



Impact of COVID-19 Lockdown on Income of Apple Growers in Kashmir: An Empirical Analysis

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The COVID-19 pandemic caused serious disruptions to all economic activities across the globe. Besides other sectors that were significantly affected, production and marketing of agricultural products particularly horticulture remained among the seriously hit. The purpose of this study is to assess the effect of the COVID-19 pandemic and the measures implemented by the government to prevent its spread on the farm income of apple growers in Kashmir. The study is based on primary data collected from farmers of the Southern districts of Kashmir Valley by adopting convenience sampling. Partial least square- structural equation modelling was employed to analyze the data using SmartPLS. The study found that fear of Covid-19 and the lockdown strongly affected workforce availability, market prices, and distribution channel management. However, the impact of the lockdown on apple production was found to be insignificant. The study also found that production, workforce availability, market prices, and distribution channel management significantly influenced the income of apple growers. The reason is self-inhibition towards buying, unless extremely necessary. Moreover, the produce lying in the cold chains was sold at cheaper prices

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due to the unavailability of potential buyers and disturbance in the distribution system. The results of the study can help policymakers in taking preventive measures without sacrificing the livelihood of families associated with horticulture.

Keywords: Covid-19 measures; lockdown; social distancing; horticulture; farmer income.

1. INTRODUCTION

The economy of Jammu and Kashmir is primarily based on agriculture and services. Kashmir Valley is known for its handicrafts and horticulture. The horticulture sector plays an important role in the state economy and is an important contributor to the state's gross domestic product. The horticulture sector contributes around 8% to 10% towards the state's domestic product [1]. Traditionally handicraft industry used to be the major source of employment. But over the period, the horticulture sector emerged as the biggest source of income in the economy. Horticulture employs around 33 lakh people and around 7 lakh families are directly or indirectly linked to horticulture [1]. Major horticulture crops from Jammu and Kashmir include apples, pears, saffron, plums, cherries, and walnuts. Apple is the major crop of Kashmir Valley. About 70% of the land under major fruit crops of Kashmir Valley is under apple cultivation and around two million metric tons of apples are produced in Kashmir Valley annually [1].

The COVID-19 pandemic caused serious disruptions to all economic activities across the globe. Besides other sectors that were significantly affected, the production and marketing of agricultural products particularly horticulture remained among the seriously hit [2,3]. To prevent the spread of COVID-19, the government of Jammu and Kashmir imposed a lockdown in the state for months, which seriously affected the movement of people and commodities including horticulture produce. In light of these facts, the study is an attempt to assess the impact of the COVID-19 pandemic and the measures implemented by the government to prevent its spread on apple production, workforce availability, market prices, and distribution channels. The study further attempts to assess the impact of all these factors on the income of apple growers in Kashmir.

2. LITERATURE REVIEW

The world is facing a highly pathogenic virus (SARS-COV-2) commonly referred to as COVID-

19 that has affected millions of people and caused lakhs of deaths worldwide. The outbreak of this novel virus has been declared a pandemic by World Health Organisation (WHO) as it has affected more than 200 countries [4]. The first case of the virus was reported in Wuhan City, Hubei province of China in December 2019 [5]. India reported its first case of COVID-19 on 27th January 2020 from Kerala [5]. The spread of the novel virus like wildfire forced governments worldwide including India to declare a countrywide lockdown and impose restrictions on the movement of people to contain the spread of the virus. On 24th March 2020, the Prime Minister of India announced its first lockdown in the country for 21 days [6] which was later extended several times and lasted for months.

The lockdown to contain the spread of COVID-19 has severely hampered the agricultural sector in India. The prolonged lockdown created fear and panic in farmers and has severely affected farming activities. The closure of markets and restrictions on movement prevented farmers to procure seeds, pesticides, fertilizers, and other inputs which has taken a toll on production [7]. Further, the unavailability of labour has severely affected plantation, harvest, and post-harvest operations which in turn reduced agricultural production [8,9]. Several researchers like Ali & Khan [10]; Eurofresh [11]; Fan et al. [7]; Gray [12] Khanna [13] and Kumar et al. [9] have argued that the COVID-19 lockdown has a significant negative impact on agricultural production.

India has an uneven population structure, around two third of the population is living in rural areas with less or no work opportunities. Most industries and other workplaces are concentrated in cities and attract large workforces for earning a livelihood. A large number of workers from rural areas migrate to cities and other places of work in search of working opportunities [14]. The imposition of the lockdown created fear and uncertainty in the market, which compelled migrant workers to leave their workplaces and return to their native villages [13]. Most of the migrant workers trapped in cities preferred to escape the center of disease (cities) and were

desperate to reach their hometowns. Thousands of migrant workers suddenly started gathering at bus terminals and railway stations, which compelled government to arrange hundreds of busses for their transportation [13]. This mass migration of migrant workers significantly reduced the workforce availability in several states [14,13,15] including Jammu and Kashmir. The unavailability of labour created agricultural workforce crises which severely affected the income of farmers [14,9].

The COVID-19 preventive measures (lockdown, social distancing, etc) significantly dried up jobs and income of people [13] which resulted in self-inhibition towards buying unless necessary. These factors caused the demand for agricultural products particularly high-value crops like strawberries, apples, etc to fall drastically [8]. The unexpected crash in demand affected severely millions of farmers and reduced their income significantly [8]. According to Ali & Khan [10], the wholesale prices of fruits and vegetables in Jammu and Kashmir saw a significant decline during the lockdown period which in turn affected the farm income. Further, the lockdown disrupted the transportation system and supply chain for agricultural produce [9]. According to Rawal et al. [16], the lockdown has the most significant impact on the marketing of agricultural produce. Due to the unavailability of transport and restrictions on movement, farmers were unable to take their produce to the mandis, and were forced to sell their harvest at low prices [16,9]. The prolonged lockdown, unavailability of transport, and closure of domestic and international markets resulted in the rotting of tons of perishable agricultural goods which lead to remarkable losses to farmers [8].

2.1 Hypothesis

In light of the above discussion, the following hypotheses were formulated for testing:

- H1:** COVID-19 lockdown has a significant impact on apple production.
- H2:** COVID-19 lockdown has a significant impact on workforce availability.
- H3:** COVID-19 lockdown has a significant impact on the Market price of apple produce.
- H4:** COVID-19 lockdown has a significant impact on distribution channel management.
- H5:** Apple production has a significant impact on the income of farmers.
- H6:** Workforce availability has a significant impact on the income of farmers.
- H7:** Market prices have a significant impact on the income of farmers.
- H8:** Distribution channel management has a significant impact on the income of farmers.

2.2 Conceptual Framework

The study used the conceptual model presented in Fig. 1 as a tool to analyze different relations between COVID-19 preventive measures and Farm Income. The model draws possible relations between independent and dependent variables in a logical sequence. The study attempts to describe the influence of COVID-19 preventive measures on apple production, workforce availability, market price, distribution channel management, and ultimately on farm income.

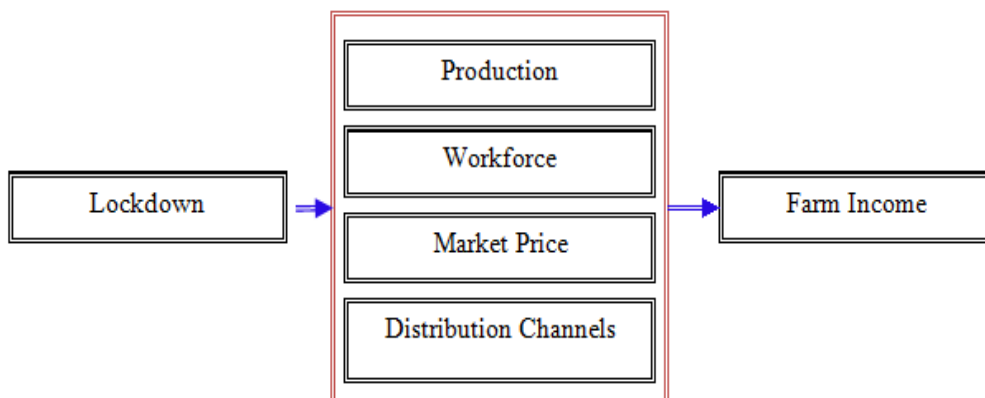


Fig. 1. Conceptual Model

3. METHODOLOGY

The study is descriptive in nature and has adopted a cross-sectional research design to collect qualitative data from apple growers of Kashmir. The data for the study was collected using a questionnaire at a single point in time.

3.1 Research Instrument

The development of a research instrument is a crucial step for conducting a quality study. A quality research instrument helps to capture proper information from respondents and prevent flawed results. The present study has adopted items from various previous studies to develop the questionnaire. Researchers suggest that previous literature should be consulted for instrument development as it improves the content and face validity of the instrument [17,18]. The questionnaire for the present study consists of 23 items measuring 6 constructs of the study. The questionnaire was subjected to

pilot testing to confirm the viability of the instrument before conducting the final study. Table 1 presents the results of Factor loading, reliability, and validity of the research instrument. The table depicts that the standard factor loading of all the items is above the threshold limit of 0.70 as suggested by Hair et al. [17], therefore all the items were retained. The reliability of the instrument was established by examining the composite reliability (CR). Table 1 depicts that all the values of CR are above the threshold limit of 0.70 as suggested by Hair et al. [19]. The average variance extracted (AVE) was calculated to examine the validity of the instrument. Table 1 shows that the AVE of all 6 constructs is above the threshold limit of 0.50 suggested by Hair et al. [19].

Table 2 presents the results of discriminant validity. The table depicts that the correlation coefficient between all the constructs is less than 0.85 as suggested by Kline [20]. Hence there was no issue with the discriminant validity.

Table 1. Factor Loading, Reliability and Validity

Constructs	Items	Std. Factor Loadings	AVE	CR
Lock Down	LOCD1	0.782	0.613	0.864
	LOCD2	0.766		
	LOCD3	0.753		
	LOCD4	0.829		
Production	PRDT1	0.725	0.576	0.844
	PRDT2	0.768		
	PRDT3	0.753		
	PRDT4	0.788		
Workforce Availability	WOAV1	0.882	0.733	0.891
	WOAV2	0.893		
	WOAV3	0.789		
Market Price	MKPR1	0.771	0.579	0.846
	MKPR2	0.746		
	MKPR3	0.733		
	MKPR4	0.792		
Distribution Channel Mgt	DSCM1	0.851	0.680	0.914
	DSCM2	0.825		
	DSCM3	0.801		
	DSCM4	0.799		
	DSCM5	0.846		
Farm Income	FRIN1	0.738	0.560	0.792
	FRIN2	0.779		
	FRIN3	0.726		

Source: SPSS Output

Table 2. Discriminant Validity

Constructs	LOCD	PRDT	WOAV	MKPR	DSCM	FRIN
Lock Down (LOCD)	0.783					
Production (PRDT)	0.312	0.759				
Workforce Availability (WOAV)	0.348	0.393	0.856			
Market Price (MKPR)	0.227	0.282	0.23	0.761		
Distribution Channel Management (DSCM)	0.345	0.408	0.366	0.448	0.825	
Farm Income (FRIN)	0.291	0.582	0.43	0.475	0.596	0.748

Source: SPSS Output

3.2 Population and Sampling

The study selected four southern districts (Shopian, Pulwama, Kulgam, and Anantnag) of the Kashmir valley purposively. These districts contribute a major portion to the apple production of the valley. Five villages each were selected randomly from these districts. 50 orchardists from each village were administered a questionnaire. Out of 250 questionnaires administered, after accounting for missing responses, 238 responses were finally found suitable for analysis.

3.3 Data Collection and Analysis

The study is based on primary data which was collected using a pretested questionnaire. The questionnaire for the study consisted of two sections. Section-I was concerned with the demographic profile of respondents. Section II consisted of 23 questions/ statements measuring the variables of the study. The responses to the statements were captured using a 5-point Likert scale. Partial least square- structural equation modelling (PLS-SEM) was employed to analyse the data using SmartPLS.

4. RESULTS AND DISCUSSION

4.1 Lockdown and Production

The study tried to analyse the production response of apples to COVID-19 induced disruptions in labour, fertilizer, and pesticide supply. The study found that there is no significant impact of COVID-19 disruptions on the production of apples. Table 3 presents the PLS-SEM results. The β coefficient for the relationship

turns out to be 0.072 and T-Value 1.021. However, the relationship was found insignificant at a 5 percent significance level ($p = 0.071$). Hence H1 was rejected and it can be concluded that the production of apples remained unaffected due to the COVID-19 lockdown. Cullen [21], Gray [12] and Laborde et al. [22] also found no significant impact of COVID -19 on the production of various commodities. Further, Tougeron [3] argued that no major food shortages have been reported from any part of the world during the previous years.

4.2 Lockdown and Workforce Availability

Apple industry is labour-intensive and relies heavily on workers for plantation, pest management, monitoring, and harvesting [3]. The study also found a significant negative relationship between lockdown and workforce availability with β value = -0.326, T value = -3.571, and p-value = 0.002. Hence H2 was supported at a 0.05 significance level. Apple production in Kashmir is extremely dependent on workforce availability. Due to the non-availability of the local labour pool, the demand for labour is met by seasonal and migrant workers coming from other parts of India. COVID lockdown forced millions of migrant workers to return to their native villages [13] due to fear and uncertainty in the market. Bochtis et al. [14] also argued that the COVID-19 restriction severely affected agricultural workforce availability. Therefore, due to the migration of the labour force, restrictions on the movement of people, and the closure of state borders, Kashmir Valley faced a severe shortage of labour which adversely affected the apple industry in the valley.

Table 3. PLS-SEM Results

Hypotheses	Relationship	Coefficient	T Value	Sig.	Decision
H1	Lock Down → Production	0.072	1.021	0.071	Not Supported
H2	Lock Down → Workforce Availability	- 0.326	-3.571	0.002	Supported
H3	Lock Down → Market Price	-0.216	-2.962	0.024	Supported
H4	Lock Down → Distribution Channel Management	-0.373	-4.215	0.000	Supported
H5	Production → Farm Income	0.348	3.885	0.000	Supported
H6	Workforce Availability → Farm Income	0.263	2.362	0.000	Supported
H7	Market Price → Farm Income	0.299	3.087	0.000	Supported
H8	Distribution Channel → Farm Income	0.189	1.998	0.005	Supported
R Square		0.432			

Source: SmartPLS Output

4.3 Lockdown and Market Price

The study found that COVID-19 disruptions have a significant negative impact on the market price of apples. The relationship has β value = -0.216, T value = -2.962, and p-value = 0.024. COVID-19 lockdown has dramatically impacted fruit sales [2]. During the pandemic, consumption habits have changed, and people have suddenly privileged safe consumption over origin, quality, and other considerations [11]. Also, the pandemic has taken a toll on the income of potential consumers [23]. This led to a considerable fall in demand for the fruit which in turn resulted in a fall in market prices.

4.4 Lockdown and Distribution Channels

The majority of the apple produce of the Valley is sold outside the state in Indian markets or foreign markets. The study assessed how COVID-19 related disruptions in transportation services have affected the distribution channels of the apple industry. The study found that COVID-19 has a significant negative impact on the distribution channels of the apple industry with β value = -0.373, T value = -4.215, and p-value = 0.000. Hence H4 was supported. The results are in congruence with the findings of Benedek et al. [24] and Kumar et al. [9] who reported significant disturbance of marketing channels due to the COVID-19 pandemic and restriction thereof.

Production, Workforce Availability, Market Price, Distribution Channel Management, and Farm Income.

Table 3 presents the PLS-SEM results. The results in the table reveal that there is a

significant positive relationship between production and farm income ($\beta = 0.348$, T value = 3.885 & p = 0.000), workforce availability and farm income ($\beta = 0.263$, T value = 2.362 & p = 0.000), market price and farm income ($\beta = 0.299$, T value = 3.087 & p = 0.000), and distribution channel management and farm income ($\beta = 0.189$, T value = 1.998 & p = 0.005). In light of the above results, hypotheses H5, H6, H7, and H8 are supported at a 0.05 significance level. The results are in line with the findings of Behrman et al. [25]; Cortignani et al. [26]; Kumar & Chahal [27]; Kumar et al. [9] and Lencucha et al. [28].

5. CONCLUSION

The study found that fear of Covid-19 and the lockdown strongly affected farmer income. The study found that the COVID-19 lockdown has affected the apple industry of Kashmir in terms of availability of workforce, distribution, and disturbances in the market prices. The reason is self-inhibition towards buying unless extremely necessary. The lockdown has created hurdles in the distribution channels. Closure of national and international borders has prevented apple produce to reach national and international markets. thereby significantly decreasing the income of apple growers. Also, the freight charges skyrocketed during the period, taking a toll on the income of farmers. It was further found that the shortage of workforce significantly impacted the income of apple growers. Moreover, the produce lying in the cold chains was sold at cheaper prices due to the unavailability of potential buyers and disturbance in the distribution system. Although the government has taken many initiatives to ensure

the produce is not wasted. Yet the stakeholders have faced various difficulties in selling their produce which resulted in a significant decrease in the income of farmers. The results of the study can help policymakers and horticulture experts in taking future preventive decisions without sacrificing the livelihood of families associated with horticulture, particularly the apple industry.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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