Milk disposal pattern and determinants of milk marketing in Maharashtra state: a regional view

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ABSTRACT

The present study examined milk disposal patterns and the determinants of milk marketing channel choice across different regions of Maharashtra. Primary data were collected from 346 dairy households through personal interviews using a pre-tested, structured interview schedule. The study analysed the distribution of milk marketing channels across Konkan, Western Maharashtra, Khandesh, Marathwada and Vidarbha regions. A multinomial logit model was employed to identify the influence of household characteristics, production factors and transaction cost-related variables on marketing channel selection, using the unorganised channel as the reference category. The results revealed considerable regional variation in milk marketing patterns. Private dairies accounted for the largest share of milk-selling households at the state level, followed by cooperative dairies and unorganised channels. Education, family size, herd size, distance from the milk disposal place, distance from the metalled road, distance from the main market, milk production, milk price and milk collection centres showed varying associations with marketing channel choice. Herd size was positively associated with private dairy participation, while distance from the milk disposal place negatively influenced cooperative dairy selection. Milk price was negatively associated with cooperative and private dairy channels but positively associated with multiple-channel choices. Regional effects were statistically significant for private dairy selection in Western Maharashtra and Marathwada relative to Vidarbha. The findings highlight the importance of strengthening milk collection infrastructure, improving market access and addressing regional disparities in dairy marketing systems to support efficient milk disposal and improve farmers' market participation.

Keywords: Dairy farmers; Milk disposal pattern; Milk marketing channels; Multinomial logit model; Transaction costs; Organised dairy sector; Maharashtra

INTRODUCTION

Over the past two decades, Maharashtra's dairy sector has experienced a remarkable transformation, marked by a sharp surge in milk production between 2017-18 and 2021-22. Today, the state proudly stands as India's fifth-largest milk producer, anchoring a massive portion of the country's overall dairy supply. By 2021-22, Maharashtra's total milk output climbed to an impressive 14,300 thousand tonnes (Galande 2025).

However, this success story isn't uniform. Experts view the state's dairy landscape through two contrasting lenses: while the macro-level numbers point to booming growth, a closer look reveals sharp disparities, with wide variations in progress both between and within different regions (Shah 2014).

To bridge these gaps, policymakers need a clear, boots-on-the-ground understanding of how milk is actually distributed and sold across the state. Gaining insight into how dairy farmers choose their market outlets is the secret to designing realistic, effective development programmes. Ultimately, analyzing marketed surplus and uncovering the real-world factors that influence where farmers sell their milk is vital to building a stronger, more equitable dairy economy.

METHODOLOGY

To gather authentic ground-level insights, primary data were collected from 346 households across all regions of Maharashtra using detailed personal interviews. These sessions relied on a comprehensive, pre-tested and well-structured interview schedule to ensure data accuracy. Additionally, a thorough census of the selected villages was conducted to assess the herd size of milch animals and map out the specific milk marketing channels active within the study area.

Milk disposal pattern in different regions of Maharashtra

The study mapped out exactly how milk moves from farm to table. The balance between home consumption and market sales was tracked, calculating the precise percentage of marketed surplus for each household. Additionally, the data broken down the specific buyers capturing this supply, tracing distribution percentages across cooperative societies, private agencies, rural and urban consumers, traditional vendors, sweet shops, creameries and tea stalls.

Multinomial logistic regression model

A multinomial logistic regression (MNLR) model was used to evaluate how different household and individual characteristics influence a farmer's decision when faced with multiple categorical options (Borooah 2002, Hill et al 2008). Specifically, the model estimates the probability (Pi) that an individual dairy farmer (i) will choose a specific milk marketing channel (j) from a set of mutually exclusive alternatives, given a vector of explanatory variables:

$$\text{Prob}\,(Y_t=1) = \frac{e^{\beta_j x_i}}{\sum_{k=o}^{J} e^{\beta_k x_i}} \text{ for j= 0,1……J, } \beta_0 = o$$

The dependent variable in this study represents the market channel choice, categorized into five distinct outcomes: cooperative dairy (coded as 1), private dairy (coded as 2), unorganised market (coded as 3), a combination of cooperative and unorganised markets (coded as 4) and a combination of private and unorganised markets (coded as 5). The regression determines the odds of selecting each marketing channel relative to a chosen reference category (eg private dairy). Grounded in probability theory, the predicted probability for any preferred choice is bounded between zero and one ($0 \leq Pi \leq 1$), whereas, the logit transformation (Πi) ranges from negative to positive infinity (Gujarati 1992).

Table 1 describes the specification and operationalization of variables used in a multinomial logistic regression analysis.

RESULTS and DISCUSSION

Regional milk disposal patterns in Maharashtra

The distribution of households utilizing different milk marketing channels across the five regions of Maharashtra is detailed in Table 2. The sampled dairy farmers fell into five distinct commercial categories

Table 1. Variables in the multinomial logistic regression model

Variable	Type	Value
Dependent variable		
Milk market preference	Categorical	A number of options available to choose
Explanatory variable		
Age of household head	Continuous	Number of years
Education level of household head	Categorical	Based on number of years
Family size of household	Continuous	Number
Herd size	Continuous	
Volume/size of milk produced	Continuous	Number of litre
Per litre price offered at the market	Continuous	Rupees
Distance from the place where milk is sold	Continuous	Kilometers
Distance from the main market	Continuous	Kilometers
Distance from the metalled road	Continuous	Kilometers
Presence of milk collection center	Categorical	0= No, 1= Yes

Analysis carried out using econometric software STATA 12

Table 2. Milk disposal pattern in different regions of Maharashtra

Marketing option	Number of households in each region					Maharashtra
	Konkan	Western Maharashtra	Khandesh	Marathwada	Vidarbha	
Cooperative dairy	3 (10.00)	0 (0.00)	29 (30.85)	9 (17.31)	29 (36.71)	70 (20.23)
Private dairy	6 (20.00)	78 (85.71)	31 (32.98)	33 (63.46)	5 (6.33)	153 (44.21)
Unorganised channel	17 (56.67)	7 (7.69)	25 (26.59)	2 (3.85)	33 (41.77)	84 (24.28)
Cooperative dairy & unorganised channel both	1 (3.33)	0 (0.00)	3 (3.19)	2 (3.85)	3 (3.80)	9 (2.60)
Private dairy & unorganised channel both	2 (6.67)	6 (6.59)	6 (6.38)	5 (9.62)	3 (3.80)	22 (6.36)
Not selling milk to a channel	1 (3.33)	0 (0.00)	0 (0.00)	1 (1.92)	6 (7.59)	8 (2.31)
Total	30 (100.00)	91 (100.00)	94 (100.00)	52 (100.00)	79 (100.00)	346 (100.00)

based on their primary outlet: (i) those supplying exclusively to cooperatives, (ii) those selling solely to private dairies, (iii) those relying entirely on unorganised channels (such as milk vendors, city consumers and village consumers), (iv) those utilizing multiple channels via a combination of cooperative and unorganised outlets and (v) those combining private and unorganised outlets. Notably, no households in the study area simultaneously supplied both private and cooperative dairies. A small fraction of households did not sell milk commercially at all, reserving their entire yield for domestic consumption.

In the Konkan region, the unorganised sector heavily dominated the market, capturing 56.67 per cent of the surveyed households. In contrast, private and cooperative dairies accounted for only 20.00 and 10.00 per cent of households respectively. Combined marketing channels were utilized by 10.00 per cent of the sample (3.33% for cooperative/unorganised and 6.67% for private/unorganised), while 3.33 per cent kept their milk entirely for home use. The heavy reliance on unorganised channels in Konkan may is primarily driven by a lack of well-established, formal dairy networks available to local farmers.

Western Maharashtra exhibited a powerful shift toward formal commercial structures, with 85.71 per cent of households selling milk exclusively to private dairies, while none utilized cooperatives as a sole channel. Unorganised channels were used by a minor 7.69 per cent of households and 6.59 per cent engaged in dual marketing through private and unorganised channels. No households used a cooperative-unorganised mix or retained their milk purely for home consumption. Benefiting from exceptionally high milk production levels, this region boasts a dense network of private and cooperative collection centers. Many private dairies pick up milk directly from farm gates, substantially lowering transaction costs and explaining their overwhelming market share.

Market preferences were highly balanced in the Khandesh region, where both formal dairy models performed competitively. Approximately 32.98 per cent of households sold their milk to private dairies, closely matched by 30.85 per cent choosing cooperative societies. The unorganised sector remained prominent, capturing 26.59 per cent of households, while 9.57 per cent preferred dual marketing channels. This simultaneous success of organized and unorganised channels stems from robust infrastructure, characterized by abundant rural collection networks alongside highly accessible urban consumer markets.

In Marathwada, private dairies emerged as the dominant buyer, utilized by 63.46 per cent of households, followed by cooperatives at 17.31 per cent. Multiple channels were used by 13.47 per cent of the farmers (3.85% cooperative/unorganised and 9.62%

private/unorganised), while unorganised routes were minimal at 3.85 per cent. A negligible 1.92 per cent of households consumed their production entirely at home. The strong preference for formal, organized processors is heavily tied to the absence of robust local or informal village retail markets, forcing producers to rely on corporate or institutional buyers.

The unorganised sector reclaimed dominance in the Vidarbha region, where 41.77 per cent of households disposed of their milk through informal routes. While cooperative dairies maintained a solid footprint at 36.71 per cent, private dairies were nearly non-existent, capturing a mere 6.33 per cent of households. Dual marketing was limited to 7.60 per cent of the sample, while a notable 7.59 per cent of households did not sell milk at all, choosing instead to consume their entire output at home. This prominent reliance on informal vendors and high home retention points directly to a severe lack of alternative, competitive organized dairy options for local farmers.

Aggregating the data across all five regions reveals that 64.44 per cent of households in Maharashtra sold milk exclusively through organized channels, with private dairies claiming more than double the share (44.21%) of cooperative societies (20.23%). The unorganised sector accounted for 24.28 per cent of households state-wide, while dual-channel marketing was practiced by 8.96 per cent of the sample. Only a tiny minority (2.31%) retained their entire supply for domestic use. Ultimately, this regional analysis highlights that modern, organized dairy networks are unevenly distributed, flourishing primarily within the state's high-production belts while leaving lower-yielding regions reliant on informal channels.

Determinants of milk marketing channel choice in different regions of Maharashtra

Choice of marketing channel is an important decision for milk producers because different channels involve varying levels of profitability, transaction costs and market access. Understanding the factors influencing marketing channel selection is essential for developing efficient milk marketing systems and improving farm income, particularly among smallholder dairy farmers. The present study aimed to identify the determinants of milk marketing channel choice among dairy farmers in different regions of Maharashtra using a multinomial logit model. The explanatory variables included farm and farmer-specific characteristics, such as age, education, family size and herd size, along with transaction cost-related variables, including distance from the milk disposal place, metalled road and main market, milk production, milk price and milk collection centres. Transaction costs represent important market access barriers for resource-poor smallholders (Randela et al 2008).

Previous studies on livestock market participation have primarily examined marketed surplus (Shah and Sharma 1993, Arora et al 1998), market participation decisions (Lapar et al 2003, Bahta and Bauer 2007) and market participation intensity (Holloway et al 1999, Omiti et al 2007). However, relatively limited attention has been given to the determinants of dairy farmers' choice among alternative milk marketing channels.

The multinomial logit model was estimated using STATA to examine the factors influencing milk marketing channel selection (Table 3). The likelihood ratio chi-square statistic was 541.71 and was statistically significant at the 1 per cent level, indicating that the explanatory variables jointly influenced the choice of milk marketing channels. The unorganised channel was used as the reference category. The model included four alternative marketing choices: cooperative dairy (CD), private dairy (PD), cooperative dairy and unorganised channel both (CDUCB) and private dairy and unorganised channel both (PDUCB). The estimated coefficients indicate the direction of association with the relative likelihood of choosing each channel compared with the unorganised channel, whereas, marginal effects indicate the change in the predicted probability of selecting each channel. The model was estimated using 338 observations, with a log-likelihood value of –169.480 and a pseudo R^2 of 0.615.

Age: Age of the household head had a negative coefficient for cooperative dairy, private dairy and private dairy and unorganised channel both, while the coefficient was positive for cooperative dairy and unorganised channel both. However, none of these coefficients was statistically significant, indicating that age was not a significant determinant of milk marketing channel choice in the study area. The marginal effects were also relatively small, suggesting that changes in age had limited influence on the predicted probabilities of selecting different marketing channels. The negative association with cooperative and private dairy channels

Table 3. Multinomial logit estimates of the milk marketing channel choice equation

Parameter	Coefficient estimate				Marginal effect				
	CD	PD	CDUCB	PDUCB	CD	PD	CDUCB	PDUCB	UC
Constant variable	7.191**	8.091***	–3.217	–5.365					
Age	–0.060	–0.030	0.009	–0.033	–0.0000	–0.0043	0.0000	–0.0010	0.0053
Education	0.401**	0.007**	0.139	0.102	0.0043	0.0060	0.0000	0.0053	–0.0156
Family size	0.495	0.219	0.831**	0.250*	0.0002	0.0207	0.0090	0.0084	–0.0383
Herd size	0.229	0.369**	1.089	0.340**	0.0000	0.0563	0.0000	0.0061	–0.0624
Distance from place where milk is sold	–0.267**	–0.336	–2.720	0.457	–0.0342	–0.0404	–0.0060	0.0202	0.0604
Distance from metalled road	5.582***	0.380	6.309	2.801	0.0024	0.1163	0.0000	0.0187	–0.1374
Distance from main market	0.445***	0.030	–0.156**	–0.202***	0.0257	0.0298	–0.0112	–0.0178	–0.0265
Milk production	0.025	0.025**	0.242***	0.003	0.0000	0.0060	0.0015	0.0007	–0.0082
Milk price	–0.372***	–0.436***	0.264**	0.085**	–0.0302	–0.0600	0.0100	0.0141	0.0661
Milk collection centers	45.912	0.071**	42.461	3.871	0.1021	0.1231	0.0001	0.0108	–0.2361
Region									
Konkan	–0.140	2.050	–10.207	2.161	–0.0004	0.1673	–0.0001	0.0432	–0.2102
Western Maharashtra	–66.889	4.510***	–73.755	0.294	–0.086	0.4831	–0.0004	0.0086	–0.4053
Khandesh	28.440	1.328	–28.411	0.955	0.0121	0.0132	–0.0158	0.012	–0.0215
Marathwada	61.564	6.226**	54.588	5.239	0.0587	0.3143	–0.0927	0.0413	–0.3216

Number of observations: 338; Log likelihood function: –169.480; Pseudo R^2: 0.615; CD: Cooperative dairy, PD: Private dairy, CDUCB: Cooperative dairy & unorganised channel both, PDUCB: Private dairy & unorganised channel both, UC: Unorganised channel; Figures within the parentheses show standard error; ***p <0.01, **p <0.05, *p <0.10); Dependent variable in market channel choice: Mk = 1 for cooperatives, Mk = 2 for private cooperatives, Mk = 3 for cooperative dairy and unorgansied cooperatives both, Mk = 4 for private dairy and unorganised cooperatives both, Mk = 0 for unorganised channel; Unorganised channel used as base category

may indicate relatively lower participation among older farmers, although the absence of statistical significance does not provide sufficient evidence for this relationship. Sharma (2015) reported a negative association between household-head age and participation in modern milk marketing channels, particularly private dairy channels.

Education: The data show that education had a positive and statistically significant coefficient for cooperative dairy (0.401) and a positive but relatively small and statistically significant coefficient for private dairy (0.007). The coefficients for cooperative dairy and unorganised channel both and private dairy and unorganised channel both were positive but statistically non-significant. These findings indicate that education was positively associated with the relative choice of cooperative and private dairy channels compared with the unorganised channel.

The marginal effects showed that one additional year of formal education increased the predicted probability of choosing cooperative dairy by approximately 0.43 per cent and private dairy by 0.60 per cent. The marginal effect for private dairy and unorganised channel both was positive (0.53%), while the marginal effect for the cooperative dairy and unorganised channel both was negligible. Education may improve farmers' access to information, managerial capabilities and understanding of organised marketing arrangements. Similar positive associations between education and milk marketing channel

selection have been reported by Kumar et al (2011), Sharma (2015), Alene et al (2008) and Mutura et al (2015).

Family size: Family size had positive coefficients for all four alternative marketing channels relative to the unorganised channel. The coefficient was statistically significant for cooperative dairy and unorganised channel both (0.831) and private dairy and unorganised channel both (0.250). The coefficients for cooperative dairy and private dairy were positive but statistically non-significant.

The marginal effects indicated that a one-unit increase in family size increased the predicted probability of selecting cooperative dairy and unorganised channel both by approximately 0.90 per cent and private dairy and unorganised channel both by 0.84 per cent. The marginal effect for private dairy was positive (2.07%), while that for cooperative dairy was negligible. These results suggest that households with larger family sizes may be more likely to use multiple marketing channels, possibly because of greater availability of family labour for milk production, transportation and marketing activities. Kariuki et al (2006) similarly reported that larger household size was associated with the selection of alternative milk marketing channels.

Herd size: Herd size had positive coefficients for all four marketing channel alternatives. The coefficient for private dairy was positive and statistically significant (0.369), while the coefficient for private dairy and unorganised channel both was also positive and significant (0.340). The coefficients for cooperative dairy and cooperative dairy and unorganised channel both were positive but statistically non-significant.

The marginal effect of herd size indicated that an increase of one milch animal raised the predicted probability of choosing private dairy by approximately 5.63 per cent. The predicted probability of selecting private dairy and unorganised channel both increased by 0.61 per cent. The marginal effect for cooperative dairy and unorganised channel both was negligible, while the probability of selecting the unorganised channel decreased by 6.24 per cent.

The positive relationship between herd size and private dairy participation may be associated with the capacity of larger dairy farms to supply greater quantities of milk to organised procurement systems. Farmers with larger herds may also have greater incentives to diversify their marketing arrangements. Similar findings regarding the influence of herd size on modern milk marketing channel participation have been reported by Tsourgiannis et al (2005) and Mutura et al (2015).

Distance from milk disposal place: Distance from the milk disposal place had a negative and statistically significant coefficient for cooperative dairy (–0.267), whereas, the coefficients for private dairy, cooperative dairy and unorganised channel both and private dairy and unorganised channel both were statistically non-significant. This finding indicates that greater distance from the milk disposal location was associated with a lower relative likelihood of selecting cooperative dairy over the unorganised channel.

The marginal effect showed that a one-kilometre increase in distance from the milk disposal place reduced the predicted probability of choosing cooperative dairy by approximately 3.42 per cent. The marginal effects for the other channels were not statistically established in the table. The negative association with cooperative dairy may reflect the influence of transportation costs and the additional time required to deliver milk to collection points. Farmers located farther from milk disposal facilities may, therefore, prefer alternative channels that provide more convenient market access. Sharma (2015) also reported a negative relationship between distance to milk collection centres and participation in modern milk marketing channels.

Distance from metalled road: Distance from the metalled road had a positive and statistically significant coefficient for cooperative dairy (5.582). The coefficients for private dairy, cooperative dairy and unorganised channel both and private dairy and unorganised channel both were positive but statistically non-significant.

The marginal effect indicated that a one-kilometre increase in distance from the metalled road increased the predicted probability of selecting cooperative dairy by approximately 0.24 per cent. The positive coefficient may indicate that farmers in relatively remote locations were associated with cooperative dairy participation, potentially because cooperatives provide milk collection facilities in areas

where alternative marketing opportunities are limited. However, the positive association should be interpreted cautiously, as distance from the metalled road may also capture other geographical and infrastructural characteristics not directly measured in the model. Sharma et al (2015) reported a positive association between distance from paved roads and participation in modern marketing channels, while Sharma et al (2007) highlighted the importance of road and market infrastructure in facilitating farmers' participation in organised milk marketing.

Distance from main market: Distance from the main market had a positive and statistically significant coefficient for cooperative dairy (0.445). In contrast, it had negative and statistically significant coefficients for cooperative dairy and unorganised channel both (–0.156) and private dairy and unorganised channel both (–0.202). The coefficient for private dairy was positive but statistically non-significant.

The marginal effects indicated that a one kilometre increase in distance from the main market increased the predicted probability of selecting cooperative dairy by 2.57 per cent. In contrast, the probabilities of choosing cooperative dairy and unorganised channel both and private dairy and unorganised channel both decreased by 1.12 and 1.78 per cent respectively. The marginal effect for the unorganised channel was negative (–2.65%).

These results suggest that distance from the main market was associated with differences in channel selection. The positive relationship with cooperative dairy may indicate that cooperatives provide a more accessible and reliable procurement arrangement for farmers located farther from the main market. The negative coefficients for multiple-channel choices suggest that greater distance may be associated with reduced participation in diversified marketing arrangements. Similar findings have been reported by Bardhan et al (2012), who highlighted the role of market accessibility and transaction costs in determining milk marketing decisions.

Milk production: Milk production had positive coefficients for all four alternative marketing channels. The coefficient for private dairy was positive and statistically significant (0.025), while the coefficient for cooperative dairy and unorganised channel both was positive and statistically significant (0.242). The coefficients for cooperative dairy and private dairy and unorganised channel both were positive but statistically non-significant.

The marginal effects indicated that a unit increase in milk production increased the predicted probability of choosing private dairy by approximately 0.60 per cent and cooperative dairy and unorganised channel both by 0.15 per cent. The marginal effect for private dairy and unorganised channel both was 0.07 per cent, while that for cooperative dairy was negligible.

The positive association between milk production and private dairy participation may be attributed to the procurement capacity of private dairies and the greater marketable surplus generated by larger milk-producing households. Farmers producing higher quantities of milk may have greater opportunities to participate in organised supply chains and multiple marketing arrangements. Similar findings have been reported by Mburu et al (2007), Tsourgiannis et al (2005) and Kumar et al (2011). However, Bardhan et al (2012) reported that increased production could also encourage farmers to use unorganised channels when these offer higher prices or greater flexibility.

Milk price: Milk price was a statistically significant determinant of milk marketing channel choice, but its effects differed across the alternative channels. The coefficient was negative and statistically significant for cooperative dairy (–0.372) and private dairy (–0.436), while it was positive and statistically significant for cooperative dairy and unorganised channel both (0.264) and private dairy and unorganised channel both (0.085).

The marginal effects indicated that a one-unit increase in milk price reduced the predicted probability of choosing cooperative dairy by 3.02 per cent and private dairy by 6.00 per cent. In contrast, the predicted probabilities of selecting cooperative dairy and unorganised channel both and private dairy and unorganised channel both increased by 1.00 and 1.41 per cent respectively. The predicted probability of selecting the unorganised channel increased by 6.61 per cent.

The negative coefficients for cooperative and private dairy channels, together with the positive marginal effect for the unorganised channel, suggest that higher milk prices were associated with a greater probability of selecting unorganised marketing arrangements. This may reflect differences in the prices offered by unorganised traders and organised

milk procurement agencies. However, the results describe statistical associations and do not establish that price differences alone caused farmers to select a particular channel. Mburu et al (2007) also reported a negative relationship between milk price and participation in cooperative milk marketing channels.

Milk collection centres: The coefficient for milk collection centres was positive and statistically significant for private dairy (0.071), while the coefficients for cooperative dairy, cooperative dairy and unorganised channel both and private dairy and unorganised channel both were positive but statistically non-significant.

The marginal effect for private dairy was 0.1231, indicating that an increase in the milk collection centre variable was associated with an increase of approximately 12.31 percentage points in the predicted probability of choosing private dairy, holding other factors constant. The marginal effects for the remaining channels were relatively small.

The positive and significant association between milk collection centres and private dairy participation suggests that the availability of collection infrastructure may facilitate farmers' access to organised milk procurement systems. Collection centres can reduce transportation-related transaction costs and improve the convenience of milk delivery. Kumar et al (2011) also highlighted the importance of milk collection centres in promoting participation in organised milk marketing chains.

Regions: The regional effects were examined using Vidarbha as the reference category. The coefficients represent differences in the relative likelihood of selecting alternative marketing channels compared with the unorganised channel in Vidarbha.

In Konkan, the coefficients for cooperative dairy and cooperative dairy and unorganised channel both were negative, while those for private dairy and private dairy and unorganised channel both were positive. None of the regional coefficients for Konkan was statistically significant, indicating that the observed differences were not statistically established.

In Western Maharashtra, the coefficient for private dairy was positive and statistically significant (4.510), whereas, the coefficients for cooperative dairy and cooperative dairy and unorganised channel both were negative but statistically non-significant. The coefficient for private dairy and unorganised channel both was positive but non-significant. The significant positive coefficient for private dairy indicates that, relative to Vidarbha, farmers in Western Maharashtra had a higher relative likelihood of choosing private dairy over the unorganised channel, after controlling for the other variables in the model.

In Khandesh, the coefficients for cooperative dairy and private dairy were positive, whereas, those for cooperative dairy and unorganised channel both and private dairy and unorganised channel both were negative. None of these coefficients was statistically significant, suggesting that regional differences in the relative choice of marketing channels were not statistically established for Khandesh.

In Marathwada, the coefficient for private dairy was positive and statistically significant (6.226). The coefficients for cooperative dairy and private dairy and unorganised channel both were positive but non-significant, while that for cooperative dairy and unorganised channel both was negative and non-significant. The significant positive coefficient for private dairy suggests that farmers in Marathwada had a higher relative likelihood of choosing private dairy over the unorganised channel compared with farmers in Vidarbha, controlling for the other explanatory variables.

Overall, the regional estimates indicate statistically significant differences primarily in the private dairy channel for Western Maharashtra and Marathwada relative to Vidarbha. The remaining regional coefficients were statistically non-significant. Therefore, the results suggest that regional variation was particularly evident in private dairy channel selection, while evidence for regional differences in the other marketing channels was limited.

CONCLUSION

The study revealed considerable regional variation in milk disposal patterns and marketing channel selection among dairy farmers in Maharashtra. Private dairies represented the major organised marketing channel at the state level, although the relative importance of cooperative, private and unorganised channels differed across regions. The multinomial logit estimates indicated that education, family size, herd size, distance-related factors, milk

production, milk price and the availability of milk collection centres influenced marketing channel choice to varying degrees. Larger herd size was positively associated with private dairy participation, while greater distance from the milk disposal place reduced the likelihood of choosing cooperative dairy.

Milk price showed contrasting associations across marketing channels, indicating differences in farmers' marketing preferences and the conditions associated with alternative outlets. Regional effects were statistically significant for private dairy selection in Western Maharashtra and Marathwada relative to Vidarbha, whereas, most other regional coefficients were non-significant. The findings emphasise the need for region-specific dairy development strategies, improved milk collection infrastructure and better market accessibility. Strengthening cooperative and private procurement systems while improving marketing opportunities for smallholder farmers could support more efficient milk disposal and enhance the sustainability of dairy farming in Maharashtra.

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