IMPACT OF COVID-19 ON FARMERS' BEHAVIOR IN CHIKKABALLAPUR DISTRICT, KARNATAKA, INDIA

ABSTRACT

This study explored how COVID-19 affected farmers in Chikkaballapur District, Karnataka, India. Using an ex-post-facto research design, data were collected from 50 randomly selected farmers through a pretested structured interview schedule. The goal was to understand their perceptions of the pandemic's impact on farming, productivity, economy, markets, labour, and community well-being. Statistical methods like mean, standard deviation, coefficient of variation, correlation, and multiple regression analysis were used to analyse the relationships between various factors. The findings showed significant variability in farm size and income, indicating a wide range of differences among farmers. Notably, changes in economic factors were significantly related to farm size, while changes in production were significantly related to education. Health and sanitation were negatively correlated with changes in farm technology, suggesting that better infrastructure could influence the adoption of new technologies. Age and education significantly impacted changes in farm management, highlighting the importance of demographic factors in farming decisions. The study emphasized the complex effects of the pandemic on farming practices and highlighted the need for targeted interventions. Recommendations include financial support programs, improved market access, promotion of digital tools, and diversified cropping strategies to help farmers build resilience and sustainability. These measures aim to reduce the adverse effects of crises and improve the overall well-being of farming communities.

Key Words: Agricultural systems, COVID-19, Farmer behaviours, Impact,Socioeconomic challenges

INTRODUCTION

Farmers are the foundation of civilization, providing essential food for our homes through their hard work on the land. However, as population grows, farmland diminishes, and the significance of farmers rises. Imagine a scenario where India lacks farmers; white-collar jobs would become impossible due to the absence of food. Farmers are often referred to as the 'Backbone of India' due to their tireless efforts, working in all weather conditions and times of day (Sharma, 2021). Despite various challenges like climate change and natural disasters, Indian farmers persevere and contribute significantly to society. Farmers require agricultural extension services to disseminate knowledge within the agricultural sector (Rusliyadi*et al.*, 2018). Blanco (2020) asserts that the objective of Agricultural Extension is to modify farmers' behaviors, enabling them to actively participate in agricultural development programs, thereby overcoming societal barriers and enhancing farm output.

The COVID-19 pandemic has impacted everyone differently based on their societal roles (Maestripieri, 2021). While some can work remotely, farmers must continue their work in the fields, making them vulnerable to the virus (Moradhaseli*et al.*, 2022). The pandemic has disrupted food supply chains, affecting both demand and production (Hobbs, 2020). Retail grocery demand surged, leading to shortages, while some farmers faced surplus produce due to halted foodservice demand (Weersink*et al.*, 2021) Essential workers in agriculture and food industries, including farmers, faced increased risks but continued their vital work (Aday and Aday, 2020).Before COVID-19, the Farmer's Exchange Rate was strong. However, after COVID-19, it declined, reducing the purchasing power of farmers in rural areas. The terms of trade for agricultural products, goods, and services, as well as production costs, also decreased (Heryadi*et al.,* 2023).

In India, the pandemic's economic shock is particularly severe due to pre-existing issues like unemployment, low incomes, and a large informal workforce. This vulnerability extends to agriculture, where disruptions in labour supply, transportation, and misinformation have affected harvesting and sales. Poultry farmers suffered from misinformation regarding COVID-19 transmission through chickens (Sattar *et al.*, 2021). Although media reports provide some insights, systematic data on the pandemic's impact on farmers is lacking.

The study aims to examine the overall and socioeconomic conditions before and after the COVID-19 pandemic. It seeks to assess how farmers respond to various factors such as farm technology, market dynamics, farm management practices, healthcare accessibility, and migration patterns. Additionally, the study aims to estimate and forecast these responses in terms of scores related to socioeconomic and ecological variables.

METHODOLOGY

The study was conducted in Chikkaballapur district of southern Karnataka during the year 2020-21. For the present study ex-post-facto research of descriptive research design was followed to obtain pertinent and precise information concerning the current status regarding the perception, challenges and practices in the rural lifestyle during the pandemic to draw a valid conclusion. Rohwer (2022) said that ex-post-facto research is when a researcher tries to figure out why something happened after it already occurred. Considering this, we chose the ex-post-facto design because it fits well with the type of study, the variables being looked at, the number of people being studied, and the phenomenon being examined. The data is collected from 50 respondents as the lockdown and pandemic were at its peak. The data was collected randomly from respondents across the district, ensuring a representative sample from all the taluks. Information was collected from the respondents through a pretested structured schedule. Keeping in view the objectives and variables under study, an interview schedule was prepared and pretested in a non-study area. After pretesting certain modifications were made in schedule by consulting experts and officials and was finalized. And this was used for data collection.

The interview schedule contains both open ended and closed ended questions. The sufficient amount of flexibility and time was given during the interview. It includes the comparative questions pre COVID19 and post COVID19.The schedule included details about the farmers, certain factors like age, education, family size, farm size, income, number of farm vehicles, number of animals, water availability, crops grown, health and sanitation, and services. It also had questions without specific answers to find out any issues.

The statistical analysis employed in the study encompassed several key measures and methods. Initially, the mean was calculated to determine the central tendency of the data, providing a baseline average. Standard deviation was then utilized to assess the dispersion of the data points around the mean, offering insights into the variability within the dataset. The coefficient of variation was employed to ascertain variation independent of measurement units, facilitating comparisons across different populations. Subsequently, correlation analysis, specifically employing Karl Pearson's coefficient, elucidated the relationship between variables, distinguishing between positive and negative correlations. Additionally, regression analysis was conducted to explore potential causal relationships between variables, with the regression equation derived through the method of least squares. These analytical tools collectively provided a comprehensive understanding of the dataset, allowing for rigorous examination and interpretation of the study's findings.

RESULTS AND DISCUSSION

Table-1: Visualization of distribution of independent variables (x1-x11) and dependent variables (Y_1-Y_5) in terms of Range, Mean, Standard deviation, and coefficient of variation.

Variables	Minimum	Maximum	Mean	Std. Deviation	CV
Age (X_1)	26	68	47.16	11.73	24.87
Education (X_2)	1	18	8.79	3.75	42.66
Family size (X_3)	3	24	6.16	3.39	55.03
Farm size (X_4)	1	65	7.64	10.55	138.08
Income (X_5)	10000	2000000	310469.38	337200.30	108.60
Number of farm vehicles (X_6)	1	4	1.51	0.91	60.26
Number of farm animals (X_7)	1	166	9.02	24.63	273.05
Water resource availability (X_8)	1	3	1.53	0.73	47.71
Crops grown (X_9)	1	2	1.93	0.24	12.43
Health and sanitation (X_{10})	2	10	5.91	2.42	40.94
Service sector facilities (X_{11})	1	10	5.71	2.76	48.33
Change in economic factors (Y_1)	-9	5	-2.12	3.86	-
Change in production(Y_2)	-6	3	-0.95	1.96	-
Change in farm technology(Y_3)	-4	5	0.06	2.09	3483.33
Change in response to market(Y_4)	-9	0	-2.24	2.92	-
Change in Farm Management (Y_5)	-6	5	-1.06	2.49	-

Table-2: Coefficient of correlation between 5dependent variables (Y_1-Y5) and 11 independent variables (x1-x11)

Sl.no.	Variables	r value				
		Y_1	**Y_2**	**Y_3**	**Y_4**	**Y_5**
1	Age (X_1)	0.008	0.200	0.038	-0.056	-0.258
2	Education (X_2)	-0.216	-0.246*	0.087	0.061	-0.368**
3	Family size (X_3)	-0.201	-0.205	0.012	0.063	-0.092
4	Farm size (X_4)	-0.249*	-0.224	0.181	-0.078	-0.188
5	Income (X_5)	-0.048	0.078	-0.024	0.080	0.124
6	Number of farm vehicles (X_6)	-0.200	-0.063	0.049	0.067	-0.008
7	Number of farm animals (X_7)	-0.034	0.056	-0.008	-0.253*	-0.006
8	Water resource availability (X_8)	0.073	0.069	-0.004	0.113	0.054
9	Crops grown (X_9)	-0.065	-0.122	-0.074	0.054	0.103
10	Health and sanitation (X_{10})	0.002	-0.025	-0.353*	0.029	0.128
11	Service sector facilities (X_{11})	0.013	0.049	0.082	0.037	0.065

*****Correlation is significant at the 0.05 level (2 tailed)

Table-3: Multiple regression analysis:change in economic factors (Y_1) with 11 causal variables

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.339	6.787		-0.197	0.845
	X_1	0.012	0.058	0.037	0.214	0.832
	X_2	-0.053	0.195	-0.051	-0.273	0.786
	X_3	-0.007	0.297	-0.006	-0.025	0.980
	X_4	-0.041	0.116	-0.111	-0.357	0.724
	X_5	4.379E-07	0.000	0.039	0.193	0.848
	X_6	-0.509	0.711	-0.118	-0.715	0.480
	X_7	-0.018	0.027	-0.109	-0.651	0.520
	X_8	0.933	0.895	0.175	1.041	0.305
	X_9	-0.533	2.598	-0.033	-0.205	0.839
	X_{10}	0.046	0.302	0.028	0.151	0.881
	X_{11}	-0.076	0.233	-0.053	-0.324	0.748
	Y_2	0.021	0.343	0.010	0.060	0.953

	Y_3	0.064	0.344	0.034	0.186	0.853
	Y_4	-0.261	0.215	-0.200	-1.213	0.234
	Y_5	0.486	0.289	0.319	1.679	0.102

Dependent variable Y   R square 24.5%The standard error of the estimate: 4.087

Table-4: Multiple regression analysis:change in production (Y_2) with 11 causal variables

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.663	3.396		0.195	0.846
	X_1	0.017	0.029	0.103	0.593	0.557
	X_2	-0.071	0.097	-0.136	-0.727	0.472
	X_3	-0.041	0.149	-0.071	-0.274	0.786
	X_4	-0.037	0.058	-0.196	-0.630	0.533
	X_5	1.485E-06	0.000	0.264	1.340	0.189
	X_6	0.096	0.358	0.045	0.268	0.790
	X_7	0.008	0.013	0.100	0.594	0.556
	X_8	-0.016	0.455	-0.006	-0.036	0.971
	X_9	-0.759	1.294	-0.093	-0.586	0.562
	X_{10}	-0.158	0.149	-0.195	-1.062	0.296
	X_{11}	0.064	0.116	0.091	0.553	0.584
	Y_1	-0.286	0.165	-0.304	-1.732	0.092
	Y_3	-0.053	0.109	-0.082	-0.485	0.631
	Y_4	-0.019	0.151	-0.025	-0.128	0.899
	Y_5	0.005	0.086	0.010	0.060	0.953

a. Dependent variable Y2R square 23.9%The standard error of the estimate: 2.045

Table-5: Multiple regression analysis: change in farm technology (Y_3) with 11 causal variables

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.335	3.376		0.395	0.695
	X_1	0.023	0.029	0.127	0.786	0.437
	X_2	0.076	0.097	0.138	0.789	0.435
	X_3	-0.174	0.145	-0.284	-1.197	0.239

	X_4	0.064	0.057	0.320	1.115	0.273
	X_5	-2.721E-07	0.000	-0.046	-0.240	0.811
	X_6	0.044	0.357	0.019	0.122	0.904
	X_7	0.004	0.013	0.052	0.331	0.743
	X_8	-0.301	0.450	-0.107	-0.668	0.509
	X_9	-0.437	1.293	-0.050	-0.338	0.738
	X_{10}	-0.334	0.139	-0.389	-2.395	0.022
	X_{11}	0.117	0.115	0.155	1.021	0.315
	Y_1	-0.057	0.109	-0.083	-0.526	0.602
	Y_2	0.187	0.147	0.232	1.275	0.211
	Y_4	0.016	0.085	0.030	0.186	0.853
	Y_5	-0.284	0.164	-0.267	-1.732	0.092

a. Dependent variable Y3R square 33.1%The standard error of the estimate: 2.036

Table-6: Multiple regression analysis: change in response to market (Y_4) with 11 causal variables

Model		Unstandardized Coefficients		Standardized Coefficients		g.
		B	Std. Error	Beta		
1	(Constant)	-6.574	5.185		-1.268	0.214
	X_1	-0.021	0.046	-0.082	-0.469	0.642
	X_2	0.024	0.153	0.030	0.157	0.876
	X_3	0.213	0.230	0.240	0.929	0.360
	X_4	-0.124	0.088	-0.431	-1.401	0.170
	X_5	2.006E-06	0.000	0.232	1.151	0.258
	X_6	0.309	0.558	0.093	0.554	0.583
	X_7	-0.023	0.021	-0.188	-1.115	0.273
	X_8	0.946	0.692	0.231	1.367	0.181
	X_9	0.950	2.025	0.076	0.469	0.642
	X_{10}	-0.055	0.236	-0.044	-0.234	0.817
	X_{11}	0.054	0.182	0.049	0.296	0.769
	Y_1	-0.023	0.235	-0.020	-0.099	0.921
	Y_2	-0.159	0.131	-0.207	-1.213	0.234
	Y_3	-0.130	0.267	-0.084	-0.485	0.631
	Y_5	-0.141	0.268	-0.097	-0.526	0.602

a. Dependent variable Y4 R square 21.8% The standard error of the estimate: 3.194

Table-7: Multiple regression analysis: change in farm management (Y_5) with 11 causal variables

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.121	3.861		0.290	0.773
	X_1	-0.078	0.030	-0.353	-2.567	0.015
	X_2	-0.243	0.103	-0.355	-2.348	0.025
	X_3	0.137	0.168	0.180	0.815	0.421
	X_4	-0.096	0.064	-0.392	-1.502	0.142
	X_5	2.363E-06	0.000	0.320	1.923	0.063
	X_6	0.255	0.406	0.090	0.629	0.534
	X_7	0.003	0.015	0.033	0.225	0.823
	X_8	0.206	0.517	0.059	0.399	0.692
	X_9	1.031	1.469	0.096	0.702	0.488
	X_{10}	0.054	0.172	0.050	0.312	0.757
	X_{11}	0.013	0.133	0.014	0.095	0.925
	Y_1	0.158	0.094	0.240	1.679	0.102
	Y_2	-0.025	0.195	-0.019	-0.128	0.899
	Y_3	0.244	0.191	0.197	1.275	0.211
	Y_4	-0.012	0.125	-0.015	-0.099	0.921

a. Dependent variable Y5 R square 43.2% The standard error of the estimate: 2.327

The study delved into multiple factors influencing farmers' responses amidst and post-COVID-19, revealing diverse patterns of consistency and correlation among key variables. Age (X_1) emerged as a strong determinant, with a mean age of 47.16 years and a relatively narrow standard deviation of 11.73. In contrast, education (X_2) and family size (X_3) displayed moderate levels of consistency, with means of 8.79 and 6.16, respectively, yet exhibited broader standard deviations of 3.75 and 3.39. Conversely, farm size (X_4) and income (X_5) demonstrated wide variability, with coefficients of variation reflecting poor and very low consistency, suggesting considerable heterogeneity within these aspects of farmers' circumstances.

Regarding the dependent variables, the study uncovered intriguing correlations between economic changes and various factors. Change in economic factors (Y_1), with a mean of -2.12 and a standard deviation of 3.86, displayed a significant correlation with farm size (X_4), indicating a potential relationship between farm scale and economic resilience. Change in production (Y_2) showed a mean of -0.95 and a standard deviation of 1.96, correlating significantly with education (X_2), implying that educational attainment might influence productivity responses amidst economic fluctuations.

Moreover, change in farm technology (Y_3) exhibited a mean of 0.06 and a standard deviation of 2.09, significantly correlating with health and sanitation facilities (X_{10}), hinting at the interplay between technological adaptation and infrastructural support. Change in response to the market (Y_4) displayed a mean of -2.24 and a standard deviation of 2.92, correlating significantly with the number of farm animals (X_7), suggesting a potential link between livestock management practices and market responsiveness. Lastly, change in farm management (Y_5) demonstrated a mean of -1.06 and a standard deviation of 2.49, significantly correlating with age (X_1) and education (X_2), underscoring the potential influence of experience and knowledge in agricultural decision-making processes.

These findings underscore the multifaceted nature of farmers' responses to economic challenges, indicating that various factors, including demographic characteristics, resource availability, and technological capacity, play interconnected roles in shaping adaptive strategies. Such insights are critical for policymakers and agricultural stakeholders seeking to devise targeted interventions that enhance the resilience and sustainability of farming communities in the face of evolving economic conditions, particularly in the context of global crises like the COVID-19 pandemic.While this study provides valuable insights into the impact of the COVID-19 pandemic on farmers' behaviours, it is important to acknowledge several limitations. The ex-post-facto research design used, while effective for exploring associations, limits our ability to establish causality. As a result, observed correlations between variables such as farming practices and income changes cannot be definitively attributed to the pandemic alone, as other factors may have influenced these outcomes. Additionally, the high variability in independent variables like farm size and income, coupled with the lack of statistical significance in some analyses, suggests that the findings may not be fully generalizable. This variability and the absence of significant results indicate that further research with larger sample sizes and more refined statistical methods is needed. Lastly, while correlations between variables are noted, it is crucial to remember that these do not imply causation. Future studies employing experimental or longitudinal approaches could offer more definitive insights into these relationships. Despite these limitations, this study lays a foundation for understanding the pandemic's effects on agriculture and points to important areas for future exploration.

To address the challenges identified in this study, it is recommended that policymakers implement targeted financial support programs and subsidies for smallholder farmers, facilitate better access to local and regional markets, and develop comprehensive emergency response plans for the agricultural sector. Agricultural extension services should promote the use of digital tools to provide timely information, conduct training programs on sustainable farming practices, and collaborate with NGOs to support vulnerable farmers. Farmers are encouraged to diversify their crops, form or join cooperatives to enhance their bargaining power, and adopt new technologies to increase efficiency and productivity. By following these recommendations, stakeholders can build a more resilient agricultural sector capable of withstanding future crises.

CONCLUSION

The COVID-19 pandemic has hit farmers the worst, causing problems like higher input costs, lower incomes, and fewer production opportunities due to supply chain disruptions and labour shortages. Despite these challenges, there's been a slight uptick in using farm technology, thanks to mobile tools, while market issues have led to less middlemen involvement but also price instability and crop wastage. With fewer labourers available, more farmers are turning to machinery, but they still struggle with shortages of inputs and agricultural advisors, making farming more expensive.

Farmers are facing tough times, dealing with lower prices for their produce, limited marketing options, delays in getting what they need, and worries about health. They prefer the situation before COVID-19 and are looking forward to improvements. Suggestions to help them include using insurance or compensation plans, joining contract farming, sharing machinery costs, trying mixed cropping for extra income, and using digital tools for farming info and decisions. It's also smart to find other ways to make money to cushion against future crises.

Ethical Approval And Consent

This study followed strict ethical guidelines by getting approval from the Institution's Ethics Committee and making sure all participants gave informed consent. Participants were told about the study's purpose, procedures, risks, and benefits. Their personal information was kept confidential by removing identifiers and securely storing the data, which only the research team could access. These steps ensured the privacy and well-being of everyone involved.

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Details of the AI usage are given below:

1.ChatGPT was used for finding grammar mistakes and editing the same.

2.

3.

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