product in the market at least the cost of health hazards.

- Farmers must be given accurate agricultural marketing information, which can help to balance supply and demand at the aggregation point and save farmers from post-harvest losses.

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CONFLICT OF INTEREST

Authors have no any competing interests.

AUTHORS DECLARATION

Authors declared that this document is review article.

AUTHOR CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author JUA generate the idea, designed the study, collected necessary data, and analyzes the manuscript. Authors SA and KAM wrote some sections of manuscript. All authors read and endorsed the final manuscript.

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