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Assessment of farm constraints and income losses during COVID-19 lockdown in India

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ABSTRACT

A telephonic survey was conducted during May 2020 among 675 farmers across 28 districts of 11 states of India to assess farm constraints and income losses of lockdown 1.0 and 2.0. The results indicate that labour availability and input accessibility were hurdles, but manageable to some extent. However, marketing constraints inflicted 48 and 19% losses in total expected income of perishable and non-perishable commodities and average loss per farm household was ₹0.93 lakh (28%). Although, income support was given through PM-KISAN, it was not adequate to compensate losses. Therefore, farm income support needs to be enhanced to cope with lockdown losses.

Keywords: COVID-19 lockdown, Farming constraints, Farm income losses, Income support

When the entire world is grappling in an unforeseen and unparallel COVID-19 induced health and economic crisis, the Indian government has opted for people's health, between the human lives' and economic losses tradeoff. To cope with the pandemic, complete lockdown was imposed in the whole country from 25th March to 14th April 2020 (Lockdown 1.0) and extended further till 3rd May 2020 (Lockdown 2.0) with certain exceptions in low-risk areas (PIB 2020). Later, it was extended till 31st May 2020 with Standard Operating Procedure (SOP) with clearly defined guidelines for the activities to be opened or closed. This lockdown has laden the farm sector more than any other sector. Unlike other industries, operations in agricultural industry are time bound, hence, any lag in it may have significant repercussions on yield and quality which gets translated into income losses. Several studies were conducted amidst lockdown on COVID-19 impact on agriculture. Of them, reports were mainly related to impact on supply chain (Carberry and Padhee 2020, Dev and Sengupta 2020, Mishra 2020) timeliness of farm operations (Dutta 2020, Jebraj 2020, Maggo 2020), economic losses (Anonymous 2020) labour availability and migration (APEDA 2020 and FICCI 2020), production losses (Latif and Niazi 2020, KPMG 2020) marketing of produce (Narayanan 2020, Varshney *et al.* 2020) are available. However, there is dearth of studies on crop-wise losses (Ananth and Pillai 2020), household-wise losses and farm constraints in Indian context. Therefore, we attempted to analyze the major constraints faced by the farmers in agricultural activities and the extent of economic losses incurred during the lockdown.

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MATERIALS AND METHODS

This study principally deals with primary data collected through telephonic interview with farmers. The survey was carried out in 28 districts of 11 states (Andhra Pradesh, Bihar, Haryana, Karnataka, Kerala, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh) of India. The data were collected through a pre-tested schedule from the list of farmers whose mobile numbers were available with Division of Agricultural Economics, ICAR-IARI, New Delhi. During the survey, in the initial round of questions farmers without any farm operations or not faced any constraints during the lockdown, farmers not interested in survey and those with poor network connectivity were dropped from the survey thus making the effective sample size to 675 respondents. The study considered the first two phases of lockdown (25th March to 3rd May 2020, i.e. 40 days) for analysis, and the term lockdown in this study indicates this period only. Therefore, the average yield or loss in yield reflects per hectare during the study period and not the whole crop period.

Analytical procedure: The enterprise-wise and household level losses due to lockdown were estimated as;

$$CIL = Expected \left(\sum_{i=1}^{n} Yit \times Pit \right) - Realised \left(\sum_{i=1}^{n} Yit \times Pit \right) + \left(\sum_{i=1}^{n} Cit \right) \quad (1)$$

where, CIL=crop income loss (₹/ha), i=Number of crops, Y_i =Yield of i^{th} crop (q/ha), P_i = Price of i^{th} commodity (₹/q), C_i = Additional costs due to lockdown (₹/ha), t= First two phases of lockdown period (25th March- 3rd May) - 40 days

$$DIL = Expected\ (Y \times P) - Realised\ (Y \times P) + (C) \quad (2)$$

where, DIL=Dairy income loss (₹/milch animal/day), Y=Yield (Litre/ milch animal/day), P= Price of milk (₹/ litre), C= Additional costs per milch animal due to lockdown (₹/ milch animal/day)

$$Household\ loss\ (Rs) = \left(\sum_{i=1}^{n} CILi \times Ai\right) + (DIL \times N \times t) \quad (3)$$

where, CIL_i=crop income loss (₹/ha), DIL_i=Dairy income loss (₹/milch animal/day), A_i=Area under i^{th} crop (ha), N = Number of cattle, t= time period (40 days).

The perishable commodities like fruits, vegetables, flowers and milk are harvested and sold on either daily or alternative days or weekly. Therefore, the expected price is the price which was received just preceding week of a lockdown or last sale price or average price expected in the month considering the various religious festivals and marriages. While the non-perishable commodities like wheat, paddy and maize were mostly sold just before the lockdown.

The cost of operations had also changed due to the rise in the wages, transport, raw materials (eg. livestock feed, fertilizer) and other transaction costs. We did not observe rise of wage *per se,* however, transaction costs of accessing labour increased due to closure of public transport. Similarly, the yield of crops as such was not influenced by the lockdown, but the total output (harvest quantity) had changed and thus impacted the total returns. Vegetables, flowers, fruits were harvested periodically and lockdown forced the farmers to harvest part of the commodity (eg. banana, watermelon). In some extreme case, the farmers have lost whole harvest and crops were ploughed back in the field especially the commodities which were highly depending on inter-state movement or export demand (eg. jasmine, tuberose, watermelon). However, the absence of complete randomization and selection of farmers with at least one constraint in farm operation during the lockdown are two factors which limit extrapolation of our results across the states.

RESULTS AND DISCUSSION

Constraints in farm operations: To understand the various constraints faced by farmers during the lockdown, we mapped the different farm operations carried out across the country. Those crops which were having at least one activity either in production or marketing during the study period were considered for the analysis. It was observed that about two-thirds of the respondents have cultivated cereals (paddy, wheat, maize and sorghum) and more than a half of the respondents have engaged in dairying. About 58% of the respondents have undertaken horticultural enterprises during the study period, of which 38% cultivated vegetables (tomato, brinjal and onion), while 20% grew fruits. A considerable proportion of respondents (12-18%) have grown cash crops (cotton, sugarcane), oilseeds (mustard and groundnut) and pulses (gram). Also, less than 10% of them produced spices (chilli), flower (jasmine, tuberose and marigold), plantation crops (rubber and coffee) and others (beekeeping and silk production). On an average sample farmers were engaged in 2.4 enterprises, which indicate diversified income sources.

Due to the diversified agro ecological condition of the country, the farmers across the states were engaged in almost all type of production and post-production activities in one or other farm enterprise during the lockdown. Almost all the farmers (98%) reported no constraints in sowing activities and only a small proportion of farmers (8%) reported severe constraints in intercultural operations due to labour scarcity. However, the lockdown period coincided with the country's peak farm harvest seasons of the crops like wheat, mustard, sugarcane, chickpea, banana, watermelon and other fruits and vegetables. Only one-fourth of the respondents faced severe constraints in harvesting while more than a half of them severely struggled to sell their produce. The limited market operation due to lockdown immensely hit the farmers dealing in perishable commodities like flowers (95%), vegetables (76%), and fruits (75%). Contrary to the perishables, the farmers dealing in non-perishable commodities such as cereals, pulses and oilseeds were relatively less affected as these commodities can be stored and sold at a later period with the imputation of storage cost and minimal loss in its quality.

Marketing constraints: Although the economic activities were limited during the study period, we attempted to capture the constraints faced by the producers in both the input and output markets. On the input marketing front, we found that about 60% of farmers who needs agro-inputs like seeds, fertilizers and pesticides, livestock feed and services did not experience any constraints (Table 1). However, the scenario for individual input-wise constraints was quite different. In case of access to livestock feed and custom hiring machinery about 62 and 46% of respondents have faced moderate to severe constraints. They also reported a gradual increase in the livestock feed prices with the progress of lockdown due to exhaustion of existing stocks and supply disruptions. On the other hand, only about 20% of respondents reported a problem in accessing seeds and crop loan. Moreover, streamlining of sales timing of agricultural input sales has eased the access to farm inputs to the farmers. About one-fourth of respondents reported limited access to farm machinery owing to strict movement restriction and non-availability of machine operators (20%). Insights from the survey also revealed that the vegetable growers and summer paddy cultivators have faced some constraints in the procurement of inputs (plant protection chemicals and growth promoters) during the lockdown.

On the output marketing front, we found that about 69% of farmers experienced medium and severe constraints in accessing packing materials like gunny bag (for paddy, maize, wheat), crate and a cardboard box (for fruits and

Table 1 Constraints in accessing inputs, services and markets by farmers in India

Constraint	Applicable farmers			Not applicable (%)
	No constraints (%)	Moderate (%)	Severe (%)	
Inputs/services				
Seeds	77.4	14.3	8.3	46.9
Fertilizers	51.7	29.8	18.5	27.6
Pesticides	59.2	26.1	14.7	36.8
Livestock feed	37.7	39.0	23.3	50.1
Custom hiring machineries	54.4	28.5	17.1	37.2
Crop loan	79.8	7.1	13.1	61.7
Average	60.0	24.1	15.8	43.4
Output market				
Availability of gunny bags/packaging materials	31.3	19.0	49.7	20
Labour for loading and unloading	42.3	20.8	36.9	1.1
Availability of transport	47.2	31.8	21.0	2.4
Getting movement pass difficult	44.6	23.8	31.6	5.0
Closure of market (APMC/eNAM/market)	41.6	33.0	25.4	3.6
Traders and local middleman are not coming for purchase	49.4	23.3	27.3	11.7

vegetables). More than 50% of respondents reported that the lack of awareness on how to get the movement pass, lag in issuing movement pass by the local administration, limited availability of labour at mandi is for produce handling (loading and unloading) were the major factors which hampered the movement of produce from farm to market. Moreover, more than a half of the respondents have reported closure of markets. Further, the reduction in the number of load men in the market has fuelled up the marketing inefficiency. Also, the fear of infection and movement restrictions had blocked the farmer-trader interface for the trading of fruits like banana, mango, coconut and watermelon. In general, the sale agreement for these commodities used to happen during March -April. Thus, the volume of agricultural trade was severely hampered although it was exempted from the lockdown norms and has severe repercussions on farm income.

Labour constraints: Several reports (Jebraj 2020: FICCI 2020) have raised concerns over labour availability, as it could emerge as a major hindrance for contemporary agricultural operations especially harvesting of the rabi crops. However, we found that 61% of the respondents did not witness any constraints in labour availability while only 39% experienced constraint in accessing labourer's services. Of those who faced constraints in labour availability, were mostly dealing in perishables like fruits, vegetables and flowers which requires multiple pickings. Further enquiry on the labour constraints revealed that fear of COVID-19 infection (56%) and non-availability of public transport (50%) were two major problems which limited the labour availability on the farms. Further, labour shortage wasmanaged by various strategies like employing additional family members and relatives (71%). Besides, in-migration labours (52%), availability of non-farm labours (37%) also became handy for bereaved farmers.

Enterprise-wise income loss: Slump in economic activities during the lockdown had severe impact on the net returns of the farmers. In our study, we found that the farmers have incurred on an average economic loss of ₹ 1.19 lakh/ha (48%) on perishable commodities, ₹ 0.44 lakh/ha (28%) on cash crops, ₹ 0.16 lakh/ha (19%) on non-perishable commodities and ₹ 0.04 lakh (43%) per milch animal during the study period (Table 2). Among the crops, the highest loss was observed in banana (₹ 1.6 lakh/ha) followed by cucumber (1.52 lakh/ha) and least in mustard (₹ 0.07 lakh/ha). A steep decline in price was noticed in jasmine (67%) followed by tomato (58%), watermelon (49%) and least decline found in paddy (9%) and no change in price noted in sugarcane.

Reduction in the volume of trade and prices were two important factors which deflated total returns. We found that on an average, price of perishable commodities fell to the extent of 48% and 25% in case of milk. Apart from reduced prices, production loss (harvest quantity or unsold) and inflated costs have also added up to the revenue loss. We observed that about 20% of the perishable commodities' output was lost or unsold during the lockdown period. The surge in operational costs was more common in non-perishable commodities (25%) mainly due to the rise in harvesting costs. A rise in incidental charges (transport arrangement, provision of food and mask, sanitizer) for labourers and custom hiring charges for farm machinery have also added to operational costs. About 13% hike in costs was reported in cash crops and 6% in milk production. In some cases, the farmers have reported no demand for their output which rendered them to left in the field as unharvested (e.g. watermelon and banana) or completely thrashed away the crops by ploughing the field (e.g. flowers), while the dairy

Table 2 Estimated enterprise-wise economic loss due to lockdown

Enterprise	Added costs (%)	Production loss/ unsold output (%)	Reduction in price (%)	Average total returns (₹ lakh /ha)		Extent of loss	
				Expected	Realized	(₹ lakh/ha)	(%)
Horticultural crops/ Perishable commodities							
Banana	6.1	25.5	39.7	3.76	2.16	1.59	42.4
Cucumber	7.5	11.2	46.6	2.37	0.85	1.52	64.1
Jasmine	0.0	73.3	67.0	1.57	0.13	1.44	91.7
Watermelon	0.0	41.0	49.3	2.52	1.17	1.35	53.5
Tomato	5.5	21.8	58.5	2.64	1.44	1.19	45.3
Papaya	4.1	0.0	35.5	2.90	1.76	1.14	39.2
Okra	8.8	11.0	50.6	1.58	0.49	1.08	68.7
Brinjal	4.0	18.9	56.6	2.26	1.20	1.06	46.9
Onion	0.0	0.0	46.0	2.32	1.30	1.02	44.0
Chilli	6.7	16.2	36.2	1.69	0.99	0.71	41.8
Moringa	0.0	27.6	58.2	0.85	0.24	0.60	71.1
Coconut	14.0	6.8	28.4	1.36	0.78	0.58	42.6
Mango	8.1	1.1	24.1	1.92	1.52	0.41	21.1
Average	5.4	20.6	49.7	2.58	1.39	1.19	47.7
Agricultural crops (Non-perishable commodities)							
Groundnut	0.0	8.9	22.0	1.54	0.96	0.58	37.6
Maize	3.0	1.7	10.8	0.94	0.83	0.11	11.6
Gram	21.9	0.0	11.5	0.73	0.49	0.24	33.2
Wheat	29.1	1.0	15.4	0.82	0.65	0.17	20.8
Paddy	31.9	2.6	9.4	0.60	0.53	0.07	11.3
Mustard	16.7	0.0	9.7	0.69	0.62	0.07	9.8
Average	24.9	1.3	13.6	0.80	0.64	0.16	19.1
Cash crops							
Sugarcane	16.9	5.8	0.0	2.08	1.64	0.44	21.4
Cotton	3.6	9.4	25.3	0.88	0.46	0.42	47.4
Average	13.3	6.8	6.8	1.76	1.32	0.44	28.3
Milk	6.4	7.8	24.5	0.08	0.05	0.04	43.4

Note: * indicates ` lakh permilch animal for 40 days

farmers were hit hard due to increased price of livestock feed and fodder and reduction in sale volume and price of milk. The survey revealed that, despite the daily loss of ₹ 100-150 per milch animal, farmers could not stop feeding because a reduction in the feed will immediately result in a drop in milk yield and restoration will take time and also hard.

State-wise household income loss: Crop-wise income loss indicates loss per ha, irrespective of actual area cultivated by farmers. For better understanding of monetary loss to farmers, we assessed households level losses by accounting actual area cultivated under each crop and number of milch animals domesticated. We found that on an average a household had lost about one-third of their expected income which amounts to be ₹ 0.93 lakh. However, the total losses incurred by the farmers varied greatly across the states. Maharashtra recorded highest loss (₹ 2.16 lakh) followed by Tamil Nadu (₹ 1.81 lakh) and lowest loss reported in Uttar Pradesh (₹ 0.15 lakh) and Haryana (₹ 0.25 lakh). The combination of enterprises and farm size determine household level losses. The harvesting season of perishable commodities like fruits and vegetables coincided with the lockdown period. It led to huge losses to farmers in Maharashtra and Tamil Nadu.While Punjab, Haryana and Uttar Pradesh were engaged in harvesting and selling of non-perishable crops like wheat and mustard which avoided the major losses. Although the economic losses were low in Karnataka, the percentage of losses was highest and farm households lost about four-fifth of their total expected returns during the lockdown. Whereas, Punjab farmers burden was low as the loss was only four percent.

Awareness and utilization of COVID- 19 relief measures: The state and central governments announced various welfare schemes for mitigating the losses incurred during the lockdown. For example, the advance instalment of PM-KISAN *(Pradan Mantri Kissan Samman Nidhi*)

Yojana (PIB 2020c), financial assistance under direct benefit transfer such as ₹ 500 per month for women *Jan-Dhan* account holders for three months (PIB 2020d), ₹ 1000 for each ration card holding families announced by Tamil Nadu and free supply of rice, wheat and pulses by Tamil Nadu (Government of Tamil Nadu 2020). Further, the Government of India extended the Operation Greens from TOP (tomato, onion and potato) to Total (for all fruits and vegetables) to minimize the economic losses of fruits and vegetable growers (PIB 2020e). Therefore, the respondents were asked about the benefits received under COVID-19 relief packages. About 67% of the sampled farmers were aware and availed advance instalment of PM-KISAN yojana; 38% received direct cash transfer via at least any one of the states or central government programmes and 40% received some food supplies through the public distribution system. The respondents also opined that amount received under direct cash transfer were very meagre and not sufficient to meet the food needs of their family.

The study analysed the constraints faced by the farmers in agricultural operations and the extent of economic losses incurred during the first two lockdown period of 40 days. Although, on an average,only 16% of the farmers faced the severe constraints in the accessibility of inputs and services, the selling of the agricultural output was the major constraint and more than a half of the farmers reported either moderate or severe constraints. It has reflected in the extent of economic losses, especially in perishable commodities. On an average about ₹ 1.19 lakh/ha losses occurred in perishable commodities and about ₹ 0.16 lakh/ha in case of non-perishable commodities. The household-wise losses were highest in Maharashtra ₹ 2.16 lakh) followed by Tamil Nadu (₹ 1.81 lakh). The study suggests that considering the extent of losses incurred by the farmers, more income support need to be given to farm households to cope with these lockdown losses.

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