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Impact of COVID-19 on output supply of vegetables in the Raipur district of Chhattisgarh

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Abstract

The COVID-19 pandemic triggered unprecedented disruptions across sectors, including agriculture and its supply chains. This research goes through the specific consequences of the pandemic on the output supply of vegetables in the Raipur district of Chhattisgarh, India. Focusing on this regional context, the study investigates how the pandemic-induced challenges affected the production and distribution of key vegetables.

The study employed a detailed examination of the region's vegetable supply chain, encompassing input acquisition, production, postharvest processes, transportation, and marketing. Information was gathered using a multistage random sampling method, and the farmers were classified according to their land holdings. The research sheds light on the differential impact of the pandemic on various categories of farmers, ranging from marginal to large landholders.

Through an analysis of farmer experiences, the study reveals a nuanced picture of the pandemic's effects on vegetable output supply. While some farmers faced significant losses due to disrupted sales channels and labor shortages, others managed to navigate challenges by adopting flexible marketing strategies. The research explores the quantities of vegetables sold, highlighting variations in outcomes across different farm sizes.

Furthermore, the study examines the marketing channels employed by farmers during the pandemic. It identifies shifts towards direct-to-consumer sales, on-farm retailing, and adjustments in wholesale marketing practices. These adaptive responses highlight the resilience of the agricultural community in Raipur district.

In conclusion, the study emphasizes the significance of comprehending the specific effects at the local level within the wider framework of global crises. It contributes valuable insights for policymakers, agricultural practitioners, and stakeholders seeking to build more resilient supply chains. By uncovering the strategies employed by farmers to cope with disruption, the study provides lessons that can inform future strategies for enhancing the stability and sustainability of vegetable output supply chains during unforeseen challenges.

Keywords: Agriculture, COVID-19, output supply, supply chain, vegetables

Introduction

COVID-19 has severely impacted all countries in the world and has caused several supply chain disruptions globally (Ivanov 2020; Choi 2020; Govindan, Mina, and Alavi 2020) [9, 3, 6]. The global economy came to a halt as a result of the COVID-19 pandemic, fulfilling the World Health Organization's warning that the outbreak would impact every sector and have a devastating effect on humanity. (Aday & Aday, 2020) [1].

After the arrival and attack of Covid-19 pandemic in India from first week of March 2020, it has lot of vegetative impact in the input supply chain and postharvest supply chain, transportation, retail marketing and trade of fruits and vegetables. Initially rumours and speculation led to the stockpiling of semi-perishable items such as potatoes and onions, causing a sudden surge in demand and subsequently impacting an increase in retail prices. This situation was influenced by the interrupted transportation of fruits and vegetables across the country due to border closures. Mass migration triggered shortage of farm labourers trained in farm works inducing broken supply chain round the country (Joshi et. al. 2019) [10]. There were major supply chain disruptions in the input and output markets of agriculture at global level (Ramakumar, 2020) [16]. Large-scale market closures occurred post-March 2020, with markets in the majority of regions operating for just two or three days per week. Many large private traders were not operational because of disruptions in truck services. When trucks were available, truck drivers were not available as many drivers had returned home.

Consequently, the quantities of crops that did not arrive in the markets may have been sold informally, if not dumped, at lower prices than in the regulated markets.

The reviewed literature collectively highlights the profound impacts of the COVID-19 pandemic on vegetable production and supply chains in various regions. Overall significant negative effects were observed, including reduced sales, lower prices, and diminished incomes for vegetable farmers. The pandemic led to challenges in the sale and disposal of perishable items, particularly in the absence of post-harvest storage options. In India, significant negative effects were observed, including reduced sales, lower prices, and diminished incomes for vegetable farmers. The pandemic led to challenges in the sale and disposal of perishable items, particularly in the absence of post-harvest storage options

This paper used data directly collected from farmers to understand disruption to production, sales and supply of vegetables in Raipur district of Chhattisgarh, to draw lessons from COVID-19 and its effects on perishables vegetables. Therefore, the study aimed to investigate how the pandemic impacted the sales and supply of vegetables for farmers in a specific region. This research examines the real-world effects of the COVID-19 pandemic on vegetable production, including its impact, management strategies, economic viability, sales, supply and waste disposal methods. This study serves as a valuable resource for future pandemic-related agricultural research. Additionally, it offers valuable insights to economic researchers operating within this field and in neighbouring sectors facing similar circumstances.

Material and Methods

Context

India registered its initial case of COVID-19 on January 30, 2020, and initiated initial response measures that encompassed restrictions on international travel and bolstering the healthcare system. On March 24, 2020, a comprehensive nationwide lockdown was imposed, which has been extended multiple times and remains in effect as of the present writing. However, there have been gradual relaxations in accordance with the severity of COVID-19 in various zones.

The lockdown coincided with the peak harvest of Rabi season for specific fruits and vegetables in many regions of India (FAO 2020) [4]. Agricultural activities were largely permitted to continue, and they were exempted from the COVID-19 lockdown restrictions, except in areas classified as active containment zones (Padhee and Pingali 2020) [14]. However, restrictions on public and private transport limited the movement of seasonal workers and agricultural inputs, especially crop protection products. This had a significant adverse effect on accessing markets for sales. The abrupt closure of outlets resulted in vegetable producers having a reduced customer base. Street food vendors, restaurants, and supermarkets were mandated to close, though small food shops and open-air markets were allowed to operate with time restrictions (GAIN 2020) [5].

The study has been confined to the Raipur district of Chhattisgarh. Five major vegetables grown in the study area is selected for the study i.e., Tomato, Brinjal, Okra, Cabbage and Cauliflower. A multistage random sampling technique

was adopted to select villages and respondents. The farmers were categorized in four groups on the basis of the size of land holdings viz. marginal farmers (up to 1 Ha.), small farmers (>1-2 Ha.), medium farmers (>2-4 Ha.), and large (>4 Ha.). Twenty-one villages have been selected from the surrounding area of Raipur city and from those villages 171 vegetable growers have been selected. This comprised 58 marginal farmers, 48 Small Farmers, 35 small farmers and 30 Large farmers. Tabular analysis was employed including percentage in respect of sales and marketing channel.

Table 1: Number of sample farmers under different categories

Village	Marginal	Small	Medium	Large	Total
Labhandi	3 (5.17)	5 (10.42)	2 (5.71)	0	10 (5.85)
Pirda	1 (1.72)	1 (2.08)	3 (8.57)	0	5 (2.92)
Bahkhtara	4 (6.90)	2 (4.17)	2 (5.71)	1 (3.33)	9 (5.26)
Nawagaon	2 (3.25)	1 (2.08)	0	0	3 (1.75)
Godhi	1 (1.72)	0	0	0	1 (0.58)
Doma	3 (5.17)	3 (6.25)	1 (2.86)	4	11 (6.43)
Julum	2 (3.45)	2 (4.17)	2 (5.71)	2 (6.67)	8 (4.68)
Raveli	2 (3.45)	3 (6.25)	3 (8.57)	3 (10)	11 (6.43)
Tekari	3 (5.17)	2 (4.17)	2 (5.71)	3 (10)	10 (5.85)
Bhatagaon	5 (8.62)	2 (4.17)	2 (5.71)	4 (13.33)	13 (7.60)
Datrenga	4 (6.90)	2 (4.17)	2 (5.71)	2 (6.67)	10 (5.85)
Kathadih	3 (5.17)	3 (6.25)	2 (5.71)	1 (3.33)	9 (5.26)
Khurmudi	4 (6.90)	3 (6.25)	3 (8.57)	2 (6.67)	12 (7.02)
Jamrao	3 (5.17)	2 (4.17)	2 (5.71)	1 (3.33)	8 (4.68)
Gomchi	2 (3.45)	3 (6.25)	1 (2.86)	1 (3.33)	7 (4.09)
Parsada	3 (5.17)	3 (6.25)	2 (5.71)	2 (6.67)	10 (5.85)
Mujgahan	3 (5.17)	2 (4.17)	2 (5.71)	1 (3.33)	8 (4.68)
Tendua	3 (5.17)	2 (4.17)	1 (2.86)	1 (3.33)	7 (4.09)
Dondekhurd	2 (3.45)	2 (4.17)	0	0	4 (2.34)
kopedih	2 (3.45)	3 (6.25)	2 (5.71)	2 (6.67)	9 (5.26)
Dharampur	3 (5.17)	2 (4.17)	1 (2.86)	0	6 (3.51)
Total	58 (100)	48 (100)	35 (100)	30 (100)	171 (100)

Selection of Crops

For the selection of major crops study purpose, secondary data of the area of vegetables from the last 4 years and taken out an average of the area of all major crops were listed, and after estimating the average, five major crops were selected i.e. Brinjal, cabbage, cauliflower, Okra, and Tomato crop.

Table 2: Area of vegetable crops in Raipur district of Chhattisgarh (Ha.) (TE-2018-19 to 2021-22)

Vegetables	2018-19	2019-20	2020-21	2021-22	Average
1. Brinjal	3727	3258	3262	3272	3379.75 (13.47)
2. Cabbage	1329	1178	1182	1186	1218.75 (4.86)
3. Cauliflower	1721	1312	1315	1319	1416.75 (5.65)
4. Okra	2880	2120	2135	2643	2444.50 (9.75)
5. Tomato	4508	4126	4130	2638	3850.50 (15.35)
6. Total Vegetables	16301	11184	11285	12321	12772.75 (50.92)
Total Vegetables	30466	23178	23309	23379	25083 (100)

Directorate of Horticulture and Farm Forestry, Chhattisgarh, Government of Chhattisgarh, Department of Agriculture Development and Farmers Welfare and Biotechnology, Raipur

Collection of data

Primary data from vegetable farmers were collected through field survey by the interview method with the help of a well-structured questionnaire. The secondary data of the study area were collected from different Government offices of the Department of Deputy Directorate of Agriculture, Directorate of Horticulture and Farm Forestry, Chhattisgarh, and also from the various government websites and District statistical year book. This study is fulfilled through tabulation and analysis of the data pertaining to the study.

Results and Discussion

Output supply of vegetables by the sampled farmers during the pandemic

Farmers who experienced reduction in sales due to COVID-19 sold their produce through multiple marketing channels, from selling directly to consumers (on farm), to selling through middlemen in wholesale market. Overall, 14 (8.19 percent) farmers sold nothing, 15 (8.77 percent) farmers lost most (60-90 %) of the vegetables, 28 (16.37 percent) farmers lost almost half (40-60%) of vegetables and 46 (26.90 percent) farmers lost some of the vegetables and 68 (39.77 percent) farmers sold almost all the vegetables. 36 (21.05

percent) marginal farmers sold all their vegetables in the market and only 2 (3.45 percent) marginal farmers lost most of their produced. 22 (45.83 percent) small farmers sold all their vegetables in the market. 10 (28.57 percent) medium farmers lost most of vegetables grown. Only 7 (20 percent) medium and 6 (20 percent) large farmers sold nothing (>90%). Only 9 (30 percent) large farmers lost most of vegetables grown by them. Table 3 shows that the medium and large farmers faced problems to sell their vegetables in the market but 58 small and marginal farmers lost little or none.

The farmers had to sell the vegetables in a limited time. Because of which vegetables were sold in different marketing channel. Table 4 shows that the overall, 89 (52.09 percent) farmers sold their vegetables in retail market and on farm followed by 46 (26.90 percent) farmers sold their vegetables in wholesale market and on the farm. 17 (9.94%) farmers sold their vegetables on farm, 10 (5.84%) farmers sold vegetables in both in retail and wholesale market, 9(5.26%) farmers in only in wholesale markets. From table 4.2 it is clear that marginal and small farmers got profit by selling vegetable in retail market and on farm.

Table 3: Quantity sold by the sample Farmers during Covid under different heads

Directorate of Horticulture and Farm Forestry, Chhattisgarh, Government of Chhattisgarh, Department of Agriculture Devel Particular	Marginal	Small	Medium	Large	Overall
Sold Nothing (>90%)	0	1 (2.08)	7 (20)	6 (20)	14 (8.19)
Lost most (60-90%)	2 (3.45)	4 (8.33)	5 (14.29)	4 (13.33)	15 (8.77)
Lost half (40-60 %)	3 (5.17)	6 (12.5)	10 (28.57)	9 (30)	28 (16.37)
Lost some (10-40%)	17 (29.31)	15 (31.25)	8 (22.86)	6 (20)	46 (26.90)
Lost little/ None	36 (62.07)	22 (45.83)	5 (14.29)	5 (16.67)	68 (39.77)
Total	58 (100)	48 (100)	35 (100)	30 (100)	171 (100)

Note: Duration is March 2020 to August 2020

Note: Figures indicate proportion of sum in parentheses.

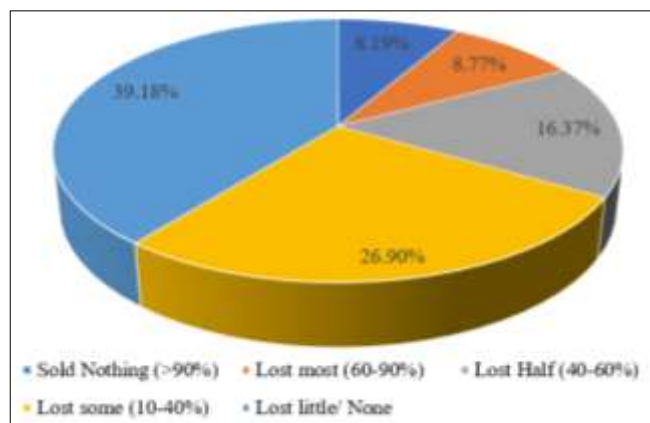


Fig 1: Overall percentage of vegetables sold by the sample farmers

Table 4: Vegetable sold in different marketing channels under different heads

Particulars	Marginal	Small	Medium	Large	Overall
Only in wholesale market	0	0	7 (20)	2 (6.67)	9 (5.26)
Only on farm	2 (3.44)	6 (12.5)	2 (5.71)	7 (23.33)	17 (9.94)
Both on farm and retail	56 (96.55)	23 (47.92)	10 (28.57)	0	89 (52.04)
Both on farm and whole sale market	0	15 (31.25)	10 (28.57)	21 (70)	46 (26.90)
Both in wholesale and retail	0	4 (8.33)	6 (17.14)	0	10 (5.84)
Total	58 (100)	48 (100)	35 (100)	30 (100)	171 (100)

Note: Figures indicate proportion of sum in parentheses.

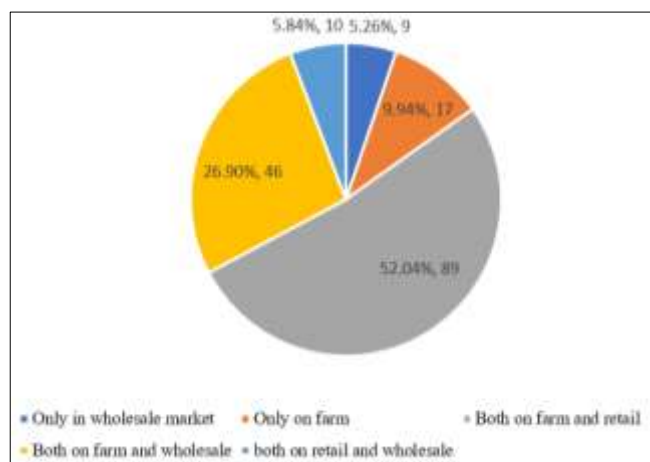


Fig 2: Overall percentage of vegetables sold in the different marketing channels

Conclusion

The COVID-19 pandemic cast a far-reaching shadow over global economies and supply chains, exposing vulnerabilities and triggering unprecedented challenges. This study, focused on the impact of the pandemic on vegetable output supply in Chhattisgarh's Raipur district, offers a localized perspective on the broader disruptions faced by agricultural communities. The data highlights the resilience and adaptability of small and marginal farmers in the face of challenges posed by COVID-19. They were more successful in finding alternative channels to sell their produce due to less quantity of produce. Medium and large farmers faced a broader spectrum of

outcomes, with some experiencing significant losses due to huge quantity of vegetables. This information underscores the importance of understanding and addressing the unique challenges faced by different categories of farmers during crises like the COVID-19 pandemic. It's really important to carefully understand how the pandemic affected different types of farmers. This helps us to designing effective support programs and policies. Recognizing the strengths and challenges of each group can help ensure a more equitable and sustainable agricultural sector in times of crisis.

The study's insights hold valuable implications for future crisis management and agricultural policy. Policymakers can draw lessons from the adaptive strategies employed by farmers, particularly in developing more robust supply chain structures. By recognizing the significance of localized responses and diversification of marketing channels, stakeholders can work toward creating more resilient systems that can weather disruptions with greater efficiency.

In a broader context, this research contributes to the understanding of how localized agricultural communities cope with global crises. By shedding light on the nuanced dynamics within a single district, it serves as a microcosm of the broader challenges and adaptive strategies witnessed worldwide. The lessons drawn from the Raipur district's experiences offer a blueprint for building resilient supply chains and ensuring food security in an increasingly uncertain world.

As the world grapples with the lasting effects of the pandemic and prepares for potential future disruptions, the insights gained from this study can serve as a guidepost for policymakers, researchers, and agricultural practitioners. By integrating local wisdom with global knowledge, it is possible to forge a path toward more sustainable and robust agricultural systems that can withstand and recover from unexpected shocks.

Abbreviation

- WHO:** World Health Organization
- FAO:** Food and Agricultural Organization
- COVID-19-** Coronavirus Disease 2019
- Ha-** Hectare
- GAIN:** Global Alliance for Improved Nutrition

Author's Contribution

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✓	Design the analysis
	Collected data
✓	Contributed data or analysis tool
✓	Perform the analysis
✓	Wrote the paper
	Other contribution

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	Design the analysis
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✓	Contributed data or analysis tool (Helped in analyzing data)
	Perform the analysis
	Wrote the paper
	Other contribution

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	Design the analysis
✓	Collected data
	Contributed data or analysis tool
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	Other contribution

References

- Aday S, Aday MS. Impact of COVID-19 on food supply chain. *Food Quality and Safety*. 2020 Dec;4(4):167-180. DOI: 10.1093/fqsafe/fyaa024
- Alam GMM, Khatun MN. Impact of COVID-19 on vegetable supply chain and food security: Empirical evidence from Bangladesh. *PLoS ONE*. 2021 Mar;16(3):e0248120. DOI: 10.1371/journal.pone.0248120
- Choi TM. Risk analysis in logistic system: A research agenda during and after the COVID-19 pandemic. *Transportation Research Part E: Logistics and Transportation Review*. 2020;145:102190. DOI: 10.1016/j.tre.2020.102190
- FAO. Local Food systems and COVID-19; A glimpse of India's responses. <http://www.fao.org/in-action/food-forcities-progra,e/news/detail/en/c/1272232/> Published 2020.
- GAIN (Global Alliance for Improved Nutrition). Impact of COVID-19 on food systems: A situation report (edition 1-3). <http://www.gainhealth.org/resource/reports-andpublications/impact-covid-19-food-system-situation-report> Published 2020.
- Govindan K, Mina H, Alavi B. A decision support system for demand management in health care supply chains considering the epidemic outbreaks: A case study. *Transportation Research Part E: Logistics and Transportation Review*. 2020;138:101967. DOI: 10.1016/j.tre.2020.101967
- Gu HY, Wang CW. Impacts of the COVID-19 pandemic on vegetable production and countermeasures from an agricultural insurance perspective. *Journal of Integrative Agriculture*. 2020;19:2866-2876. DOI: 10.1016/S2095-3119(20)63429-3
- Harris J, Depenbusch L, Pal AA. Food system disruption: initial livelihood and dietary effects of COVID-19 on vegetable producers in India. *Food Security*. 2020;12:841-851. DOI: 10.1007/s12571-020-01064-5
- Ivanov D. Predicting the impact of epidemic outbreaks on global supply chains: A simulation-based analysis on the coronavirus outbreak. *Transportation Research Part E: Logistics and Transportation Review*. 2020;136:101922. DOI: <https://doi.org/10.1016/j.tre.2020.101922>
- Joshi P, Kulkarni U, Munje S, Kulkarni S. Impact of COVID-19 pandemic on Indian fruits and vegetables export, post-harvest management supply chain and future strategies. *AgricINTERNATIONAL*. 2019;6(4). DOI: 10.5958/2454-8634.2019.00015.9
- Kaur S, Samota MK. Addressing the impact of lockdown due to COVID-19 pandemic on Indian farmers. *National Multilingual Conference on problems and opportunities in Agriculture: In and after COVID 19*. 2021.
- Kumar SS, Schreinemachers P, Pal AA, Manickam R, Nair RM, Srinivasan R, *et al*. The continued effects of COVID-19 on the lives and livelihoods of vegetable farmers in India. *PLoS ONE*. 2023;18(1):e0279026. DOI: 10.1371/journal.pone.0279026
- Mahajan K, Tomar S. Here Today, Gone Tomorrow: COVID-19 and Supply Chain Disruptions. *American Journal of Agricultural Economics*. 2020. DOI: <http://dx.doi.org/10.2139/ssrn.3596720>
- Padhee AK, Pingali P. Lesson from a pandemic to repurpose India's agricultural policy. *Nature India*. 2020.
- Poudel P, Poudel M, Gautam A, Phuyal S, Tiwari C, Bashyal N, Bashyal S. COVID-19 and its Global Impact on Food and Agriculture. 2020. DOI: 10.35248/2322-3308.20.09.221
- Ramakumar R. India's Agricultural Economy during the Covid-19 Lockdown: An Empirical Assessment. *Indian Journal of Agricultural Economics*. 2022;77(1):January-March.
- Sharma R, Shishodia A, Kamble S, Gunasekaran A, Belhadi A. Agriculture supply chain risks and COVID-19: mitigation strategies and implications for the practitioners. *International Journal of Logistics Research and Application*. 2020:1-27. DOI: <http://doi.org/10.1080/13675567.2020.1830049>