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# Labour Use in Rice Cultivation: Male-Female Differential in Time Allocation

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**Abstract:** Based on the hypothesis that technological change in agriculture has a differential impact on the patterns of time allocation by the male and female, this study examines such patterns on the basis of individual data collected from six rice-producing villages in India. The results show that, although invisible and mostly unregistered, female participation in rice production is substantial. Also, specific technological innovations have widely divergent effects on the use of human labour, depending on whether it is male or female.

## Introduction

In the continuing search for a clearer understanding of the factors responsible for the persistence of relatively low agricultural technology and development side by side with areas of modernization, increasing attention is being paid to the interactions between the physical and natural resources systems on the one hand and human resources on the other (Mellor and Johnston, 1984). A strong component of that new research is the emphasis placed on the role of women in agriculture and development. In this paper, an attempt is made, on the basis of on-farm and household research data from six villages in the State of West Bengal, India, to throw some light on the differential response of the male and female population of the villages to the changing technological processes in their major economic activity, rice cultivation.

The economic and noneconomic activities of a population, both within and outside the household, are largely reflected in the pattern of allocation of household time to the entire range of activities. An examination of that allocation pattern for different occupational categories of a population, male and female separately, would be useful in understanding the demographic, social, and economic factors governing its motivation, participation, and performance in adopting new technologies. That examination is more than the conventional analysis of labour force participation where only traditional economic activities are considered. An attempt is made here to examine the pattern of allocation of time by the male and female population of six villages in the age group of 15-50 years into various economic and noneconomic activities.

## Time Allocation by Male and Female Populations

For this study, the age 15-50 population of the six villages has been classified into four broad occupational categories—only agriculture, only nonagriculture, both agriculture and nonagriculture, and other, including the unemployed and persons not in the labour force. The distribution of total time has been studied for all activities, excluding personal care, rest, relaxation, recreation, and sleep. Economic activities have been classified into agriculture, nonagriculture, and noneconomic. Noneconomic activities are education, child care, housework, and other. The data are presented in Table 1.

In the six villages in the 15-50 age group, 2,319 males and 2,123 females each on average spend 9.47 and 9.53 hours, respectively, every day, on the activities considered. The male spends 6.25 hours per day on economic activities and 3.22 hours on traditionally noneconomic activities. The female spends only 1.35 hours per day on traditionally economic activities and 8.18 hours per day on education, child care, housework, and other activities; e.g., sewing, knitting, and making cowdung cakes for home use. If the activities not traditionally designated as economic are included, the total number of hours spent by the female exceeds those for the male for each occupational category because the female spends much longer hours in the “noneconomic” activities than the male, which more than compensates the excess of male over female hours in “economic” activities. A noticeable feature of this time allocation is that for each occupation, the number of hours spent by the female on noneconomic activities is fairly steady at about 5.5 hours per day irrespective of variations in the number of hours spent in economic activities, while the time spent by the male on noneconomic activities varies substantially. That implies that, whenever a male works an extra hour on income-earning activities, he gets the equivalent time off from his household work, whereas a female would work the extra hour *in addition* to her household work.

The overall participation rate is 84 percent for the male and 10 percent for the female. Out of the 84 percent for the male, 38 percent is in the “only agriculture” category, 28 percent in “only

nonagriculture,” and 18 percent in “both agriculture and nonagriculture.” The female economic participation is about evenly distributed between “only agriculture” and “only nonagriculture.”

**Table 1—Total Time Allocation by Male and Female by Occupational Category**

Activity	Ag.		Nonag.		Both		Other		Total	
	M	F	M	F	M	F	M	F	M	F
Agriculture hired labour:										
Number	396	92	—	—	52	9	—	—	448	101
Hours (person/day)	4	3	—	—	5	2	—	—	4	3
Agriculture family labour:										
Number	706	37	—	—	379	5	97	462	1182	504
Hours (person/day)	4	2	—	—	2	1	1	2	3	2
Nonagriculture hired labour:										
Number	—	—	270	116	143	9	—	—	413	125
Hours (person/day)	—	—	8	6	6	4	—	—	8	6
Nonagriculture family labour:										
Number	—	—	379	29	281	—	11	460	671	489
Hours (person/day)	—	—	9	2	8	—	2	2	8	2
Subtotal Economic:										
Hours (person/day)	5	4	9	6	10	7	2	1	6	1
Education:										
Number	23	—	23	7	17	—	298	172	361	179
Hours (person/day)	6	—	7	7	3	—	9	8	8	8
Child care:										
Number	126	37	52	39	63	3	—	958	241	1037
Hours (person/day)	2	2	1	3	1	3	—	3	1	3
Housework:										
Number	639	91	402	107	367	9	126	1906	1584	2133
Hours (person/day)	2	4	2	4	2	5	2	6	2	6
Other:										
Number	287	8	75	13	57	2	80	256	499	279
Hours (person/day)	2	2	3	2	2	2	7	2	3	2
Subtotal Noneconomic:										
Hours (person/day)	2	5	2	5	2	6	7	9	3	8
Total Economic and Noneconomic:										
Number	890	92	649	116	413	9	367	1906	2319	2123
Hours (person/day)	8	9	10	12	12	13	9	9	9	10
Participation rate										
Percent	38	4	28	5	18	1	16	90	84	10

The pattern of time allocation shows that, out of the total time of work, the proportion spent on economic activities is 66 percent for males and 14 percent for females. Also, although the female participation in economic activities is low, her total hours of work (including work within the household) is no less than the total time of work by the male. In agricultural activities, the average number of hours put in by both male and female is higher as “hired labour” than as “family labour.” In nonagricultural activities, however, the average number of hours provided as “family labour” is higher for the male and lower for the female, which may be due to the existence of self-employed small nonagricultural enterprises in the villages (e.g., ownership of cycle carts or small businesses run mainly by the male).

#### Time Allocation in Rice Cultivation

The villages under study are primarily growers of rice, and the major share of the villagers’ time is, therefore, used in the cultivation and processing of rice. The extent and pattern of that time use are linked closely with the technology and productivity of rice cultivation, as are the extent of useful

**Table 2—Time Allocation by Male and Female**

Category	Male Hired	Male Family	Male Subtotal	Female Hired	Female Family	Female Subtotal	Total
<i>Total number of hours worked during season:</i>							
	363 (47.37)	329 (42.97)	691 (90.34)	51 (6.71)	23 (2.95)	74 (9.66)	765 (100)
<i>Percentage of hours spent on:</i>							
Seedbed preparation	1.55 (20.89)	6.35 (77.83)	3.83 (98.73)	0.40 (0.77)	0.60 (0.50)	0.46 (1.27)	3.51 (100)
Field preparation	11.63 (47.07)	14.29 (52.48)	12.89 (99.55)	0.64 (0.37)	0.31 (0.08)	0.54 (0.45)	11.70 (100)
Transplanting	25.03 (78.51)	3.37 (9.59)	14.73 (88.10)	26.41 (11.74)	0.82 (0.16)	18.59 (11.90)	15.10 (100)
Irrigation	2.03 (21.01)	8.37 (78.56)	5.04 (99.57)	— —	0.66 (0.43)	0.20 (0.43)	4.58 (100)
Application of fertilizer	2.37 (43.76)	3.34 (55.89)	2.83 (99.65)	0.07 (0.20)	0.13 (0.15)	0.09 (0.35)	2.56 (100)
Weeding	26.01 (66.04)	8.94 (20.59)	17.89 (86.63)	35.20 (12.66)	4.51 (0.71)	25.82 (13.37)	18.66 (100)
Harvesting	20.04 (68.91)	6.37 (19.85)	13.54 (88.76)	21.30 (10.37)	4.00 (0.86)	16.01 (11.23)	13.77 (100)
Processing	11.34 (50.25)	4.58 (18.40)	8.12 (68.65)	15.97 (10.02)	77.25 (21.33)	34.69 (31.35)	10.69 (100)
Supervision	— —	44.39 (98.22)	21.12 (98.22)	— —	11.71 (1.78)	3.58 (1.78)	19.42 (100)

[Note: Figures in parentheses indicate percentages for columns.]

absorption of local labour and the potential for introducing cost-effective innovations in rice cultivation.

Table 2 shows that the total population of the six villages above 15 years of age worked for 765,446 hours in rice-producing activities during the 1982 *khari*f season. Out of that, about 90 percent were male hours.

Out of the nine major activities listed for rice cultivation during the season, weeding appears to have absorbed the largest proportion of the village labour, barring supervision, which is mainly a male family labour-using activity. Weeding seems to be the most important rice-growing activity for the female labour, but it is not for the male, and the major part of labour for weeding comes as hired labour both for male and female. The second activity in terms of labour absorption is processing and storage. Seventy-seven percent of female family labour and 15 percent of female hired labour are used in that activity. In supervision, a substantial proportion of labour comes from male family labour. Hired labour is used mostly in transplanting and harvesting, which follow in that sequence in terms of proportion of total labour used, the male and female allocating about the same share of their time to those activities. Seedbed preparation, irrigation, and application of fertilizer are generally the major occupations of the male family labour.

The sex-specific roles of village labour in regards to individual activities for rice cultivation suggest that, generally, female labourers spend most of their time hired by others on weeding, harvesting, and transplanting. For landowners, the female is typically busy in processing and storage activities. The male, on the other hand, spends most of his time on his own farm on supervision, field preparation, weeding, and irrigation. As a hired labourer, he allocates his time relatively more to weeding, transplanting, and harvesting.

### Conclusion

Female participation in labour force, particularly in rice agriculture, though substantial in reality, remains mostly invisible and unregistered. In contrast with the male, the female responds more sharply to technological changes and possibilities of output growth, both in positive and negative directions. For example, introduction of weedicides tends to displace female labour, whereas growth in the volume of harvest due to HYV seeds tends to increase female activity in harvesting and processing, a largely unregistered effect. Also, for the male, nonhousehold activities increase at the expense of household activities, whereas, for the female, household activities remain at a steady level of about eight hours per day irrespective of the burden of nonhousehold activities.

These findings tend to support the need to re-examine the definition and measurement of such concepts as "economic" and "noneconomic" activities, households, labour force participation, work, employment, and income. These findings also suggest the need for taking into account in the designing of new technologies the differential impacts of such technological changes within the household, not only as a means of achieving gender equity, but for the more fundamental reasons of providing a rational basis of remuneration for work performed and for augmenting overall productive efficiency of the human resources involved.

### Note

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### Reference

Mellor, J.W. and Johnston, B.F., "The World Food Equation: Interrelations Among Development, Employment, and Food Consumption," *Journal of Economic Literature*, Vol. 22, June 1984.

## Discussion Opening—*Anna Burger*

The common features of the three papers are that they all deal with the role of female labour in the farming sector (but in different parts of the world). The papers assert that women have a multiple working task—in farming, household activities, and child care—which is relevant to the whole of the economy and even more relevant to agriculture.

The Bengali and Thai papers deal with labour allocation by gender on rice-cultivating farms. The paper dealing with Bengali farms says that women have less share in economic than in noneconomic activities but spend more daily hours in work than men do. The Thai paper stresses that both male and female labour are misallocated on Thai farms. Male labour time is overallocated to farming, female to nonfarm enterprises, and they are underallocated *vice versa*. The two papers raise problems of change in the division of labour and in the meaning of economic and noneconomic activities in the course of development.

In traditional agricultural societies, farm households act as complete (or almost complete) economic entities. Their major task is to ensure the family's basic food needs: housing, fuel, furniture, kitchenware, and clothes and their repair and food preparation. Farm households also make and repair tools and appliances for crop production, livestock, and draught animals. To satisfy the small cash requirements of the family, some cash crops and household handicrafts are sold. Those handmade products, as a rule, are also produced for own use.

Those are household activities in the sense that they are done in the framework of the household and economic activities in the sense that they satisfy the economic needs of the family. Both men and women take part in those activities. Men, however, spend more working time outside the home, in crop production and livestock breeding. Men deal first of all with those handicrafts that need more physical strength; e.g., blacksmithing and wood carving. Women are, at the same time, much more bound to the home in order to care for the children. The women, therefore, do more household work and garden and animal care around the house and produce and repair more household goods for own household use and for trade than men do. However, all those activities are economic activities, in the sense of providing subsistence living. Men are still regarded as breadwinners for families, however, since the bulk of food subsistence is supplied by them.

In the course of development, the traditional division of labour by gender is substituted for the social division of labour. A major part of traditional household activities is taken over by industries and services. Family farms of developed economies, however, are still preserving some of the features of the traditional division of labour. The great importance of traditions in the farming sector is also stressed by de la Torre. Family planning and health services could reduce women's labour time in households and would also decrease poverty.

## General Discussion—*Jill L. Findeis*, Rapporteur

The discussion on the role of human capital, specifically the role of women in agriculture, focussed on the following:

- variable measurement and interpretation issues specifically related to the price of labour and the marginal value product (*MVP*) of the labour variable;
- applicability of results to farms of various sizes and to different social classes;
- child care and access to health services among migrant workers;
- the “equal-pay-for-equal-work” concept;
- implications for off-farm work and income; and
- the application of technology to perform household tasks.

The measurement issue was addressed by one participant who asked if the same price was used by Pollard and Meyer for both on-farm and off-farm work. The participant pointed out that if the price of hired labour (on-farm) is used, it is probably too high since it includes transport costs implicitly as well as other costs. Another participant questioned the validity of using an imputed wage for household work. The assumptions used to derive the *MVP* of labour were also questioned. Another participant cautioned that the *MVP* estimates derived in the Pollard and Meyer study should be interpreted carefully, pointing out that the value of an additional hour in a specific activity should be differentiated from an additional hour of work by sex in general.

In response, Meyer said that he recognized the existence of measurement problems and for that reason their study does not “come down too hard” on the allocative inefficiencies found in the study. He noted that since data on detailed activities within farming and off-farm are very difficult (and costly) to collect, estimates of *MVP* by sex *and* by activity cannot be supplied given his present data.

One participant questioned the level of aggregation used in the two allocation studies, specifically the applicability of the studies’ estimates for different farm sizes and social classes. In response, Mukhopadhyay said that a great deal of variation would exist in the estimates derived if estimated by farm size, class, and caste. He added that the allocation of labour for economic and noneconomic work does vary by farm size and social class.

The issues of child care for working women and health care for migrant workers received attention from several participants, one of whom pointed out that poor prenatal care is not limited to migrant women, since many women fearing job loss do not seek adequate care. That participant also asked if such services are costly in the USA or if health care for undocumented persons is covered by existing US welfare programmes. Another participant further questioned if adequate child care is available for the children of migrant workers. If not, the women’s choice to work may not be efficacious in terms of the children’s welfare. In response, de la Torre emphasized that because migrant workers have no kin network in the USA, increased access to health services and other services is necessary if adequate care is to be provided. In the USA, a few programmes (e.g., the special supplemental food programme for women, infants, and children) exist that could provide aid, but the fear of being deported discourages many workers from seeking care. Another participant added further that in some US regions (e.g., Utah), volunteer groups have been organized to provide child care to migrant workers, and those groups have been successful.

A participant asked if any of the authors had found evidence to support or refute the existence of “equal pay for equal work.” In response, Mukhopadhyay commented that he had found that, compared to men, women were generally paid a 25 percent lower wage for the same job. Meyer reported finding similar results, although he cautioned that gender differences often exist within the same job. De la Torre commented further that she had observed that many women now work on crops traditionally grown by men. A participant commented that studies in Sri Lanka showed wage differentials between women and men to be 30 percent on average for the same job.

Several participants asked questions related to the role of off-farm employment, off-farm income, and the use of technological improvements to perform household work to allow more work time outside the home. One participant asked about the role of off-farm income and the extent to which women were employed off-farm. Others questioned if technology was being used or improved to substitute for labour currently being used for noneconomic work. In response, Mukhopadhyay replied that, in India, many rural women remain unemployed since nonfarm employment is not readily available to women. Meyer noted that currently we know little about off-farm work in nonfarm activities and little about those industries that will hire farm labour that is seasonal in nature. On the latter issue, Mukhopadhyay noted that while technological improvements had been adopted for farming itself, subsidization or help for women for noneconomic employment was nonexistent, even in terms of technological improvements. Meyer noted that males have generally been unwilling to do household work. He pointed out that tradition clearly plays a key role here.

Participants in the discussion included M. Ahearn, P. Pinstrup-Andersen, W. Frank, B. Greenshields, J.R. Hildebrand, V. Hildebrand, E. Kelita, L. Moore, C. Pemberton, J. Remenyi, I. Tinker, and A.C. Thorne.