

## HUMAN LABOUR AVAILABILITY AND EMPLOYMENT IN SEMI-ARID TROPICAL INDIA

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This paper critically examines various facets of labour availability and use under existing rainfed crop production systems in the semi-arid tropics (SAT) of India. The specific aspects covered in this study are availability of family labour for crop and non-crop activities, contribution of various labour sources in crop production, and relative shares of different land holding categories in total labour availability and use in crop production.

The data for the study were derived from the ICRISAT village level studies that have been underway in six villages of South India since 1975.<sup>1</sup> The six villages were selected purposefully to represent three broad agro-climatic zones: (1) Aurepalle and Dokur villages in Mahbubnagar district of Andhra Pradesh; (2) Shirapur and Kalman villages in Sholapur district; and (3) Kanzara and Kinkheda in Akola district, the latter two districts in Maharashtra. The two villages in each of Sholapur and Akola districts have been combined while the Mahbubnagar villages have been treated separately for the subsequent analyses in this paper because of wide socio-economic and resource endowment differences between the Mahbubnagar villages.

### LABOUR AVAILABILITY

The data collected through the time allocation schedule were used to estimate various components of labour availability. Initially, the estimates of effective labour availability were obtained by considering fortnightly total labour availability and subtracting from it non-availability because of rain, migration, sickness, festivals, and holidays (Table I, col. 3 and 4). On an average, both males and females in all regions are available from 11 to 12 days per fortnight. In most cases the availability of females is slightly greater than that of males. But these differences are significant in only 5 of 16 cases. The statistical tests performed on availability between different categories of cultivator households did not yield any significant results, indicating that effective labour availability does not vary across these categories. However, the availability in labour households is significantly lower than on small farms, probably because labour households migrate more frequently in search of work. Aurepalle males are the only exception to this finding.

There was a consistent tendency for coefficient of variation in fortnightly labour availability (not reported here) for males to increase and for females

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1. Present analysis is based on the data pertaining to agricultural years 1975-76, 1976-77 and 1977-78. For a detailed description of villages and the complete range of information, see N. S. Jodha, M. Asokan, and J. G. Ryan, "Village Study Methodology and Resource Endowments of the Selected Villages", Occasional Paper 16, Economics Program, ICRISAT, Patancheru, 1977.

TABLE I—EXTENT OF EFFECTIVE LABOUR AVAILABILITY AND USE IN DIFFERENT LAND HOLDING CATEGORIES (1975-76)

Region	Operational land holding category	Mean labour days available per fortnight		Average daily labour use for all activities (hours/person)		Average daily labour availability for crop activities (hours/person)	
		Male	Female	Male	Female	Male	Female
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Aurepalle	Labour	11.7	11.4 <sup>†††</sup>	6.7	7.6**	0.9	3.1***
	Small	11.9	12.6***	6.6	8.6***	1.4	3.1***
	Medium	12.6	12.7	6.4	8.4***	2.5	3.4***
	Large	12.5	12.7	5.7 <sup>†††</sup>	4.5 <sup>†††</sup>	4.2 <sup>†††</sup>	1.0 <sup>***</sup> <sup>†††</sup>
Dokur	Labour	9.9 <sup>†††</sup>	11.9 <sup>†††</sup> <sup>***</sup>	5.4	8.1***	2.6	4.6***
	Small	12.3	21.3	6.9	8.3***	2.9	4.2***
	Medium	10.7	12.18***	5.6	8.4***	2.5	4.8***
	Large	12.2	12.4	5.5 <sup>†††</sup>	7.4 <sup>†††</sup> <sup>***</sup>	3.1	3.1 <sup>†††</sup>
Sholapur	Labour	10.5 <sup>†††</sup>	10.7 <sup>†††</sup>	5.4	6.8***	1.8	2.5***
	Small	12.5	12.2	7.0	7.1	2.2	2.1
	Medium	11.9	12.4*	6.3	7.4***	3.	2.3***
	Large	12.1	12.9***	6.5 <sup>††</sup>	7.6 <sup>†††</sup> <sup>***</sup>	3.3 <sup>†††</sup>	2.2***
Akola	Labour	11.2 <sup>††</sup>	10.9 <sup>††</sup>	6.6	7.8***	2.5	3.4***
	Small	12.4	12.4	6.3	7.5***	2.1	3.1**
	Medium	10.7	12.8	6.6	7.3***	3.8	2.6***
	Large	12.2	11.6	6.1	6.1 <sup>†††</sup>	3.1 <sup>†††</sup>	1.9 <sup>***</sup> <sup>†††</sup>

<sup>†††</sup> Indicates that labour category figures are significantly different from small farm figures in the same region.

\*\*\* Indicates that male figures are significantly different from female figures in the same category.

<sup>†††</sup> Indicates that large farm figures are significantly different from small farm figures in the same region.

<sup>†††</sup> Significant at 1 per cent, <sup>††</sup> Significant at 5 per cent, <sup>†</sup> Significant at 10 per cent.

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to decrease as the farm size increases. However, these differences were not statistically significant. We found elsewhere<sup>2</sup> an inverse relationship between coefficient of variation in fortnightly crop labour use and farm size. This, along with an observation (to be made in this paper) that females contribute more than 50 per cent in total crop labour use implies that variation in total crop labour input is mostly managed by adjustments in female's labour input.

To obtain estimates of labour availabilities for crop and non-crop activities, the current magnitudes of labour use for all activities were calculated. These activities include crop production, animal husbandry, building and other construction work, repairs and maintenance, trading, marketing, transportation, domestic work, fuel gathering, food processing, and regular jobs. The figures so obtained were adjusted for in and out migration, holidays, festivals and sickness (Table I, col. 5 and 6). In general, in all the categories and regions, females worked longer daily hours than males. The differences were mostly statistically significant, especially for the labour, small and medium categories. With the male dominance in society, the customary division of labour may have been partly responsible for females working longer daily hours for jobs which are laborious and time consuming. Women may be paid less per hour simply because they are engaged in tasks which by their nature are time-intensive and do not require high levels of physical exertion. Both males and females from large farm households provided significantly less labour than did their counterparts from small farm households. The only exception to this was females in the Sholapur villages.

The labour used in non-crop activities was subtracted from total labour hours to arrive at labour availability for crop production (Table I, col. 7 and 8). On an average, in these villages men and women are available around 2 to 3 hours daily for crop production with the only exception being women in Dokur where they are available around four hours a day. Except for Sholapur, women are available for longer hours per day for crop work than men. More than 50 per cent of the labour of both men and women is utilized for non-crop activities. Large farm males spend more time on crop activities than the small farm males. For females the reverse is true.

Women from large farms are significantly less available for crop activities than women from small farms while the reverse is true in the case of men. There is an uniform trend that as farm size increases the proportionate labour availability of male labour for crop production increases while the proportionate availability of female labour decreases. This is because males from large farms spend a considerable time on field supervision and management while females do a lot of work at home in annual food processing, grain drying and additional cooking for labourers employed on their farms. Another paper<sup>3</sup> discusses in detail crop labour utilization pattern and its variations across different regions and land holding categories.

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2. R. D. Ghodake, J. G. Ryan, and R. Sarin, "Human Labour Use with Existing and Prospective Technologies in the Semi-Arid Tropics of South India", *Journal of Development Studies*, Vol. 18, No. 1, 1981, pp. 25-47 (forthcoming).

3. Ghodake, Ryan and Sarin, *ibid.*

## COMPOSITION OF CROP LABOUR USE

*Family versus Hired*

It seems (Table II) that in the Akola villages, hired labour constitutes around 80 per cent of total labour used, with a tendency for large farms to employ more than small farms. However, in the Sholapur villages and in Dokur, where small farms use significantly more total labour per hectare, we find a smaller proportion of hired labour being used on average (51 to 57 per cent). Hence, there seems to be a relationship between the proportion of family labour use in a village and the variation in total labour use per hectare across farm size categories within the village. The higher the proportion of family labour used, the more likely it is that there will be an inverse relationship between farm size and total labour use per hectare.<sup>4</sup> Again, Aurepalle is an exception to this rule, because of significant differences in resource endowments between large and small farms there.

The Akola village economies are based on a cash crop enterprise (cotton), and this seems to explain the small proportions of family labour used (22 per cent).<sup>5</sup> In addition, cotton demands specialised operations like weeding and spraying which are normally done by hired labour, and the payment of wages on the basis of piece rates for cotton picking operations attracts more hired labour. The high caste families generally avoid manual labour in Akola villages, where they constitute 50 per cent of the farmer respondents. This might explain the low family labour input there. In the other four villages cropping patterns are dominated by foodgrain crops, and this explains their more intensive use of family labour (between 40 to 50 per cent).

In each region there is a clear inverse relationship between farm size and the proportion of family labour used when small and large farm categories are compared. In contrast there is a positive correlation between hired labour use and farm size as due to increasing prosperity many members of wealthy families drop out of the work force, particularly women and children.<sup>6</sup> The family labour availability per hectare is also inversely related to farm size, and this undoubtedly contributes to the tendency to use relatively more family labour on small farms. Similar results are common in the literature of both Asia and Africa.<sup>7</sup> While small farmers hire proportionately less labour than do large farmers, the extent of labour hiring by them is by no means insignificant. It reaches a figure of 58 per cent of the total labour use in Akola.

4. This is apparently because opportunity wages of family labour are lower than the actual wages or hired-in labour. However, the authors admit that this seems a somewhat tautological explanation.

5. We do not want to give the impression that a high proportion of hired labour use is always attributed to cash crop *per se*. Rather it depends upon the type of cash crop.

6. J. G. Rayan, R. D. Ghodake and R. Sarin, "Labour Use and Labour Markets in Semi-Arid Tropical Rural Villages of Peninsular India", in Proceedings of the International Workshop on Socioeconomic Constraints to Development of Semi-Arid Tropical Agriculture, 19-23 February, 1979, International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, 1980, pp. 357-379.

7. See (i) A. Rudra and R. Biswas, "Seasonality of Employment in Agriculture", *Economic and Political Weekly*, Vol. VIII, No. 39, September 29, 1973, pp. A-91-A-100, and (ii) D. W. Norman, "An Economic Study of Three Villages in Zaria Province: 1. Land and Labour Relationship", Samaru Misc. Paper 19, Institute of Agricultural Research, Samaru, Nigeria, 1974.

TABLE II—PERCENTAGE CONTRIBUTION OF VARIOUS LABOUR SOURCES TO TOTAL CROP LABOUR USE BY LAND HOLDING CATEGORIES<sup>a</sup> (1975-76)

Region	Land holding category	Family			Hired			Total		Proportionate contribution of female labour
		Male	Female	Total	Male	Female	Total	Male	Female	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Aunepalle	Small	..	23	64	15	21	36	56	44	52
	Medium	..	17	63	14	23	37	60	40	47
	Large	..	2	33	24	43	67	55	45	52
	All farms	..	33	6	39	22	39	61	55	45
			(15)	(100)	(36)	(64)	(100)			
Dokur	Small	..	14	56	12	32	44	54	46	53
	Medium	..	38	14	52	42	48	44	56	62
	Large	..	7	38	12	50	62	42	57	64
	All farms	..	34	9	43	10	47	57	44	56
		(79)	(21)	(100)	(18)	(82)	(100)			
Sholapur	Small	..	20	57	22	21	43	59	41	48
	Medium	..	15	44	26	30	56	54	45	52
	Large	..	35	50	19	31	50	54	46	52
	All farms	..	35	14	49	22	29	51	56	43
		(71)	(29)	(100)	(43)	(57)	(100)			
Akola	Small	..	18	42	27	31	58	51	49	56
	Medium	..	26	39	26	35	61	52	48	55
	Large	..	11	13	42	45	87	53	47	54
	All farms	..	16	6	22	37	41	78	53	47
		(73)	(27)	(100)	(47)	(53)	(100)			

a. All data have been converted into male equivalents prior to calculation of the proportions. However, figures in the last column are based on absolute hours of work indicating the proportionate contribution of absolute female labour in total labour.

b. Figures in parentheses are per cent values with respect to the sub-category totals.

Rudra and Mukhopadhyay, using data from various areas in India, also found that small farmers hire significant amounts of labour.<sup>8</sup>

### *Effect of Sex*

Males and females contribute almost equally to total labour use (Table II). Employment potential for women seems greatest in the highly irrigated village of Dokur and in the cotton growing villages in Akola district. The data in Table II represent man equivalent proportions. When we examine the absolute hours of work (percentage contributions on the basis of absolute values given in the last column of Table II), the total hours of female labour exceed those of males in all villages. These data reveal the substantial contribution of female labour in crop agriculture of SAT India. Children contribute very little.

Comparing the relative contributions of family male versus hired male labour, we find that in the Mahbubnagar and Sholapur villages more than 60 per cent of the male labour is from the family. However, in Akola, more than two-thirds of the male labour is provided by hired males. The picture is quite different with female labour. The contribution of hired female labour is always higher than its family counterpart when the village as a whole is taken. Of the total female labour used in the Mahbubnagar and Akola villages, 80 to 90 per cent was provided by hired females. In the Sholapur villages, the figure was around 70 per cent. This comparatively low Sholapur figure could be because of almost total absence of hand weeding in post-rainy season crops there, traditionally a major employer of women. The activities of paddy transplanting and weeding in Mahbubnagar and cotton picking in Akola seem to create a high demand for hired female labour in these areas.

Males contribute substantially more of the total family labour than do females while females dominate the hired labour portion. Children do not enter the hired labour force for crop production. Thus if increased demand for hired labour results from new technology it could help women achieve more wage employment, provided such technology does not decrease labour demand in operations which are predominantly carried out by females. In all the four regions, a higher proportion of family male as well as female labour is used on small farms than on large. The pattern of hired female labour use is however similar in all villages. There is a clear positive relationship between the proportion of hired female labour employed and the size of farm.

### LABOUR SUPPLY AND DEMAND

As explained earlier in this paper, the labour used in non-crop activities was subtracted from total labour use for all activities to arrive at labour availability for crop activities. Such estimates were multiplied by the number of members in the respective land holding categories to derive estimates of total labour availability. These figures were then adjusted for gross cropped

8. A. Rudra and M. M. Mukhopadhyay, "Hiring of Labour by Poor Peasants", *Economic and Political Weekly*, Vol. XI, Nos. 1 and 2, January 10, 1976, pp. 33-36.

area by considering sampling fractions of each category. In turn, such figures were used to calculate the shares of different land holding categories in total labour availability. In Mahbubnagar villages around 20 per cent of total available labour comes from labour households, whereas in Sholapur and Akola villages the figure is around 30 per cent (Table III). Larger farms constitute a greater proportion of the total labour available than do smaller farms. This

TABLE III—CONTRIBUTION OF DIFFERENT LAND HOLDING CATEGORIES IN HUMAN LABOUR AVAILABILITY AND USE FOR CROP PRODUCTION (1975-78)

Region	Land holding category	Percentage share in total labour availability	Percentage share in total labour use
(1)	(2)	(3)	(4)
Aurepalle .. .. .	Labour .. ..	17 (86) <sup>a</sup>	0
	Small .. ..	18 (94)	6
	Medium .. ..	21 (81)	13
	Large .. ..	44 (148)	81
Dokur .. .. .	Labour .. ..	23 (84)	0
	Small .. ..	24 (116)	9
	Medium .. ..	21 (90)	20
	Large .. ..	32 (143)	71
Sholapur .. .. .	Labour .. ..	29 (164)	0
	Small .. ..	16 (155)	12
	Medium .. ..	20 (170)	31
	Large .. ..	35 (275)	57
Akola .. .. .	Labour .. ..	31 (150)	0
	Small .. ..	18 (161)	9
	Medium .. ..	23 (136)	18
	Large .. ..	28 (200)	73

a. Figures in parentheses are the total number of family workers (man equivalents) available during 1975-76, 1976-77 and 1977-78.

trend is obvious, firstly because the greater number of family workers on larger farms as indicated by the bracketed figures in the table, and secondly large farm workers, especially males, spend more time on crop activities compared to those from small farms.

The picture on shares of different categories in total crop labour use is consistent with the land holding trend. Except for Sholapur villages, the percentage share of family labour availability exceeds the percentage share of crop labour use on small and medium farms. On large farms, invariably, the percentage share of crop labour use is much higher than the percentage share of family labour availability.

More than 70 per cent total crop labour use is on large farms in the case of Aurepalle, Dokur and Akola whereas in the Sholapur villages it is around 60 per cent. Thus, even on the basis of estimates of proportionate labour availabilities, it is evident that a substantial quantity of labour is required to be hired in on large farms. The actual values of surpluses and deficits of labour, considering absolute values of availabilities and uses indicated that Dokur and Akola large farms faced annual deficits of 20 and 15 per cent respectively. During peak periods large farms in all the regions showed labour deficits which rise to 60 per cent in the case of Dokur and Akola. Small and medium farms in all the regions showed sufficient family labour availability to meet their present crop labour demand even during peak periods.

#### CONCLUSIONS

The data presented in this paper reveal that females are the major contributors in the supply of labour both for performing different kinds of activities and for doing crop activities. In general, both males and females supply less than 50 per cent of their available total labour time for crop activities. As the farm size increases the proportionate labour availability of male labour for crop activities increases while that of female labour decreases. The inverse relationship between farm size and total labour use per hectare is associated with a high level of family labour use. The predominance of cash crops (cotton) in the Akola region, together with the fact that almost half the farmers belong to castes which avoid manual labour, seems to explain the small proportion of family labour used on farms there. The more proportionate use of family labour in Sholapur and Mahbubnagar villages is associated with a predominance of foodgrain crops. The role of high caste families in family labour contributions in these regions needs to be examined more closely, particularly the influence of size of farm on this relation.

Employment potential for women seems greatest in the highly irrigated Alfisol (red soil) village of Dokur and in the cotton growing villages of the Akola district. Males contribute substantially in the total family labour input while females dominate the total hired labour input for crop production. During peak periods only large farms face labour deficits, while small and medium farms have sufficient family labour availability to meet their peak period labour demand for crop production.