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Covid-19 Led Vulnerability of Vegetable Production and Marketing: Insights From Marginal Farmers of Odisha

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Abstract
The global economic crisis due to COVID 19 pandemic has revealed how the supply chain of agricultural marketing has been devastated in general and vegetable farming in particular. So, this paper tried to examine the impact of COVID-19 on the vulnerability of vegetable farmers in Odisha. To execute the study, data were collected from vegetable growers through a direct personal interview method. Data were analyzed by using descriptive statistics and a multi-variable regression model to evaluate the vulnerability of farmers as well as to identify the factors affecting the extent of vulnerability. Survey findings indicate that 71 per cent of farmers were able to sell 60-80 per cent of their harvested product in the market and the rest products were wasted. The prime reasons for the losses are lockdown, lack of buyers in the markets and fear of coronavirus spreading among consumers as well as producers. The empirical study is evident that significant factors such as production quantum, land cultivated, and having personal vehicle have negative impact on the vulnerability extent of farmers. The study got its originality, as it considers marginal farmers with both rented and owned forms of land holdings.

Keywords: COVID-19 Pandemic, Marginal Farmers, Marketing, Vegetables

Introduction:

The vulnerability of agriculture is greater to uncertainties and natural calamities, as it is a very sensitive activity (FAO, 2019). In the disastrous situation of COVID-19, the agricultural sector is retarded all over the world (Adhikari et al., 2020). The Economic cost of the health disaster on the Macroeconomy as a whole is very high across the globe. It not only affected the production and distribution but also

impacted employment vigorously and the unskilled laborers fully lost their work during the initial phase of lockdown. Particularly in the agri-food system workers are unemployed during the initial phase of lock-down after that the economy is slowly revised but it is nothing positive change in the agri-food system workers' employment due to the sluggish recovery of restaurants and uncertainty in external demand (Zhang et al., 2020). The world economy has exposed its vulnerability and threatens to derail socio-economic goals. COVID-19 pandemic has also a massive blow to the Indian economy and has caused enormous hardship to every sector of the country. The COVID-19 lockdown was started in March which devastated the sectoral growth of an economy and most specifically agricultural harvesting and marketing of Rabi crops in the Indian state. The closure of transportation facility and restriction on movements has created many difficulties in harvesting and marketing Rabi season crops. The vegetable is one of the major productions in Rabi season in our country and more particularly in Odisha.

India is the second largest producer of vegetables in the world after China. India constitutes 17 per cent of vegetable production in the world (Shankar et al., 2017). But still, we are lacking behind to fulfill the requirement. Indian Council of Medical Research (ICMR) suggests per capita consumption of vegetables should be 300g per day but the per capita consumption of vegetables is 135g per day in India. So, there is greater scope for the development of vegetable production in our country to be self-sufficient. The income elasticity of rice and wheat has become almost zero or even negative but price elasticity is very high (Kumar & Joshi, 2014). But on the other hand for fruits and vegetables income elasticity is positive and own price elasticity has decreased and become very low (Acharya, 2015). This indicates the potential market for vegetable production. With the increase in per capita income, there is greater scope for vegetable production in our economy. In our country, 1 lakh crore value of agricultural products per annum are being wasted due to inefficiency in the marketing system (Acharya, 2015).

The perishability and bulkiness nature of vegetable production makes it more vulnerable. COVID-19 lockdown affected the agriculture sector negatively (Poudel et al., 2020). But the study shows that agriculture is the only sector in which the growth rate is positive but the food system is destroyed through the breaking of the supply Chain during the pandemic period (Dilnashin et al., 2021; Mahajan and Tomar, 2021). According to the Agricultural Produce Market Committee (APMC), price of vegetables and fruits have declined 15-20 per cent due to a descent demand from hotel, restaurants, and street vendors. Farmers were not getting the fair price of their crops in the market. They were not only suffered in the aspect of the value of their product but also in the quantity sold of their product. Farmers could not sell their output in the market due to various restrictions (Aday and Aday, 2020) and the imperfect market mechanism. This downfall in consumer demand occurred due to disruption in the supply chain of products. Farmers in such a critical time period not only face harvesting problems but also bear a heavy loss in sales. But at the same time study revealed that, the pandemic has hardly impacted the sales stage by increasing the market risks of vegetable production and the high gap between field price and market price (Hai-ying & Chang-wei, 2020).

Vegetable cultivation as a labour-intensive activity required lots of labour hours during the harvesting of products in the month of March and April. But the restriction on the movement of labour as an obligatory action and the fear spread of disease as a self-concerned action made a huge labour deficiency in the market (Ananth, 2020; Arumugam et al., 2020). As a result of which harvesting of the product was underperformed with only the help of family labour and additional work time. Farmers also faced the problem of inputs shortage in form of access and increased prices due to the non-availability of raw materials and poor transport facilities (Yadav, 2020). On one hand, farmers had tolerated the increasing

cost of production and on the other hand, they had faced declining returns due to lower prices in the market. It is observed that the availability and access of different inputs including labor get affected in both short and long periods during the pandemic situation. Particularly the Small and marginal farmers faced difficulties to transport their harvest, inputs, and laborers due to COVID guidelines. As a result, there is a huge loss in food distribution due to the shift of consumption pattern from perishable goods to essential items i.e., masks, sanitizer, medicines, etc. (Balkan et al., 2021).

The COVID-19 pandemic has disrupted the supply chain of vegetable harvesting and marketing (Sahoo & Samal, 2020). Both the demand side as well as supply-side are affected by this pandemic (Poudel et al., 2020). On the Supply-side it affected the production and marketing through labour availability and distribution of output into the market on the other hand on the demand side the negative income shock reduced the market access and the consumption pattern of the households has changed due to the rise in prices of different articles (Cariappa et al., 2021) The problems faced by the Indian agricultural sector and supply chain of food due to the COVID pandemic are that farmers faced problems to harvest their crops in time, they are not getting the fair price of their crops in the market, and they are not getting seeds of crops because for lockdown and shut down (Yadav, 2020; Arumugam et al., 2020). All prices spiked initially in April, they recovered relatively quickly, underscoring the importance of time duration for analysis. Wheat prices were anchored in large part by the MSP while tomato prices were low in some months. Supply constraints began erasing in the month of May with greater market arrivals perhaps reflecting distressed sales (Varshney et al., 2020). On one hand, farmers had incurred increasing costs of production due to a shortage of labour, on the other hand, suffered because of wastage of the product. The majority of farmers had suffered yield loss on their harvest (Kapil, 2020). As a result, the revenue of farmers declined, resulting in unsettling the expenditure pattern of farmer households (Ananth, 2020). Farmers had struggled to generate funds to meet the working capital for cultivation during this period (Kak, 2020). The lack of buyers in the market was resulting in wastage of products and also low prices for the products. In many dimensions, vegetable farmers were worst affected during the pandemic period (Kapil, 2020). The wide-ranging vulnerability of farmers due to COVID 19 is rarely addressed in studies. With the aforementioned studies and bizarre scenarios of COVID-19 from different aspects, the study tried to examine the impact of COVID-19 on the vulnerability of vegetable farmers in Odisha.

Data and Method

The present study is carried out by employing both primary and secondary data. The sample size is 336 farmers who are engaged in vegetable cultivation. The data are collected by using a pre-tested structured schedule in the direct personal interview method during July-September 2021. The study got its importance as it deals with marginal farmers; of which rented pattern of land is more practiced. The statistical tools used to analyze the data are descriptive in nature; these are per, frequency, and average. A multi-variable regression model is applied to examine the determinants of the extent of vulnerability of vegetable farmers. The functional form of the model is given as;

Index of vulnerability = f (Education of the farmer, Production quantum, Family size, Possession of own transportation facility, Land cultivated, Having COVID pass)

The multi-regression equation among the variables is as follows;

$$Yi = a_0 + \sum_{i=1}^{6} (a_i Xi) + \epsilon i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.\ldots (1)$$

Where,

Y_i = Index of vulnerability which is a composite index of 9 variables index score in ordinal scale. 9 indicators are labour shortage, shortage of seed, shortage of fertilizer, availability of pesticide and insecticide, availability of transportation vehicles, increasing cost of transportation, lack of buyers, wastage of product and fear of police. An Index is developed by using a score of 9 indicators on a rating scale of 1 to 5. The vulnerability index is the average score of these 9 indicators (Behera et al., 2021).

a_0 = Intercept parameter, a_i's = Slope parameters, X_1 = Education of farmer, X_2 = Family size,

X_3 = Production per week, X_4 = Land size,

X_5 = 1, if the farmer household have own transportation vehicle

= 0, if not,

X_6 = 1, if the farmer was not provided COVID pass

= 0, otherwise and

ϵ_i = Error term

Result analysis:

The low return from traditionally grown crops compelled farmers to practice diverse and economically benefited crops. In this light farmers found vegetable production as a comparably higher return crop with their existing know how of agricultural practices in India. As a result of this, farmers practiced vegetable production for commercial purposes with increased intensification and production. The picture of this can be visualized in table 1.

Over the years in India area under vegetable cultivation as well as its quantum of production has increased. But in the case of Odisha, the productions of vegetables are nearly static. But vegetable production (8.24 per cent) constitutes an important portion of the total agricultural area in 2018-19. So consideration of the vulnerability of vegetable production with greater perishability nature in the COVID-19 lockdown scenario is rational. In this line, the field experiment results states that most of the farmers (68 per cent) in our study are primarily educated and most of them are belong to the Other Backward Classes (OBC) category. With these educationally and socially backwardness characteristics of sampled farmers the analysis of the study is as follows.

The study is relevant as it deals with farmers cultivating with very small amount of land with intensified vegetable production. And more particularly, cultivators are cultivating on their rented land. Vegetable cultivation is generally practiced on high land, which is often small in size. But the return from vegetable production is quite comparatively better if everything goes well. So the majority of farmers of the area are practicing vegetable cultivation during the Rabi season. But the amount of rent paid for land is very high with an average amount of rupees 8089 per 0.04 acre. Due to the non-availability of own suitable land for vegetable production, farmers are cultivating other people's land with a high amount of rent. The preparedness of farmers for paying a high amount of rent for land is here indicating greater agricultural intensification and higher expectations about the return from it. The detailed land structure of vegetable cultivation is given below in table 2.

The mean cultivated size of land for vegetable production is 0.092 acres, which is very low. And we can notice that the range of land cultivation is also not large. This indicates that the highest amount of land used for vegetable production is 0.28 acres. It provides us a clear picture that these farmers are very marginal in production. Three different forms of land practices for vegetable production are used in the study area. One form is own land cultivation, the other one is shared where harvested production is

shared between farmer and owner of land with a certain ratio (as per practice in the locality), and another form is rented where an amount of money farmer paid to the land owner. With these small land sizes, they also used to produce a good amount of product. The scale of production is generally quite high. But in the catastrophic situation of COVID 19 lockdown, these farmers also faced many difficulties.

One of the important problems faced by vegetable cultivators is the selling of their products in the market. In our study, all farmers opined that they had experienced problems in selling their products in the market. Some farmers could manage to sell their product to some extent while some others had suffered a lot due to the imposition of restrictions on movements. But all have gone through the problem, only the extent varies which is shown in the following table 3.

Cultivators on average could able to sell 63.62 per cent of vegetables in the market, within the limit of 40- 80 per cent in the Rabi season. The majority of farmers could able to sell 50-80 per cent of their harvested product in the market. No farmers could able to sell more than 80 per cent of their product. As a result, a huge amount of products were being wasted. So overall every farmers were affected by the COVID-19 lockdown. There are many reasons for which farmers could not sell their products fully in the market which is shown in the following table 4.

There are many reasons for the inability to sell all vegetables in the market by farmers. Lockdown and fear of corona spreading were the most important reason for it (Chen and Yang, 2021). Farmers also face the problems like transportation facilities, low prices, and no market to sell their products. In support of field observation, the literature supported that the traditional small farmers had faced serious losses as compared to e-commerce business-linked farmers due to a substantial price gap in these two different markets places (Hai-ying & Chang-wei, 2020). The restrictions were very strict and also continued for a long period of time, which was the exact time of vegetable harvesting. Thus, farmers could not able to sell their all products in the market. An Ethiopia based study confirmed that just half of the sample households were affected by the Covid-19 crisis mainly because of loss of revenue and consumer confidence and further the spread effect leads to destructed supply chain and increased cost burden on sellers (Temesgen et al., 2022). But permission was given by government officials to move for necessary activities like of it was selling agricultural products. But all farmers could not get the COVID pass due to procedural complexity and many other reasons. From certain viewpoints and self-observation from the field, the study has found 9 broad problems faced by vegetable cultivators. Farmers were asked to rate each problem faced by them on a rating scale of 1-5. Here response i.e., 5 indicates the maximum problem while 1 indicates the least problem. The table 5 gives us a picture of the different problems faced by farmers.

The study found that lack of buyers is the most important problem faced by vegetable farmers followed by fear of police in movement. Lack of buyers was a serious problem faced by farmers during the COVID-19 lockdown as its mean score is 4.90 and also the minimum score of it is 4. The third most important problem faced by farmers is the wastage of products followed by a labor shortage. As vegetables are a quickly perishable product, due to restrictions on movements, lack of effective buyers, and non-availability of the storage facility, farmers suffered a huge wastage of their product. As a restriction on movements and fear of corona spreading at the top level, a noticeable labour shortage had faced by farmers for their farming activity. Some other problems like shortage of seed, and fertilizer, availability of pesticide, and transportation facility were faced by farmers with also high scores. Thus, overall farmers have experienced serious problems in the course of farming activity as well as the marketing of their products. The extent of vulnerability varies from farmer to farmer due to different so-

cioeconomic characteristics, which is shown in the following table 6.

The result of the regression model reflects that the vulnerability of farmers due to COVID-19 lockdown is very high, but the extent of vulnerability to some extent varies due to different socio-economic characteristics. Years of schooling have a negative impact on the vulnerability of farmers but are statistically not significant. Increases in one year of schooling have reduced 0.01 score in the vulnerability of farmers due to the COVID-19 lockdown. An educated farmer could deal with the problems in a well manner, and as a result which extent of vulnerability is reduced. Family members have a positive significant impact on farmers exposed to lockdown situations. Farmers having personal motor vehicles have a negative impact on the vulnerability of farmers at a 5 per cent level of significance. Land cultivated and provided by COVID pass have a negative impact on the vulnerability of farmers but is not statistically significant. Production per week has a negative significant impact on farmers' vulnerability during the lockdown. Farmers having a low level of production suffered most due to the problem of the scale of production. The r square of 0.22 indicates that the goodness of fit of the model is 22 per cent. As the Durbin Watson statistics is 1.95 which is closer to 2, there is an absence of autocorrelation in the model. The absence of multi-collinearity also can be noticed as the mean VIF is 1.38 and all variables have VIF much lower than 5.

Policy Suggestions and Conclusion:

The pandemic has curtailed both harvesting and marketing of vegetables during the initial period of COVID-19 in the state with strict restrictions and enforcements. Farmers and more particularly vegetable growers had dreadfully affected during the period. A significant proportion of the product was wasted either by an inability to harvest or the lack of effective demand in the market. Lack of buyers, fear of the police, wastage of product, and unavailability of transportation facilities were important problems faced by vegetable farmers during the period. The disruption in the harvesting and marketing of vegetables has resulted in an increased cost burden in production and revenue loss on the part of farmers. To some extent, both central and state government had tried to suppress the negative impact of COVID-19 on the agricultural sector, but the dimension of vulnerability due to the pandemic was such large that the agricultural sector could not be insulated. As a result, the agricultural sector in general and many farmers, in particular, were severely affected during this period.

In general Government of India and Odisha has many active policies on agriculture and food security. But there was no specific policy on food security to address the right to food issues during pandemics or emergency periods. In this regard to mitigate different challenges with respect to agricultural and food security issues government need to initiate or start a new program or policies like some innovation on production, distribution and buffer stock of perishable food items like vegetables, fruits etc. Adoption of E-marketing may decline the loss of revenue and waste of food items during the pandemic situation. Farmers producing perishable food items need to practice home delivery services to sell the said products in the respective local markets. Local authorities should collect the perishable Agri-product from the farmers and sell them in the local area through vegetables/fruits on wheels. Authorities need to strengthen the governance system to handle pandemic-like situations. No COVID protocol on production and transportation of perishable food items. These policy measures may revive the socio-economic conditions of vegetable farmers.

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