



## Research Article

# ECONOMIC ANALYSIS OF MILK PRODUCTION AND MARKETED SURPLUS IN MIGRANT AND NON-MIGRANT MEMBER HOUSEHOLDS OF HILLY DISTRICT OF PITHORAGARH, UTTARAKHAND

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**Abstract:** Out-migration is quite conspicuous in the hilly areas of Uttarakhand. Besides other things out-migration has a bearing on livestock rearing which forms an integral part of hill economy. Present work attempts to study the economics of milk production and marketed surplus in migrant and non-migrant member households. Primary data was collected from 90 migrant and 60 non-migrant member households which were then analyzed using conventional economic analysis and linear regression analysis. Total cost of milk production was found to be higher for migrant member households whereas marketed surplus was higher for non-migrant member households. Migrant status of household was found to have a significant negative impact on marketed surplus of milk.

**Keywords:** Out-migration, economics of milk production, marketed surplus, migrant member household, linear regression analysis

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## Introduction

Since time immemorial, migration has been taking place world-wide. Migration is seen from poor countries to rich countries and within a country from regions of poor resource endowments to the regions of rich resource endowments. Majority of instances of migration take place within national borders. Internal migration and remittances are much more important for poverty reduction as compared to international migration, since internal migration between regions, districts and municipalities and between rural and urban areas, are more likely to involve poorer people [1, 2]. The National Sample Survey Organization (NSSO) [3] estimates internal migration in India at 326 million (28.50 percent). Migration becomes more pronounced in the case of hilly states like Uttarakhand because of their inaccessibility, fragility and limited resources and opportunities. Subsistence nature of agriculture and lack of industries further aggravates it. About 89 percent of the total geographical area of Uttarakhand is mountainous and inhabited by 59 percent of the state population. According to the NSSO, 2008 [3] estimate, around 381 persons out of 1000 migrated from rural areas of Uttarakhand for employment. Livestock farming forms an integral part in the economy of the Uttarakhand Himalaya and plays an important role in the mixed farming system. It provides a base for livelihood of the populace under conditions of small and fragmented land holdings and low productivity of agriculture [5]. As such out-migration and remittances seems to have a definite bearing on livestock enterprise. Although at the primary instance, out-migration seems to simply aggravate the problem of livestock by creating labor shortage and limiting people's willingness to take on low-paid activities but migration and remittances can also foster household farm investment and milk production as seen in some other parts of the country.

In view of the above, the present study was carried out with the following specific objectives:

1. To compare the cost and return of milk production among migrant and non-migrant member households.

2. To compare the production, consumption and marketed surplus of milk among migrant and non-migrant member households.
3. To analyze the factors affecting marketed surplus of milk.

## Methodology

The state of Uttarakhand has the total geographical area of 53,483 sq. km, out of which 86.07 percent area is hilly. The rural population of the state forms 69.45 percent out of the population of 10 million. Present study was conducted in the easternmost Himalayan district of Uttarakhand, namely, Pithoragarh. Agriculture is the most important segment of the Pithoragarh district's economy. About 59 percent of the land holdings are marginal and only 6 percent of the cultivable area is under irrigation. Because of this, subsistence farming is predominant in the region. The major crops of the district are rice, finger millet, soybean, wheat, barley and lentil. Besides, livestock enterprises provide an important source of livelihood for the people.

## Sampling design and database

All villages of the district were categorized into two broad clusters based on distance from the district headquarters. Forty five migrant and 30 non-migrant households were selected randomly from each cluster to constitute a total sample size of 150 households. The sample respondents were classified into four categories as 'migrant member household close to the district head quarter' (MMC), 'migrant member household away from the district head quarter' (MMA), 'non-migrant member household close to the district head quarter' (NMC) and 'non-migrant member household away from district head quarter' (NMA). Relevant data was collected using a pretested structured schedule by personally interviewing the respondents.

**Analytical tools and techniques**

Conventional economic measures were used to assess the economics of milk production as influenced by the remittances. Total costs of production were estimated in terms of variable and fixed costs. The variable cost of milch animals included expenditures incurred on feed (fodder, concentrate and grain), labor and maintenance cost (including veterinary and other miscellaneous expenses). The fixed cost comprised of interest on fixed capital and depreciation on animal and fixed assets. Based on the assumption of 10 years of productive life of dairy animals, the depreciation rate was worked out as 10 percent per annum. Similarly, the depreciation rate for other fixed assets were taken as 5 percent. The interest on fixed capital like value of animal and cattle shed was calculated at 12 percent per annum. The value of family labor was imputed based on the prevailing wage rate in the study area. Gross returns included income from milk, dung and from custom hiring of animals. Income from milk was estimated based on the prices prevailing in the study area. Net return was computed by deducting gross cost from gross return. The total milk produced by all milch animals in households was reckoned as per day milk production for household. The quantity of milk retained at home for consumption or conversion into milk products was taken as per day milk consumption of household. The actual quantity of milk sold by farmers in market was considered as marketed surplus and marketable surplus is residual quantity of milk with producer farmer after meeting his family requirement for consumption. Marketable surplus of milk was estimated on the basis of minimum nutritional requirement recommended by ICMR [4] (Table 1).

Table-1 Indian Council of Medical Research (ICMR) recommendations for milk requirement (g/day)

Pre-school children	300
School children (7-12 yrs)	250
Boys and girls (13-18 yrs)	250
Adult men and women (200g)	200
Pregnant women	325

The following model was employed to study the impact of various socio-economic variables on marketed surplus of different households:

$$MS = f(X_1, X_2, X_3, X_4, X_5)$$

MS = Marketed surplus of milk per household per day in kg

X<sub>1</sub> = Total milk production per household in kg

X<sub>2</sub> = Family size of household

X<sub>3</sub> = Number of milch animals per household

X<sub>4</sub> = Average price of milk

X<sub>5</sub> = Dummy for migrant/non-migrant status of households; 1 if it is migrant member household, otherwise 0.

**Results and discussion**

**Socio-economic characteristics of the sample households**

The findings regarding various socio-economic characteristics of sample households like family size, family structure, caste, land holding etc. are shown in table 2. The average family size was slightly larger in the case of migrant member households. Because of the larger family size, agriculture fails to provide sufficient income to meet the expenditure of the households which might have motivated the migration of male family members. Joint families were more prevalent in the case of migrant member households. Most of the migrant member households belonged to the upper caste. Higher social status might have enabled them to acquire good education and necessary skills essential for getting a job elsewhere. Lack of education and skills, no links in the city and inability to bear the migration cost in the case of lower caste can be the major hindrance for migration. Land holding size was bigger in the case of migrant member households than non-migrant member households. In the case of migrant member households, percentage of land kept fallow was comparatively higher than their counter-parts. As the migrant member households received a good income from remittances, their food security was ensured. Thus, they do not want to put more efforts in agriculture as it was not profitable. As most of the migrant members are employed in good salaried jobs, remittances received by the families left behind improved the income status of the household.

**Livestock details of the sample households**

As depicted in table 3, number of livestock was more in the case of non-migrant member households than migrant member households; because migrant households derived income from other sources and livestock was kept only for subsistence whereas among non-migrant households livestock enterprise was the main source of income.

Table-2 Socio-economic characteristics of the sample households

Particulars	MMC	MMA	NMC	NMA
Family Size	5.51	6.08	4.40	4.83
Number of migrant/family	1.22	1.46	0	0
Upper caste households (%)	88.89	73.33	76.67	36.67
Lower caste households (%)	11.11	26.67	23.33	63.33
Joint family (%)	55.56	77.78	23.33	36.67
Nuclear family (%)	44.44	22.22	76.67	63.33
Land holding (acres)	1.08	1.11	0.90	0.60
Fallow land (%)	17.73	15.28	0.93	3.33
Average annual household income (in Rs.)	424,504.02	467,538.94	166,465.63	131,343.91

Table-3 Livestock details of the sample households

Category	MMC		MMA		NMC		NMA	
	No./family	No. of families						
Cow (CB)*	0.91	26	0.24	7	1.30	23	0.23	4
Cow (Ind)**	0.58	14	1.27	29	0.33	6	1.50	23
Buffalo	0.09	4	0.38	8	0.07	2	0.43	10
Goat	0.53	12	1.09	9	1.37	12	3.60	20
Bullock	0.22	7	0.36	6	0.50	9	0.97	16
Poultry	0.00	0	0.00	0	0.20	2	0.00	0
Total	2.33	39	3.33	39	3.77	30	6.73	30

Households located nearer to district headquarter irrespective of the migrant/non-migrant status were found to have cross bred cattle whereas indigenous cows were more common in households located away from the district headquarter. Lack of awareness might be one simple reason for this difference. Buffaloes were not so common in households located near to district headquarter because of the lack of green fodder.

**Economics of milk production under different categories**

Livestock is the integral component of agriculture in the hilly region. The most common livestock species in the study area were cattle, buffaloes and goats. Milk was mainly produced from buffalo and cow, which was sold at the nearby market and was the partial source of income of the people. Bullocks were mainly used for plowing the fields.

Goats were reared mainly for meat. Following table shows the cost and returns of milk production per animal per year for the four categories of households. Households located near the district headquarter were found to spend more on fodder, concentrate and grain as they need to purchase everything from the market. On the other hand, forests were accessible to the households located away from the district headquarter, thus, they mainly depend on forest for fodder needs. Cross bred cattle were popular in areas closer to district headquarter which necessitates the purchase of high quality feed and fodder whereas the indigenous cattle which were more common in remote villages can easily be reared on fodder collected from forests. If we observe the pattern of expenditure and returns on the basis of migrant status of households, then it can be seen that the expenditure was higher in the case of migrant member households. Remittances received from outside permit the migrant member to spend more on feed and fodder. Non-migrant member households were rearing comparatively more number of livestock thus the average labor cost per animal was less in their case. Returns from milk were higher in the case of non-migrant households in households located near to the district headquarter as they were rearing more number of high milk yielding crossbreds. In the case of households located away from district headquarter returns were higher for migrant member households which can be due to better feeding and management practices. Gross returns were quite higher in the case of households located near to the district headquarter due to rearing of more number of crossbreds and the higher milk price prevailing in the nearby market.

Table-4 Economics of milk production under four categories of household (in Rs./animal/year)

Particulars	MMC	MMA	NMC	NMA
<b>Variable Cost</b>				
Fodder	1679.01	390.12	1060.60	356.76
Concentrate	4148.15	2654.81	3181.82	2325.88
Grain	1688.89	707.56	1655.45	558.47
Labor	7604.32	8676.82	6695.37	6495.58
Maintenance	334.57	266.80	290.00	194.95
Total Variable Cost	15454.93	12709.45	12883.25	9931.65
<b>Fixed Cost</b>				
Interest on fixed capital	1292.79	1003.89	1013.56	736.87
Depreciation	871.07	758.29	698.45	562.62
Total Fixed Cost	2163.86	1762.18	1712.02	1299.49
<b>Gross Cost</b>				
	17618.80	14471.64	14595.27	11231.13
<b>Returns</b>				
Milk	28561.18	15520.11	31411.76	12037.04
Value of dung	1485.55	1274.76	1289.63	978.96
Gross Returns	30046.73	16794.87	32701.39	13016.00
<b>Net Returns</b>				
	12427.94	2323.23	18106.12	1784.87

**Production, marketable surplus and marketed surplus of milk**

Table 5 provides the details of milk production, marketable surplus and marketed surplus. It can be observed that per day milk production was highest for NMC households followed by MMC, MMA and NMA households. Overall production was higher in the case of households located closer to the district headquarter as they have better access to information and modern technology when compared with their counter parts.

Table-5 Production, marketable surplus and marketed surplus of milk (in kg/day/household)

Category	Production	Minimum requirement	Marketable surplus	Marketed surplus
MMC	7.05	0.919	6.131 (86.97)	4.26 (60.43)
MMA	4.51	0.985	3.525 (78.16)	1.33 (29.49)
NMC	7.35	0.955	6.395 (87.01)	4.86 (66.12)
NMA	3.71	1.035	2.675 (72.16)	1.36 (36.66)

Note: Figures in parentheses indicate the percentage of total production

In the case of households located near to the district headquarter milk production

was higher in non-migrant member households as they were rearing larger number of milch animals. Whereas in the case of households located away from the district headquarter milk production was higher in the case of migrant member households possibly because of better management practices. The average marketable surplus of milk as a proportion of total milk production ranged from 72.16 percent in NMA category to 87.01 percent in MMA category. The percentage marketable surplus was observed to increase with increase in milk production. Further it was observed that marketed surplus of milk was lower than marketable surplus of milk. This indicated that there was no distress sale or forced sale of milk across all categories of households in the study area. Marketed surplus was higher for non-migrant member households indicating that they tend to sell more percentage of milk produced in order to earn higher income whereas migrant member household prefer to consume more milk at household level.

**Factors affecting marketed surplus of milk**

It can be seen in table 6 that R<sup>2</sup> value is 0.9470 which implies that about 94 percent of variation in marketed surplus in the study area was explained by the independent or explanatory variables under consideration. Coefficient of milk production was found to be statistically highly significant at 0.1 percent level of probability. Coefficient of migrant/non-migrant status (-0.3637) and average price of milk (0.1021) were significant at 1 percent and 5 percent respectively.

Table-6 Factors influencing the marketed surplus (Results of linear regression analysis)

Particulars	Coefficients	t-value
Dependent variable	Marketed surplus of milk per household per day in kg	
Independent variables		
Intercept	-3.3609	-3.3761
Total milk production per household in kg	0.8186**	33.9200
Family size of household	-0.0255	-0.9314
Number of milch animals per household	-0.0754	-1.1373
Average price of milk	0.1021*	2.4459
Migrant and non-migrant status (Migrant=1 & Non-migrant=0)	-0.3637**	-3.204
R <sup>2</sup>	0.9470	
Adjusted R <sup>2</sup>	0.9440	
F-value	317.8172	

Note: \*\* represents significance at 1% and \* represents significance at 5%

The results of marketed surplus function showed that the values of regression coefficients of milk production had a positive impact on the marketed surplus of milk indicating thereby that one percent increase in the production after keeping all other variables constant, the marketed surplus could increase by 0.8186 percent. This clearly implies that as the milk production increases, there will be more marketed surplus of milk. The quantity of marketed surplus of milk also increases with the increase in the average price of milk. Negative sign of coefficient in the case of migrant/non-migrant status implies that marketed surplus is less in the case of migrant member households. One possible explanation for this can be that migrant member households instead of rearing livestock for commercial purpose generally tend to rear them for fulfilling household needs only. The other variables like family size did not show any significant impact on the marketed surplus. However, its sign was negative which clearly indicated that as the family size increases, the marketed surplus of milk will decrease. The number of milch animals did not have any significant influence on the marketed surplus as there was a huge difference in the yield of crossbreds and indigenous breed being reared in the area which makes the effect of mere number of animals as insignificant.

**Conclusion**

Average cost of milk production was higher in the case of migrant member households. Returns from milk were higher in the case of non-migrant households in households located near to the district headquarter as they were rearing more number of high milk yielding crossbreds. In the case of households located away from district headquarter returns were higher for migrant member households which can be due to better feeding and management practices.

The average marketable surplus of milk as a proportion of total milk production ranged from 72.16 percent in NMA category to 87.01 percent in MMA category. Marketed surplus was higher for non-migrant member households indicating that they tend to sell more percentage of milk produced in order to earn higher income whereas migrant member household prefer to consume more milk at household level. Milk production and price had significant positive influence on marketed surplus whereas migrant status of household had significant negative influence. High value of marketable surplus against low marketed surplus even in non-migrant households for whom livestock comprise the major source of income indicates that availability of proper market for the surplus milk can help in increasing the income of these households which is necessary to reduce the inequity between migrant and non-migrant member households. Imparting skills related to value addition and awareness regarding high milk yielding breeds can further help the non-migrant households particularly those situated away from the district headquarter.

**Application of research:** Current study provides household level estimates related to cost, returns, production, consumption, marketable surplus and marketed surplus of milk which can work as an input for framing dairy policies in the study area.

**Research Category:** Dairy Economics

#### Abbreviations:

MMC: Migrant member household close to the district head quarter  
MMA: Migrant member household away from the district head quarter  
NMC: Non-migrant member household close to the district head quarter  
NMA: Non-migrant member household away from district head quarter  
NSSO: National Sample Survey Organization  
ICMR: Indian Council of Medical Research

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