



THE IMPACT ON INDIAN AGRICULTURE TO COVID-19 IN LOCKDOWN: OPTIONS TO REDUCE

¹Nitin Kumar, ¹K.P Yadav, ²Sheekha, ¹Hemraj Meena and ¹Keshav Prasad Kurmi

Sangam University, Bhilwara, Raj. India-311001

²ICAR-Indian Agriculture Research Institute, Pusa campus, New Delhi-110012

Abstract

Indian farming has done fetching well during the current period. The yearly growth has been 3.5 to 5 % during the previous five years and the growth broad-based both in terms of the production and regions. The superior estimates of farming invention for 2019-20 are confident and the development is probable to be more than 3.5 %. Food grain production is like to be 292 million tonnes (2.4 % higher than 2018-19), as per the second prior estimates. Moreover, then horticulture production in 2019-20 is predictable to be 0.84% higher than 2018-19. However it is to be noted that any difference in usual procedure may give some set-back to these assessment, predominantly the impact of late rainfall and hailstorm on rabi crops. Advance, as per the FCI as in March 2020, the stocks of rice and wheat in the central pool stand at 58.49 million tonnes, which is more than binary the prepared buffer-cum-strategic stock of 21.04 million tonnes. All these mark to more than sufficiency of the food furnish in the country. The lockdown in the come around of COVID-19 has disrupted financially viable actions and the furnish chains appreciably. The millions of public are contaminated with COVID-19 worldwide and the casualty toll is increasing fast. It is estimated the lockdown shall flat the infectivity curve soon and important economic activities and work shall be in place. In India, the speed of infection, unfortunately, is not that rapid due to timely interventions by the government, but the influence of COVID-19 coincides with the financial slowdown. It is predictable that the lockdown shall advance decrease the financial growth about 10 % or more. This is probable to have an influence on require for farming products, displacement of labour force and distraction of furnish chains. This advancement shall have implications for the social safety net schedule of the government.

Keyword: INDIAN AGRICULTURE, COVID-19, LOCKDOWN, INFLUENCE FINANCIAL

Harvest and Post-harvest Operations

The urgent implications of the lockdown are for yield marketing and harvesting of farming goods. It appears that harvesting operations might have been acutely impacted by the lockdown which is not true. Crop harvesting is closely linked to the southern and central India and it will initiate in the central of April in northern India. Presently there is a probability of labour decrease, circumstantially in the north-west India, anywhere operations are done through contractual dispensation among labour and farmers contractors. Though, two factors hint that cutting operations shall not be impacted. Initial, labour from urban has gone back to the rural area and for them farming can be now a general resource of income. Still there is labour reduction, it will be compensated by family unit labour-farmers use more family labour during sowing farming operations. Since more than 80 % of the holdings are marginal and small, family unit labour should be sufficient for cutting operations. Secondly, the use of apparatus labour is increasing and all the large and medium farmers use apparatus for cutting. As shown in Table 1, the level of field mechanization varies from 19.59 % in rice to 39.17 in wheat. Consequently, farmers shall be capable to whole field operations and the maximum cutting may be expanded concerning one week by use of apparatus on a custom-hiring basis.

Table 1. Level of mechanization of field operations

Crop	Mechanization Index in percent (All India)	Max. (%)
Wheat	39.17	59.78 (Punjab)
Rice	19.59	30.41 (Tamil Nadu)
Corn	21.34	30.38 (Maharashtra)
Gram	28.97	42.1 (Chhattisgarh)
Arhar	23.3	29.49 (Karnataka)
Lentil	32.46	40.09 (Madhya Pradesh)
Soybean	33.1	43.24 (Chhattisgarh)
R&M	25.81	36.86 (Haryana)
Groundnut	19.39	31.77 (Rajasthan)
Cotton	13.31	17.82 (Punjab)
Sugarcane	7.66	26.50 (Maharashtra)

Source: NIAP

In general trouble is with the marketing of field yield increase in the arouse of lockdown. The Government has now exempted selling from the lockdown but still there are not numerous buyers in the bazaar and there are carriage bottlenecks. This is in part non-accessibility of largely and buyers due to bazaar inexactitude and wrong-formation. So, the public sector should Expand acquaintance about bazaar, superior practices for sociable distancing and campaign of items to secure deliver chains. The under-mentioned are some exclusive recommendations.

a) The campaign of field produce does not essentially inset campaign of a major figure of people. There are well-founded bazaar drains and transactions can capture collocation without the physical impendence of farmers. So, transportation logistics are additional significance. These can be arranged by farmers' groups or traders for reliability and the new guidelines help address this bottleneck.

b) Realisation of wheat can be wamble through rate encouragement and arrangement of bazaar arrivals. Traders have the connection of farmers for such scheduling. Produce can be delivered at the intended destinations, markets or warehouses.

c) The Government, under e-NAM, has introduced new situation to endow the data record of logical providers to traders. Etiquette these relations, traders would be capable to find entrée of over 3.75 lakhs trucks across the country. However, the reluctance of truck operators could pose hurdles to this initiative.

d) There is a require to inform a large figure of warehouses as deemed bazaar to raise the extension and reach between the farmers. In this respectability, all State Warehousing Corporation (SWC) and Central Warehousing Corporation (CWC) along with PAC warehouses should be notified as deemed bazaar, at least for the next 3 to 6 months.

e) Credit: Farmers storing their generate in these attributed warehouses would also be able to get finance through electronic Negotiable Warehouse Receipts (e-NWRs). After notifying the CWC and SWC warehouses as deemed mandis, Central/State government(s) should also available the essential sustain and modality to strengthen the environment. Moreover, farmers should be confident to use these warehouses to store at subordinate storage costs along with receiving finance through e-NWRs at a subsidized finance cost.

f) For perishables like fruits and vegetables, an intensive promotion channel can be products and evolved can be delivered straight in the terminal bazaar or to the shipment buyers. This shall decrease foster and wastage links with farmers. In the procedure, the IT-enabled marketing system shall develop which shall be more accomplished and transparent.

g) In the case with a shorted purchase during the lockdown, product diversification may be attempted by farmers. Some examples are ghee making from milk, raisin making from grapes, and oil extraction from rapeseed and mustard. This can be an opportunity to diversify the product range and the beginning of processing by farmers.

At this point, it is significance to note that the prices of some of the commodities tend to increase during this period because of their low production or non-availability. Examples are vegetables and milk and therefore moderate price

increase is normal. The rate of vegetables in offseason is also relatively superior. This means the focus should be on the provider of the product which is available with farmers or traders.

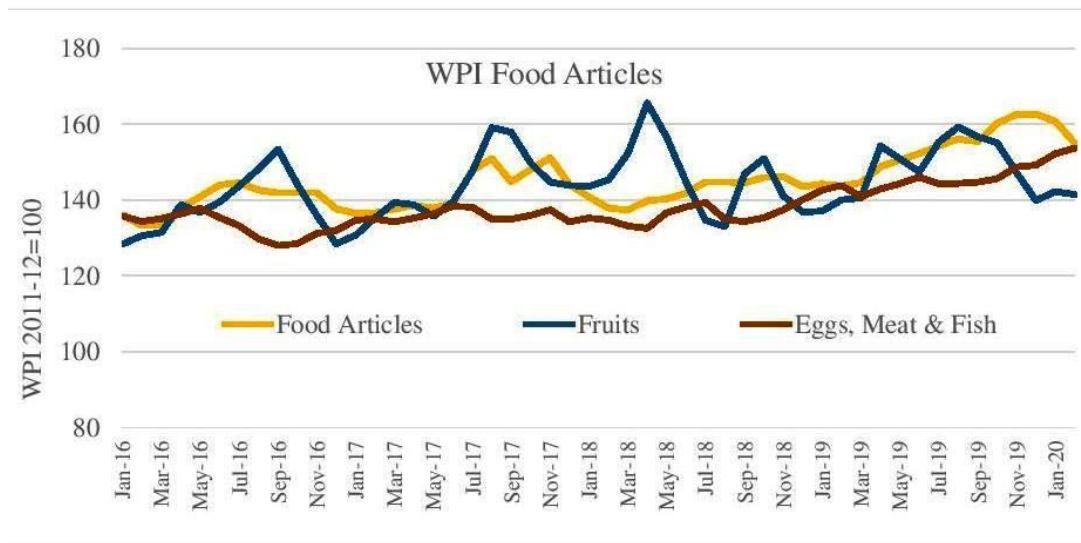
Agricultural Commodity Prices

The impact on agricultural commodity rate shall be determinate by the accessibility, predictable amend in require and disruption in the supply chains. As discussed above, the supply of food grains and other important commodities is likely to be normal because of a good agricultural year.. It is therefore expected that domestic prices of essential food commodities are likely to be stable during the lockdown and after. There is not much change in the demand except lower demand from the bottom income group primarily because of loss of income during the lockdown. The wholesale and retail rate of cereals and edible oil in the 4 metros have risen reasonably (less than 10 %) and for pulses, the price raise was 10-20 %. It was only in case of potato and vegetables, in Kolkata and Chennai and tomato in Delhi, the rate raise was 30 % or more (Table 2). Partly the price increase could be attributed to the disruption of supply chains and a large part of the price change is because of the off-season for vegetables like tomato. The same might be true for other vegetables. The supply of vegetables from hills in the off-season usually will begin at some times in May-June.

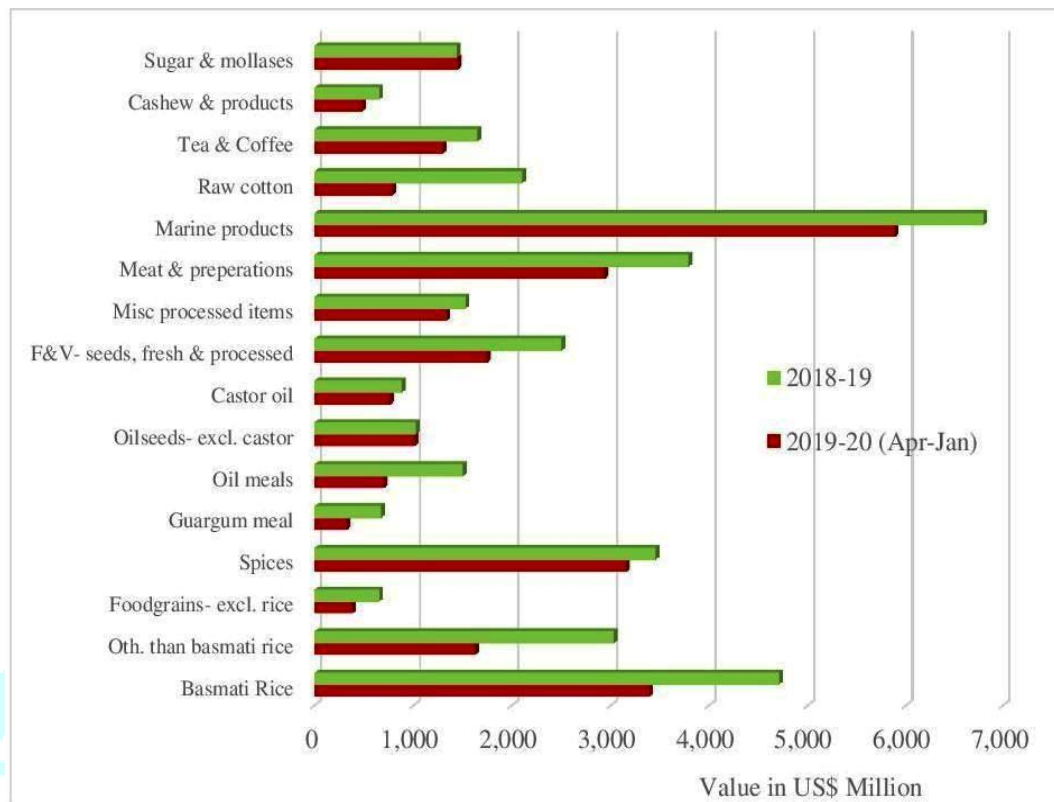
Table 2. Change (%) in retail prices and wholesale of essential food items in the post lockdown over the pre-lockdown period

Centre	Prices	Wheat	Wheat flour	Gram dal	Tur dal	Groundnut oil	Potato	Onion
Chennai	Wholesale	5.0	0.0	10.8	15.1	--	29.6	-0.2
Chennai	Retail	6.1	0.0	10.3	8.1	4.8	30.0	10.0
Delhi	Wholesale	0.0	2.9	0.7	8.6	0.0	10.4	27.0
Delhi	Retail	0.0	6.5	13.2	2.4	5.6	14.1	-0.4
Kolkata	Wholesale	--	5.7	11.0	2.1	0.7	36.9	0.0
Kolkata	Retail	--	9.6	9.2	2.3	0.8	30.8	0.0
Mumbai	Wholesale	-4.0	0.0	16.7	13.7	1.7	10.5	-13.4
Mumbai	Retail	0.0	-2.4	18.3	12.9	4.3	20.3	13.2

The trend in the wholesale rate until February 2020 shows a moderating trend, except for egg, meat and fish which are moving upward (Fig 1). But this trend regular timing the lockdown, there may not be much change in wholesale rate of necessary commodities, except for meat and milk which or else also illustrate some raise in their rise timing this duration. The international prices of agricultural commodities have been temperate because of near normal production. Because of the disruption of the export value chains, domestic prices in some of the importing countries might face an upward trend temporarily. In fact, the prices showed a declining trend since the last few years, which should have continued in the absence of the lockdown. The normalcy of the rate shall be restored with the normalcy of the deliver in both the exporting and the importing countries. An example of this is the export of shrimp to China.

Fig 1. Trends in the wholesale price index of major commodity groups

Commodity rate in major wholesale bazaar of grams, wheat, rapeseed and mustard, onion and potato were also projected for 6 weeks beginning from the third week of April.. The projected price showed a fair amount of stability during the lockdown period and beyond. The time series models were applied for the forecasts. This is in spite of the fact that bazaar arrivals of rabi crops may be delayed for a week or so. This solidity shows that there is assurance in the bazaar and the traders visualize no shortage of product and market imperfections. One major factor which can influence domestic prices is exports of agricultural commodities and the data for the lockdown period are not available. But the information collated through different sources indicate exports have taken place for significance commodities like aquaculture, fruits, and grain during February-March and not much produce is collected to discourage the domestic rate. The accessible data up to January 2020 (Fig 2) also indicate that farming exports in cost conditions in 2019-20 were similar to those in 2018-19 for mainly of the products. The cost of exports of spices, sugar, and coffee tea in 2019-20 (up to January) was approximate equal to their exports in 2018-19. The value of exports of nautical products and meat was close to the before year. However, the export rate of fruits, oil meal and rice & vegetables were much lower in 2019-20 in similarity to 2018-19. Since export of cotton and rice major export commodities, is not seasonal and here upon may catch up in February- March or since the lockdown. Thus, there may not be much stress on the domestic rate due to exports, and it the Dissociation in the supply chains in domestic bazaar which may have larger impact on the domestic rate. Hopefully, a comparable export situation shall prevail for other commodities similar to mangoes.

Fig 2. Value of Farming exports from India

Commodity rate and Field Income

A new scheme of the government and enhancement of on processing schemes are bringing motif on desirable rearward and onward linkages. Pradhan Mantri Kisan Sampada Yojana for agro/marine processing and improvement of agro-processing clusters was promoted by the (MFPI) Ministry of Food Processing Industries with an allotment of Rs. 6000 crores timing the period 2016-17 to 2019-20. RKVY has been reorganized as RKVY-RAFTAAR, which lays down that that a large share of distribution shall be apportioned for evaluative infrastructure namely (50 % for infrastructure and assets, 30 % for rate-addition linked invention projects, and rest 20 % to be used as flexi-funds). Thereby, two way production and post-production related infrastructure get inappropriate focus. Besides, 10 % of the RKVY-RAFTAAR budget has been reserved for promoting vocation and complementary incubation facilities in several ICAR centers, SAUs, KVKs, etc. Moreover, the doubling agriculture income (DAI) strategies has focused on production based growing gains; resources utilize accomplishment and sustainable exercises. In this consider, it has particularly recommended a motif on somewhat ignored crop domains like oilseeds, pulses, and nutri-cereals (millets). The strategies has paid dividends in terms of sustainable farming rise with record production of food grains and a growth price of 3.5 % or more in 2019-20.

Bazaar reforms

The DFI policy has emphasize on bazaar reforms as a stipulation to enable the farmers to realize profitable rate on their items across a combined Indian bazaar. The Government has decided to bring on-board 415 more mandis beyond the 585 already on boarded. It is also recommended to strengthen the deliver sequence for susceptible products, namely onion, tomato, and potato. In this regard, the public sector has announced the initiation of ‘Operation Greens’, to build up and encourage efficient movement of the verdant produce (greens) from field-gate to the customer. A budgetary distribution of Rs 500 crore has been prepared for 2018-19 for this reason. MoFPI has begun the work for launching this proposal. The deliver chains are however disrupted and this time to sponsor these deliver chains and make eNAM fully direction. In the privation of these reforms, there would be an unfavorable impact on field gate rate which in turn will impact the farmers’ income. These particulars are highlighted in the case studies on grapes, aquaculture and **livestock products**.

Impact on bazaar arrivals

The impact of COVID-19 on farming bazaar reveals that the bazaar arrivals declined extensively timing the first March to 10th April. India's potato, cereals and pulses arrivals declined enormously in this time in 2020 as compared to the same period in 2019. It was noticed that wheat advent declined by 59 %; Bengal gram arrivals declined by 78 %; green gram and urad also declined by more than 50 and 60 %, serially (Table 3). A part of the reject in the arrivals of gram and wheat could be attributed to accessory rains in March, delaying harvesting of these crops. Generally the movements of necessary commodities have been stuck due to lockdown which is disturbing both farmers as well as customers. A decrease in the bazaar arrivals should not be measured as low profits of farmers as the production levels of these crops are usual and the product shall be brought by the farmers after normalcy or reduction in the movement of farm produce, which is announced by the government.

Table 3. Bazaar arrivals for big states during 1st March to 10th April, ‘000 tonnes

Crops	2019	2020	% Changes
Wheat	2,543	1,031	-59
Paddy common	1,035	851	-18
Potato	1,494	837	-44
Arhar	96	79	-17
Lentil	104	91	-12
Bengal gram	591	128	-78
Urad	51	24	-53
Green gram	31	12	-62

Source: AGBAZAAR

The rate of farming commodities are reasonable up to February 2020 because of excellent cutting and these are probable that this style should not be impacted by the lockdown greatly. The wholesale rate of farm animals products are affecting upward during the last few months which may maintain albeit at a reasonable scale chiefly because of low production timing summer (Fig 3). In case the supply chains are disrupted for a longer period, farmers may find stiff to sell these products timing the lockdown. The rate data monitored by the Department of Consumer Affairs (DCA) specify some amplify in the rate of vegetables and pulses during the lockdown period.

Fig 3a. Wholesale Price Index for major pulses (March-2017 to February 2020)

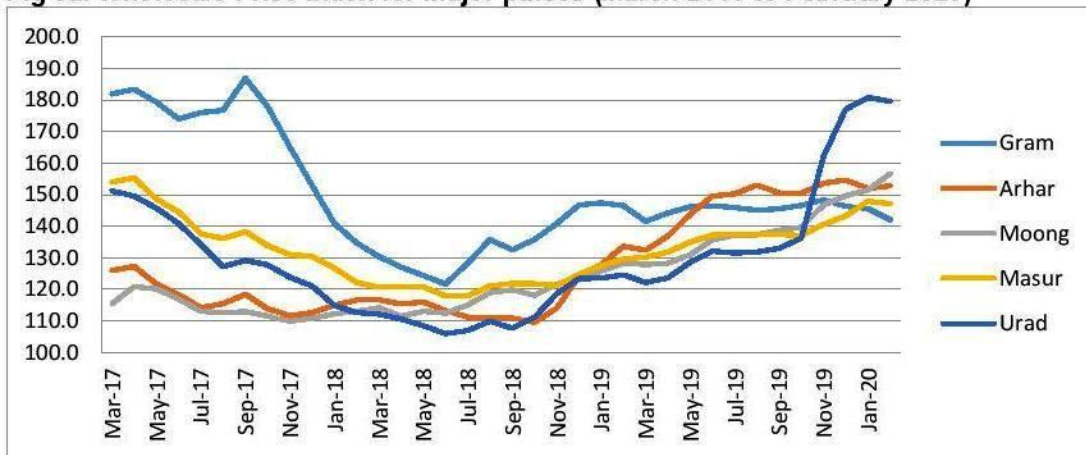


Fig 3b. Wholesale Price Index for major vegetables (March-2017 to February 2020)

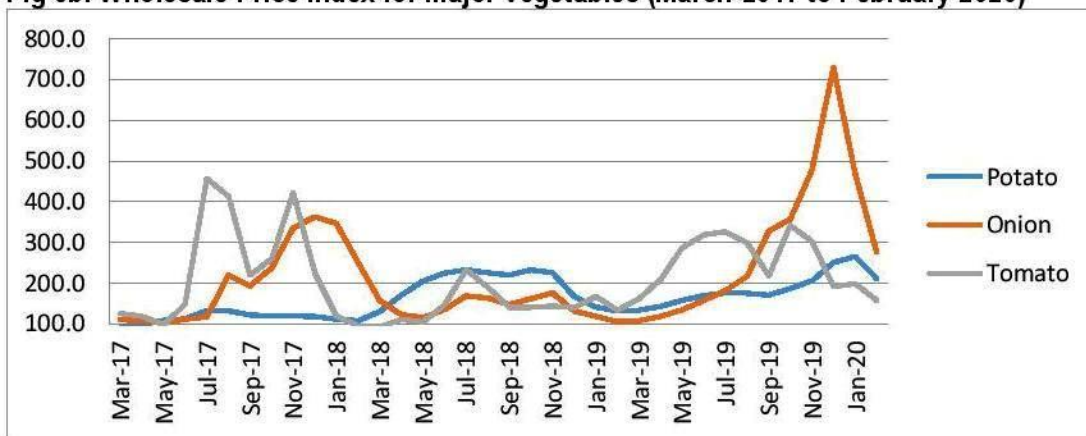
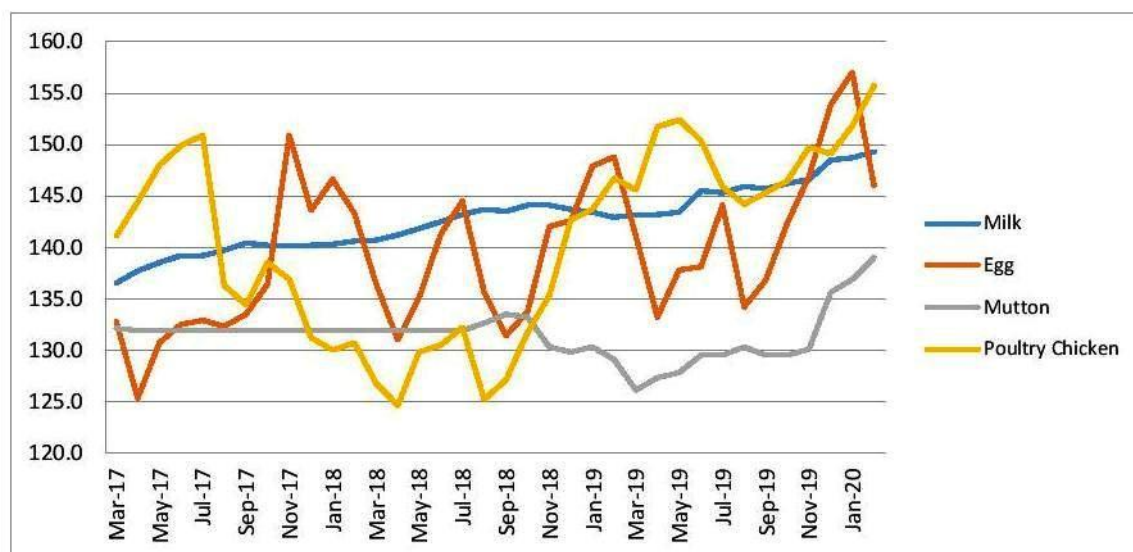


Fig 3c. Wholesale Price Index for livestock products (March-2017 to February 2020)

Source: Office of the Economic Adviser

Demand for Food

According to the formulation produced by FAO (2011), 'food and nutritional sanctuary exist when all people at all times have physical, social, and economic access to food of enough capacity and quality in terms of diversity, variety, nutrient contented, and security to meet their nutritional desires and food liking for an active and healthy life, coupled with a sanitary atmosphere, sufficient health, education and care'. Depending on the situation of the lockdown, food and dietary safety are probable to be unfavorably affected due to require and/or supply-side shocks in the food system. The magnitude of unfavorable belongings will depend on the period and strictness of the outbreak in the country. In the short run, the delivery shocks may start due to disruptions in the delivery chain of food commodities on relation of association limitations compulsory by the establishment or profiteering activities of errant traders. Expansion in Public Distribution System (PDS) provisions of food grains may though partly negate the delivery shock in staple food commodities. If the outbreak remainder for a longer time, the physical accessibility of food commodities may shrink due to slow-down in farming operations for the approaching crop season. Farmers may also decrease the marketed surplus in expectation of a probable deficiency of food commodities in the bazaar. At present, the opportunity of such a situation is rather weak. The demand-side shocks may begin due to reduced affordability to food mainly by poor and lower-middle income class households, and modify in food Consumption patterns from high to low perishable commodities. Wage-earners of the relaxed sector would be unfavorably affected due to the shutdown of financial activities. In the short run, retail bazaar may experience a spurt in food require for household spending due to panic buying by the customers. However, this order may vanish gradually over time. The cut down in out of home consumption would have dampening belongings on generally food require in the financial. Expenditure patterns of the customer may be altered and more spending may be allocated towards low-perishable food commodities. The longer-run impacts on food require will depend on to what extent markets conditions are restored and financial activities are

resumed. The social safety contingency schemes of the public administration and philanthropist activities of civil societies may have cushioning effects on the food and dietary safety.

Household food require at the countrywide level

The predictable production of food grains, livestock and horticultural products is adequate to cover the household food require. It is value noting that household food require does not contain food consumed outside the home and other oblique require (feed, seed, wastage, etc). That time the lockdown period, require due to food extreme away from domicile will be negligible. Further, it is advised to costumer a reasonable Feeding to boost immunization to scrap beside the novel corona virus. National Institute of Nutrition, Hyderabad has suggested Recommended Dietary Allowance (RDA) of foods for dissimilar age groups and movement position (sedentary/moderate/heavy) to supply required nutrition (NIN, 2011). The weighted average of age-wise RDA of foods using the population of concerned age group (2011 census) as weight is presented in Table 4. Using predictable regular norms for modest movement condition, normative require of food matter has been predictable for the base year 2016-17. The production is also get to be enough to meet the normative require for food commodities except for milk, pulses, vegetables, and non-vegetarian products. The investigation reveals that the national has adequate accessibility of food to meet the real household require for all food items and normative require of calorie-supplying food items. Modify in food intake, if any will be due to constraints in the allocation of food at the regional and local level, and household-specific financial and non-economic factors.

Table 4. Production, household consumption and requirement of food in 2016-17

Food item	Production (mt)	Actual household consumption (mt)	NIN norms# (grams/capita/day)	Normative food demand (mt)
Cereals & millets	253	175	326	154
Pulses	23	12	71	34
Animal Food	24	10	118	56
Milk	165	65	377	179
Vegetables	178	108	432	205
Fruits	93	24	100	47
Fat	23	11	30	14
Sugar	31	12	27	13
Overall	790	421	--	702

Minimum balanced food norms of National Institute of Nutrition (ICMR) for moderate activity

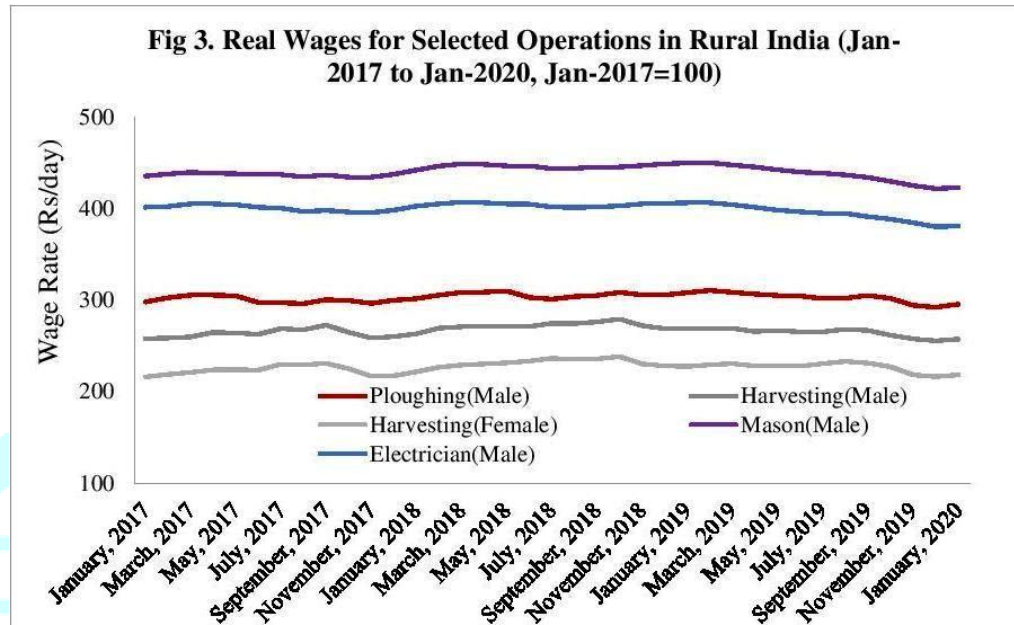
Access to food at the household level

The accessibility of food may be essential but not enough situation for ensuring food safety. The real eating of food by specific may depend on a diversity of house hold explicit factors. Between others, profits are the most significant factor affecting financial entrance to food. Spending elasticities of calories-food is 0.23 for country areas and 0.14 for municipal areas which implies an affirmative involvement among profits and food intake. Thus, a decrease in profits of the wage earners due to the shutdown of financial behavior will have an unfavorable impact on food intake. This should be compensated through public allocation and other welfare programs. The impact of COVID-19 will be much stronger for moderately poor households who waste a reasonably large share of income on food as compared to rich counterparts. The unimportant tendency to consume food for the households belonging to the bottom expenses class in rural areas is 61 % as compared to only 16 % for the households belonging to top expenses class. Further, the incidence of malnutrition is extensively superior amongst poor households. The proof suggests that supplementing the profits of the poor households will have a superior affirmative impact on food and dietary safety. The current packages of extending economic sustain to poor households through PM-KISAN and other welfare schemes of the Central and State Governments may lead to wanted outcomes. Apart from profits, price is another factor that unfavorably affects the purchasing power of poor households. Due to negative rate elasticities, any increase in rates of food commodities will lead to a decline in expenditure. The impact of price increase will not be uniform and it will be stronger for poor households and high-value farming commodities. These factors necessitate supplementing the food requires of poor households from PDS materials. The effect of in-kind PDS supplies on calorie-intake is 3.5 to 3.9 times higher than of direct cash move of food financial support even at the existing level of losses and leakages in PDS supply (Srivastava et al, 2017). In the position of disruption and lockdown in the existing supply chain, the significance of PDS increases manifolds.

Employment and the Rural Poor

In India, the estimate by ILO, CMIE and other researchers have meaningful to a demanding job loss condition, which further deteriorated by the present lockdown in the country (Bloomberg Quint 2020). There are no data accessible to assess the recent labour bazaar situation and its consequence on their profits. The data accessible upto early 2020 designate slighting weakening tendency in the actual wages of rural workers since 2019. This tendency is factual for real wages of farm and non-farm workers (Fig 3). If during the lockdown period, rural non-farm workers are back in the villages, the wages may abide constant. But in the areas where rural migrant workers are significant, there could be raise in the wages of farm workers during the time of lockdown and beyond. The ILO has undertaken a global assessment and classified the different sectors as high, medium-high, medium, low-medium and low based on the impact of the crisis on financial output (ILO 2020). Though farming, fishing and forestry are classified as low-medium risk, the scale of employment in this area and confidence of such households on non-farm employment would lead to higher risk between these households. Sectors such as food, accommodation, manufacturing, wholesale and retail trade, which are labour serious, are classified as high risk. Based on our analysis for rural India based on unit-level

data from the PLFS 2017-18, we observe that 15.98 percent of the working population is employed in areas that are measured to be high risk, 58.66 percent in low-medium risk, and 6.28 percent at low risk. The farming area, which consists of about 59 % of overall villager employment, also contributes to three-fourths share in generally womanly employment. Within the farming area, about 28 % of the workers are womanly. Most of these female are oftentimes implicated in suspected work and are thus devoid of any form of labor protection.



The divide of households and the frequency of circumstances in rural and municipal India by diverse employment categories are given in Table 6. Since the newest circumstances estimates are not updated, the estimates for 2011-12 are used. These data designate that the divide of rural and municipal households effective as relaxed labour in non-farm area was 13 and 12 %, respectively in 2011-12. In addition, there are 21 % of households effective as informal labour in farming in 2011-12 which compact to 12 % in 2017-18. The divide of informal workers in villager nonfarm and municipal area has however remained 25 % in 2017-18. The immediate short-run impacts of the lockdown would be felt most between these informal workers. Here it may note that some of little and unimportant farmers and informal farming labour also work in the villager non-farm area and these may also be precious to the limitation of employment missing. The prevalence of circumstances is high between these informal workers in rural and municipal region, which may further contort if income loss is not compensated. A lockdown for one month would strictly affect and shift a important ratio of the informal workers (about 10 million) below the circumstances line. This raise in the incidence of circumstances is matter to the situation of no income transfer or higher government distribution by the public. The public has however taken numerous steps to support the farming and allied area by exempting the area from the lockdown, undertaking public distribution of food grains and direct cash transfer. Therefore, the circumstances impact may be a provisional phenomenon and long-term impact may occur through a lower rate of growth in other area.

Table 5. Employment shares across sectors in rural India and global sectoral risk assessment, 2017-18

Sector	Global sectoral assessment of risk	Share (%) in total employment	Share (%) of women workers
Manufacturing	High	7.82	8.31
Wholesale and retail trade	High	6.84	3.20
Accommodation and food service activities	High	1.25	1.02
Real estate activities	High	0.07	0.02
Transportation and storage	Medium-high	3.88	0.19
Arts, entertainment and recreation	Medium-high	0.17	0.04
Mining and quarrying	Medium	0.40	0.20
Construction	Medium	12.38	4.68
Financial and insurance activities	Medium	0.45	0.21
Agriculture, forestry and fishing	Low-Medium	58.66	72.41
Other services, education, health, administration etc.	Low	8.08	9.73

Source: ILO (2020) and Authors' estimation based on Periodic Labour Force Survey data, 2017-18.

Table 6. Employment categories and the incidence of poverty in India

Rural			Urban				
House hold type	Share of households (%)		Poverty headcount ratio(%)2011-12	House hold type	Share of households (%)		Poverty headcount ratio(%)2011-12
	2011-2012	2017-18			2011-2012	2017-18	
Self-employed in agriculture	34.3	37.8	22	Self – employed	35.3	32.4	15
Self – employed in non agriculture	15.5	14.3	19				
Regular wage /salary	9.6	12.7	11				
Casual labour in agriculture	21.0	12.1	40	Casual labour	11.8	11.8	33
Casual labour in non - agriculture	13.5	12.9	33				
Others	6.1	10.1	18	Others	11.2	14.4	8
Overall	100	100	25	Overall	100		14

Source: Consumer Expenditure Survey data, 2011-12, PLFS data 2017-18.

Policy Implications

We don't expect a main long-term impact of the lockdown or lower financial growth on Indian farming. A normal farming growth in 2019-20 and exception of farm operations during the lockdown period shall contribute to better farm income. For marketing of farming produce also, special efforts are made to ensure smooth performance of deliver chains of the delicate commodities. These direct interventions are additional strengthened by an optimistic predict of IMD for a usual monsoon in 2020 which is particularly significant for the coming kharif period. Farming shall also sustain some emigrant laborers who are back in the villages, provided they are prepared to work on the farm. The arrival of emigrant labor to the cities may take some time and therefore predictable loss of employment and profits predominantly in the rural non-farm area and municipal informal workers which form about 15-20% of the total workforce may be worst affect. Therefore, provide a social security net in the form of food, health and other necessary goods should be the circumstances of the public. Some area like transport, hospitality, tourism, and real domain may bear the impact for an extended period and therefore these areas will need particular awareness, particularly measures for the welfare of the casual workers.

The following are some of the priorities of the public for the farming area:

1. Farmers should be advised for delayed marketing of those products which are storable like food grains, rapeseed and mustard, and some overstocking of aquaculture and meat animals. The use of meat and fish should be examined and tested for safety at different levels.
2. Facilitate supply chains of perishable commodities like milk, eggs, fruits and vegetables. The movement of commodities does not mean the movement of a large number of people. Digital contacts can help reduce the movement of people as farmers and traders have direct and repeated transactions.
3. The central and State Governments can plan procurement of wheat and gram and the products can be delivered at the place these are needed. Also, make eNAM operational in all the mandis
4. Up scaling of farmer advisories for the lockdown period, particularly for farm operations and social distancing. This should be in local languages with simple messages. KVK network of ICAR is a great strength in this respect.
5. There is adequate time to plan for the next kharif season for the supply of seeds and fertilizers. Similarly, the supply chain of mango and litchi can be planned to avoid any income loss to the farmers.
6. Promote farm mechanization like adoption of paddy transplanters following custom hiring models. Also promote drum seeded rice to cope with shortage of labour. Promote clusters of pulses and oilseeds for higher production through price incentives and procurement logistics
7. Credit delivery for agriculture and allied sectors appears to be normal until January 2020, but more liquidity should be injected in agriculture, particularly for commercial and processing activities.
8. Strengthen research on biosecurity, zoonotic diseases, microbiome, and natural barriers to plant and animal diseases and natural calamities.

THE SECTORAL IMPACTS

Fruits

India is the second biggest producer of vegetables and fruits in the world after China with a allocate of 12.2 and 10.7%, correspondingly, of the worldwide production. The larger fruits mature in India aonla are, grapes, papaya and guava, banana pomegranate, sapota and mango. For several years, horticulture has emerged as the mature driver of farming in India distributing virtually one-third to farming GDP with yearly growth of 7% and 9.5% in vegetables and fruits, respectively (1991-92 to 2018-19). The effect of Indian Horticulture area is rather evident currently. The fruits of banana and grapes are in the bazaar and mango has started in the southern states and it will soon be accessible in northern India. These fruits are also exported and therefore the lockdown is probable to have larger impact on the marketing and rating of these fruits. The impact on some of the larger crops, namely Banana, Grapes and Mango is discussed below.

Grapes

As grape is a extremely commercialized crop, the lockdown has precious the grapes farmers in different ways. Most of the farmers from Sangli and Nashik districts of Maharashtra produce grapes for export purposes. The most important difficulty occurred during the initial 10-12 days of lockdown, as there was confusion between the farmers and traders. This year till the first two weeks of March, operations were normal. Farmers got a price of 60-80 per kg (Modal price) by exporting their products and about 30-50 Rs per kg in the domestic bazaar. The public administrative announced a lockdown on 22nd March which effectively inhibited the movement of labours and vehicles. Traders were not getting requirement and were not able to send their produce to destinations across India and outside the country. As the rate was very low, most of the farmers converted grapes into raisins (about 25 %) and some sold their produce at a very low rate. Delayed harvesting would have increased TSS thereby deteriorating the superiority for table purposes and accelerated the drying for raisin making. Farmers who cultivated the grapes for the export purpose were most affected by approximately nil export during the lockdown period. The rate accessed by the farmers reduced to Rs. 30-40 /kg. Some companies in Nashik like PC foods are giving the rate of Rs 25-30 per kg. Furthermore, they were procuring very less quality. Still, about 25-30 % of the product item is with the farmers in Maharashtra. About 15-20 % in Sangli someplace crop duration and harvesting are early as differenced to other districts of Maharashtra. However, if the Corona crisis had not occurred, export would have been raised by 25-30 %. The Maharashtra State Grape Growers' Association reported that the number of containers for exports this year has almost matched with the previous years and thus total quantity exported is not affected. As of now, fresh required for the product is there from the European countries, and other competitor countries like Chile, South Africa, and Peru etc. are finding it complicated to export their produce. Now European Union has agreed to allow the field packs (as against earlier pack house or cold storage packing only) of 40 kg each. Therefore, exporters have started their operations in some parts of Sangli. Therefore, harvesting can be done by following social distancing norms on farmers' field which is difficult to follow in pack-house and cold storages. The containers which were departed from India before lockdown in other countries were kept at ports only, which are slowly releasing nowadays the product was received by buyers as such. One container takes around 45 days to reach the destination. Produce can be kept in a container for another 1.5 months. Therefore, there was not complete rejection and loss to farmers. During the lockdown duration, most of the grapes in fields are converted to raisins. The inputs needed for this, Ethyl Oleate and Potassium Bi Carbonate is being made obtainable to farmers with the help of state government. Most of the farmers who are converting grapes into raisin would store it in cold storages on rent (40 paise/kg/month) till value becomes normal. Various persons have started the business where they would wash the raisins, grading and packaging (all mechanized) of them at 7 Rs/kg rate. One noteworthy thing here is that converting raising is not giving more profit to the farmers as the export of fresh grapes. Farmer in Maharashtra Nashik district told that since 2.5 acre of land he earned 21 lakhs by exporting grapes before 28 Feb, now after the lockdown produces from 2.5 acre area is transformed into raisins for which at the normal rate he would get about Rs 9 lakh only, i.e. Rs 11 lakh less than the normal year. Domestic product was fetching a price of Rs 30-50 per kg before the lockdown. Which has reduced to 10-20/kg? Transport to bazaar in Bihar, UP, West Bengal is hit by stringent lockdown followed by these states. Several farmers are even making packing of 1-2 kg and selling

insinuatingly in villages and nearby cities. Farmers who do not have net shades and space for raisin preparation are selling grapes at a lower price. Another important constraint is labour availability. Only about 100 labour is available when 1000 would be there normally. About 30-40 % traders have started operations now after lockdown, but they are procuring less quantity. The rest of the demand is met by family labour. After all, farmers have to ascertain that the production which is there on the plant for 6 months is harvested and pruning is carried out for the next season.

Mango

The lockdown and COVID thread has brought fear amongst the farmers of all the mango producing states, namely Karnataka, Andhra Pradesh, UP, Gujarat, Bihar etc. relating to the harvesting, deal and export. Sporadic rains and hailstorms during the flowering cause pests and diseases, and the lack of availability of labourers and timely pest control procedures are probable to reason sizable production impairment across the eastern regions and northern, predominantly in West Bengal, Uttar Pradesh, Odisha and Bihar. In the southern states, harvesting of mangos has beforehand commenced. The famous Alphonso mango particularly from Ratnagiri and Sindhudurg districts in Maharashtra has been suffering low picking up to an range of 30-40% due to lockdown and low sale in the bazaar followed by Dissociation in the supply chain. In Andhra Pradesh, mango crop is prepared to yield in most of the districts. However, unavailability of labourers, plummet in rate due to small bazaar require and lack of transport facilities are causing hindrance to the mango trade.

Measures to strengthen the supply chain

- ❖ As on focused, there is lack of enough transporting facilities to take away mango from production region to the bazaar yards and also for the exports. The public sector may be provided stimulation and rebate in tax for transporters engage in transport of far commodities to bazaar.
- ❖ In case there are enough buyers in the market, direct selling of fruits to consumers and processing for juice should be encouraged.

Banana

- ❖ Creation of temperature-controlled parcel vans in the Indian Rail for the transport of mango under the current scenario effectuates deliveries. Public administrative may also use/ attach idle AC tier coaches.

There were not enough buyers during the lockdown period, and the price of the commodity slashed to less than Rs 5/kg in many parts of India, causing massive disruption in the supply chain Through the lockdown period covering March to April months, about 30% (10.0 million tonnes) of total banana production is expected to comes from the larger banana growing states (Maharashtra, AP, TN, Gujarat, Karnataka).. With the steep drop in the rate, roughly Rs. 6000 crores are lost as usually the farmers used to sell his produce at Rs. 15/ kg.

Measures to strengthen the supply chain

Commodity based cluster formation or co-operative farming for procurement of all the inputs on collective basis, better implementation of the technologies, credit approval, and better price realization.

Developing methodologies based on input-output models which provide information about the cluster wise production of banana and could identify the major catchments for supplying the fresh produces. This will allow in calculating the impact of any change in the supply chain.

Providing banana under welfare scheme of the Government for the poor people and ensuring the movement to the consumption areas on priority. The option of converting banana into healthy powder, puree and chips could be used in functional food markets.

Aggressive, cost competitive marketing of fresh banana by the nodal agencies and FPOs through the formation of farm clusters. Developing contingency plans for the export of banana to individual countries through bilateral agreements

Manipulation of post-harvest life of fresh banana through tailor made approaches and exploitation of new Greener methodologies for the export of traditional varieties

Livestock and Poultry

There are four possible channels through the lockdown may affect livestock production:

1. reduced supply of feeds and fodders
2. disruption in supply/value chains of outputs,
3. depreciation in animal stock
4. disruption in livestock services including breeding and health,

Dairying

The immediate impact of lockdown on dairying is care of the interruption in milk supply chains. Of the whole milk production more than half finds way to bazaars through the cooperatives, particular processors and milk vendors, and the rest is inspired by the producer-households. Milk is a perishable commodity and requires instant transportation to the bazaar centres or refrigerated storage or processing into less-perishable forms. Approximately half of the marketed surplus of milk is accounted for by the informal sector buyers including the milk vendors who aggregate and supply milk to urban consumers and sweat-makers. Even exemption for transport of milk, the lack of availability of labour for collection, transport, processing, packaging and distribution the milk supply chains will be adversely affected. While the municipal household expenditure require for milk is improbable to abide unchanged at pre-lockdown time, they require from unofficial municipal milk processors has been hardly hit by the lockdown, and it might have put a downward pressing on milk rate, and hence on the profit of farmers and informal processors. The prolonged lockdown might have adversely affected milk yields by disrupting the supply chains for feeds and fodders, more so, for the urban and peri-urban industrial production systems, also even for the larger villager dairies that dependent on manufactured feeds. In India, mainly dairying in the country is practiced as a factor of mixed farming system deriving its feed needed from crop by-products and residues, and here upon the villager dairy production is improbable to face reduction of feeds and fodders during the lockdown period.

The disruption in the movement of individual engaged in provision of breeding and health services will result in the decrease of production or breeding prospective of animals in the long-run. For example, an cattle in heat requiring insemination if not joined to in time will lose about a month of its productive life. As well, lack of animal physical condition services may result in morbidity and Death rate losses to farmers. The poor diet and physical condition ultimately result in loss of the financial value of the animals. The high-producing animals that require better feeding and health care and depend on synthetically insemination will suffer the most. In the post-lockdown time, require is to strengthen : (i) strengthen integrated formal value chains by the cooperatives, FPOs and private processors encompassing both the backend and forward activities. (ii) Local processing and storage of feeds and fodders, say creating village feed-fodder banks,

Poultry

Poultry sector in India is mainly dualistic in nature represented by (i) industrialized commercial production systems. (ii) Subsistence oriented small-scale production systems including the backyard poultry and these two differ in their capital and input requirements, riskiness and market linkages. The impact of lockdown is therefore will be different on diverse segments. The lockdown events have reduced the require for poultry products, which is mainly to the customers belief that the Corona virus has its origin in animals and the disease is zoonotic, i.e., it has spread in humans through consumption of meat. The extended lockdown causing disruption in supply chain led further decline in the require for poultry meat. The broiler production was hit by lack of accessibility of feed. The backyard poultry is the least affected by the lockdown. Bulk of broiler production in India takes place through contract agricultural, with a complete integration of its backward and forward activities. The industrialized production is the most affected by the lockdown. Even those farmers who produce under contracts have been forced to close down. The independent small-scale producers engaged in broiler production for bazaar are hard hit by these developments, forcing many of them to kill the chicks and close the business. The solution lies in dispelling the belief that Corona virus infection is zoonotic, and provision of investments for revival of the broiler industry.

Aquaculture: Shrimp Farming, source: CIBA

Seed Production

Currently 90% of the farmed shrimp is the exotic vannamei, hence the movement of SPF brood to the fishpond through the public administrative Quarantine facility from the global suppliers, and the transport of fishpond - produced to the farms from the fishpond are the basic in the shrimp farming. Covid 19 correlated limitations across the worldwide have approximated halted the Global air cargo system, variously affecting the import of further consignments of SPF shrimp bloodstock. Fishpond not only need SPF brood stock but also artemia, special larval feeds, and many other products used in the fishpond. The April month is the stocking season in the Indian shrimp farming, while the Covid 19 lockdown has brought the entire process to stand-still. Though the public administration has allowed the movement of aquaculture related inputs including shrimp seeds, the majority of farmers, say 75

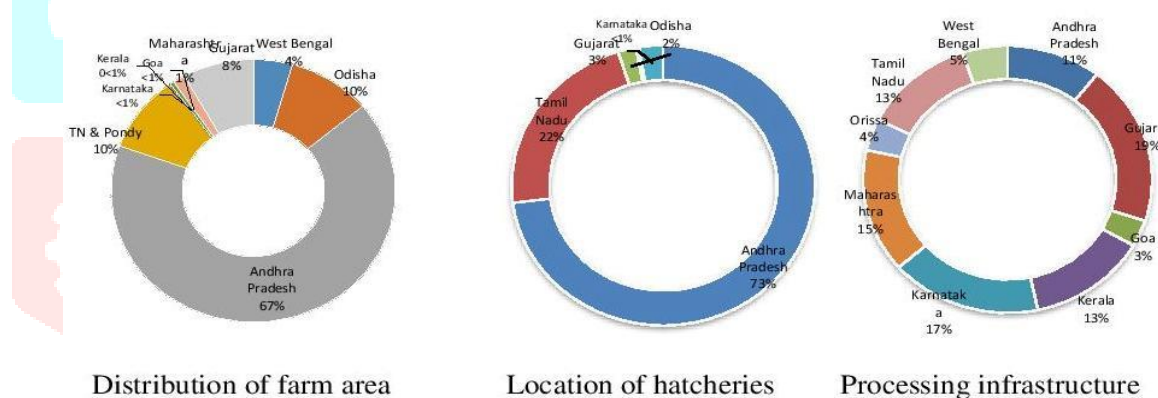
percent have not introduced the stocking process due to many other restrictions affecting the continence working of farms.

Formulated Feed

Feed mill area dependent on the agricultural operations, and the poor stocking movement in the farm, lead to the scaling losing or stoppage of feed mills, which produce the formulated feeds for the farmed shrimp. The further lockdown has affected the movement of unprepared materials such as soybean, fish meal, meal and other particular inputs such as krill, fish oils, etc, compelling the feed mills to scale down or lockdown of the action

Processing and Marketing of the Produce

The worldwide lockdown has gravely affected the ordinary processing chain catering to the shrimp export. Suspicion in the importing countries and the issues related to orders and export process, has put the Indian exporters in dilemma, and they are abidance a wait and watch scheme. The Impact quickly trickled down from exporters to retailers to processors farms and fishpond. The scope of finding domestic market too is very much limited, in the 'lockdown mode'.



To comprehend likely affect of lockdown and social distancing in the shrimp price chain one has to understand the diagram of the shrimp aquaculture sector including the spread of fishpond, farming, and processing infrastructure in India. Inter-state activity of seed, inputs and products for processing and finally export facilities are of utmost significance for sustaining shrimp aquaculture in the country. Shrimp farming is concerted in Tamil Nadu, Andhra Pradesh, , Odisha and Gujarat, while most of the fishpond are in Tamil Nadu and Andhra Pradesh and processing facilities are available in Karnataka, Tamil Nadu, Maharashtra, Kerala and Gujarat. Fishpond reported great quantities of seed wastage due to poor require in March 2020. This may lead to the aquaculture area to decrease the output as the farmers expect decrease costumer requirement and value loss. Exporters may predict reduced orders and may fail in meeting orders in hand. Hence the overall decreased in the sector's output is expected. This may lead to failure to meet targets at processing and export nodes.

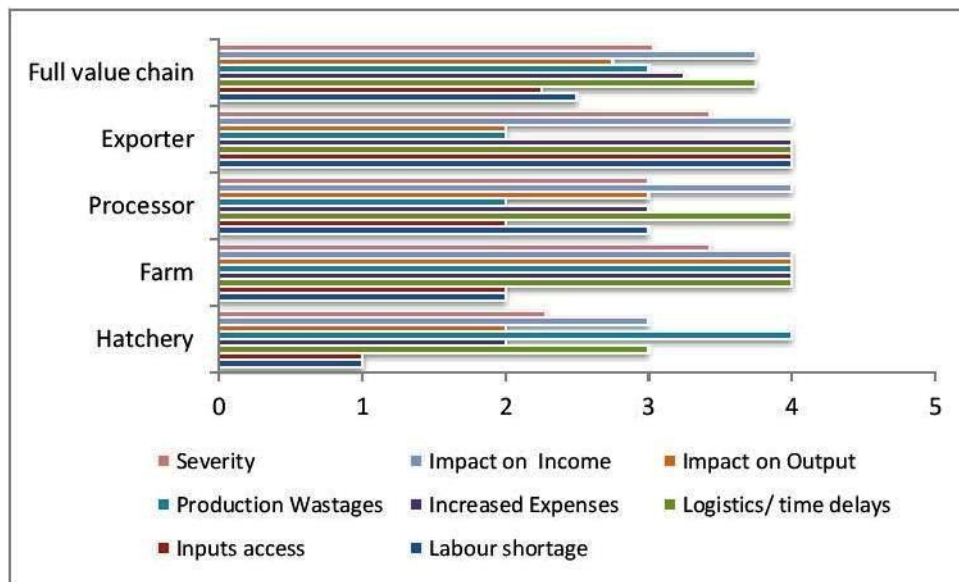


Figure.1. Heat map of impact on production to consumption shrimp value chain

Although some unskilled labour resides at fishpond and farm itself, still executives and technicians commute from closely cities or towns. Several of whom are not able to inspection farms continually. The animals are to be fed in time for healthy and disease-free growth. Though cell phones do help to a convinced extent the difficulties in obtaining farm inputs do constrain the efficiency of operation of farming. Improper functioning of godowns and stock points due to rail and road transport networks along with very limited labour availability severely affect the volume of items being handled through the system. Many state government fisheries departments have passed public administrative orders permitting the transport of animal feeds by road during lockdown small farmers may not be able to get a small proportion of their requirement. Delays or inadequacies in feeding may also affect the final average bodyweight of the animals and finally the total biomass harvested. The money circulation system is also undergoing a severe strain as shrimp farmers depend on the private money circulation system. The curtailments placed on road activity will intercept the easy supply of inputs to aquaculture, particularly to small farmers who required slighter quantum of inputs in more frequent intervals. Seafood exports to China period April-December 2019 stood at 2,42,218 tons appreciated at US\$ 1032 million as against 1,65,950 tons appreciated at US\$ 589 million in the same time last year. The increase is 46 % in terms of quantity and 75 % in terms of worth". Around 500 exporters are exporting seafood from India to China and the exporting community, in universal, has not raised any concern about exports to that country. Additional, large India- China trade balance may help Indian shrimp imports to be sustained by China. Shipping shrimp to China may be affected to a convinced extent as the shrimp consumption might reduce. But there is a strong possibility of the Chinese consumers switching to healthier seafood options leaving behind other low-price items.

Table.1. Simulated losses of P. vannamei shrimp farming

Parameter	Normal (Triennial Avg 2018-20)	25% less than normal	50 % less than normal
Farm area Lakh ha	0.97	0.73	0.49
Seed Billion	43.08	32.31	21.54
Feed Billion	1.16	0.87	0.58
Productivity Kg/ha	7.63	5.72	3.82
Total shrimp production Lakh tones	622327	466745	3,11, 164
Economic value production/loss Rs.crores	18669	-4667	-9334
Export price loss by 25%	14002	-3500	-7,001
Combined loss scenario	-4667	-8167	16,495

The cumulative factors of seed, feed and other input use will result in productivity losses and lead to reduced production. Sector changes will reduce require for seed and later necessity of feed. Under three diverse scenarios of normal, 25 and 50 % reductions the sector may end up in losses as given in table.1. In the worst scenario of both production and value losses the combined loss may reach to the tune of Rs. 8,167 to Rs.16, 495 Crores in 2020- 2021 financial year.

Interventions:

- ❖ Restricted harvesting of shrimp to the extent that overgrowth does not adversely affect the prices.
- ❖ utilize of exemptions of the lockdown for ensuring the delivery of seed and feed stock to farmers banned transport of shrimp to preserve compulsory supply chains including export with strict isolation and sanitization measures

Reference:

1. Bloomberg Quint (7 April 2020). India Unemployment Rate Spiked To 23% Post Lockdown, Says CMIE.<https://www.bloombergquint.com/business/india-unemployment-rate-spiked-to23-post-lockdown-says-cmie>
PLFS 2017-2018
2. FAOSTAT (2017). Food Balance Sheet. <http://www.fao.org/faostat/en/#data/FBS>
3. ILO (2020). ILO Monitor 2nd edition: COVID-19 and the world of work
https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/briefingnote/wcms_740877.pdf
4. NIN (2011). Dietary guidelines for Indians. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.
5. **Oxfam (2020). Dignity Not Destitution.**
<https://www.oxfam.org.nz/wpcontent/uploads/2020/04/Oxfam-Report-Dignity-not-Destitution.pdf>
6. Srivastava, S.K. and R. Chand (2017). Tracking transition in calorie-intake among Indian Households: Insights and policy implications. Agricultural Economics Research Review, 30(1): 23-35.
7. The Hindu (10 April 2020a). Corona virus lockdown | Choked supply lines to be cleared
<https://www.thehindu.com/news/national/coronavirus-lockdown-choked-supply-lines-to-be-cleared/article31309859.ece>