



## **An Analysis on Vegetables Profitability after Covid-19 Pandemic**

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### **ABSTRACT**

The present study was conducted during 2022-23 with the objectives to estimate the profitability of vegetable production (onion as a case study) before, during and after the COVID-19 lockdown and identify the constraints facing vegetable farmers in the studied areas. The research data has been collected from different ways like Harvest Price Survey, Agriculture Marketing Information Service (AMIS) and Farmers Survey telephonically. Economic parameters like net return and BCR were calculated for profitability analysis. Likert type scale was also used to determine the constraints faced by the farmers. Based on published data set (2018-2022) the maximum price rise (180%) was recorded during January month in comparison to minimum price (16.53%) during September. Like before COVID-19 lockdown during 2019-2020 the profit was calculated as PKR 38158/acre which was decreased (-25.47%) with PKR 28441/acre during COVID-19 lockdown. Then after COVID-19 lockdown the profit value was calculated as PKR 31894/acre with 12.14% increase over year period. Based on Likert type scale significant scores the major constraints were recorded as high cost of inputs, pest and diseases attack, perishability of produce, price fluctuation, inadequate credit etc. It was concluded that COVID-19 pandemic had negative effect on the profitability of vegetable production and the economy of the country. An improved supply chain, Global food decentralization, adopting digital technologies for crop monitoring and pest management might be possible measures to counter COVID-19 effects.

### **Keywords**

COVID-19, Gujranwala, Net returns, Onion, Vegetable profitability

### **INTRODUCTION**

Sustainability of global food systems has been a growing area of research interest in recent years after COVID-19 outbreak that began in early 2020. Having undergone one of the most stringent global lockdowns in 2020, followed by one of the deadliest second waves in 2021, understanding food system disruptions across economic and public health crises among farmers can be instructive for several lower middle-income countries where agriculture remains the staple employer for most of the population. With the changing nature of the pandemic, government and market responses evolved in Pakistan and across the globe to mitigate the trade-offs between livelihoods, nutrition and health. The economic impact of COVID-19 disturbances on farms and agricultural workforce-dependent households, agribusiness firms, and rural and urban buyers were severe, according to Boughton et al., (2021), who conducted research across Myanmar's agri-food system. The COVID-19 pandemic has particularly affected the supply of perishable foods such as vegetables, which could adversely affect food and nutrition security. Adebisi et al., (2021), noted that there was increase in expenditure on food items during the lockdown as the price of food items also increased during the period.

The COVID-19 pandemic has caused the breakdown of vegetables supply chain. Due to movement restrictions, traders were not able to come in the area. Farmers were forced to sell some parts of their product (about 25%) in the local markets directly to the consumers. Thereby making vegetable production quite expensive, increase its spoilage and difficulty in selling, have a negative effect on the livelihood and income of the farmers (Lucas, 2020). Horticultural crop production creates jobs. On average it provides twice the amount of employment per hectare of production compared to cereal crop production. Major vegetables in Punjab province of Pakistan include Tomato, Onion, Lady Finger, Tinda, Radish, Cabbage, Cauliflower, Carrot, Potato, Pumpkin, Cauliflower, Brinjal, Chillies, Garlic etc. Onion is an edible vegetable in the allium family, which also includes red onions, yellow onions, spring onions, leeks, ramps, scallions, chives, and shallots. Onions are a base ingredient that adds flavor to many dishes. Therefore, onion as a vegetable is an important and essential ingredient for our daily cooking (Ali et al. 2002). Pakistan's rural areas recorded food inflation of 40.2%, the bureau told Reuters. Food inflation for both rural and urban areas reached 48.1%, the highest since FY16 when the bureau started recording the categories separately (Anonymous, 2023).

Therefore, this study was conducted with the objective to estimate the profitability of vegetable production (onion as a case study) before, during and after the COVID-19 lockdown and identify the constraint facing vegetable farmers in the studied areas.

**MATERIAL AND METHODS**

The study was conducted during 2022-23 to make an analysis on vegetable profitability after COVID-19 pandemic. The data used in this study has been gathered from a variety of sources. The detail is as under: -

**Harvest Price Survey:** The harvest prices survey is an annual survey conducted by the crop reporting service wing of the Agriculture Department Punjab. Harvest price is what is received by the growers at the time of harvest or within 2 months after the harvest of a crop in the villages where these are grown. Harvest prices are collected by the staff of Crop Reporting Service to determine the price level at the Farm Gate. This primary data of the survey is not available publicly, we could access the primary data through the Department of Agriculture. For the purpose of this research, we obtained the data for Onion for the years 2019 to 2023.

**Agriculture Marketing Information Service (AMIS):** is a publicly available information service managed by the Directorate of Agriculture (Economics & Marketing) Punjab. It provides daily auction prices of agriculture commodities from 135 markets across Punjab. AMIS also provides the daily record of supply of commodities from the origin in Pakistan (called arrival source) to destination in Punjab. We scraped daily data on auction prices and arrival sources for Onion for the years 2019 to 2023.

**Farmer Survey:** Punjab Province has five cropping zones: (i) rice-wheat, (ii) mixed cropping, (iii) cotton-wheat, (iv) rain fed or arid, and (v) low intensity (Ahmad et al. 2019). During 2022-23, the Adaptive Research Farm, Gujranwala conducted a computer-assisted telephone survey of 120 Onion farmers across four districts (i.e. Gujranwala, Hafizabad, M.B.Din, Sialkot and Narowal) lying in rice-wheat cropping zone of Punjab Province and interviewed them through purposive sampling technique.

Economic parameters like net returns and BCR were calculated for profitability analysis. The net returns was calculated as: **Net returns = Gross returns – Gross variable cost**

The benefit cost ratio (BCR) was calculated with the formula as (CIMMYT 1988);

**BCR = Gross returns / Gross variable cost**

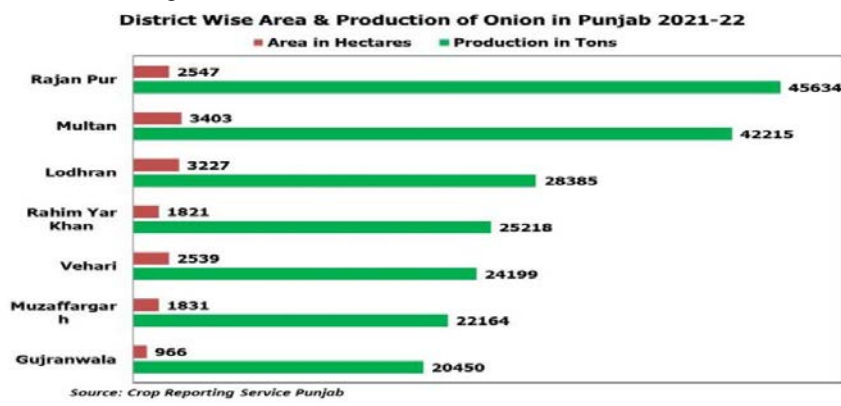
Likert type scale was used to determine the constraints faced by the vegetable (Onion) farmers in the study area e.g. high cost of inputs, perishability of the produce etc. A five-point scale consisting of ordinal measurement (i.e. 1-5) was used to examine the intensity. The five- point scale includes; 1=Not serious, 2=Less serious, 3=Moderately serious, 4=Serious, 5=Very serious

Therefore;  $X_w = 5(F_5) + 4(F_4) + 3(F_3) + 2(F_2) + 1(F_1)$

Where,  $X_w$  = Total weighted score, 1-5 = Rating scale of not serious (1) to very serious (5)  $F_5-F_1$  = Frequency of the respondents in each scale, and  $X_w$  was used to rank constraints faced by vegetable farmers.

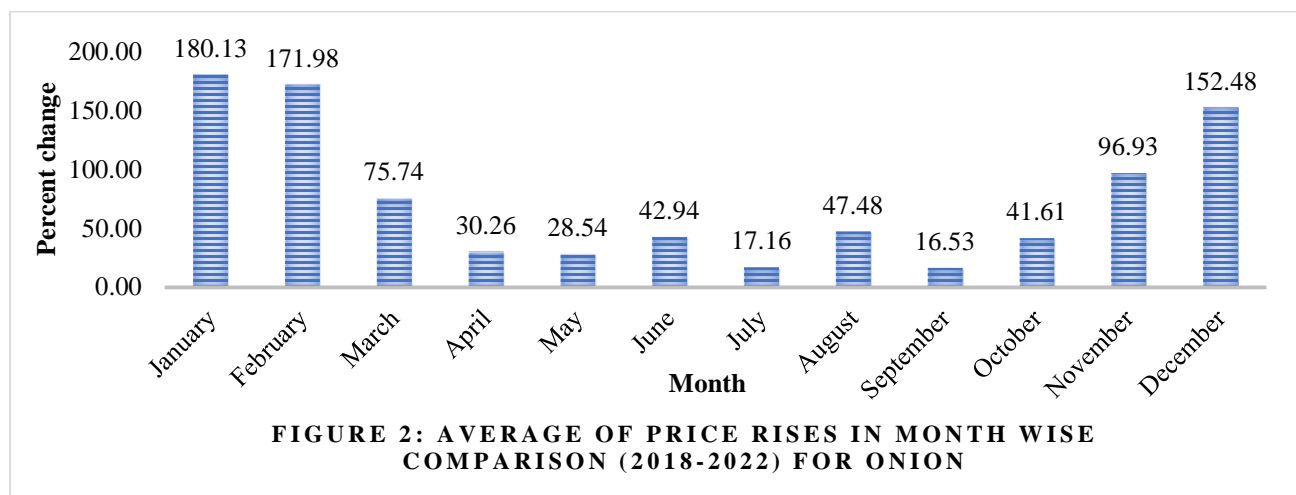
**RESULTS AND DISCUSSION**

Availability of onion crop in markets remains normal during March to July in Punjab province of Pakistan. The top Onion Producing districts of Punjab are Rajan Pur, Multan, Lodhran, Rahim Yar Khan, Vehari, Muzaffargarh & Gujranwala etc. (Figure 1). In rice-wheat cropping zone Gujranwala district lies in top 10 districts of Punjab in producing Onion; the main vegetable in basket of food.



**Figure 1: District wise area and production of onion in Punjab during 2021-22**

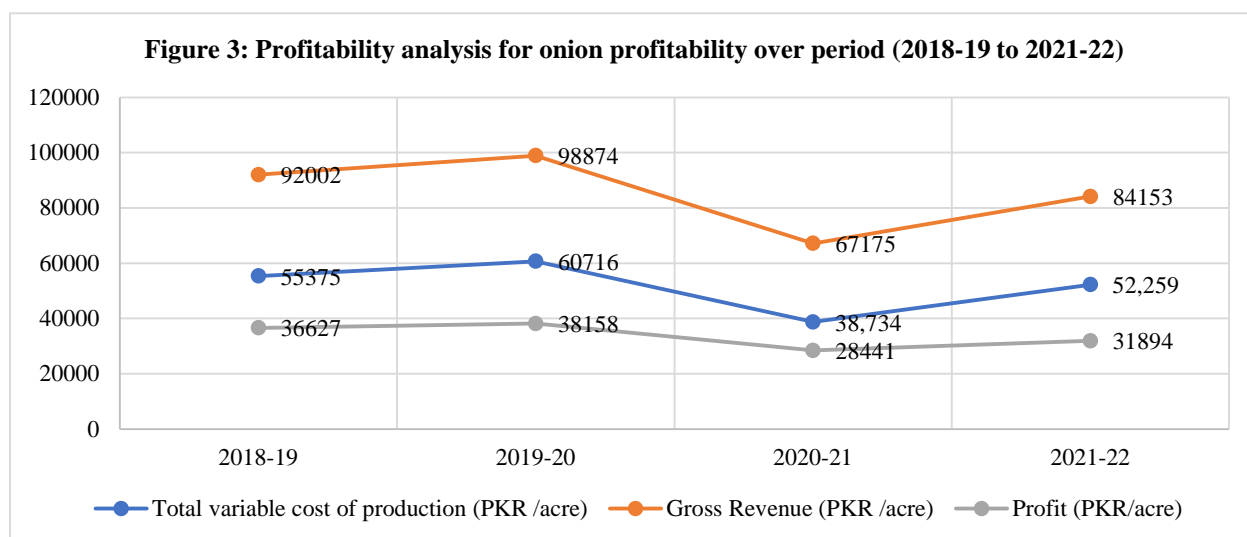
Based on published data set (2018-2022) the calculated average prices rise (month wise) has been analyzed with percent change values (Figure 2). The maximum price rise (180%) was recorded during January month in comparison to minimum price (16.53%) during September.



There was significant difference across the total profit earned from the sale of onion crop. Like before COVID-19 lockdown during 2019-2020 the profit was calculated as PKR 38158/acre which was decreased (-25.47%) with PKR 28441/acre during COVID-19 lockdown. Then after COVID-19 lockdown the profit value was calculated as PKR 31894/acre was with 12.14% increase over year period. Total variable cost of production (PKR /acre) included the cost of seed, fertilizer, herbicide, irrigation, insecticide, manure, harvesting & marketing and labour. The profitability index (BCR) showed that for every one Pak Rs spent on onion production before, during and after COVID-19 lockdown, almost same level of outcome was achieved with significant difference in net returns (profit) values (Table 1 and Figure 3).

**Table 1: Profitability analysis for onion profitability over period (2018 to 2022)**

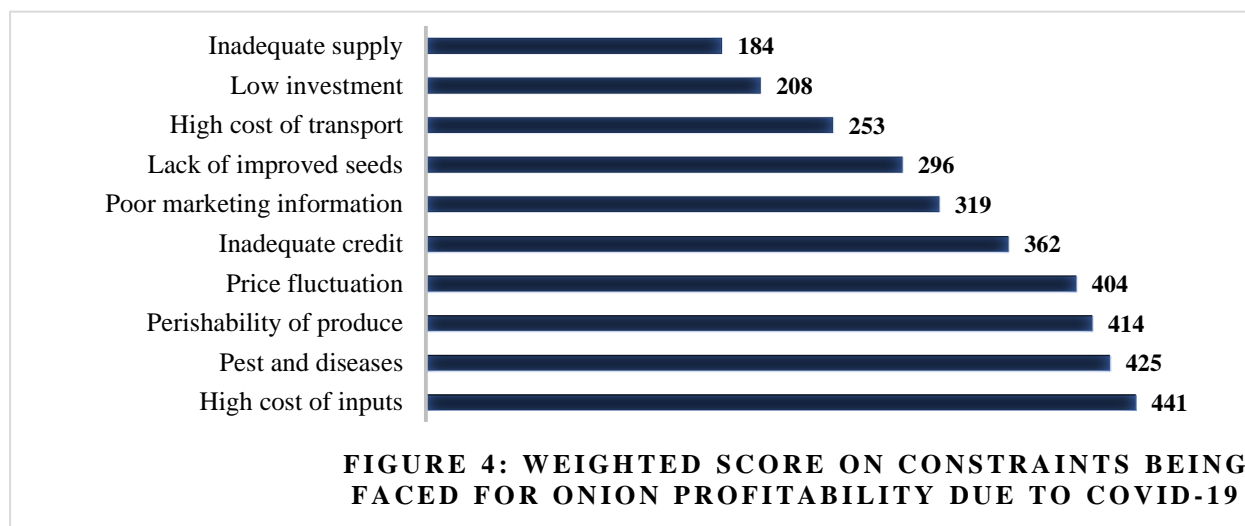
Year	Before Covid-19	During Covid-19	After Covid-19	After Covid-19
	2018-19	2019-20	2020-21	2021-22
Total variable cost of production (PKR /acre)	55375	60716	38,734	52,259
Indicative Price (PKR/40 Kg) @ 25%	979	1001	727	793
Avg. Yield (40kg/acre)	93.98	98.78	92.4	106.12
Gross Revenue (PKR /acre)	92002	98874	67175	84153
Profit (PKR/acre)	36627	38158	28441	31894
Profit (% change) over year		4.18	-25.47	12.14
BCR	1.66	1.63	1.73	1.61



There was high perception (weighted score of 441) among the respondents given high cost of inputs as a serious factor limiting vegetable production in the study area and it was ranked first using the Likert type analysis. This is in line with Rahman and Matin (2020). Pest and diseases were ranked second with a weighted score of 425; as reported by the farmers, it hinders the productivity of the vegetables thereby reducing output and farmers' income. This corroborates with Adeoye (2020) who stated that pest and disease, inadequate storage facilities and high cost of inputs are the major constraints that affect vegetable production in Nigeria. Perishability of produce, Price fluctuation were ranked third and fourth with a weighted score of 414 and 404 respectively. Other constraints included; Inadequate credit, Poor marketing information, Lack of improved seeds, High cost of transport, Low investment and Inadequate supply (Table 2 and Figure 4).

**Table 2: Constraints being faced for onion profitability due to Covid-19**

Constraints	Weighted score	Mean score	Rank
High cost of inputs	441	3.68	1
Pest and diseases	425	3.54	2
Perishability of produce	414	3.45	3
Price fluctuation	404	3.37	4
Inadequate credit	362	3.02	5
Poor marketing information	319	2.66	6
Lack of improved seeds	296	2.47	7
High cost of transport	253	2.11	8
Low investment	208	1.73	9
Inadequate supply	184	1.53	10



About 34% of survey respondents indicated that their households experienced losses in wages and non-farm earnings because of COVID-19, and 24% reported that at least one family member had returned home from urban and other areas. Farm households were burdened by increase in the number of household members and reduced cash income, which resulted in reduced non-food expenditures (15%) and lowered food consumption (10%). Vegetable and fruit growers were severely affected because they could not sell their produce owing to market closures and restricted movement of goods. Milk producers were also affected, as traders were unable or unwilling to buy milk from dairy producers. As many restaurants and markets shut down, the demand for milk collapsed, resulting in low milk prices.

The survey respondents identified actions they felt were necessary and listed them in order of priority such as: The largest number (80.3%) cited ensuring price stability for agricultural produce, followed by 70.9% of respondents who stated easing of loan repayment conditions or waiving loans. The need of ensuring the availability of agriculture inputs and removing restrictions on marketing of agriculture produce in districts other than the farmers' home district were identified by 62.3% of respondents.

**CONCLUSION**

Restrictions on movement of goods upset the marketing of highly perishable products, such as vegetables like onion as they were difficult to store, unlike grains. Disruptions in the food supply chain resulted directly in income losses for producers and increased food prices.

**SUGGESTIONS**

Some of the recommendations based on this research study are as under: -

- Coping strategies like setting up a specific amount or a donation limit which needs to be provided to lower income class, migrants, laborers at such uncertain times (Workie et al., 2020). Such strategies will improve the livelihoods of the country as well as control the economy of the country.
- Global food decentralization: increasing the usage of local food products and processing technologies most suited for the particular environmental condition. The system makes an attempt to improve the countries'

economic growth, thereby saving logistics time making it more self-reliant. For instance, countries like Uganda made an attempt to build a decentralization system from district to village level (Nathan et al., 2020). Continuous campaigns were undergone to strengthen this system, making it better for households to receive food at the right time. The method has also noticed resilience in countries like the UK having a remarkable adaptive capacity (Dominic et al., (2020). It is noteworthy to mention that the whole process involves least involvement with stakeholders and third parties, thereby reducing costs with an improved planning.

- Adopting digital technologies for crop monitoring and pest management, developing advanced eco-agricultural engineering models based on the suitability of applications, implementing an awareness program on the usage of pesticide and its health hazards, development of proper food storage and processing industries, and good government policy and framework to support farmers.

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