# Indian Economic Review

(REPRINT)

DELHI SCHOOL OF ECONOMICS

# Preference for Dairying Among Rural Women Doing Domestic Duties in India: An Econometric Analysis of Unit Level Data from NSS 68th Round Employment-Unemployment Survey

VINAY PATEL

AND

SUBIR MITRA[1]
*National Dairy Development Board*

ABSTRACT

India is the largest producer of milk and its rural women engaged in domestic duties are the pivotal players in this small holder family production system. Though National Sample Survey Office (NSSO) has been publishing special reports on the preferred choice for additional work, among rural women engaged in domestic duties, we do not find any analysis in the literature on the subject. This paper, through an econometric framework, aims to contribute towards bridging this research gap, by investigating how individual characteristics such as social group, occupational type of households, age, literacy, geographical location and income levels affect preference for dairying, as an additional vocation. Thereafter, it also analyses the presence of requisite skill and form of assistance sought for taking up this vocation. The state wise and zone wise disaggregation provides a rich understanding of the local effects and varied profile of women seeking dairying as a means of additional income. These results can be useful for policy makers not only in planning and designing of dairy development programs for rural women across the country but also for rural employment and empowerment programs for women.

**Keywords:** Rural Women, Employment in Unorganized Sector, Labour Productivity, Econometric Models, Dairy Industry, Women in Domestic Duties.

**JEL Classification:** J21, J32, J23, J43, O13, R1

## 1. INTRODUCTION

It has been predicted by leading economists across the world that over the next few decades, more than half of India's growing population would still live in rural areas. Further, for food prices to remain constant, farmers yield gains will have to increase by 50% on essentially the same land area, with less water, nutrients, energy and labour and as climate changes, the more we delay investments in these areas, the more steeper would be the challenge. However, with appropriate support, smallholder farmers can

---

1 Corresponding Author: National Dairy Development Board, Anand 388001. Email: subir@nddb.coop.

become the engines for productivity growth and transform India's economy. Thus for an optimistic future, the government's policy must support ways in which the rural farming households can increase their income [e.g., Binswanger-Mkhize and Hans (2011)]

India's structural transformation has neither followed the western recipe nor its eastern neighbours viz. China or Korea; urban migration and labour absorption has been slower than expected, especially in the typically labour intensive manufacturing sector. As a result, formal sector jobs are few and declining, as the share of employment and agricultural employment and growth remains low.

Farms on an average are declining in both land and household size and the farmers are trying their best to diversify into high value crops and livestock, which have better demand than cereals. The rural non-farm sector has emerged as the largest source of new jobs in the economy and it is likely to remain so for quite some time, if suitable alternatives in the manufacturing or service sector are not found. Although, these jobs though offers higher wages than farm labour, they are mostly informal and/or insecure (no health benefits, insurance or pensions) and they go mostly to men of 18-26 year old with some education, while illiterates and women in general are struggling for transition to this sector.

Transition from farm economy to non-farm economy for the majority of population has never been smooth, in fact quite painful, in the economic history of the world, because of the underlying apparently paradoxical process, which governs such transition. In the initial stage of this transition, farm incomes are expected to fall behind incomes earned in the rest of economy, as the share of workforce engaged in farms is much higher, while the GDP generated by that workforce is comparatively lower. However, with better integrated labour and financial markets this gap is expected to narrow down with higher incomes. The theoretical Lewis Turning point is reached when labour productivity (wage/income) in both the sectors begin to converge. However, this can only happen when there is a simultaneous progressive increase in per capita income in the farm sector! This calls for enhancing the farm productivity per se, within this transformation.

The share of agriculture in the GDP has been declining over the years in India, having fallen steadily from 23 per cent in 1999-00 to reach 12 per cent in 2011-12. However, during thecorresponding period, the decline in the share of population dependent on agriculture fell only from 60% to 52%.

Further, the average annual growth rate in the agriculture and allied sector stood around 3 per cent in the same period (1999-2000 to 2011-12). However, if we consider dairy sector (Milk Group) as a sub-sector within agricultural sector, then we see it growing at an annual rate of 3.9%, which was 1.27 times more than the overall agricultural growth and also 2.62 times more than the Cereals Group. The dairy sector also increased its contribution in the value of output of agricultural sector from 25% to 28% during the

same period. In fact the value of output of the dairy sector (Milk Group) has surpassed the combined wheat and paddy of the Cereals Group since 2012-13.

The dairy sector (Milk Group) has contributed around 35 per cent to the overall agricultural growth during the period 1999-2000 to 2011-12. This indicates the importance of dairy sector in generating not only sustainable agricultural growth but also in becoming an important and effective bridge for the households (most of whom are small holders) during this structural transition in the economy, by increasing farm productivity as well as income in the rural areas.

The basic economic premise around which Operation Flood was conceived, is still relevant in the present context viz. small holders have limited access to land but their access to bovine livestock is more equitable and less directly related to land holding, thus these class of rural producers can be encouraged to take up dairying as a means of income generation and also because there is surplus labour available within the family, which is at best unemployed or under-employed which can be productively used here. Given a guaranteed market and remunerative price, these smallholders can be encouraged to sustain and increase production by means of more efficient scientific feeding and care for animals. Women who form a large proportion of family labour can be positively utilised for dairy production and while adding to the family income, they will also be able to change their status from non-earners to earning members. In the process, milk production and consumption will increase for the society at large, affecting the nutrition levels positively [e.g., Mitra and Manoshi (1986)]

National Sample Surveys (NSS) 68th round (2011-12) indicate that around 61.6 per cent of rural working age women (15-59 yrs) were principally engaged in housework or domestic duties. While this has increased by about 6 percentage points between 1999-2000 and 2011-12, in the same period, the work participation rate among rural working age women has declined by about 11 percentage points. This has become an intense area of debate among economists, regarding the reasons behind such a phenomenon, given the spectacular growth in the economy in the same period [e.g., Dasgupta and Goldar (2005), Das *et al.* (2015)].

It has also been argued that this was due to steep decline in availability of work for women in rural areas, due to rising landlessness and declining labour absorption in agriculture on one hand and their inability to access urban non-agricultural employment, given the lack of basic work amenities and problems of security [e.g., Rawal and Saha (2015)]

In this context, it is pertinent to note that a large proportion of women engaged in domestic duties do not report themselves to be unemployed, even if they have some free time and they may be willing to seek job/attend work, as they may not be willing to go outside the household premises for that purpose. Nonetheless, they may be willing to

accept certain types of work, if the work is made available to them at their household premises [National Sample Survey Office (NSSO) (2012)].

As per NSS definition, the women engaged in domestic duties are generally not considered part of the labour force i.e. neither working nor available for work, except those who have additional subsidiary employment. As per the estimates of NSS 68th round Employment & Unemployment Survey (2011-12), there are around 15.75 Crores women (age more than 15 years), who are engaged in domestic duties in rural sector and 17 per cent of these women have only subsidiary employment (*14 per cent as self-employed in agriculture & 3 per cent as casual worker in agriculture*), thus 83 per cent are purely non-workers. Thus, by this definition we have an estimated 13.07 Crores women engaged in domestic duties alone, who are non-workers.

Further, the restrictive definition of unemployed, as persons, who during the reference period actively sought work and did not find any, may have excluded a significant portion of the aforesaid women engaged purely in domestic duties in rural sector. These women from their past experience and observation of the shrinking labour market may not have sought work as they might have known that remunerative employment was not possible. Thus, not making an attempt to seek work does not reflect lack of interest or inability to work. With no means of obtaining remunerative employment, they may have resigned themselves to un-remunerative and minimally productive forms of labour like collecting food, fuel and fodder and mending clothes for the use of their household. If they are considered as part of the work force, it is estimated that the estimated unemployment rate among rural women in the working age group (15-59 years) would go up very sharply from 1.7 per cent to 50.7 per cent [e.g., Rawal and Saha (2015)].

In the context of dairying, there is a further offshoot to this dilemma. What if a woman was rearing a buffalo and selling part of the milk produced, in that case whether she should be treated as a worker (in the dairy sector) or as a non-worker. The NSSO instructions for survey has no guidance for such cases. It is suggested that NSSO in the next rounds of survey incorporates such guidance so as to give us a better perspective, given the importance of dairying as means of employment and livelihood for rural women, even when they may be engaged in domestic duties.

In this round, as in the previous quinquennial rounds, NSSO has been asking a set of probing questions to all the members of households that are classified as engaged in domestic duties (usual principal status codes 92 & 93) to elicit their participation in certain economic activities along with household activities, which has provided benefits to their households. Further, it is also asked whether such persons were willing to accept work at their household premises, and if so, what was the nature of work and type of work acceptable to them; whether they possessed any skill /experience to undertake that work and what form of assistance would they need to undertake their desired work. These findings are reported in its publication "Participation of Women in Specified Activities

along with Domestic Duties" at the national and state level.

In this paper, we further analyse these findings at the household and individual level exclusively for rural women engaged in domestic duties by using the Unit Record Data obtained from NSS on the 68th round (Employment Unemployment Survey) conducted in 2011-12.

## 2. PREFERRED CHOICE FOR ADDITIONAL WORK BY RURAL WOMEN ENGAGED IN DOMESTIC DUTIES, PARTICULARLY DAIRYING AT THE MACRO LEVEL

At the outset, it would be of interest to get an idea on the demographic changes in the decade between 1999-00 and 2011-12 for rural women, who were engaged in domestic duties. As can be seen from the Table-1 no significant changes are observed in age group 15-29 years but for all other age groups, we find sharp increases ranging from 7 to 11 per cent. These also underlines the fact that the engagement of women in the middle age groups have increased significantly in domestic duties, reasons for which, we have discussed earlier.

TABLE 1

PER CENT OF RURAL WOMEN ENGAGED IN DOMESTIC DUTIES IN VARIOUS AGE GROUPS (USUAL PRINCIPAL STATUS CODE 92 & 93)

| Age Group (yrs) | 1999-00 | 2011-12 |
| --- | --- | --- |
| 15-29 | 56.5 | 57.5 |
| 30-44 | 54.7 | 65.8 |
| 45-59 | 55.0 | 62.8 |
| 60 & above | 39.9 | 46.2 |

Next, we analyse the changes in the willingness to take up additional work and the nature of work desired among these age groups (in detail) in Table-2. It can be seen that the overall proportion of women seeking work is more or less same at around 33-34% between 1999-00 and 2011-12, however there is higher demand for additional work in the age group 15-29 years.

TABLE 2

PER CENT OF RURAL WOMEN ABOVE 15 YRS AND ENGAGED IN
DOMESTIC DUTIES (USUAL PRINCIPAL STATUS CODE 92 & 93) WITH THEIR
PREFERENCE FOR ADDITIONAL WORK

| Prefered Work => | Tailoring | | Dairy | | Other AH | | Poultry | | Spinning & Weaving | | Others | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NSS Survey Year => | 1999-00 | 2011-12 | 1999-00 | 2011-12 | 1999-00 | 2011-12 | 1999-00 | 2011-12 | 1999-00 | 2011-12 | 1999-00 | 2011-12 | 1999-00 | 2011-12 |
| Age Group (yrs) | | | | | | | | | | | | | | |
| 15-19 | 19 | 26 | 8 | 4 | 2 | 2 | 4 | 3 | 4 | 4 | 6 | 5 | 43 | 48 |
| 20-24 | 16 | 21 | 9 | 5 | 3 | 3 | 4 | 3 | 4 | 5 | 7 | 6 | 43 | 47 |
| 25-29 | 14 | 17 | 11 | 7 | 3 | 4 | 5 | 3 | 4 | 5 | 6 | 6 | 43 | 46 |
| 30-59 | 6 | 8 | 10 | 7 | 3 | 4 | 3 | 4 | 2 | 2 | 4 | 4 | 29 | 30 |
| 60 & above | 0 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 6 | 5 |
| All | 10 | 12 | 9 | 6 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 4 | 33 | 34 |

As per NSS estimates, around 5.29 crores of rural women presently engaged in domestic duties (usual principal status codes 92& 93 with or without subsidiary work) may be willing to accept additional work.

It is also seen that tailoring followed by dairying are the most sought after additional work or vocation. While there has been an increase in preference for tailoring from 10% to 12%, there has been decline in preference for dairying from 9% to 6% across all age groups between 1999-00 and 2011-12. Within the working age groups, as we move from younger to older, we find preference for tailoring decreasing while that for dairying increasing. This is an interesting trend, which is analysed subsequently in this paper through an econometric analysis.

From our analysis of the Unit Record Data of NSS for the 68th round (2011-12), it is estimated that out of the 5.29 crores of rural women in domestic duties, who have expressed their willingness to accept additional work, around 92.6 Lakh women are estimated to be preferring dairying over other alternatives, in the 20 major states where the survey was conducted.

Interestingly, among these women preferring dairying, 22 per cent would like to take up this vocation as full time work while 76 per cent would like to take it up as part time work and the remaining as occasional work. Further, 74 per cent in this category mentioned that they already have the requisite skills for taking up dairying (*incidentally this is the highest among all categories of additional work choices*). With regard to financial assistance sought for taking up dairying as a vocation, 67 per cent asked for easy initial finance while 24 per cent called for working capital assistance.

Further analysis based upon the literacy levels is presented in Table-3. It can be observed that 55 per cent of these women are illiterate while another 37 per cent have received only primary education or below primary education. The choice for dairying is more pronounced in the age group 30-49 years, around 54% in comparison to the younger generation which is around 34%.

TABLE 3

PER CENT OF RURAL WOMEN ENGAGED IN DOMESTIC DUTIES WHO PREFER DAIRYING AS ADDITIONAL WORK (LITERACY LEVELS)

| Age group | Literacy levels | | | | | |
|---|---|---|---|---|---|---|
| | Illiterate | Below Primary | Primary | Secondary | Higher Secondary & above | Total |
| 15-19 yrs | 1.40 | 0.63 | 2.53 | 0.58 | - | 5.13 |
| 20-29 yrs | 11.55 | 3.93 | 9.40 | 4.25 | 0.08 | 29.21 |
| 30-49 yrs | 32.66 | 4.64 | 13.48 | 2.83 | 0.10 | 53.72 |
| 50-59 yrs | 7.38 | 0.40 | 0.81 | 0.53 | 0.05 | 9.18 |
| 60 & above | 2.04 | 0.35 | 0.33 | 0.03 | - | 2.76 |
| Total | 55.02 | 9.95 | 26.56 | 8.24 | 0.23 | 100.00 |

Next, we analyse the preferences among various socio-economic groups which is presented in Table-4.

TABLE 4
PER CENT OF RURAL WOMEN ENGAGED IN DOMESTIC DUTIES WHO
PREFER DAIRYING AS ADDITIONAL WORK
(CLASSIFICATION BY HOUSEHOLD OCCUPATION TYPE)

| Occupational Type | Social classes | | | | |
|---|---|---|---|---|---|
| | Scheduled Tribe | Scheduled Caste | OBC | Others | Total |
| self-employed in agriculture | 3.86 | 4.95 | 18.73 | 9.74 | 37.28 |
| self-employed in non-agriculture | 0.59 | 3.56 | 6.56 | 2.68 | 13.39 |
| regular wage/salary earning | 0.36 | 1.18 | 2.28 | 1.18 | 5.00 |
| casual labour in agriculture | 2.41 | 8.93 | 8.85 | 2.34 | 22.52 |
| casual labour in non-agriculture | 1.14 | 7.22 | 8.83 | 1.62 | 18.81 |
| Others | 0.18 | 0.63 | 1.61 | 0.58 | 3.00 |
| Total | 8.54 | 26.47 | 46.85 | 18.13 | 100.00 |

Further, we find that around 40 per cent of these women come from households whose principal occupation is as casual labourers. It is also important to underline that approximately half of them are from casual labourer households in non-agriculture. Next around 37 per cent come from cultivator household background.

Among the social classes, we find around 47 per cent belong to OBC households followed by SC households around 27 per cent.

Among the socio-economic classes we find that OBC households with cultivation as the principal occupation are the single largest dominant category (around 19 per cent) among all the rural women performing domestic duties and preferring dairy as additional vocation.

The state wise analysis provided below in Table-5, can also help us assess the stated need for dairying, as an additional vocation by rural domestic women, in terms of estimated population, type of work preferred, presence of requisite skills and form of assistance required. This may help policy makers and stakeholders in devising suitable plans and policies for dairy development, as a means for enhancing rural income and employment at the state level.

TABLE 5

STATE WISE DISAGGREGATED ANALYSIS OF RURAL WOMEN ENGAGED IN DOMESTIC DUTIES AND THEIR PREFERENCE FOR DAIRYING

| Region | State | Willing to accept any work | Willing to accept Dairy | Willing to accept Dairy (as a % of Total) | Willing to accept Dairy as Regular full time Occupation (as a % of willing to accept Dairy) | Willing to accept Dairy as Regular part time Occupation (as a % of willing to accept Dairy) | Have requisite skill to perform Dairy (as a % of willing to accept Dairy) | Easy Initial Finance require for Dairy | Working Finance require for Dairy |
|---|---|---|---|---|---|---|---|---|---|
| East | Assam | 24,01,621 | 1,36,282 | 5.67 | 22.59 | 76.76 | 49.21 | 48.18 | 41.98 |
| East | Bihar | 64,02,415 | 12,74,524 | 19.91 | 13.65 | 84.09 | 67.40 | 65.56 | 22.59 |
| East | Chattisgarh | 6,62,651 | 60,694 | 9.16 | 3.34 | 96.01 | 70.16 | 54.75 | 16.24 |
| East | Jharkhand | 14,18,249 | 2,17,763 | 15.35 | 38.89 | 61.11 | 39.05 | 76.54 | 13.71 |
| East | Orissa | 32,69,934 | 7,61,234 | 23.28 | 11.96 | 87.41 | 59.22 | 75.37 | 23.17 |
| East | West Bengal | 64,75,343 | 7,40,035 | 11.43 | 24.84 | 73.72 | 77.12 | 50.10 | 39.04 |
| **East** | **Total** | **206,30,213** | **31,90,532** | **15.47** | **17.75** | **80.82** | **65.05** | **64.11** | **26.64** |
| North | Haryana | 6,39,994 | 82,286 | 12.86 | 38.20 | 61.19 | 80.15 | 25.88 | 32.39 |
| North | Himachal Pradesh | 1,87,339 | 9,776 | 5.22 | 64.10 | 35.91 | 83.73 | 73.05 | 22.65 |
| North | Jammu & Kashmir | 6,99,598 | 74,832 | 10.70 | 7.19 | 90.48 | 87.24 | 58.87 | 29.39 |
| North | Punjab | 14,96,611 | 3,75,669 | 25.10 | 16.96 | 82.97 | 91.47 | 77.47 | 14.85 |
| North | Rajasthan | 25,81,924 | 4,35,578 | 16.87 | 49.18 | 43.57 | 60.45 | 73.74 | 20.11 |
| North | Uttar Pradesh | 116,54,086 | 26,24,729 | 22.52 | 17.50 | 79.16 | 83.20 | 69.60 | 23.87 |
| North | Uttaranchal | 4,03,963 | 78,525 | 19.44 | 23.52 | 73.81 | 83.57 | 60.83 | 32.43 |
| **North** | **Total** | **176,63,515** | **36,81,395** | **20.84** | **21.69** | **74.94** | **81.37** | **69.52** | **22.99** |
| South | Andhra Pradesh | 12,01,372 | 2,33,193 | 19.41 | 21.78 | 74.91 | 89.64 | 77.73 | 14.25 |
| South | Karnataka | 16,03,172 | 4,46,839 | 27.87 | 36.29 | 60.63 | 74.95 | 53.95 | 32.87 |
| South | Kerala | 14,83,222 | 2,67,273 | 18.02 | 32.76 | 64.24 | 72.21 | 78.72 | 12.36 |
| South | Tamil Nadu | 13,67,035 | 2,62,407 | 19.20 | 25.66 | 65.96 | 67.35 | 75.10 | 15.53 |
| **South** | **Total** | **56,54,801** | **12,09,712** | **21.39** | **30.41** | **65.34** | **75.53** | **68.59** | **20.99** |
| West | Goa | 27,564 | 120 | 0.44 | 100.00 | - | 100.00 | 55.00 | - |
| West | Gujarat | 12,86,199 | 3,40,690 | 26.49 | 18.55 | 81.32 | 77.33 | 46.96 | 44.99 |

TABLE 5 continued...

| Region | State | Willing to accept any work | Willing to accept Dairy | Willing to accept Dairy (as a % of Total) | Willing to accept Dairy as Regular full time Occupation (as a % of willing to accept Dairy) | Willing to accept Dairy as Regular part time Occupation (as a % of willing to accept Dairy) | Have requisite skill to perform Dairy (as a % of willing to accept Dairy) | Easy Initial Finance require for Dairy | Working Finance require for Dairy |
|---|---|---|---|---|---|---|---|---|---|
| West | Madhya Pradesh | 34,31,666 | 3,79,681 | 11.06 | 24.49 | 65.15 | 71.72 | 84.38 | 4.04 |
| West | Maharashtra | 35,03,515 | 3,97,713 | 11.35 | 17.71 | 78.89 | 58.96 | 57.83 | 32.39 |
| West | Total | 82,48,944 | 11,18,204 | 13.56 | 20.27 | 74.96 | 68.89 | 63.53 | 26.60 |
| All India | Total | 529,48,087 | 92,59,739 | 17.49 | 21.52 | 75.47 | 73.49 | 66.79 | 24.39 |

As discussed earlier, out of an estimated 5.29 crore women, around 92.6 lakh are estimated to have expressed their preference for dairying at the country level, which is around 18%.

If we analyse it zone wise, we see that though the overall demand for additional work is highest in the East Zone, the maximum demand for dairying comes from the North Zone (36.81 Lakhs) followed by East Zone (31.90 Lakhs).

However, most of the respondents (around 76 per cent) would like to take it up as a part-time activity across the country, with Chattishgarh being the highest (96 per cent) followed by Jammu & Kashmir (90 per cent), Odisha (87 per cent) & Bihar (84 per cent), where it is significantly higher than other states.

Preference for dairying as a full-time work is highest in Himachal Pradesh (64 per cent) followed by Rajasthan (49 per cent), Karnataka (36 per cent) & Jharkhand (39 per cent), where it is significantly higher than other states.

We now analyse the form of assistance required by these women vis-à-vis the occupational type of their households and determine whether any significant relationship exists between them. It is evident from the table that the most pressing need among all categories are sources for obtaining easy initial finance followed by working finance. The need for easy initial finance is highest for women from casual labourer households while the need for working finance is highest for women from cultivator households.

TABLE 6

## FORM OF ASSISTANCE REQUIRED FOR TAKING UP DAIRY AS A VOCATION

| Form of assistance required | Occupational Type of Households | | | | | |
|---|---|---|---|---|---|---|
| | Regular | Self-empl | CL Agri | CL Nonagri | Others | Total |
| None | 3% | 4% | 4% | 2% | 5% | 3% |
| Easy Initial Finance | 63% | 62% | 69% | 73% | 73% | 66% |
| Working Finance | 24% | 26% | 22% | 20% | 16% | 23% |
| Easy Raw Material Availability | 1% | 1% | 1% | 1% | 0% | 1% |
| Market Access | 2% | 3% | 1% | 1% | 0% | 2% |
| Requisite training | 4% | 2% | 1% | 2% | 0% | 3% |
| Accomodation at work | 1% | 1% | 0% | 0% | 2% | 1% |
| Others | 2% | 1% | 3% | 1% | 4% | 1% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% |

## 3. MODEL, DATA AND VARIABLES

In this paper, we use Unit Record Data from rural households in India, collected by the National Sample Survey Office (NSSO) in its 68th round (July 2011 – June 2012). The data relates to Schedule 10 of the Employment Unemployment Survey. Further, it also uses NSS reports on "Participation of Women in Specified Activities along with Domestic Duties" viz. NSS Report No.559 (2011-12) [National Sample Survey Office (NSSO) (2014) NSS Report No. 559] and NSS Report No.465 (1999-2000). [National Sample Survey Office (NSSO) (2001) NSS Report No. 465]

The dataset consists of a sample of 18,547 rural women, who are aged 15 years and above, usually (principal status) engaged in domestic duties (code 92 & 93 with or without subsidiary work status) and willing to accept additional work at their household premises. These represent an estimated 5.29 crores women in the country, details presented in Table 6 below. *We checked the sample counts from the unit records datasets (made available to us from NSSO) and found them in agreement with the NSS summary publications on the subject.*

Table 7

NUMBER OF RURAL WOMEN ENGAGED IN DOMESTIC DUTIES & WILLING
TO ACCEPT ADDITIONAL WORK

| Nature of additional work acceptable | Sample | Estimated (Lakhs) |
|---|---|---|
| dairy | 2673 | 92.597 |
| poultry | 1740 | 48.293 |
| other animal husbandry | 1401 | 53.356 |
| food processing | 1175 | 37.155 |
| spinning & weaving | 2062 | 46.744 |
| manu. wood & cane products | 164 | 4.481 |
| tailoring | 6543 | 180.826 |
| leather goods manufacturing | 46 | 1.462 |
| others | 2678 | 64.002 |
| Not Reported | 65 | 0.565 |
| **all** | **18547** | **529.481** |

We study their stated preferences to the hypothetical choices on the nature of additional work presented to them, during the survey viz. dairy, poultry, other animal husbandry, food processing, spinning & weaving, manufacturing of wood & cane products, tailoring, leather goods manufacturing and others. Particularly, we are interested to know whether and how does individual characteristics such as the social group, occupational type and expenditure levels of their households, literacy levels, religion, geographical location and age might have affected their decision of choosing the nature of their preferred additional work.

Our main motivation was to help identify appropriate policy responses for dairy development in rural areas particularly among women, by providing policy makers and stakeholders with quantitative measures of relative importance to different individual characteristics of rural women engaged in domestic duties. This we attempt through an econometric analysis (using Stata 12.0 statistical software) which is described below [StataCorp, 2011].

We fit a multinomial logit regression model to the [*NSS 68<sup>th</sup> Round Employment Unemployment Survey Schedule 10. Level 08 (Block 7)*] variable "Type of Work Acceptable" and name it as W_TYPE, which takes on 7 nominal values: 1=Dairy, 2=Poultry, 3= Other AH, 4= Food Processing 5=Spinning & Weaving, 6=Tailoring, 7=others (*we combine manufacturing of leather goods & wood /cane products with others, as they are preferred marginally*).

*Description of the Model*

The multinomial logit model is used with alternative-invariant regressors or case specific regressors viz. vary over the individual but do not vary over the alternative e.g. the household income, age, social group etc. of the rural women engaged in domestic duties may vary over the individual women but they do not vary over their preferred alternatives like tailoring, dairy, poultry etc.

Given that there are 1, 2, 3, …, 7 outcomes recorded in y, the dependent unordered categorical variable (W_TYPE), as described earlier i.e. the individual woman may choose any ONE among the 7 choices presented to her, then in the multinomial logit model, we estimate a set of coefficients $\beta(1)$, $\beta(2)$, $\beta(3)$, $\beta(4)$, $\beta(5)$, $\beta(6)$ and $\beta(7)$ corresponding to each outcome, given that the explanatory or predicted variables are in X a vector set (x1,x2,x3,..xp):

The relative probability of y=1 Dairy to the base outcome y=6 Tailoring is,

Prob (y=1 Dairy)/ Prob (y=6 Tailoring) = $e^{X\beta(1)}$

Stata defines RRR (Relative Risk Ratio) as obtained by exponentiating the multinomial logit coefficients, $e^{\beta}$, which are also called adjusted odds ratios, since the interpretation is just like odds ratios but comparison is with the reference category. For example, in Table 11, it can be observed that the RRR is more than 1 viz. for Self employed in agriculture RRR=1.81 i.e. its coefficient $\beta$ is 0.5933 ($e^{0.5933}$ =1.81), for Casual labour in non-agriculture RRR= 1.71 i.e. its coefficient $\beta$ is 0.5365 ($e^{0.5365}$ =1.71) in comparison to reference category Regular Wage/Salary Earning/self-employed in non-agriculture.

This is interpreted to mean that it is 81% more likely for women in Self-employed in agriculture household category and 71% more likely for women in Casual labourer in non-agriculture household category to opt for dairy, in comparison with women from households belonging to the Regular Wage/Salary Earning/self-employed in non-agriculture category (reference category, RRR=1).

While in the case of Other Household category (non-agri and non-labourer households), we get the RRR=0.77 or its coefficient $\beta$ is -0.2614 ($e^{-0.2614}$ =0.77) which means that it is 23% less likely that women from this category will be opting for dairy, in comparison to the reference category mentioned above.

We follow the recommended procedure for an analysis of the results from a multinomial logit model [Freese and Long (2014)]. We check the association between several predictor variables and W_TYPE, our dependent unordered categorical variable, consider hypothesis testing and thereafter analyse these associations in detail.

*Explanatory or Predictor Variables*

First, we consider the following 8 predictor variables, Occupation Type (occupational type of the household to which she belongs), Social group (social group to which she belongs), Religion, Education level (her level of general education), Zone (geographical zone of the country in which she stays) - which are all categorical variables and also MHCE (monthly household consumption expenditure of her household), Age and HH Size (Household size of her household)-which are continuous variables.

Next, we perform an initial bivariate analysis of the relationship between all the categorical predictors and the response variable W_TYPE and find that all of them have a significant relationship at p<0.05 level. Before testing, we declare the survey related probability weights *comb_wt* as provided by NSSO in the unit records. [Heeringa, West and Berglund (2010)]

The results are presented below in Table-8.

TABLE 8

INITIAL BIVARIATE DESIGN-BASED TESTS ASSESSING POTENTIAL PREDICTORS OF W_TYPE FOR THE NSSO 68TH ROUND RURAL WOMEN IN DOMESTIC DUTIES PREFERRING ADDITIONAL WORK

| Categorical Predictor | F-test statistic | P(f>F) |
|---|---|---|
| Occupation Type | $F(32.95, 6.1e+05)=7.2813$ | < 0.001 |
| Social Group | $F(22.20, 4.1e+05)=10.5449$ | < 0.001 |
| Religion | $F(16.48, 3.0e+05)=15.1562$ | < 0.001 |
| Education Level | $F(46.21, 8.5e+05)=17.0186$ | < 0.001 |
| Zone | $F(18.43, 2.8e+05)=16.8605$ | < 0.001 |
| Age Group | $F(27.92, 5.2e+05)=15.1608$ | < 0.001 |
| MHCE | $F(18.77, 3.5e+05)=8.3732$ | < 0.001 |
| HH Size | $F(26.96, 5.0e+05)=3.0452$ | < 0.001 |

We also conduct a test for multicollinearity among the variables and find that none of these have significant correlation with each other, as shown in Table-9.

PEARSON'S CORRELATION AMONG INDEPENDENT VARIABLES

| | HH Type | Social Group | Education Level | Religion | Zone | Age | MHCE |
|---|---|---|---|---|---|---|---|
| Occupation Type | 1 | | | | | | |
| Social Group | -0.0236 | 1 | | | | | |
| Education Level | 0.0148 | 0.14 | 1 | | | | |
| Religion | 0.0066 | -0.0526 | 0.0282 | 1 | | | |
| Zone | 0.0408 | -0.0947 | 0.1749 | -0.0251 | 1 | | |
| Age | 0.0343 | 0.0086 | -0.2767 | 0.0563 | 0.0549 | 1 | |
| MHCE | 0.0642 | 0.1084 | 0.2593 | 0.1392 | 0.1273 | 0.0813 | 1 |
| HH Size | -0.1549 | 0.0251 | 0.008 | -0.0142 | -0.1496 | -0.1166 | -0.1798 |

Now, we fit the model to the W_TYPE outcome using multinomial logit.

This provides us with estimated adjusted odds ratios (which Stata interprets as relative risk ratios) and 95% confidence intervals. The default baseline category is W_TYPE =Tailoring.

Next, for evaluation of the fitted model, we do multi-parameter Wald tests for the overall significance of each of the predictors: Occupation Type (HH_TYPE), Social group (SOCIAL_GROUP), Religion (RELIGION), Education level (GENEDU), Zone (ZONE) - which are all categorical variables and also monthly household consumption expenditure of her household (MHCE), Age (AGE) and Household size of her household (HH_SIZE)

The results are given in Table-10. Inspection of these test results show that all these co-variates are strong determinants ($p < 0.05$) of the relative odds that a rural women engaged in domestic duties prefers one among the hypothetical choices presented during the survey. This is provided in Table-10 below.

TABLE 10
OVERALL WALD TESTS FOR THE PREDICTORS IN THE MULTINOMIAL
REGRESSION MODEL FOR W_TYPE

| | | F | df | df_r | P>f |
|---|---|---|---|---|---|
| 3. Occupation Type | Self-employed in agriculture | 7.721 | 6 | 6 | 0.000 |
| 4. Occupation Type | Casual labour in agriculture | 12.199 | 6 | 6 | 0.000 |
| 5. Occupation Type | Casual labour in non-agriculture | 6.68 | 6 | 6 | 0.000 |
| 9. Occupation Type | Others | 2.046 | 6 | 6 | 0.056 |
| 2. Social Group | Scheduled Castes | 2.315 | 6 | 6 | 0.031 |
| 3. Social Group | Other Backward Classes | 7.139 | 6 | 6 | 0.000 |
| 4. Social Group | Scheduled Tribes | 4.413 | 6 | 6 | 0.000 |
| 2. Education Level | Below Primary | 13.272 | 6 | 6 | 0.000 |
| 3. Education Level | Primary | 13.452 | 6 | 6 | 0.000 |
| 4. Education Level | Middle | 15.903 | 6 | 6 | 0.000 |
| 5. Education Level | Secondary | 10.629 | 6 | 6 | 0.000 |
| 6. Education Level | Illiterate | 20.96 | 6 | 6 | 0.000 |
| 2. Religion | Muslim | 14.886 | 6 | 6 | 0.000 |
| 3. Religion | Christian | 3.974 | 6 | 6 | 0.001 |
| 4. Religion | Others | 2.695 | 6 | 6 | 0.013 |
| 2. Zone | North | 14.313 | 6 | 6 | 0.000 |
| 3. Zone | East | 9.842 | 6 | 6 | 0.000 |
| 4. Zone | North East | 43.538 | 6 | 6 | 0.000 |
| 5. Zone | South | 7.632 | 6 | 6 | 0.000 |
| Age | | 44.026 | 6 | 6 | 0.000 |
| MHCE | | 6.637 | 6 | 6 | 0.000 |
| HH Size | | 3.572 | 6 | 6 | 0.002 |

Wald tests for independent variables (N=18477)

*Ho: All coefficients associated with given variable(s) are 0*

The detailed output for the estimated model, including RRR (relative risk ratios) and 95% confidence intervals for the RRRs are presented in Table-11 below. We have limited the comparatives with Dairy, Other Animal Husbandry (AH) and Poultry vis-à-vis the baseline category of Tailoring, to understand the preference of dairy not only among all choices but also within the work choices available under the livestock sector as a whole.

TABLE 11

ESTIMATES OF ADJUSTED ODDS RATIOS OR RELATIVE RISK RATIOS (RRR) FOR THE ADDITIONAL WORK PREFERRED OUTCOME W_TYPE

| Predictor* | Category | Dairy:Tailoring | | Other AH:Tailoring | | Poultry:Tailoring | |
|---|---|---|---|---|---|---|---|
| | | RRR | 95% CI for RRR | RRR | 95% CI for RRR | RRR | 95% CI for RRR |
| Occupation Type | self-employed in non-agriculture | 0.61 | (0.49,0.76) | 0.69 | (0.51,0.93) | 0.80 | (0.61,1.06) |
| | regular wage/salary earning | 0.45 | (0.33,0.60) | 0.49 | (0.34,0.72) | 0.55 | (0.39,0.78) |
| | casual labour in agriculture | 1.31 | (0.97,1.76) | 1.49 | (1.05,2.13) | 1.73 | (1.22,2.45) |
| | others | 0.44 | (0.27,0.73) | 0.38 | (0.20,0.72) | 0.55 | (0.30,1.02) |
| | | | | | | | |
| Social Group | Scheduled Castes | 0.60 | (0.39,0.92) | 0.77 | (0.48,1.21) | 0.45 | (0.29,0.71) |
| | Other Backward Classes | 0.54 | (0.36,0.80) | 0.54 | (0.35,0.84) | 0.25 | (0.16,0.38) |
| | Others | 0.49 | (0.32,0.76) | 0.44 | (0.27,0.73) | 0.42 | (0.27,0.65) |
| | | | | | | | |
| Education level | Below Primary | 0.70 | (0.50,1.00) | 0.48 | (0.31,0.75) | 0.42 | (0.28,0.63) |
| | Primary | 0.55 | (0.43,0.71) | 0.29 | (0.21,0.40) | 0.51 | (0.38,0.70) |
| | Secondary | 0.37 | (0.27,0.52) | 0.15 | (0.09,0.25) | 0.25 | (0.16,0.38) |
| | Higher Secondary & above | 0.08 | (0.04,0.16) | 0.06 | (0.03,0.13) | 0.25 | (0.11,0.56) |
| | | | | | | | |
| Religion | Muslim | 0.67 | (0.48,0.93) | 0.70 | (0.45,1.07) | 3.48 | (2.51,4.83) |
| | Christian | 0.53 | (0.27,1.02) | 1.15 | (0.56,2.36) | 2.23 | (1.16,4.28) |

TABLE 11 continued...

| Predictor* | Category | Dairy:Tailoring | | Other AH:Tailoring | | Poultry:Tailoring | |
|---|---|---|---|---|---|---|---|
| | | RRR | 95% CI for RRR | RRR | 95% CI for RRR | RRR | 95% CI for RRR |
| | Others | 1.25 | (0.82,1.93) | 0.50 | (0.20,1.22) | 0.72 | (0.31,1.68) |
| | | | | | | | |
| Zone | East | 1.05 | (0.82,1.35) | 0.91 | (0.66,1.25) | 6.31 | (4.28,9.32) |
| | North East | 1.03 | (0.62,1.73) | 1.39 | (0.77,2.51) | 8.85 | (4.72,16.58) |
| | West | 0.72 | (0.54,0.98) | 1.15 | (0.79,1.67) | 3.76 | (2.36,6.00) |
| | South | 1.61 | (1.17,2.22) | 1.05 | (0.64,1.75) | 4.94 | (2.99,8.14) |
| | | | | | | | |
| Age | | 1.07 | (1.06,1.09) | 1.05 | (1.04,1.07) | 1.06 | (1.05,1.07) |
| MHCE | | 1.00 | (1.00,1.00) | 1.00 | (1.00,1.00) | 1.00 | (1.00,1.00) |
| HH Size | | 1.02 | (0.98,1.06) | 0.95 | (0.90,1.00) | 0.92 | (0.88,0.97) |

*Source: Analysis based on the NSS 68th round Employment Unemployment Survey (2011-12) data.*
*\*Reference categories for categorical predictors are: Regular Wage/salary earning/self-employed*
*in non-agri (Occupation Type); General (Sociap Group);Higher Secondary & above (Education Level);*
*Hindu (Religion); West(Zone)*

*Baseline category for the multinomial logit regression model was W_TYPE =Tailoring*

## 4. EMPIRICAL RESULTS AND INTERPRETATION OF THE ECONOMETRIC MODEL

From Table-11, we can interpret the results as below.

Occupational type of households: Relative to women, who belong to households which are regular wage/salary earning/self-employed in non-agriculture , the odds of choosing dairy as compared to tailoring is significantly high for women belonging to casual labour in agriculture household followed by self-employed in agriculture (cultivators) (reference category) and casual labourers in non-agriculture. This clearly demarcates the preferred need for additional income through dairying by these women. Further, women from casual labourer in non-agricultural households seem to prefer Other Animal Husbandry (small ruminants) and poultry more than women from self-employed in agriculture (cultivators) primarily because of lack of land for growing fodder to feed dairy animals.

Social Group of households: Relative to women belonging to General class, the odds of choosing dairying as compared to tailoring is significantly higher for women belonging to scheduled tribe households (reference category). This is true for their preference for Other Animal Husbandry & Poultry as well, which in fact is higher than dairying. Women from Schedule Caste show distinctly significant preference for Other Animal Husbandry (small ruminants).

General Educational Level of women: Relative to women, who have attained educational qualifications of Higher Secondary & above, the odds of choosing dairying as compared to tailoring is significantly highest among illiterates (reference category). This is followed by women who had attained at least below primary, primary and secondary education in that order. Though the trends seem to be same for dairying and Other Animal Husbandry, illiterates also have a greater preference for Other Animal Husbandry (small ruminants) as compared to dairying.

Religion of Households: Relative to women from Hindu households (reference category), the odds of choosing dairying as compared to tailoring, women from Muslim households would significantly prefer Poultry rather than dairy animals.

Geographical Location of households: Relative to women from West Zone, the odds of choosing dairying as compared to tailoring is significantly higher for women from South Zone, followed by East, North (reference category) and Northeast in that order. This underlines the demand for dairying very strongly in Southern Zone & Eastern Zone.

Further, for one year increase in age (AGE), the relative odds in favour of choosing dairy rather than tailoring are 7% higher than (RRR=1.07). Thus, older women tend to prefer dairying more than tailoring in comparison to younger women.

Likewise, for one unit increase in household size ( HH Size), the relative odds in favour of choosing dairying rather than tailoring are 2% higher (RRR=1.02). Thus, women coming from larger households would tend to prefer dairying more than tailoring.

The relative odds in favour of choosing dairying rather than tailoring does not seem to be impacted by their monthly household consumption expenditure (MHCE) as per the findings listed above with RRR=1.0.

## 5. IMPLICATIONS OF THE EMPIRICAL FINDINGS

The findings of this paper can be useful for policy makers and stakeholders in the dairy development as livelihood programs in the rural areas, among women engaged in domestic duties. The econometric analysis of the choice behaviour of these women for additional work underlines the need for designing interventions/programs that can help them combine home-based income generation through dairying along with their household chores. This will contribute to better economic conditions of their households and at the same time empower them.

At a macro level, these steps would be significant for the present transition period of our economy towards inclusive growth with employment for women in rural areas, as discussed earlier.

Further, from the point of enhancing milk production in the country, if we assume we are able to engage the estimated 92.6 lakh women engaged in domestic duties and willing to take up dairying as additional vocation, then the incremental milk production would be around 14 million MTs annually (*assuming an average round the year bovine milk production of 4 Kg/day by such women entrepreneurs*).

NSSO in its subsequent rounds of Employment & Unemployment survey may endeavour to capture whether or not the households where women are engaged in domestic duties (code 92&93) with or without subsidiary employment, are also engaged in production as well as sale of milk. This information would be immensely useful for dairy development programs for enhancing livelihood.

Though it may be wishful thinking for many think-tanks , we need to appreciate the fact that the present rural livelihoods cannot leapfrog into other forms in manufacturing or service sectors without the concomitant structural changes , which does not seem to be accelerating at the desired pace. Intertwined is the livelihood through dairying for small holders and also India's milk production system, which has been made *numero uno* in the world by these small holders! Thus, during this process of structural transformation, dairying seems to be the best option as it now has an increasingly remunerative and guaranteed market for small and marginal households, thanks to Operation Flood and rising urban/rural demand for milk.

Some of the possible directions in which interventions in dairy development may be made in the rural areas among women engaged in domestic duties, might include the following,

It is apparent that for women lacking technical skills and formal education, dairying is the most preferred choice in farm households because dairying has been a traditional family activity in Indian households done mostly by women. However, the image of dairying now needs to move out as the last resort for unskilled and underutilised family labour to that of a highly remunerative modern day enterprise, which can be set up at the household level following scientific principles, without the normally associated drudgery.

Recognising household dairying as a formal certified skill by itself -by training these women in modern dairying practices along with basic literacy. This in turn should be recognised by banks, financial institutions and development agencies for funding these women for their start-up venture.

While the demand for additional work has increased in the age group 15-29 years group in the last decade, it may be disconcerting to note that the preference for dairying has declined somewhat sharply in this age group during the same period. We need to encourage the younger generation of women to take up dairying with scientific dairying practices and labour saving devices at the village level to increase productivity. Currently, we find the extension of efforts in dairying negligible in comparison to agriculture.

Lay greater focus in engaging rural women from the Eastern Zone (particularly Odisha, Bihar , Jharkhand & Chhattisgarh) and Southern Zone (particularly Karnataka & Andhra Pradesh)

Earmark special funds targeting these category of women with initial easy financial terms and also working capital finance particularly for casual labourer households, engaged in agricultural or non-agricultural work. We need to rethink and revamp our policies on extending loans for dairying for this segment. Most of the time they cannot avail these, as they do not have any collateral.

Further research is required on the extent of dairying taken up by women from casual labourer households engaged in non-agricultural work, especially to find out how they manage the feed and fodder requirement of bovines and also the space required for keeping large animals.

Promote rural women who have higher education to take up dairying as an enterprise and economic venture.

Women from casual labourer households engaged in agricultural/non-agricultural work and marginal cultivators with monthly income less than Rs. 10,000/- (2011-12) should be specially targeted for enhancing livelihoods through dairying

Women from Scheduled Tribe households are showing significant willingness to undertake dairying, which is a welcome change and needs to be encouraged.

## REFERENCES

Binswanger-Mkhize, Hans P. (2011), Structural Transformation of the Indian Economy and its Agriculture 1961-2040 CABR Annual Meeting Frascati, Italy June 27-27, 2011.

Das, S., Chandra, S.J., Kochhar, K and Kumar, N. (2015), Women Workers in India: Why So Few Among So Many? IMF Working Paper WP/15/55.

Dasgupta, P. and Goldar, B. (2005), Female Labour Supply in Rural India: An Econometric Analysis, Institute of Economic Growth, Delhi.

Freese J and Long J.S (2014), *Regression Models of Categorical Dependent Variables Using Stata*, 3rd edition, Stata Press, Texas.

Heeringa S.G, West B.T and Berglund P.A (2010), *Applied Survey Data Analysis,* Chapman & Hall/ CRC Press, Taylor & Francis Group, Boca Raton, Florida.

Mitra, Manoshi (1986), Women in Dairying In Andhra Pradesh, Working Paper. Series on Dairy Aid and Development No.19, Institute of Social Studies, Erasmus University, Rotterdam, Hague.

National Sample Survey Office (NSSO) (2014), NSS Report No. 559: Participation of Women in Specified Activities along with Domestic Duties, 2011-12.

National Sample Survey Office (NSSO) (2012), Key Indicators of Employment and Unemployment in India (68th round), 2011-12.

National Sample Survey Office (NSSO) (2001), NSS Report No. 465: Participation of Indian women in Household Work and Other Specified Activities, 1999-2000.

Rawal, Vikas and Saha, Partha (2015), Women's Employment in India: What do NSS surveys of Employment and Unemployment Show? indianstatistics.org Website.

StataCorp (2011), *Stata 12 User's Guide*, Stata Press, Texas.

ANNEXURE-I

SUMMARY STATISTICS OF VARIABLES

| Variable | Observations | Mean | Std. Dev. | Min | Max |
|----------|--------------|------|-----------|-----|-----|
| HH Size | 18547 | 5.7 | 2.6 | 1 | 28 |
| MHCE | 18546 | 7011.2 | 5404.1 | 267 | 196730 |
| Age | 18547 | 31.3 | 10.2 | 15 | 80 |