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Deciphering the Impact of Novel Coronavirus (Covid-19) on the Indian Agricultural System: A Review

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A B S T R A C T

For the past three years, world is suffering from the Covid-19 pandemic, it has affected not only human beings but almost all the spheres of livelihood. In India, agriculture is one of the significant contributors to the Indian economy and noblest of all profession in the world, which offers the most vital requirement for the existence of humans i.e. 'food'. More than 70 % of the rural families rely upon agriculture for their livelihood. After analysing research articles related tocovid-19 and their impact on agriculture, a systematic review on impact of covid-19 in Indian Agricultural System (IAS) has been presented in this paper. It includes various domain of agricultural system which has been affected by covid-19 direct or indirect. The aim of this review article is to recognize the impact of the corona virus disease (Covid-19) on the Agricultural System (AS) in India. In this article, we have focused on agricultural production (AP), agricultural marketing (AM) and agricultural consumption (AC).

Introduction

Corona Virus or Covid-19 is a new virus disease that has originated (Wang *et al.,* 2020) in late November 2019, a highly infectious pandemic known as Covid-19 was discovered in Wuhan, China. Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is the virus that has caused it (Feng *et al.,* 2020), and it has a global impact. Covid-19 instances are on the rise around the world. The World Health Organization (WHO) determined in January 2020 that the disease Covid-19 fits the criteria for a public health emergency of international concern (Duarte *et al.,* 2020), and in March 2020, the disease was formally proclaimed a worldwide pandemic (Cucinotta & Vanelli, 2020). The unusual outbreak of SARS-CoV-2 is one of the most serious global public health challenges and its adverse effects on human health. Other areas such as economy, industry, global markets, agriculture, health care etc. have severely affected due to covid-19 pandemic (Kumar & Nayar, 2020).In the past, world has faced

various pandemic: Hantavirus pulmonary syndrome, severe acute respiratory syndrome, H5N1 influenza, H1N1 influenza, Middle East respiratory syndrome, and Ebola virus disease (Gostin *et al.*, 2016).

Since World War II, the Covid-19 pandemic has posed the world's largest humanitarian problem (Hua & Shaw, 2020). The virus has spread widely, and the number of cases were increasing every day while governments try to contain it. India had moved quickly, putting in place a proactive, pro-active strategy. Lockdown for 21 days across the country, with the purpose of flattening the curve and allowing time to plan and sufficient resource responses India's fight against the Covid-19 virus has proven fruitful. Though lockdown was applauded all around the world the shutdown, however, came at a financial cost and had a cascading effect. It had an impact on people from all spheres of life. The Covid-19-induced curfew in India was a major setback a financial shock. It began on March 24, 2020, across the country and is still going on.

Several countries, including China, Italy, Spain, and Australia, were fighting the corona virus disease in the first week of March 2020 by enacting strict measures such as statewide lockdowns or cordoning off locations suspected of posing a risk of community spread.

Taking lessons from its international counterparts, Indian government announced a major statewide lockdown on March 25th for 21 days, from March 26th to April 14th, 2020. (British Broadcasting Corporation, 2020). With a population of 1.3 billion people, India was in grave danger of irreversible damage, and severe measures were expected to "flatten the curve." The lockdown was announced by the Prime Minister of India (Covid-19, 2020), but it was not unexpected because Indians were given a taste of it by a 14-hour curfew on March 22nd from 7 a.m. to 9 p.m., dubbed the "Janata Curfew" (The Economic Times, 2020). As a result, Indians were somewhat exposed to a lockdown situation, which helped them mentally prepare for the nationwide lockdown, and the announcement did not come as a surprise to them.

Indian Agricultural System (IAS)

Commercial demand for agricultural produce increased, according to (Johnston & Mellor, 1961) as a result of rising income and population, urbanisation, and liberalisation of trade marketed supply rises at the same time as a result of increased productivity in production, postharvest processing, and distribution systems. In their study article, (Hoff *et al.*, 1993) documented how, in response to the de-institutionalization of rural areas as a result of state compression, new institutions were built. Agricultural institutions that work in tandem with the market and the government. As a result, the state is a critical component in rural development. This has taken the form of either a private or a cooperative enterprise. Since the millennium, according to (Grosh, 1994), the focus has switched to more micro-level and institutional policies. Contractual obligations, in particular, agreements with downstream processors and agricultural exporters and retailers, which are frequently orchestrated by agricultural groups, are becoming more widely recognised as a technique of overcoming the market flaws that resulted in the downfall of policies for macroeconomic and sectoral adjustment. According to (Readron & Barret, 2000), when the market reforms, commodity prices rise, promoting an increase in production, particularly of the agricultural sector crops for export the increase in pricing makes it easier to start a business supermarket chains, cooperatives, and export-oriented businesses broad stimulation of schemes, processing zones, and general stimulation of emerging countries' agro-industrialization. In his analysis, (Sivanappan, 2000) indicated that modernising existing post-harvest processing and establishing appropriate infrastructure facilities will result in substantial economic benefits. The amount of money saved by a country's exchequer aids in the feeding of the country's burgeoning population. In their study, (Hota *et al.*, 2002) concluded that cooperatives play a significant role in India's

economy due to their coverage of rural farmers, business turnover, and financial stability contribute to their members' economic well-being as well as India's rural economy. In their study, (Readron *et al.*, 2003) found that private enterprises now play a major role in the development of enhanced infrastructure in nations such as China, India, and South Africa. (Royce, 2004) noted that, despite the fact that state agencies remain the primary buyers of product and suppliers of input, cooperatives' management authority is limited. There is a lot more member involvement and decision-making on the farm.

In his study paper, (Ramkishen, 2004) suggested that the grower is denied of a decent price for his goods during the peak selling season due to a shortage of food processing and storage, while the customer is forced to pay a higher price during the lean season. In his analysis, (Godara, 2006) stated that the good trend of economic liberalisation and associated opening up of the Indian economy has greatly reduced the system's structural rigidities, and that this trend should be the foundation of India's future agricultural reform. The worldwide market has had a significant and direct impact on the agricultural industry. To satisfy international standards, Indian farmers must create high-quality items. Marketers need to build creative solutions like e-marketing to solve problems typical of the rural setting, such as physical distribution, channel management, promotion, and communication, according to (Kashyap & Raut, 2006) in their article. "Anytime-anywhere" e-marketing's advantage leads to efficient price discovery, lower transaction costs for trading, and a more reliable and transparent environment. In their study, (Brithal *et al.*, 2007) indicated that by constructing an efficient and effective supply chain employing state-of-the-art procedures, it is possible to provide value-added food to the public while also ensuring remunerative prices for farmers. In their research, (Tripathi & Prasad, 2009) stated that Indian agriculture has evolved not just in terms of output and yield, but also in terms of structural improvements. In his research paper, (Pathak, 2009) stated that agriculture's contribution to a nation's growth is constituted by the growth of products within the sector itself, as well as the agricultural development allowing other sectors to develop through the goods produced in the domestic and global markets. Since 2010 Indian agriculture has witnessed massive shifts in terms of both production and consumption. 2020 was pivotal for farmers as supply chain got interrupted due to unexpected lockdowns all over the country. Workers from unorganized sector had to flee to their lockdown which hampered the labor force participation in agricultural systems. Movement limitations hampered the uninterrupted flow of inputs and outputs for agricultural activities, disrupting supply networks (Barrett, 2020; Carberry & Padhee, 2020). The supply of perishable goods was particularly affected, posing a threat to the food and nutritional security of the most vulnerable members of society (Harris *et al.*, 2020). The Indian food system was able to combat the pandemic because to large buffer supplies of rice and wheat, which were augmented by a record harvest in the 2019–20 crop season (Padhee & Pingali, 2020; Pothan *et al.*, 2020). According to a government assessment, tonnes of food grains have been squandered in the Food Corporation of India (FCI) storage structures since May 2020. Food loss during manufacturing, marketing, distribution, and family consumption was worsened by the Covid-19-induced lockdown.

Though Covid-19 has not affected the IAS directly, but it has affected the IAS indirectly. Some of the reasons are lack of availability of labour and machines, restrictions on free movement of men and machineries (Rawal *et al.*, 2020). Strict lockdown laws (Arunachalam & Halwai, 2020), social distancing (Wasdani & Prasad, 2020), restrictions in movement could result in increased. The global pandemic of the Coronavirus (Covid-19) has resulted in extraordinary losses and disruptions. No country has been spared the brunt of it, from developed to developing (Aneja & Ahuja, 2021). We have examined the impact of Covid-19 on Indian agricultural system on the basis of available literature. An effect assessment is made on all three

sectors: Agricultural production, agricultural marketing and agricultural consumption.

Impact of Covid-19 on agricultural production in India

Covid-19 has affected the agricultural production both directly and indirectly. Directly agricultural system got affected due to lockdown implications. There was shortage of inputs like seeds, fertilizer and irrigation devices. Indirectly the system of production got hampered on account of scarcity of labor resources. Six earlier studies on agricultural production, livelihoods, and food security in India during Covid-19 have just been published (Acharya 2020; Ceballos *et al.,* 2020; Harris *et al.,* 2020; Azim Premji University 2020; Totapally *et al.,* 2020; Vikas Anvesh Foundation 2020). Between the 7th and 9th of April, a survey focused on the financial impact of the lockdown and the availability of government subsidies was undertaken in 6915 homes classified as being below the poverty line (Totapally *et al.,* 2020). They discovered that 43% of men and 48% of women were concerned about receiving daily necessities like groceries, and that 43% of those who were eligible for free food rations under the Public Distribution System (PDS) did not receive them (Totapally *et al.,* 2020). Another study (Vikas Anvesh Foundation, 2020) analysed food security more specifically between April 27 and May 2 (5162 respondents). Despite the fact that the majority of questioned homes (84 percent) received food rations through PDS, half of the households reported a decrease in the number of meals taken and two-thirds reported a fall in the amount of items in a meal. A third survey, performed in mid-April and involving 3970 people, including 331 farmers, supported this hypothesis: Despite the fact that 91 percent of rural households received PDS assistance and 53 percent received a government cash transfer, 70 percent of rural households reported eating "less food than before" (Azim Premji University, 2020). Among many of the 331 farmers, 37 percent recorded being unable to reap their crop and 15 percent were not able to peddle their produce due to the shutdown. According to a survey of 1694 people in two states, 48 percent of households in Bihar and 32 percent of homes in Uttar Pradesh reported food shortages in the shutdown (Acharya, 2020).

Impact of Covid-19 on agricultural marketing in India

The Covid-19 had a huge impact on the world economy, including India. Few recent studies have attempted to examine the global effects of corona virus pandemics on agriculture marketing and supply chains. (Ali & khan, 2020; Pu & Zhong, 2020; Cariappa *et al.,* 2021; Siddiquei & khan, 2021). Due to the sudden implementation of the lockdown by the Indian government, there was a ruckus in the entire agricultural marketing sector. When lockdown was declared, then no plans were taken to safeguard the continuity of agricultural markets or the safety of food supply systems. India is a predominantly agrarian country with a long history of traditional food processing methods and short food supply chains.

The government exempted agricultural mandis from the lockdown restrictions on March 27, five days after the initial set of restrictions, which began with the Janta Curfew. Despite this exemption, these administrative decisions remained completely ineffective for several weeks due to a lack of complementary measures to ensure labour availability, facilitate safe transportation of produce from villages to mandis, and ensure the safety of those involved in transportation and marketing (Rawal *et al.,* 2020). Due to the lockdown and the resulting threat of recession, millions of migrant workers have lost their jobs in India. Lockdowns and social distancing measures had dual impact, on one hand, they dried up jobs and wages, while on the other hand, they have damaged agricultural production, transportation systems, and supply chains (Khanna, 2020). In urban areas, food shelves were found empty mainly where the shipping of food has become enormously difficult due to the unusual lockdown. However, make a connection between commodities and seller is a difficult process in India with high population (Flanagan *et al.,* 2019;

Galanakis, 2020). After doing some village level assessment and analysis it has been found that many farmers suffered a lot due to closed market and lack of transport due to the lockdown, Wholesale prices of the agricultural commodities in Jammu and Kashmir (Ali & Khan, 2020) affected by Covid-19 lockdown as well as retail markets of fruits and vegetables and food grocery. The impact of the lockdown on agricultural markets has been widely noted, owing to restrictions on the movement of vehicles and persons around the country.

Impact of Covid-19 on agricultural consumption in India

(Rawal & Verma, 2020) and (Narayanan & Shah, 2020) are two studies that looked at price changes in agriculture after the shutdown 2020. Between March 15 and April 15, Rawal and Verma discovered significant fluctuation in mandi pricing for seven commodities. Other than mustard and potato, there was no discernible upward trend in mandi pricing. Between mid-March and April 21, 2020, (Narayanan & Shah, 2020) looked at prices in urban food marketplaces. They collected data from the Ministry of Consumer Affairs, Food and Public Distribution, Government of India, about daily wholesale and retail price data for 22 commodities from 114 centres. After March 24, 2020, both wholesale and retail prices for several commodities showed an increased tendency, according to the researchers. During the lockdown, the gap between wholesale and retail pricing widened, indicating "higher transaction costs for retailers or more retailer authority to determine prices." According to them, demand collapse may not have outweighed supply shocks during the lockout, and rising prices reflect this likelihood. Furthermore, an internal Reserve Bank of India (RBI) review of daily price data for 22 basic food products found that food prices climbed by 2.3 percent in a broad-based way until April 13, 2020. (Narayanan, 2020b). According to a Ministry of Finance report, retail prices for these 22 items increased by 4.2% in April 2020 compared to March 2020. (Department of Economic Affairs 2020).Only pulses, fruits, milk, and meat exhibited a growing trend in the WPI in March and April. This comes as no surprise. NAFED boosted pulse purchase but was unable to effectively distribute them. Pulses have to be moved from procuring states such as Madhya Pradesh, Uttar Pradesh, Maharashtra, and Rajasthan to mills, and then back to the states. NAFED, on the other hand, lacked an efficient distribution system. Fruit prices have risen as a result of late market deliveries of certain fruits, such as mango and apple. Private dairies raised milk pricing by Rs 2 to 3 per litre, resulting in higher milk prices and lower milk procurement. Beef prices soared as demand grew throughout the Easter and Ramadan seasons, despite a lack of supply. In April 2020, the Consumer Price Index (CPI) in urban areas increased in pulses, fruits, and milk. In the case of cereals, the Wholesale Price Index (WPI) decreased while the CPI increased. This could be a sign of supply chain disruptions in metropolitan regions. Vegetables have a different scenario. While the WPI for vegetables stayed relatively stable in April 2020, the CPI for veggies increased. Vegetables were affected by a significant drop in market arrivals as well as supply problems. In April 2020, the WPI for eggs and poultry fowl dropped, despite an increase in the CPI for eggs. Wheat prices climbed at the start of the lockdown, but then dropped to pre-lockdown levels. Paddy prices decreased in the end of April 2020, recovered in the early part of May 2020, and then fell again by the middle of May 2020. Pulses and maize prices barely changed. Through the lockdown, the prices of perishable vegetables including tomato, onion, cabbage, cauliflower, and lady's finger, as well as cereals like barley, were plummeting. Potato prices surged early in the lockdown, but were stable thereafter.

When it comes to fruits, mango costs have dropped, while banana prices have remained consistent. In general, most of the vegetables studied, as well as fruits such as mango, have seen a decrease in price. The price changes during the lockdown were compared to the same time period in 2019. The price trends in maize, barley, pulses, peas, potato, and banana in 2020 were fairly consistent with those in

2019. According to a study, notable differences from 2019 were observed in paddy, wheat, most vegetables, and fruits such as mango. The drop in wholesale price indices for grains, vegetables, eggs, and fowl chicken indicated that farmers were receiving poor prices. It is probable that supply shocks were bigger than demand slowdowns for specific commodities, such as pulses. Animal goods, which are produced and distributed on a daily basis, were in a distinct scenario. The shutdown of a number of meat facilities in wealthy countries reduced meat supplies. In April and May 2020, grocery store meat shelves were nearly empty. In the case of milk, there was a significant drop in demand, as well as disruptions in supply networks. During the lockdown in India, milk demand decreased by 20 to 30 percent, and cooperative milk procurement fell as well. In the case of meat, transportation difficulties resulted in slaughterhouse closures. Poultry farmers suffered the greatest losses in the animal sector, as demand for eggs and poultry plummeted, resulting in significant financial losses. Culling of millions of birds was used around the world, including in India, to reduce losses among poultry farmers. The utter breakdown of global and Indian supply chains was a crucial component of the lockdown. Agricultural exports fell over the world. Crop sowing, harvesting, and marketing were all in trouble. There were (a) disruptions in government procurement of foodgrain; (b) disruptions in traders' collection of harvests from farms; (c) shortages of workers to harvest the *rabi* crops; (d) shortages of truck drivers; (e) blockades in the transport of commodities; (f) limited operations of APMC mandis; and (g) retail market shutdowns in India.

The global pandemic has negatively affected various sectors of the economy, including agriculture. It has been observed that during the pandemic in India, the corona virus disease affected various subdomains of agriculture or non- agriculture. i. e. Production, Marketing, Consumption (Cariappa *et al.*, 2021), agricultural income, food supply chain(Aday & Aday, 2020), food security (Workie *et al.*, 2020), Agri-food sector (Apostolopoulos *et al.*, 2021), Global Agricultural Markets (Elleby *et al.*, 2020), Agricultural labor (Shirsath *et al.*, 2020), Food supplychain (Aday & Aday, 2020) Indian economy (Dev & Sengupta, 2020), Agricultural Workforce (Bochtis *et al.*, 2020); fisheries sector (Purkait *et al.*, 2020) etc.

The Covid-19 pandemic has affected all sectors of agriculture, as we know agriculture plays an important role in Indian economy. Therefore, it is very important to know its affected areas, so that we can be prepared for the problems that may come on agriculture in future. Covid-19 posed challenges for the farming system, but it also provides an opportunity to build a better farming system. It has given us awareness to deal with such problems. It has told us what aspects of agriculture will be at risk if this type of pandemic occurs in future so that we are prepared to deal with it. This article provides the major area of Indian agricultural system which has been badly affected during pandemic. Presented article provide a scenario for stakeholders of the agriculture for taking corrective measures in the future.

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