

RESEARCH ARTICLE

Economic impact of COVID-19 pandemic on milk unions and milk vendors

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Abstract: In this present study, an attempt was made to identify and compute the scale of the economic impact of the COVID-19 pandemic occurred to the two most important players of the milk supply chain in India, i.e., cooperative milk unions (3 milk unions, 18 dairy cooperative societies) and milk vendors (60 numbers). The study was conducted in Howrah, Nadia and N-24 Parganas districts of West Bengal state, India. The data collected from the respondents covered three periods of the first wave of the COVID-19 pandemic i.e. pre-lockdown (January 01 2020 to March 23 2020), lockdown (March 24 2020 to May 31 2020) and post-lockdown period (June 01 2020 to December 31 2020). The analysis revealed that the total marketing margin of cooperative milk unions from the sale of single-toned milk increased by 6 to 7 per cent and total marketing cost decreased by 8 to 11 per cent. During the lockdown period, there was a sudden hike in sales of single-toned milk (5 to 25%), curd (5 to 56%), paneer (11 to 26%) and ghee (40 to 80%) but the sale of lassi (-25 to -50%) and peda (-50 to -80%) decreased. The sale of milk was reduced by around 64 to 100 per cent during the lockdown period and net returns decreased substantially (70 to 680%) for all types of vendors during the pandemic. Vendors supplying milk to hotels and small processors were the most affected during the lockdown period.

Key words: DCS, Lockdown, Milk product, Post-lockdown, Pre-lockdown, Single-toned milk

Introduction

The dairy sector provides huge employment opportunities both directly and indirectly. Approximately 20.5 million people across the country depend on cattle for their livelihood. It employs around 8.8 per cent of India's population (DAHD&F, 2019). The cooperative milk unions are the backbone of the Indian dairy sector and are the only organised structure of the milk supply chain run by the State Governments. The cooperative milk unions covered around 1,90,516 village dairy cooperative societies (DCS), with a cumulative membership of 16.93 million milk producers. The cooperative milk unions collectively procured an average of 507.69 lakh kg of milk per day (NDDDB, 2019). Of the total milk produced in the country only 20 per cent of milk is sold to the organised sector, 34 per cent to the unorganised sector i.e. milk vendors, private dairies, halwai (sweet-maker) etc. and the remaining 46 per cent of milk is consumed locally (Mahida et al. 2022).

Milk vendors are individuals or businesses that sell milk to consumers. They play an important role in the dairy industry and ensure that people have access to a nutritious and essential food source (Das et al. 2024). One of the main benefits of milk vendors is that they provide a convenient and accessible source of milk for consumers. Many milk vendors sell milk door-to-door, which can be particularly beneficial for people who live in rural areas or who have difficulty in getting to a grocery store. Additionally, milk vendors can provide a source of fresh milk, which can be more nutritious than milk that has been sitting on a grocery store shelf. Many milk vendors source their milk from small, local dairy farmers, which can help to support the local economy and ensure that farmers are paid a fair price for their milk (The dairy site, 2021). However, as compared to the milk unions, the challenges associated with milk vendors are more. One challenge is that milk vendors may not have the same level of food safety and sanitation standards as larger dairy processors and retailers. This can increase the risk of foodborne illness and can be a concern for consumers. Additionally, milk vendors may not have the same level of regulation and oversight as larger

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dairy processors and retailers, which can make it more difficult to ensure that they are operating safely and ethically (Kumar, 2021; Munshi et al. 2024).

Historically, global pandemics like smallpox, plague, Spanish flu and cholera not only affected the health of people across the world but also caused severe impacts on the global economy. The Coronavirus disease that surfaced in the year 2019 is a challenge to mankind globally where advancements in the technological and economic spheres have been sharp and unparalleled in the past. The first infection was reported in Wuhan city, the People’s Republic of China and in no time spread across the world like wildfire. The World Health Organisation (WHO) declared the novel coronavirus as a pandemic and pronounced it as “COVID-19”. To contain the virus, many countries declared a lockdown on all social and economic activities. India too observed a nationwide lockdown from March 24, 2020, to May 31, 2020, followed by conditional unlocking of social and economic activities in a phased manner from June 1, 2020, and with strict lockdown in the containment zones (GOI, 2020).

Due to lockdown restrictions businesses, all modes of transport and the movement of individuals were severely affected. The dairy sector, which deals with highly perishable products affected severely due to disruption in demand and supply chain caused by restricted business hours, and shutdown of bulk consumers such as hotels, the confectionary industry, marriages, parties, schools and inter-state transport (Chechi, 2020). The COVID-19 pandemic has not only reduced the income of dairy farmers but also made a significant impact on cooperative milk unions and milk vendors. Hence, the present study was undertaken to understand the constraints and economic impact of the COVID-19 pandemic on cooperative milk unions and milk vendors.

Materials and methods

Study area and data sources

The present study was conducted in Howrah (22.5604° N, 88.0510° E), Nadia (23.4710° N, 88.5565° E) and N-24 Parganas (22.6168° N, 88.4029° E) districts of West Bengal (22.9868° N, 87.8550° E), India (Fig. 1).

West Bengal has twelve cooperative milk unions and 1627 DCSs (WBCMPF, 2023). Three milk unions namely Howrah Cooperative Milk Union Ltd. (HOMUL), Howrah; Kishan Cooperative Milk Union Ltd. (KIMUL), Nadia; and Ichhamati Cooperative Milk Union Ltd. (IMUL), N-24 Parganas, are working actively in the study districts, were selected for the study. From each milk union, six DCSs were selected randomly.

A total sample of 60 milk vendors was selected randomly from the study districts. After the collection of data, milk vendors were classified into three categories based on their end customers as Vendor-A (Supplies milk to consumer households), Vendor-B

(Supplies milk to hotels and small processors) and Vendor-C (Supplies milk to both). The data from cooperative milk unions and milk vendors were collected using a standard interview schedule. The study covers three periods of the first wave of the COVID-19 pandemic, i.e. pre-lockdown (January 01, 2020, to March 23, 2020), lockdown (March 24, 2020, to May 31, 2020) and post-lockdown periods (June 01, 2020, to December 31, 2020).

Analytical tools

Gap in number of active milk pourers and milk procurement quantity

The gap in the number of active milk pourers (%ΔMP) and milk procurement quantity (% ΔMPQ) was estimated using the following formula and compared across three periods.

$$Gap (\%) = \left[\frac{(MP/MPQ \text{ during period } t) - (MP/MPQ \text{ during period } (t-1))}{MP/MPQ \text{ during period } (t-1)} \right] \times 100$$

t = lockdown or post-lockdown period

t-1 = pre-lockdown period

Wilcoxon signed-rank test was used to test the significant gap in active milk pourers and milk procurement quantity during the lockdown and post-lockdown periods as compared to the pre-lockdown period. The level of statistical significance was fixed at 5 per cent (P ≤ 0.05).

Estimation of cost of milk collection, reception, chilling and processing for milk unions, and cost and returns for milk vendors

The total cost of milk collection, reception, chilling and processing for milk unions, and cost and returns for milk vendors per litre of milk per day was estimated for pre-lockdown, lockdown and post-lockdown periods of the COVID-19 pandemic using standard methodology.

1. Fixed costs: These costs do not vary with the output level and remain unchanged in the short run. These costs include costs due to depreciation and interest on fixed capital. Annual depreciation of buildings, machinery and equipment used by cooperative milk unions and milk vendors was included for calculation using Capital Recovery Cost (CRC) method (Singh and Datta, 2016).

$$R = Z \left[\frac{(1+r)^n r}{(1+r)^n - 1} \right]$$

Where,

R = capital recovery cost

Z = initial value of the capital asset

r = interest rate

n = useful life of the assets

2. Variable costs

a. Cooperative milk union: Variable costs are those costs that vary with the output level and can be altered in the short run. Variable costs include the cost of raw materials, electricity charges, labour wages, water and steam charges, store and maintenance charges, refrigeration charges, cost of testing, weighing, packaging and quality control expenses.

$$\text{Cost of milk collection (Rs./litre/day)} = \frac{\text{Total cost of milk collection}}{\text{Total quantity of milk collected}}$$

$$\text{Cost of milk reception (Rs./litre/day)} = \frac{\text{Total cost of reception}}{\text{Total quantity of milk received}}$$

$$\text{Procurement cost of milk (Rs./litre/day)} = \text{Cost of collection} + \text{Cost of reception}$$

$$\text{Chilling cost of milk (Rs./litre/day)} = \frac{\text{Total cost of chilling}}{\text{Total quantity of milk chilled}}$$

$$\text{Total cost of processing of single-toned milk} = \text{Total fixed cost} + \text{Total variable cost}$$

b. Milk vendor: Variable costs include purchasing cost of milk, fuel cost, labour cost and miscellaneous cost.

$$\text{Milk handling cost (Rs./litre/day)} = \frac{\text{Total cost}}{\text{Quantity of milk handled}}$$

$$\text{Milk marketing cost (Rs./litre/day)} = \text{Milk handling cost} + \text{Milk cost}$$

$$\text{Returns (Rs./litre)} = \text{Consumers' price} - \text{Milk marketing cost}$$

Results and Discussion

Constraints faced by cooperative milk unions during the COVID-19 pandemic

The major constraint faced by the cooperative milk unions was shortage of labours in the processing units. Two out of three milk unions reported moderate constraints on this account. Some of the permanent workers were also not able to join their workplaces due to the unavailability of transportation during the lockdown period. Jitendra (2020) and Khairnar (2020) also reported such observations. The demand for single-toned milk, curd, paneer and ghee was not affected during the lockdown period, however, the demand for other dairy products such as lassi and peda decreased during the lockdown period. Haritha et al. (2022) and Thejesh et al. (2022) also reported a similar observation. The majority of milk unions reported that inventory costs increased during the lockdown period due to lower demand for some dairy products, which caused wastage of such products and ultimately



Fig. 1 Physical map of West Bengal showing Nadia (red border), N-24 Parganas (blue border) and Howrah (green border) districts

caused revenue loss to milk unions. These findings corroborate with CRISIL (2020), DPAC (2020), Mukherjee (2020), Munshi et al. (2023) and Raghu and Deb (2020).

Cost of milk collection, reception, chilling and processing for milk unions during the COVID-19 pandemic

a. Cost of milk collection by DCSs

During the pre-lockdown period, DCSs of KIMUL procured 91.11 litres of milk daily, which increased to 97.41 and 103.33 litres per day, respectively, during the lockdown and post-lockdown periods. DCSs of IMUL (Pre-lockdown: 104.03 litres per day, Lockdown: 114.64 litres per day and Post-lockdown: 104.69 litres per day) and HOMUL (Pre-lockdown: 80.97 litres per day, Lockdown: 93.59 litres per day and Post-lockdown: 95.75 litres per day) also showed a similar trend of results (Supplementary Table 1). During the lockdown and post-lockdown periods, gap analysis revealed that DCSs were able to collect more quantity of milk due to the increasing number of milk pourers (Table 1) with their existing labour, machinery and other fixed resources, which significantly reduced per-litre milk collection costs. It was found

to reduce by around 8 to 14 per cent and 0.27 to 14 per cent during the lockdown and post-lockdown periods, respectively, across different DCSs. Srivatsa (2020) and Das et al. (2021) also reported such observations.

b. Cost of receiving liquid milk by milk unions

Milk received at the processing plants of milk unions was tested and chilled before processing. During the lockdown period, DCSs received around 7 to 16 per cent more milk (Table 1), therefore the per-litre cost of receiving liquid milk by KIMUL, IMUL and HOMUL decreased significantly during the lockdown period by 13, 18 and 7 per cent, respectively, as compared to pre-lockdown period. During the post-lockdown period, the decreasing trend was found in HOMUL, but in KIMUL and IMUL it again increased to the pre-lockdown level.

c. Total procurement cost of liquid milk by milk unions

The total procurement cost of milk is the sum of the cost of collection of milk by DCSs and the cost of receiving milk by milk unions (Table 2). The milk procurement cost decreased during the lockdown and post-lockdown periods as compared to the pre-lockdown period for all the milk unions. The highest decline was found in HOMUL, where the total milk procurement costs decreased by 13.6 and 14.3 per cent during the lockdown and post-lockdown periods, respectively.

d. Cost of chilling liquid milk

After transportation from dairy cooperative collection centres to the milk processing plant, the liquid milk undergoes a chilling process before further processing activities. The chilling cost incurred by processing plants of milk unions was estimated and presented in Supplementary Table 3. The average quantity of milk chilled during the lockdown period increased and that caused low milk chilling costs. In HOMUL per litre milk chilling cost decreased from Rs.1.49 in the pre-lockdown to Rs.1.40 and Rs.1.37 in the lockdown and post-lockdown periods respectively. In the case of KIMUL and IMUL, milk chilling costs decreased during the lockdown period but than again increased and reached pre-lockdown levels. Mohapatra (2022) estimated the chilling cost in the case of milk union as Rs. 0.53 per litre during normal period before the COVID-19 pandemic.

e. Processing cost of single-toned milk

The total cost incurred by the processing plants of milk unions for the conversion of liquid milk into single-toned milk along with its manufacturing and packaging forms the total processing cost of single-toned milk. The processing cost incurred by the dairy plants of milk unions is presented in Supplementary Table 4. The milk processing cost per litre for IMUL and HOMUL decreased during the lockdown period (IMUL: Rs. 2.08 per litre, HOMUL: Rs. 1.52 per litre) and post-lockdown period (IMUL:

Table 1: Gap analysis of the average number of active milk pourers (% ΔMP) and milk procurement quantity (% ΔMPQ) in selected DCSs under different milk unions during the COVID-19 pandemic

DCS	ΔMP (%)		ΔMPQ (%)	
	LD vs PRLD	POLD vs PRLD	LD vs PRLD	POLD vs PRLD
KIMUL	-0.98	5.28	6.91	11.83*
IMUL	14.47*	8.87**	10.20*	0.63
HOMUL	11.18**	10.93**	15.59	15.43**

Statistically significant at *P<0.05; **P<0.01; ***P<0.001
PRLD- Pre-lockdown, LD- Lockdown, POLD- Post-lockdown

Table 2: Total procurement cost of liquid milk for different milk unions during the COVID-19 pandemic (Rs./litre)

Particulars	KIMUL			IMUL			HOMUL		
	PRLD	LD	POLD	PRLD	LD	POLD	PRLD	LD	POLD
A. Cost of collection of liquid milk	8.19	7.52	7.24	7.37	6.67	7.35	9.18	7.87	7.82
B. Cost of receiving liquid milk	0.30	0.26	0.42	0.51	0.42	0.51	0.70	0.65	0.64
Total procurement cost of liquid milk (A+B)	8.49	7.78	7.66	7.88	7.09	7.87	9.87	8.53	8.46

PRLD- Pre-lockdown, LD- Lockdown, POLD- Post-lockdown

Fig. 2 Trends in the monthly sale of milk products by KIMUL (2019 – 2021)

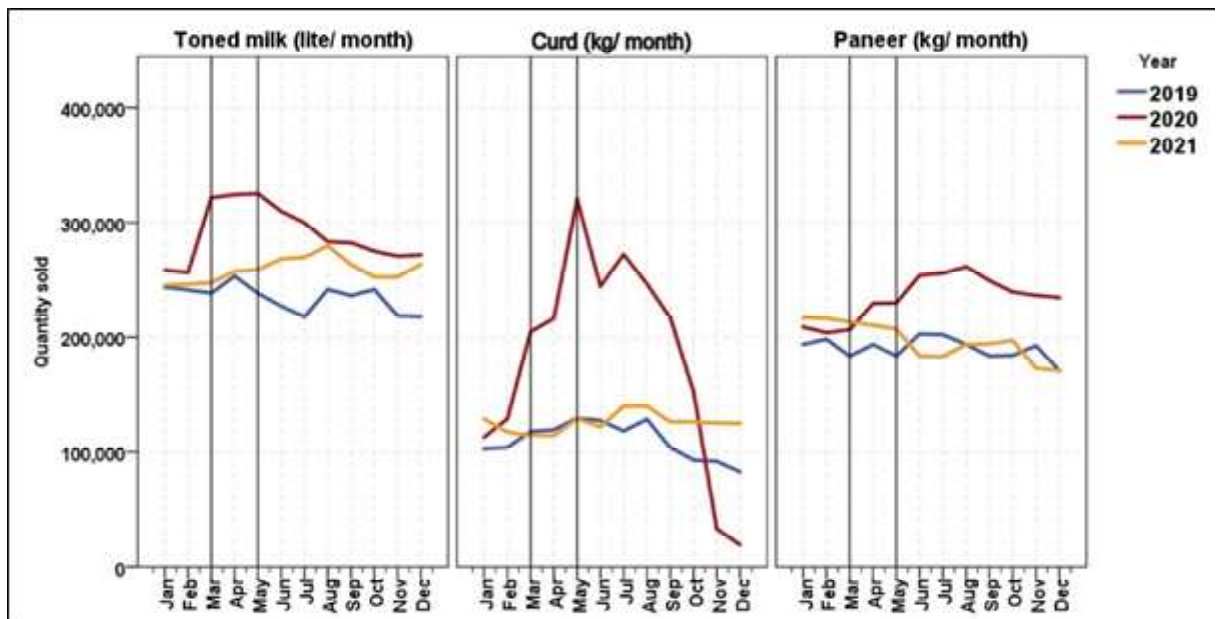
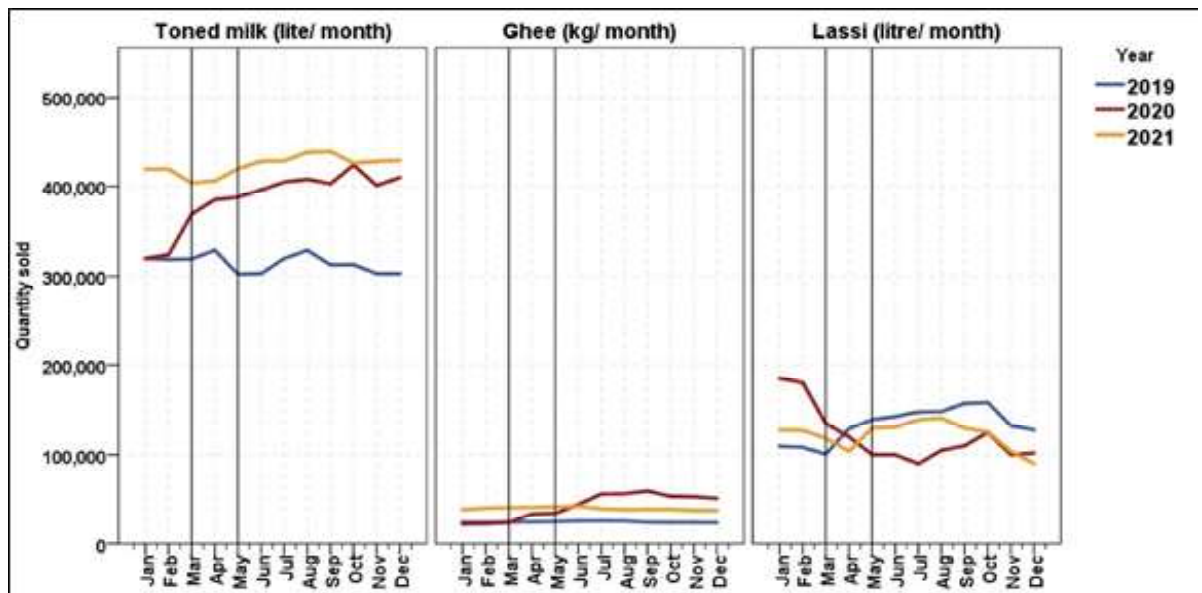


Fig. 3 Trends in the monthly sale of milk products by IMUL (2019 – 2021)



Rs. 2.69 per litre, HOMUL: Rs. 1.48 per litre) periods as compared to the pre-lockdown period (IMUL: Rs. 2.73 per litre, HOMUL: Rs. 1.56 per litre). In the case of KIMUL, milk processing cost declined during the lockdown period (Rs. 1.30 per litre) but during the post-lockdown period (Rs. 2.06 per litre) it increased more than the pre-lockdown level (Rs. 1.38 per litre) because in KIMUL during the post-lockdown period, amount of milk processed to make single-toned milk declined as compared to the pre-lockdown level. Mohapatra et al. (2022) found the processing cost of full cream milk by milk unions as Rs. 2.98 per litre during a normal period before the COVID-19 pandemic.

f. Marketing margin and marketing cost

Table 3 revealed that during the lockdown period marketing margin surged by around 6 to 7 per cent, whereas total marketing cost decreased by around 8 to 11 per cent across the milk unions. During the lockdown period, milk procurement from dairy farmers increased and unions were able to reduce the cost of milk processing and marketing. Along with that by keeping the selling price same (Rs. 48 to Rs. 49 per litre) they were able to generate more marketing margin.

The concept of “economies of scale” stated that if a farm can produce more with its existing infrastructure, its efficiency increases. In the case of milk unions also this theory appears to

be applicable. Milk unions were getting an excess quantity of milk from dairy farmers with their existing facilities leading to a reduction in the cost of total milk procurement, milk chilling/processing cost, and thus a decrease in total marketing cost and an increase in marketing margin.

Trends in monthly sale of milk and milk products by milk unions during the COVID-19 pandemic

Figure 2, 3 and 4 present the monthly trends in the quantity of milk and milk products sold by KIMUL, IMUL and HOMUL, respectively, for the period 2019 to 2021. From the figures, it can be seen that there was an unusual pattern in the number of products sold by milk unions during 2020 as compared to the years 2019 and 2021.

During the lockdown period, the sales of toned milk increased by around 5 to 25 per cent as compared to the pre-lockdown period in all the milk unions. Along with toned milk, sales of curd (5 to 56%), paneer (5 to 56%) and ghee (40 to 80%) were also found to increase. Due to lockdown restrictions, local milk vendors or

other private players and hotels were not able to operate in the study region, therefore consumers shifted their consumption preferences from local unpackaged milk products to packaged milk products to boost their immunity against Corona virus. Due to changes in consumers’ consumption preferences, the sales of mentioned milk products increased suddenly during the lockdown and post-lockdown periods. However, Figure 3 and 4 revealed that during the lockdown period, sales of lassi (25 to 50%) and sweets like peda (50 to 80%) decreased substantially for IMUL and HOMUL, respectively. During the lockdown period, consumers mainly preferred to consume dairy products that are more beneficial to their health. Therefore, by analysing the consumers’ preferences, milk unions decided to produce a very less quantity of products like lassi and peda, and ultimately sales of these products were found to be decreased in the year 2020.

Constraints faced by milk vendors during the COVID-19 pandemic

During the lockdown period, milk vendors reported that they faced constraints concerning milk procurement quantity and

Fig. 4 Trends in the monthly sale of milk products by HOMUL (2019–2021)

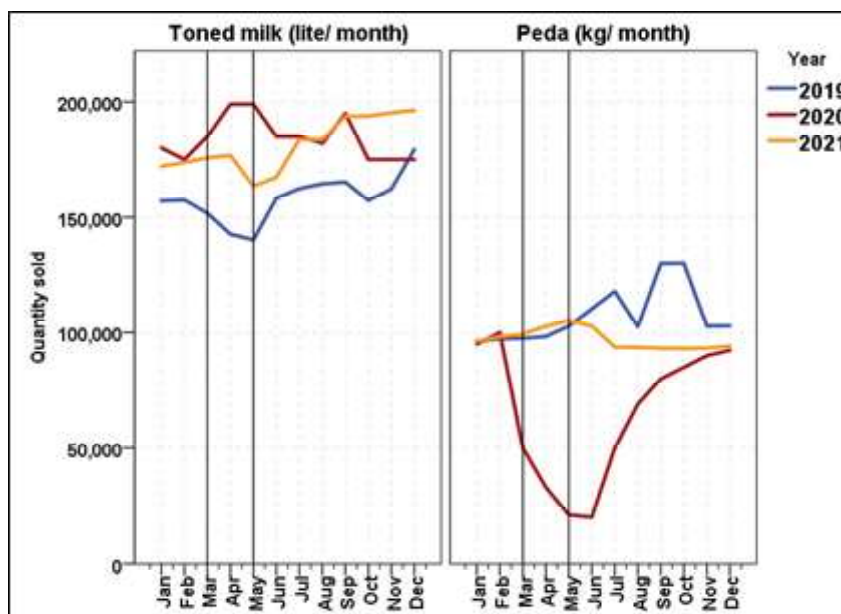


Table 3: Marketing margin and marketing cost of single-toned milk (Rs./ litre)

Particulars	KIMUL			IMUL			HOMUL		
	PRLD	LD	POLD	PRLD	LD	POLD	PRLD	LD	POLD
Total cost (TC) (IC+PC+CC+PrC)	40.06	39.58	40.90	40.19	39.44	41.77	42.08	41.08	41.96
Selling price (SP)	48.00	48.00	48.00	48.00	48.00	48.00	49.00	49.00	49.00
Marketing margin (TC-SP)	7.94	8.42	7.10	7.81	8.56	6.23	6.92	7.92	7.04
Total marketing cost (PC+CC+PrC)	10.48	9.63	10.64	11.82	10.15	11.77	12.92	11.44	11.31

IC = Input cost, PC = Procurement cost, CC = Chilling cost, PrC = Processing cost

revenue due to the lockdown restrictions, they faced difficulties in milk procurement causing a reduction in total revenue. All the vendors of Vendor-A and Vendor-B types and 95 per cent of Vendor-C reported that the demand for milk in the market reduced drastically (Supplementary Fig. 1).

During the post-lockdown periods, the majority of restrictions were removed and it was seen that the number of vendors who faced constraints also decreased. In terms of milk procurement quantity and milk demand, severe constraints were faced by Vendor-A, because the consumption preferences of consumers shifted to packaged milk, and due to that their procurement quantity was reduced as compared to other vendors. In terms of revenue, a severe constraint was faced by Vendor-B, because during the post-lockdown period, hotels and small processors were not working at full strength.

Costs and returns incurred by milk vendors during the COVID-19 pandemic

The costs and returns incurred by milk vendors during the pre-lockdown, lockdown, and post-lockdown periods of the COVID-

19 pandemic are presented in Table 4. The details of cost and returns analysis are presented in Supplementary Tables 5, 6 and 7.

During the pre-lockdown and post-lockdown periods, the share of TVC (76 to 86%) to total cost was found to be higher for all the types of milk vendors. In contrast, during the lockdown period, the TVC for Vendor-B was found to decrease drastically and its share was reduced from 11 to 14 per cent. For the other two vendors i.e., Vendor-A and C the share of TVC was also found to be decreased to around 62 to 80 per cent. Among the different components of TVC, the share of transportation and labour costs was found to be higher. During the lockdown period, the cost of transportation and labour was reduced, so the total cost was also reduced significantly. The TFC remained constant for each milk vendor throughout the pre-lockdown, lockdown and post-lockdown periods.

The total cost incurred by all the categories of milk vendors decreased during the lockdown period due to reduced costs of transportation, labour and vehicle maintenance cost. In contrast, miscellaneous costs increased during the lockdown and post-

Table 4: Costs and returns incurred by milk vendors during the pre-lockdown, lockdown and post-lockdown periods of the COVID-19 pandemic

Districts	Particulars	Vendor-A			Vendor-B			Vendor-C		
		PRLD	LD	POLD	PRLD	LD	POLD	PRLD	LD	POLD
Howrah	Total variable cost (TVC)	194	156	184	234	9	240.35	206	144	218
	Total fixed cost (TFC)	37	37	37	50	50	50	43	43	43
	Total cost (TC=TVC+TFC)	231	194	222	285	59	290	249	188	261
	Net returns (Rs./ litre)	9.74	-0.76	10.28	12.45	-59.05	15.82	11.52	1.06	14.46
		(-107.8)	(5.5)		(-574.3)	(27.1)		(-90.7)	(25.50)	
Nadia	Total variable cost (TVC)	185	93	174	222	8	239	219	164	228
	Total fixed cost (TFC)	57	57	57	62	62	62	33	33	33
	Total cost (TC=TVC+TFC)	243	151	232	284	70	301	252	197	261
	Net returns (Rs./ litre)	10.06	2.67	11.63	12.06	-70.25	13.38	12.19	3.61	13.59
		(-73.4)	(15.6)		(-682.6)	(10.9)		(-70.3)	(11.4)	
N-24 Parganas	Total variable cost (TVC)	188	132	183	241	6	252	236	133	231
	Total fixed cost (TFC)	38	38	38	43	43	43	50	50	50
	Total cost (TC=TVC+TFC)	227	170	222	284	49	295	287	184	282
	Net returns (Rs./ litre)	9.41	0.03	11.32	10.28	-49.26	15.08	13.76	2.32	15.34
		(-99.6)	(20.4)		(-579.2)	(46.7)		(-83.1)	(11.4)	

Figures within parentheses indicate percentage differences in net return during the lockdown and post-lockdown periods as compared to the pre-lockdown period. PRLD- Pre-lockdown, LD- Lockdown, POLD- Post-lockdown

lockdown periods as vendors purchased masks and sanitizers, and took other Corona virus preventive measures such as hygiene, and sanitization of vehicles and equipment. During the lockdown and post-lockdown periods, vendors offered a low price to dairy farmers and charged a higher price to customers to balance the marketing costs of milk. However, they failed to reduce the total marketing costs due to higher milk handling costs (per litre). Milk handling cost was found to be increased because the total milk handled per day decreased severely during the lockdown period. Due to the above-mentioned reasons, vendors faced severe economic losses during the lockdown period. Net returns decreased from Rs. 9.74, Rs. 12.45 and Rs. 11.52 to Rs. -0.76, Rs. -59.05, and Rs. 1.06 per litre during the lockdown period for Vendor-A, Vendor-B and Vendor-C, respectively, in Howrah district. Govindaraj et al. (2022) reported similar findings in their study. Mohapatra et al. (2022) estimated the returns of the two categories of milk vendors as Rs. 12.22 and Rs. 9.45 per litre during a normal period before the COVID-19 pandemic.

Vendor-B faced the highest economic loss as all the hotels and small processors remained closed, followed by Vendor-A and Vendor-C. However, due to higher demand and reduction in COVID-19 restrictions during the post-lockdown period, their net returns increased as compared to the pre-lockdown period. Nadia and N-24 Parganas districts also showed similar trend as that of the Howrah district.

Vendor-B of Nadia district suffered the highest economic loss during the lockdown period, as their net return (per litre of milk) decreased by 682.5 per cent, followed by Vendor-B of N-24 Parganas (-579.2%) and Howrah (-574.3%) districts. However, the net returns of all the categories of milk vendors improved during the post-lockdown period than the pre-lockdown period due to increased selling prices of milk.

Conclusion

During the COVID-19 pandemic, the total marketing margin of milk unions from the sale of milk increased by 6 to 7 per cent and total marketing cost decreased by 8 to 11 per cent due to reduction in the cost of milk collection, reception, chilling and processing. During the lockdown period, there was a sudden hike in sales of toned milk (5 to 25%), curd (5 to 56%), paneer (11 to 26%) and ghee (40 to 80%) but the sale of lassi (-25 to -50%) and peda (-50 to -80%) decreased. Though cooperative milk unions were in a slightly gainful position during the pandemic, on the other hand, milk vendors suffered the worst. Due to strict lockdown restrictions, milk vendors were unable to operate at full strength and their sale of milk was reduced by around 64 to 100 per cent during the lockdown period and which ultimately caused the reduction of net returns by around 70 to 680 per cent Vendors supplying milk to hotels and small processors (Vendor B) were the most affected during the lockdown period. Milk vendors should diversify their customer base and scale operations to

minimize loss during a pandemic like COVID-19. The government may also devise policies for private vendors to produce, process and supply dairy products efficiently.

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