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Impact of COVID-19 Pandemic on Agricultural Output of Farmers with Special Reference to Selected Districts of Punjab

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Abstract

The COVID-19 pandemic has adversely impacted the economy of India and the world. The agricultural sector of our country has also been adversely affected. The agricultural sector of our country was already very weak and due to COVID-19 it became more vulnerable due to which the farmers had to face many problems during COVID-19 lockdown. As a result, the income of farmers has reduced and they are not being able to survive. The study was conducted in the food grain market of two districts of Punjab (Pathankot & Gurdaspur) with a sample size of 147 people. The survey was done through questionnaires (Google form). The convenience sampling technique (unrestricted sampling) is used in this study. It's a type of Non Probability Sampling. We conducted our research to find out the impact of COVID-19 pandemic on agricultural output. The five-point interval scale (likert scale) was used to measure the perception of respondents (farmers) on 18 parameters related to the impact of COVID-19 pandemic. Anova and regression (inferential statistics) were used to find out the impact of variables on farmers. 54.1% of impact is explained by our independent variables. The research suggests that there is a considerable degree of impact of COVID-19 pandemic on agricultural output of farmers.

Keywords: Agricultural Output, COVID-19, Agricultural Sector

Introduction

India's Agricultural Sector

A large part of our country's employment comes from the agricultural sector (primary sector) and it has a significant contribution to India's economy (both employment and revenue generation). Agriculture's contribution to India's GDP is 12-13 percent approx., and it also provides employment to around 41.49 percent population (2019-20). The contribution of agriculture in India's economy is declining day by day but we cannot ignore its contribution towards our economy because our country is in a developing stage, not a developed nation. In 2019-20, India exported agricultural products of around 41.82 billion US dollar. India is on first rank in the production of milk, spices and pulses whereas in the production of vegetables and fruits India is on the second rank worldwide. Because of the Green Revolution, there was a boost in the agricultural sector due to which India became a self-reliant nation. India is now exporting wheat and rice to the rest of the world.

Key Issues

In India, agricultural activities depend totally on the weather conditions. Apart from this, government agencies are not able to purchase crops of the farmers in right quantity and right price. In India, farmers get loans at a very high rate of interest because of which their agricultural activities get affected and they are not able to produce in right quantity. There is no effective facility of exporting agricultural products directly by the farmers. In India, 80 percent of the farmers have less than 1 hectare of agricultural land (Marginal Farmers). Apart from this, because of MNREGA the labor works for 2-3 hours and they get full daily wages so they do not work in agricultural fields effectively and efficiently. Farmers also want their children to get good education and work in urban areas rather than doing farming. Due to which, the condition of Indian farmers is not good. They are committing suicide every day. In Rajya Sabha, our Union Minister

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Mr. Narendra Singh Tomar told that 10,281 farmers committed suicide in 2019 which is approximately 7.4 percent of total suicides in the country in the same year. Government should focus on ground reality of farmers rather than doing paperwork in favor of them. Few months ago, there was a lockdown in our country due to COVID-19 pandemic. As a result, farmers were facing a lot of problems. The farmers had to do harvesting of crops again. Government started giving exemptions to the farmers but the ground reality was a bit different. Labors started migrating to their states because of which there were not adequate workers for the production of crops.

Punjab's Agricultural Sector

Punjab is famous for its agricultural activities as the land in Punjab is very fertile. Main crops which are produced in Punjab are Wheat, Rice, Maize and Bajra. Both types of crops (Kharif and Rabi) are produced in Punjab. Crops of Rabi includes oil seeds, potatoes, wheat, barley and gram whereas crops of Kharif includes Bajra, peas, pulses, rice, sugarcane, onion, chilly and jwar. The production of wheat is in all over Punjab whereas Maize and Rice are produced in some parts of Punjab. Most of the rice is produced in Kapurthala, Amritsar and Gurdaspur district of Punjab. Apart from this, sugarcane, tomato and groundnuts are produced in a major quantity in Punjab. One-third milk of total production of India is produced in Punjab. Green revolution made a remarkable impact on the agricultural system of Punjab as the agricultural production of Punjab has increased a lot. Because of this, Punjab gives wheat and rice in heavy quantities to the storage of Central Government (Emergency storage).

The contribution of agricultural sector towards Punjab's GDP is 28.13 % (2019-20). Every year, 10.7 million tons' approx. wheat is produced in Punjab, this is why Punjab is known as Wheat Bowl of India. There is no adverse effect of less rain in Punjab as there are three major rivers (Beas, Satluj & Raavi) flowing throughout Punjab which provides good irrigation facilities (Canal System) to the agricultural lands. Taking into consideration that Punjab is one of the smallest states of India, it still contributes in the agricultural sector of India in large quantities.

COVID-19 Pandemic

COVID-19 started from the wet market of China (Wuhan). COVID-19 has spread across the globe which made an adverse effect on economic activities all over the world. Because of which millions of people became unemployed. According to the report of WHO 5,08,66,743 cases were positive as of November 09, 2020 out of which 12,63,992 died and 3,85,63,160 were recovered from COVID-19. Most of the cases are in The United States. India comes second in the number of positive cases of COVID-19. The positive point for India is that the recovery rate of India is approximately 92 percent. The country in which this pandemic originated (China) is ranked 59 in the number of cases. The main reason of the spread of this virus across the globe is the Communist Government of China (Xi Jinping). When this virus started spreading in Wuhan, China played with the facts and provided wrong reports to WHO because of which it spread all over the world. It also made an adverse impact on the economic activities across the globe as well as India. Most of the population of India depends on agricultural sector. It also made a negative impact on the agricultural sector of India.

Review of Literature

Serial No.	*Author Publication Year*	*Research Study*	*Research Findings*
1	Jody Harris, Lutz Depenbusch, Arshad Ahmad Pal, RamakrishnanMadhavan Nair and Srinivasan Ramasamy / JULY 2020.	Food system disruption: initial livelihood and dietary effects of COVID-19 on vegetable producers in India.	According to the study, the majority of farmers report negative impacts on production, prices, sales and profits. Over eighty percent of farms reported some decrease in revenue and over twenty percent of farms reported catastrophic declines [Nearly nothing sold] and price reductions was reported by 80 percent farmers, approximately. The research findings suggest that woman farmers are more vulnerable and farmers need Government assistance in order to overcome from current bad situation.

Serial No.	Author Publication Year	Research Study	Research Findings
2	Prashant Joshi , Upendra Kulkarni, Shyam Munje and Shubham Kulkarni/ 2020.	Impact of COVID-19 pandemic on Indian fruits and vegetables export postharvest management supply chain and future strategies.	According to this study, the post-harvest supply chain management, shipping, retail and wholesale marketing of fruits, vegetables and grains suffered a lot, due to unprecedented situation. We must take a lesson and need to formulate appropriate strategies in order to overcome from such situations effectively and efficiently in upcoming future.
3	A.K. Singh, Lakhan Singh and Sunil Kumar / 2020.	Impact of COVID-19 on Agriculture and Allied Sectors.	According to the study, the harvesting of major crops and livestock sector was affected significantly, due to several restrictions imposed by Government. Agricultural labor suffered losses due to shutdown of various activities related with agricultural sector.
4	Dionysis Bochtis, Lefterisbenos, Maria Lampridi, Vassomarinoudi, Simon Pearson and Claus G. Sorensen / 2020.	Agricultural Workforce Crisis in Light of the COVID-19 Pandemic.	The findings of research demonstrate that fifty percent of the agricultural workforce and fifty-four percent of the annual income of workforce are at moderately high risk. So, required measures must be taken to boost the effectiveness and sustainability of agricultural sector.
5	R. Ramakumar/2020.	Agriculture and the COVID-19 Pandemic: An Analysis with Special Reference to India.	The research indicates that the price of 16 major crops fell down during lockdown, and large number of migrant labors returned home and farmers incurred huge losses. All the major ports of India were closed during lockdown. As a result, export of agricultural product suffered. It involves data of more than 2000 food grain markets of our country.
6	AG Adeeth Cariappa, Kamlesh Kumar Acharya, Chaitanya Adhav, Sendhil R., P. Ramasundaram / 2020.	Effect of COVID-19 on Indian Agricultural System: A 10-Point Strategy for Post-Pandemic Recovery.	The research findings indicate that, the COVID-19 affected development and marketing through the constraints like labor and logistic. The consumption pattern has been affected by reduced income, limited market access and increased prices. The pandemic has caused significant physical, economic, social and emotional damage to all stakeholders in the Indian agricultural system.
7	Ganesh Das/2020.	Impact of COVID-19 in Agricultural System, Value Chain, and Food Security.	According to the report, COVID-19 negatively affected the agricultural sector, supply chain and food security. It has an indirect impact on agricultural production, inventory, farm profits as well as India's GDP. Necessary steps must be taken to ensure sustainable agricultural output.
8	Poulami Ray, Kamlesh Kumar Acharya and Amit Thakur / 2020.	COVID-19 Impact and implication to Agriculture and Food security.	The research paper suggests that there is a need to track farm price fluctuations, encourage public-private collaborations and target unique strategies by leading organizations like ICAR[Indian Council of Agricultural Research] to ensure sustainable agricultural growth.
9	Jyotsnarani Biswal, Kennady Vijayalakshmy and Habibar Rahman/Sep 2020.	Impact of COVID-19 and associated lockdown on livestock and poultry sectors in India.	According to the study, the COVID-19 pandemic and associated lockdown not only caused immense misery to millions of poor and marginal farmers, but also adversely affected nationwide poultry & dairy farming and activities of value chains associated with them. Farmers suffered a lot due to the shortage of transport and labor in lock down.
10	Binita Timilsina, Nitu Adhikari, Sheetalkafle, Susmita Paudel, Sushmita Poudel and Deepak Gautam / July 2020.	Addressing impact of COVID-19 Post Pandemic on Farming and Agricultural Deeds.	The research paper indicates that, from a pandemic to a lockdown, locusts to heavy rainfall, unsold crops to rotting crops, economic collapse to severe hunger, agricultural practices have collapsed, whereby people trust only those who can produce the food for them. The Government needs to take robust measures to facilitate farmers such as direct financial fundings, high yielding seeds and self-propelled tractors etc. in order to develop agricultural sector resistance to the pandemic.

Research Methodology

Problem Statement

The pandemic COVID-19 has adversely impacted the economy of the world and India. The agriculture sector of our country has also been adversely affected. The agriculture sector of our country was already very weak and due to COVID-19 it became more vulnerable. Due to which the farmers had to face many problems during COVID-19 lockdown. As a result, the income of farmers has reduced and they are not being able to survive.

Objectives of the Study

- To evaluate the impact of pandemic COVID-19 on agricultural sector (Punjab).
- To study the effectiveness of Government's policies regarding farmers during lockdown.

Research Design

We used inferential research approach in our research. The convenience sampling technique (unrestricted sampling) is used in this study. It's a type of Non-Probability Sampling.

Data Collection and Analysis

We used Multiple Regression[SPSS] to find out the impact of COVID-19 pandemic on farmers. In our research we used one dependent variable and eighteen independent variables. The five-point interval scale (Likert scale) was used to measure the perception of respondents (farmers) on 18 parameters related to the impact of COVID-19 lockdown. ANOVA and regression (inferential statistics) were used to find out the impact of variables on farmers.

Sample Size and Area: We collected data from 147 respondents. The data was collected from selected districts of Punjab (Pathankot & Gurdaspur).

Period of Study and Questionnaire: The period of study has been from 5th Oct 2020 to 9th Nov 2020. We used a questionnaire in Google form.

Hypothesis

H_0 (Null Hypothesis): There is no impact of COVID-19 pandemic on agricultural output.

H_a or H_1 (Alternative Hypothesis): There is an impact of COVID-19 pandemic on agricultural output.

Data Analysis and Interpretation

Table 1: Gender of Respondents

Total Responses	*Male*	*Female*	*Other*
147	113	34	0

Interpretation: Here total number of respondents are 147 out of which:

- 113 (76.9%) respondents are male.
- 34 (23.1%) respondents are female.

Table 2: Age of Respondents

Total Responses	*18-30*	*31-45*	*45-60*	*Above 60*
147	18	77	46	6

Interpretation: Here total number of respondents are 147 out of which:

- 18 [12.24%] respondents are from 18-30 age group.
- 77 [52.38%] respondents are from 31-45 age group.
- 46 [31.29%] respondents are from 45-60 age group.
- 6 [4.08%] respondents are from above 60 age group.

Table 3: Income Level of Respondents in Per Annum

Total Responses	*0 - 50,000*	*50,000 -1,00000*	*1,00000 -2,00000*	*2,00000-3,00000*	*Above 3,00000*
147	24	40	40	24	19

Interpretation: Here total no. of respondents are 147 out of which:

- 24 [16.3%] respondents are from 0-50,000 income level per annum in INR.
- 40 [27.2%] respondents are from 50,000-1,00000 income level per annum in INR.

- 40 [27.2%] respondents are from 1,00000-2,00000 income level per annum in INR.
- 24 [16.3%] respondents are from 2,00000-3,00000 income level per annum in INR.
- 19 [12.9%] respondents are from above 3,00000 income level per annum in INR.

Table 4: Size of Land Holding

Total Responses	*Below – 2 Acres*	*2-5 Acres*	*5- 10 Acres*	*10-15 Acres*	*Above 15 Acres*
147	22	35	37	34	19

Interpretation: Here total no. of respondents are 147 out of which:

- 22 [15%] respondents have land below 2 Acres.
- 35 [23.8%] respondents have land between 2-5 Acres.
- 37 [25.2%] respondents have land between 5-10 Acres.
- 34 [23.1%] respondents have land between 10-15 Acres.
- 19 [12.9%] respondents have land above 15 Acres.

Table 5

Mean and Percentage-Wise Data Interpretation of Variables			
Sr. No.	*Variables*	*Mean*	*Percentage*
1	The availability and quality of fertilizers was satisfactory, during COVID-19 lockdown.	3.12	62.31
2	During COVID-19 lockdown, the space provided by Government in food grain market was adequate.	3.35	66.94
3	The Minimum Support Price (MSP) of crops determined by Government was adequate, during COVID-19 lockdown.	1.58	31.56
4	During COVID-19 lockdown, the inspectors of food grain market were inspecting properly.	2.81	56.19
5	The fertilizer subsidy provided by Government was satisfactory, during COVID-19 lockdown.	3.37	67.48
6	The time given by Government to the farmers in lockdown was sufficient.	3.34	66.8
7	The irrigation facilities provided by Government in COVID-19 lockdown were sufficient.	2.71	54.29
8	The Government was continuously providing electricity for farming, during COVID-19 lockdown.	2.07	41.5
9	Availability of labor in lockdown was satisfactory.	1.46	29.25
10	During COVID-19 lockdown, the Government was buying grain from farmers in right quantity.	2.93	58.5
11	The Government made proper arrangement for storage in food grain market, during COVID-19 lockdown.	3.44	68.84
12	The middlemen appointed by Government in food grain market were doing their job properly, during COVID-19 lockdown.	2.13	42.59
13	During COVID-19 lockdown, the substantial exemption given by Government to the people related to agricultural sector.	3.53	70.61
14	The Government made proper arrangement of transport to bring the crops to the food grain market, during COVID-19 lockdown.	3.77	75.47
15	During COVID-19 lockdown, the Government was providing superior quality seeds and fertilizers at reasonable price.	2.9	58.1
16	The agricultural scientists were cooperating with farmers, during COVID-19 lockdown.	2.71	54.15
17	The Agricultural societies made by Government were cooperating with farmers, during COVID-19 lockdown.	2.84	56.87
18	During COVID-19 lockdown, the commission taken by the middlemen in food grain market was correct.	1.44	28.84

In Sr. No. 1, we calculated mean and percentage through Likert scale from Strongly disagree to Strongly agree.

Table 6

Likert Scale	*Strongly Disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
Numbering	1	2	3	4	5
Responses*Numbering	24(1)	34(2)	20(3)	39(4)	30(5)
=	24	68	60	156	150
Total			424		
Mean (Total/Respondents)			458/147 = 3.12		
Percentage (Mean*20)			3.12*20 = 62.31%		

Similarly, we calculated mean and percentage of rest of the variables.

Interpretation

- The mean of Variable 1 is 3.12. When we convert it to percentage by multiplying by 20 then it is becoming 62.31%. It indicates that 62.31% of the farmers are satisfied with the availability and quality of fertilizers while 37.69% of the farmers are not satisfied with the quality and availability of fertilizers during the lockdown. It means 37.69% of the farmers were not happy with the availability and quality of fertilizers and they suffered losses due to low yield.
- The mean of Variable 2 is 3.35. When we convert it to percentage by multiplying 20 then it is becoming 66.94%. It indicates that 66.94% farmers are satisfied with space provided by Government in food grain market during lockdown, while 33.06% farmers are not satisfied with the availability of space in food grain market during lockdown phase. It means 33.06% farmers have suffered losses and are badly affected due to lack of space in food grain market during lockdown. It means due to lack of availability of space in food grain market, the crop of 33.06% farmers has deteriorated.
- The mean of Variable 3 is 1.58. When we convert it to percentage by multiplying 20 then it is becoming 31.56%. It states that 31.56% farmers are satisfied with the minimum support price of crops determined by Central Government, while 68.44% farmers are not satisfied with the minimum support price of crops. It indicates that 68.44% farmers think that they are not getting fair MSP for their crops. This is the main reason of farmers' suicide in our country. The central Government must increase the MSP to reduce the suicide rate of farmers.
- The mean of Variable 4 is 2.81. When we convert it to percentage by multiplying 20 then it is becoming 56.19%. This variable defines that 56.19% Farmers are satisfied with the inspection of food grain inspector in the food grain market, while 43.81% farmers are dissatisfied with the inspection of food grain inspector. It indicates that farmers have to pay bribes to the food grain inspector to get good value of their crop.
- The mean of Variable 5 is 3.37. When we convert it to percentage by multiplying 20 then it is becoming 67.48%. This variable indicates that 67.48% farmers are satisfied with the fertilizer subsidy provided by Government, while 32.52% farmers are not satisfied with the subsidy in the form of fertilizers. It means, the Government needs to increase the subsidy on fertilizers.
- The mean of Variable 6 is 3.34. When we convert it to percentage by multiplying 20 then it is becoming 66.8%. This Variable indicates that 66.8% farmers were satisfied with the time given by Government during lockdown, while 33.2% farmers were not satisfied with the time provided by Government. It indicates that the time provided by Government in lockdown was not adequate. As a result, farmers had to face difficulties.
- The mean of Variable 7 is 2.71. When we convert it to percentage by multiplying 20 then it is becoming 54.29%. It indicates that 54.29% farmers were satisfied with the irrigation facilities provided by

Government, while 45.71% farmers were not satisfied. It means, during lockdown farmers did not get irrigation facilities at right quantity and they faced problems.

- The mean of Variable 8 is 2.07. When we convert it to percentage by multiplying 20 then it's becoming 41.5%. This variable indicates that 41.5% farmers are satisfied with the supply of electricity during lockdown, while 58.5% are not satisfied with the availability of electricity. It means, Government is not providing adequate amount of electricity to farmers. The electricity is hardly available for 4 to 5 hours in a day. AS a result, farmers have to face many complications during irrigation. That's why they used Diesel pumps for irrigation, consequently their expenses increased.
- The mean of Variable 9 is 1.46. When we convert it to percentage by multiplying 20 then it is becoming 29.25%. It indicates that 29.25% farmers are satisfied with the availability of labor in lockdown, while 70.75% farmers are not pleased with the supply of labor. It means, the labor has gone back to their respective states by trains run by Central Government. Consequently, there is a shortage of labor in market. Now the farmers have made their arrangements in some way and suffered great losses.
- The mean of variable 10 is 2.93. When we covert it to percentage by multiplying 20 then it is becoming 58.5%. It indicates that 58.5% farmers are satisfied that government is buying food grains from them in right quantity while 41.5% are not satisfied with this purchasing of government. The government makes false claims that it purchases all the crops of farmers at a reasonable rate whereas the reality is quite different, the crop gets spoiled in food grains market.
- The mean of variable 11 is 3.44. When we convert it to percentage by multiplying 20 then it is becoming 68.84%. It indicates that 68.84% farmers are satisfied that government has made proper arrangement for storage in food grain market while 31.16% are not satisfied with this arrangement of both State and Central Government. It indicates that in food grains market there is no proper arrangement as half of the crop is to be kept under open sky because of which the crop get damage so government needs to increase storage so that farmers do not face hurdles in future.
- The mean of variable 12 is 2.13. When we convert it to percentage by multiplying 20 then it is becoming 42.59%. It indicates that 42.59% farmers are satisfied with the work of middlemen appointed by government in the food grain market while 57.41% are not satisfied with the work of middlemen. It indicates that middlemen charge a high rate of commission from farmers and they take their crops on credit due to which farmers are left with low margins. This is one of the reason why farmers in India are committing suicides.
- The mean of variable 13 is 3.53. When we convert it to percentage by multiplying 20 then it is becoming 70.61%. It indicates that 70.61% farmers are satisfied with the exemptions given by the government in lockdown while 29.39% are not satisfied with the exemptions given by government in lockdown. It indicates that some farmers are not satisfied because if their agricultural equipment gets damaged so they have to make pass to bring them to the mechanic which is very time-consuming process.
- The mean of variable 14 is 2.9. When we convert it to percentage by multiplying 20 then it is becoming 58.1%. It indicates that 58.1% are satisfied with superior quality seeds provided to them by government at reasonable price during lockdown whereas 41.9% are not satisfied, they think that the seeds are of inferior quality and government is charging high price on them.
- The mean of variable 15 is 3.77. When we convert it to percentage by multiplying 20 then it is becoming 75.47%. It indicates that 75.47% farmers are satisfied with the transportation facility provided by government to bring crops from agricultural land to food grain market during lockdown whereas

24.53% are not satisfied with the transportation facility of government. Majority of farmers are satisfied because government included private sector's trucks for transportation of crop during lockdown.

- The mean of variable 16 is 2.71. When we convert it to percentage by multiplying 20 then it is becoming 54.15%. It indicates that 54.15% farmers are satisfied with the cooperation of agricultural scientists employed by government during lockdown whereas 45.85% farmers are not satisfied with the agricultural scientists employed by government. Almost half of the farmers are dissatisfied as agricultural scientists don't cooperate with them at all. Government should take surveys with farmers at regular intervals about the cooperation of agricultural scientists.
- The mean of variable 17 is 2.84. When we convert it to percentage by multiplying 20 then it is becoming 56.87%. It indicates that 56.87% farmers are satisfied with the agricultural societies made by government for their welfare whereas 43.13% farmers are not satisfied with the agricultural societies made by government during lockdown. Almost half of the farmers are not satisfied with the facilities provided by agricultural societies (short-term loan).
- The mean of variable 18 is 1.44. When we convert it to percentage by multiplying 20 then it is becoming 28.84%. It indicates that 28.84% farmers are satisfied with the commission they have to give to agents (licensed by government) whereas 71.16% farmers are not satisfied with the commission they have to pay to these agents. These farmers are not satisfied because the agents of government charge very high amount of commission from farmers, due to which farmers get low amount of profit from their crops. This variable is most important as most of the farmers are dissatisfied, so government should focus on this variable and should remove middlemen so that farmers can interact directly with the government and they do not have to pay commission to anybody which will increase their profit margin.

Analysis of Variables by using SPSS Software

MODEL SUMMARY

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	.773[a]	.597	.541	.69116

a. Predictors: (Constant), X18, X9, X7, X6, X17, X4, X5, X3, X15, X8, X16, X13, X1, X11, X12, X14, X2, X10

b. Dependent Variable: Y19.

- The Value of R is .773. It indicates there is a positive correlation between X and Y variables.
- The value of R square and adjusted R square is .597 and .541. 54.1% of impact is explained by our independent variables. It indicates that there is a considerable degree of impact of COVID-19 pandemic on agricultural output of farmers.

ANOVA ANALYSIS

Model	*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1 Regression	90.704	18	5.039	10.549	.000[b]
Residual	61.146	128	.478		
Total	151.850	146			

a.Dependent Variable: Agricultural output.

b.Predictors: (Constant), X18, X9, X7, X6, X17, X4, X5, X3, X15, X8, X16, X13, X1, X11, X12, X14, X2, X10.

Interpretation

Anova analysis contains significance level (P Value) and also known as alpha value. It indicates the probability of rejecting null hypothesis. In our analysis, P value is equal to 0.000 and less than .005. It states that there is a strong relationship between Dependent variable (Agricultural output) and independent variables (18). The P value is the area to the right of F statistics and in this case the value of P is low. So, it means null hypothesis is rejected and alternative hypothesis is accepted.

	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
COEFFICIENT	(Constant)	6.213	.346		17.936	.000	5.527	6.898
	X1	-.111	.052	-.152	-2.139	.034	-.213	-.008
	X2	-.158	.065	-.177	-2.443	.016	-.285	-.030
	X3	.018	.098	-.012	-.184	.044	-.177	.213
	X4	.011	.055	-.014	-.204	.028	-.098	.121
	X5	-.132	.061	-.142	-2.174	.032	-.253	-.012
	X6	.001	.058	-.001	-.012	.029	-.115	-.116
	X7	.061	.056	-.072	-1.094	.023	-.049	-.172
	X8	-.002	.062	-.002	-.027	.979	-.124	-.121
	X9	-.101	.110	-.057	-.918	.036	-.318	-.116
	X10	-.151	.070	-.169	-2.146	.034	-.290	-.012
	X11	-.090	.068	-.094	-1.334	.017	-.224	-.044
	X12	-.128	.065	-.140	-1.988	.049	-.256	-.001
	X13	-.056	.071	-.053	-.793	.014	-.197	-.084
	X14	-.023	.067	-.025	-.346	.024	-.155	-.109
	X15	-.079	.076	-.069	-1.044	.023	-.230	-.071
	X16	-.109	.054	-.133	-2.032	.044	-.216	-.003
	X17	-.115	.047	-.153	-2.464	.015	-.208	-.023
	X18	-.123	.095	-.080	-1.295	.198	-.312	.065

$-.079x_{15}$ $-.109x_{16}$ -.115x

a.Dependent Variable: Agricultural output

b.Independent Variables: Q1 to Q18 (Table 1)

$Y = a + bx$

$Y = 6.213 - .111x_1 - .158x_2 + .018x_3 + .011x_4 - .132x_5 + .001x_6 + .061x_7 -$

$.002x_8 - .101x_9 - .151x_{10} - .090x_{11} - .128x_{12} - .056x_{13} - .023x_{14} - .079x15 - .109x16 - .115x17 - .123x18$

Y = Dependent variable (Agricultural output)

X = Independent variables: Q1 to Q18 (Table 1)

The Beta value is used in regression equation. The value of T is obtained by dividing Beta Value with Standard Error Value. For instance, by dividing Beta value 6.213 with standard error .346, we will get T value 17.396. Above table also includes confidence level and significance level. In our case confidence level is 95% (0.95) and significance level is (0.05). The significance value is less than .005. It means null hypothesis is rejected and alternative hypothesis is accepted. There is an impact of COVID-19 on agricultural output of farmers.

Findings

Through this research, we found that the farmers were facing many difficulties during the COVID-19 lockdown phase due to which their agricultural activities were adversely impacted. As a result, the earnings were adversely affected. There are various reasons behind this impact such as farmers were not getting sufficient electric supply during lockdown. In the research, we found out that only 41.5% of the farmers got adequate electric supply. Due to this, there was a need to use diesel pumps among 48.5% of the farmers. Consequently, production cost of crops increased, which resulted in the negative impact in the earnings of farmers.

Apart from this, 54.15% of the farmers were agreeing to the point that agricultural scientists cooperated with them and 56.87% of the farmers agreed that agricultural societies were supporting them during lockdown. Agricultural societies provide loans to the farmers at very low rate of interest to promote agricultural activities. The remaining percentage of farmers didn't drive any benefit from the

agricultural societies. Agricultural scientist's function is to research the soil fertility level in the farmer's land which helps the farmer to recognize which fertilizer along with the amount that can be used for a better productivity level.

As it can be seen in the study conducted, the farmers are also facing problems regarding food grain markets' middlemen. Here, the middlemen are the people which take commission from the farmers for selling the yields. Along with this, they also provide loans at high rate of interest. There was a considerable decline in the production level of crops due to the middlemen commission. This added into the adverse impact on the farmers combining with the above stated points because only 28.81% of the farmers found the commissions taken by the middlemen to be correct while rest 71.19% farmers did not find the commissions fair.

Further, 41.9% of the farmers were not provided with superior quality seeds and fertilizers. Here, quality seeds and fertilizers are the vital part for the production of crops. Due to this, there was an adverse impact in the day-to-day livelihood of the farmers. 68.84% of the farmers were also not satisfied with the warehouse (storage system) provided by the Government in food grain market. At the same time, 31.16% of the farmers had to keep the crops (mainly wheat) in the open field which got spoiled due to bad weather conditions.

Furthermore, the Government usually sets a minimum support price (MSP) for the benefits of farmers. Our study reflected that the MSP of crops determined by the Government in food grain market was not found by most of the farmers. Only 31.56% of the farmers found that the MSP prices were adequate while rest 68.44% found them inadequate. Apart from this, there was an insufficient labor supply which resulted in the adverse impact in the earnings of the farmers. 70.75% of the farmers agreed to the lack of availability of labors. During the lockdown, various state Governments provided various special transport facilities where the labors went back to their states which resulted in the shortage of labor supply during the paddy sowing season.

In Punjab the irrigation process is through canal system, but during lockdown the canal system didn't work properly. 54.29% of the farmers got proper irrigation facilities while the rest 45.71% had to use diesel pumps. Central government has appointed Food Grain Inspector in food grain market who checks the quality and moisture of the crops produced by farmers. On the basis of this, farmers get the price of their crops. We found in our research that 56.19% of the farmers were satisfied by the work of Food Grains Inspector.

One of the parameters of our study was transport facilities provided in order to bring the crops to the market. During the lockdown, the Government has provided transport facilities to the farmers to transport their crops to the food grain market and in our study, 75.47% of the farmers were satisfied with this facility provided by the Government. This doesn't affect the farmer's day to day livelihood. Our research also suggested another positive point. The Government has provided some exemptions to the farmers where they can use mechanical shops inn special cases. The farmers often face mechanical problems related to agricultural machinery. 70.61% of the farmers were satisfied with the substantial exemptions given by the Government. 54.1% of impact is explained by our independent variables. It indicates that there is a considerable degree of impact of COVID-19 pandemic on agricultural output of farmers.

Conclusion

Bureaucracy and infrastructure are the main cause of problems faced by the farmers, during lockdown. To overcome this problem, the State Government must start helpline number for farmers. So, the grievances of farmers get redressed quickly in case of worst scenario. Connectivity is also a very big issue for the farmers as the connectivity of rural parts of the country is not up to the mark. The infrastructure of rural areas of Punjab is very poor. That's why no private organization wants to go to the village for purchasing grains from farmers directly due to which farmers incurs losses as farmers have to sell their crop in food grain market to middlemen even if they don't want.

Therefore, Government must focus on the infrastructure of villages in terms of connectivity. This will increase the connectivity of villages to the cities. As a result, the food companies will be able to buy the crops directly from the farmers. The farmers will sell their crops directly to the companies as there will be no middlemen in between. So, the farmers will get more price for their

yields. This will give a rise in the socio-economic status of farmers. Institutions and Officers of government such as, agricultural scientists appointed by State Government, Managers of Gramin Bank appointed by the government, food grain inspector and societies made by Government for the welfare of farmers do not perform their respective obligations. They did the same during COVID-19 lockdown which made an adverse impact. Instead of just making strategies, government should focus on effective implementation as well. If government is not able to implement the strategies effectively then farmers will not be able to get proper benefits. For example, Government has fixed MSP for the crops of farmers but unfortunately, they don't purchase crops in the right quantity. Therefore, farmers are forced to sell their crops at lower than the minimum support price due to which there is a fall in their income. This will not only lead to the loss of farmers but the economic growth of our country will also get affected. As of today, 65.53 percent of the total population lives in rural areas and their employment also depends on agricultural activities. NITI Aayog of our country wants to make India an economy of 5 trillion Dollars till 2025 but this is not possible without the development of rural areas. Government should understand that instead of just focusing on reports they should also look towards the ground reality of agricultural sector because the farmers of our country are already in huge losses and due to COVID-19 pandemic their situation has become worse. Whenever there is lockdown again, then both State and Central Government must formulate adequate strategies to stop the movement of labor. Otherwise, the farmers have to suffer again. The Central and State Government must consider the concerns of Sarpanch of the village, during the formulation of strategies for farmers. Because they live in the village and understand the concerns of the farmers more effectively than any other agency of the Government.

Limitations and Implications of the Study

To conduct the research, we have put in a lot of efforts in order to ensure the objectivity, validity & reliability. The most significant limitation of our research is that it was conducted exclusively in the food grain market of two districts of Punjab (Pathankot & Gurdaspur), with a sample size of just 147 people. 54.1% impact is explained by our independent variables. There could be other variables that were not included in our research. In future, researchers can keep these constraints in their mind to improve the quality of their research. This type of study can also be conducted in other sectors, to find out the impact of COVID-19 pandemic on output.

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