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PADDY PRODUCTION, PROCESSING AND WOMEN
WORKERS IN INDIA - THE SOUTH VERSUS THE
NORTHEAST

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The general belief that paddy cultivation is associated with the presence of women workers in agriculture, and, in particular, of women wage labourers, is largely based on the experience of east and south-east Asia. In India too there is a common perception that the regional concentration of women agricultural labourers is based on the extent of paddy cultivation relative to other foodgrains. In fact, however, systematic analysis across states and districts elicits no such simple association between the two.^{1/} In earlier work, I had found, if anything, that women agricultural labourers predominate, inter alia, in areas where the fine grains (rice and wheat) are not grown. This led me into a closer analysis of the rice growing areas of the country, and of the practices employed in paddy cultivation and processing.

Rice has traditionally been grown in India in the southern states (Andhra Pradesh, Tamil Nadu, Kerala and some of Karnataka); in some of the coastal and interior districts of an otherwise dry rain state like Maharashtra, and in the eastern and north-eastern states (Orissa, West Bengal, Assam and large parts of Bihar, West Uttar Pradesh and Madhya Pradesh).^{2/} However, as a broad generalization, women agricultural labourers as a proportion of the female population are to be found chiefly in the southern states, and only to a much lesser extent in the eastern and north-eastern states. We shall, in this paper, compare paddy production practices in the two broad regions in order to obtain some clues to this contrast. These two regions are by no means homogenous in agro-climatic terms, and we shall use this broad division only as a starting point.

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Paddy production across regions

A striking feature of the regional comparison of paddy acreage, production and yield is that the eastern and north-eastern states have the largest acreage under paddy, but the lowest yields. The four Southern states have the highest yields in both the early 1960's and the mid 1970's (i.e. pre- and post - HYV), followed by Maharashtra, West Bengal and Assam, while Orissa, Bihar, Uttar Pradesh and Madhya Pradesh have the lowest yields. See Table I. This pattern appears to be broadly true during the pre-independence period as well, with the highest yields being found in Madras presidency. See Table II. The pre and post independence data cannot be compared more systematically because of the wide-ranged reorganization of states after independence. It is apparent, however, that the regional patterns of area and yield are not a new phenomenon, but have existed historically.

What accounts for this pattern appears to be a systematic difference in the extent of irrigation. As far back as 1918-19, fully 70% of the rice acreage in Madras Presidency was irrigated.^{3/} In the period 1927-28 to 1936-37, on average 72% of rice area in Madras was irrigated, while only 10% was irrigated in the United Provinces, with the other principal rice regions falling between. See Table III. Again, this pattern continues to hold in the more recent period, as can be seen in the table. Over 90% of rice area in Tamil Nadu and Andhra Pradesh is now irrigated, while the irrigated proportion is considerably lower in the eastern and north-eastern states. The proportion of area irrigated is, admittedly, only a first approximation to an explanation of yield differences. The quality of irrigation (wells, tanks, canals or pumpsets) affects the actual control of the farmer over the amount and timing of water use, which are also critical

to the yield obtained. Likewise, the type of water source together with the social and institutional structure affect the distribution of irrigation water, its timely availability to various classes of farmers, and hence the average yield.

Irrigation and female labour

Granting these caveats about the quality and distribution of irrigation water, the proportion of irrigated area would affect labour use in paddy cultivation directly by making it more possible to transplant rice, rather than sowing it broadcast. Transplanting becomes possible for a rice variety of a given duration if water is available for seed bed preparation prior to the actual cultivation season. Thus, transplanting is also possible in areas with a long and reliable monsoon, as is usually the case in much of India's western coast line, covering the coastal districts of Kerala, Karnataka and Maharashtra, as well as in the north-east states of Assam and West Bengal. Many of these districts have low irrigation ratios, but transplanting is still possible within rain-fed agriculture. Irrigation then is, by and large, a sufficient but not a necessary condition for transplanting rice. Allowing for this, the demand for transplanting labour is likely to be much higher in irrigated regions.

Irrigation also indirectly affects the demand for labour, by raising yields, and hence increasing the demand for harvesting labour. Since female labour is usually quite important in both transplanting and harvesting paddy, we would expect a strong association cross-sectionally between the proportion of area irrigated and the demand for female agricultural labour.^{4/} This effect would be strengthened if irrigation also led to an increase in cropping intensity, ceteris paribus. All this is, of course, predicated on the fact that techniques for replacing human labour

by machine power in either transplanting or harvesting paddy have not made much headway in India.

Testing this hypothesis about the relationship between irrigation, transplanting and the demand for female agricultural labour requires data on all three variables, and these are not entirely satisfactory. Data on the proportion of irrigated to total rice area are fairly reliable, and have been obtained from the Indian Agricultural Statistics, which provides both net area irrigated (by irrigation source) and gross area irrigated (by We have used the proportion of gross area irrigated under rice to the gross cropped area under rice.

Unfortunately, we do not have available to us any recent data on the exact proportion of rice area that is transplanted. Our data go back to the pre-independence period, and are available for two triennia, 1934- to 1936-37, and 1946-47 to 1948-49. See Table IV. Two features of the data merit particular attention. Firstly, the sharp increase in the proportion transplanted in Bengal in the later triennium is probably because of the exclusion of East Bengal which had become a part of Pakistan. It is likely that the proportion of broadcast rice was much higher in East Bengal since rice was grown there in low lying tracts subject to flooding. Secondly, while the transplanted proportion in Madras is certainly higher than in Bihar, Orissa, the Central Provinces and the United Provinces, it is also high in both West Bengal and Assam, despite their low irrigation ratios. It is evident therefore that our classification of the districts into two broad regions is inadequate. We need at least a four-fold classification as follows:-

- (a) the main rice growing districts of Andhra Pradesh, Tamilnadu, Kerala and Karnataka - high irrigation ratios, high transplanting proportions;



- (b) the coastal districts of Maharashtra and, to some extent, Karnataka and Kerala - rainfed transplanting;
- (c) the rice-growing districts of eastern Madhya Pradesh, eastern Uttar Pradesh, interior Orissa, and the Chhota Nagpur and North Bihar districts of Bihar - mainly rainfed with high broadcast proportions;
- (d) West Bengal, Assam, coastal Orissa and the irrigated districts of Central Bihar - both rainfed and irrigated transplanting.

Ceteris paribus, we would expect the demand for female agricultural labour to be lowest in (c) above. Since our data on transplanting proportions are so meagre, we cannot directly test their impact on the demand for female labour. We shall therefore focus on irrigation alone.

Data on the third variable; viz., women agricultural labourers were obtained from the 1971 population census. The problems with the 1971 census data for women have been discussed elsewhere at length.^{5/} Suffice it to say that we do not believe these problems to be insuperable for study of women agricultural labourers. However, the problem still remains as to what is the appropriate variable to measure the incidence of women agricultural labourers. The ratio of women agricultural labourers to the total women agricultural workers (i.e. labourers plus cultivators) is rendered suspect by the unreliability of the data on women cultivators, especially in the 1971 census.^{6/} We have used instead the ratio of women agricultural labourers to the female rural population as our variable. This avoids the problem with the earlier index, but is likely to be affected by variations in the population density across districts.^{7/} We have attempted partially to control for this by using

population density as an independent variable in the regression.

We estimated an equation for the incidence of women agricultural labourers in the rural female population using cross-sectional data for 96 districts of the country where the proportion of rice in the gross cropped area under foodgrains was over 25% in 1969-70.^{8/} This was the year nearest to the 1971 census, for which we could get data. Two versions of the equation were tried. In the first version, the proportion of gross cropped to net sown area (i.e. the multiple cropping index), the proportion of rice to gross cropped area under foodgrains, and the proportion of irrigated to gross cropped area were entered as right hand variables, in addition to population per hectare of gross cropped area (an index of population density), the Gini coefficient of owned land, and the proportion of irrigated rice area to gross rice area. Since the first three variables proved to be insignificant, possibly due to multicollinearity, a second version was run with the Gini coefficient of owned land, population density and the proportion of irrigated to total rice area as independent variables. The regression results for both versions and the correlation matrix are presented in Tables V and VI. The strong association between the irrigation ratio and the incidence of women agricultural labourers appears to conform to our starting hypothesis. The proportion of women agricultural labourers in the female population appears to vary systematically, inter alia, with the extent of irrigation, indicating possibly that it is not paddy cultivation per se but irrigated paddy cultivation that increases the incidence of female labourers.^{9/}

Rice processing techniques and labour absorption

Although the negative impact of a decline in hand-pounding techniques on female employment in paddy processing has been noted in other countries,

notably *Java*, few systematic studies have been undertaken for India.^{10/} That there has been a very sharp decline over the last fifty to sixty years or so, and that the decline was particularly marked during and immediately following the Second World War, has been noted in some major official documents.^{11/} Here we shall attempt to provide some idea of the regional dimensions of this decline, and suggest some hypotheses by way of possible explanation.

The regional distribution of workers engaged in dehusking rice is presented in Tables VII and VIII for two census years, 1931 and 1961. Data for the two years are not strictly comparable due to changes in occupational definitions and in the territorial divisions. It is clear, though, that already in 1931, dehusking was a less labour intensive process in Madras when compared to Bengal, United Provinces, Bihar and Orissa. A rough index for this is the smaller number of workers engaged in dehusking per million tons of rice produced in Madras. Thus, the small power-driven hullers had already made greater inroads into the handpounding industry in Madras by 1931. The phenomenon was by no means peculiar to Madras. Indeed Census Superintendent L J Sedgwick speaks of the decline in handpounding employment in Bombay even earlier, between 1911 and 1921, consequent on the growth of mills.^{12/} Indeed, for India as a whole, the total number of female workers engaged in dehusking declined from 981,342 in 1911 to 626,362 in 1921 and 482,187 in 1931; the number of male workers fell from 134,844 to 121,172 to 117,933 during the same period.^{13/}

A second notable feature of the period prior to the Second World War is that the number of women workers far outnumbered male workers, being in the ratio of 4:1 in 1931. The 1931 distribution shows that this was true in all the provinces. However, the decline between 1911 and 1931

was far more precipitous for women. There was a 51% decline for women compared to a 13% decline for men, indicating possibly that men were at least partially being reabsorbed by the milling sector.

By 1961 women constituted only 45% of all workers in rice milling (inclusive of both the handpounding and power driven sectors), although they still predominated in the household industry sector.

Our chief concern here is with the regional pattern which appears to indicate a greater relative importance of power-driven milling in the southern states, especially Andhra Pradesh and Tamil Nadu, compared to most of the eastern and north-eastern states, both before and after independence. The data we have examined so far have been based on employment in milling. The distribution of the number of mills also indicates a similar pattern. See Table IX.

Data on the number of mills must however be treated with caution since they include mills of very different capacities, from small hullers to modern large rice mills. We have not been able to obtain capacity data for the mill sector. The Bulletin on Food Statistics provides data on number of mills by different categories - hullers, sheller-cum-hullers and modern rice mills, without providing average capacity ratings. However, in the early 1960's there were very few large mills, and the majority of the mills in all states were hullers. Of course, even within hullers, there may be wide capacity variations^{14/} and this must be borne in mind.

We do, however, have some data that indicate that the ranking of milling capacity and number of mills do not diverge, at least in the first decade after independence. The Rice Milling Committee of 1954-55 estimates

the proportion of handpounded to total rice production for the various states for 1953-54. See Table X. Applying these proportions to the total rice produced in 1959-60 (a normal production year), we can obtain estimates for the total amount of rice hand-pounded or milled in each state. These estimates are given in the table. There is a very strong positive association between the estimated amount of milled rice and the number of rice mills in each state in 1960.^{15/} We may therefore reasonably conclude that the data on number of mills, total amount milled, and employment in the non-household sector, all point towards a greater absolute and relative importance of power driven milling in Andhra Pradesh and Tamil Nadu as compared to Uttar Pradesh, Bihar, Orissa, Assam or Madhya Pradesh in the early 1960's. Among the eastern and north-eastern states, only West Bengal had a large number of mills or amount of milled rice in that period.

At least a part of the regional differences in milling can be attributed to the varying degrees of vigour with which the government's rice procurement policies were channelled through mills during the second world war. This policy appears to have been particularly strongly implemented in Madras provinces.^{16/} But, as we have already noted, the greatest importance of milling in Madras predates the war. The policies pursued during the war tended only to accentuate the regional pattern that was already in existence.

A clue to the possible reason behind this is available in some of the government reports on the subject.

"Hand-pounded rice is produced mostly by the growers and agricultural labourers for their domestic consumption. In several areas, however the hand-pounding industry has been

producing rice on a commercial scale and even for export to other states in the country..... While the bulk of the milled rice is put on the market, only about one-fourth of the hand-pounded rice is marketed. Thus the total marketed surplus of rice consists more of milled rice than of hand-pounded rice" (Rice Economy of India, 1961, p.33).

A possible hypothesis that is indicated is that the higher the share of marketed surplus of rice in a region, the higher the proportion of production that is milled. The Rice Marketing Committee of 1941 had estimated the average marketable surplus by province for the triennium 1934-5 to 1936-37, as also the proportion milled. These data are given in Table XI. There appears to be a positive association between the two,^{17/} although it is clear that, on the one hand, not all of the marketable surplus was being milled in some provinces, while even some of the non-marketed production was being milled in others.

The relative cost of hand-pounding versus milling may have been one reason why more of the marketed rice tended to be milled.^{18/} Hand-pounding being generally more costly than milling, the price of hand-pounded rice would have had to be proportionately higher ceteris paribus in order to afford the seller an equal profit on both. It is doubtful whether this was the case. According to the Rice Marketing Committee of 1941, in many provinces there tended to be a price differential of one to four annas per maund in favour of hand-pounded rice of the fine or medium varieties. On the other hand, for the coarser varieties, milled rice was often higher priced than the hand-pounded.^{19/} Since, even the price differential in fine varieties was unlikely to have been large enough to cover the extra cost of hand-pounding, the logic of the market seemed to be firmly against

hand-pounding. This would particularly affect the cost calculus of an intermediary trader who purchased paddy, processed it and sold it in the form of rice. It may be a less critical factor if paddy were retained for domestic consumption, and hand-pounded by family labour. While the imputed cost may be high in this case, the actual money cost of hand-pounding might be lower than paying ^{for} milling. There might therefore be a greater tendency for the marketed paddy to be milled, than that which was retained for own consumption by the cultivating household. Variations in the relative cost and price ratios as between hand-pounded and milled rice in the different provinces may have been an important reason for the varying extents to which the marketed surplus tended to be milled. This, however, needs further investigation.

In the light of the above discussion it would appear that government procurement policies during the war gave an extra fillip to the already favourable economics of power-driven milling. Although some post-war attempts were made to control the growth and spread of mills through Rice Mills Control Orders in some states, these ceased to operate when rice was decontrolled in 1954. In any event, although the First Five Year Plan attempted to introduce various measures, viz., the "Common Production Programmes" to allow coexistence of handpounding along with the mills, it became impossible to check the rapid (often unlicensed) growth of small hullers. Far more active and earlier (prior to the war) intervention would have been necessary to improve the technology of hand-pounding and thereby strengthen its competitive position.

Conclusion

This paper has examined some of the regional dimensions of two aspects of paddy cultivation and processing which have traditionally been highly intensive of female labour. Although the empirical evidence linking the practice of transplanting rice *inter alia* with the incidence of women agricultural labourers is not sufficiently up to date, the data do indicate a strong relationship between irrigation and inequality of land holding on the one hand and the presence of women labourers on the other. To the extent that transplanting is predicated on irrigation (and this is not true everywhere), we may infer that transplanting is linked to the presence of women labourers in the current period as well.

The data on paddy processing indicate that milling paddy made great inroads into female employment in hand-pounding in the main southern rice producing provinces even prior to the war. While government policies during the war undoubtedly speeded up the overall growth of mills and accentuated the regional differences, hand-pounding had already been doomed by economic considerations.

What is particularly interesting about the regional dimensions is that the regions where there is a high incidence of women labourers in paddy cultivation are also the regions where women's role in paddy processing has declined earliest. A much deeper analysis is required to study the possible inter-connections between the two. For example, one might hypothesise that the early presence of transplanting in the southern parts of the country and the consequent high demand for female labour reduced the supply of labour available for hand-pounding, thereby tilting the relative costs in favour of milling, once the technology became available.

On the other hand, the increase in milling would probably have increased the supply of female labour for cultivation and depressed the wage there. We enquire a better knowledge of the historical evolution of both the technology and the relative prices and wages in order to test these hypotheses.

Table I: Area, Production and Yield of Rice, post 1947, and % of women Agricultural Labourers to the Rural Female Population, 1971

		Area in hectares Production in tonnes yield in kg. per ha.	
		<u>1960-61 to 1962-63</u>	<u>1970-71 to 1972-73</u>
Andhra Pradesh	- Area	3,276,352	3,046,600
	- Production	4,139,708	4,382,400
	- Yield	1,263	1,441
	- % women agricultural labourers		18%
Assam	- Area	1,879,785	2,001,600
	- Production	1,706,783	2,021,900
	- Yield	908	1,009
	- %		0.3%
Bihar	- Area	5,176,930	5,133,800
	- Production	4,410,491	4,530,666
	- Yield	852	903
	- %	1,352	7%
Karnataka	- Area	1,057,171	1,096,800
	- Production	1,430,764	1,932,900
	- Yield	1,352	1,762
	- %		9%
Kerala	- Area	778,986	874,100
	- Production	1,054,953	1,329,800
	- Yield	1,356	1,521
	- %		7%
Madhya Pradesh	- Area	4,188,705	4,464,400
	- Production	3,097,939	3,581,557
	- Yield	740	802
	- %		11%
Maharashtra	- Area	1,319,816	1,324,066
	- Production	1,381,930	1,259,066
	- Yield	1,048	945
	- %		14%

contd..

Contn. of Table I

Orissa -	Area	4,098,296	4,537,400
	Production	3,714,268	3,979,700
	Yield	910	878
	%		4%
Tamil Nadu-	Area	2,573,775	2,672,733
	Production	3,830,229	5,329,800
	Yield	1,488	1,994
	%		11%
Uttar Pradesh-	Area	2,573,775	4,565,900
	Production	3,210,365	3,575,200
	Yield	763	3% 782
	%		3%
West Bengal -	Area	1,490,396	5,007,633
	Production	1,887,711	6,130,233
	Yield	1,087	1,225
	%		3%

Source: Estimates of Area and Production of Principal Crops in India 1954-55 to 1964-65, and 1972-73.

Census of India, 1971, Part II A (ii), Union Primary Census Abstract.

Table II - Area, Production and Yield of Rice - pre 1947^{1/}

British territories		1928-29 to 1930-31	1934-35 to 1936-37
Assam	- Area	4.62	5.20
	Production	1.47	1.66
	Yield	799	801
Bengal ^{2/}	- Area	20.73	21.27
	Production	9.03	9.43
	Yield	1,093	995
Bihar	- Area	10.79	9.94
	Production	4.36	3.10
	Yield	1,014	783
Orissa ^{3/}	- Area	3.38	5.03
	Production	1.38	1.45
	Yield	1,025	716
Central Provinces and Bessar			
Central Provinces and Bessar	- Area	5.49	5.63
	Production	1.55	1.67
	Yield	703	744
Madras	- Area	11.52	10.25
	Production	5.20	4.84
	Yield	1,171	1,185
United Provinces	- Area	6.92	6.69
	Production	1.46	1.97
	Yield	529	739

Source: Report on the Marketing of Rice in India and Burma, S. 12, Government of India Press, 1941, Appendices III to VI.

Notes: ^{1/} The data are averages for the two triennia.

^{2/} Includes both East and West Bengal.

^{3/} Data for the first triennium exclude Ganjam and Koraput districts. Data for the second triennium are averages over only 1935-36 and 1936-37.

^{4/} 1 ton = 1016 kg. 1 ha. = 2.47 acres.

Table III : Irrigated Rice area as a % of gross cropped area under rice

Average of 1927-28 to 1936-37		1969-70	
		Andhra Pradesh	0.946
Assam	0.125	Assam	0.107
Bihar	0.291	Bihar	0.346
		Karnataka	0.649
		Kerala	0.545
Central Provinces and Berar	0.164	Madhya Pradesh	0.156
Bombay	0.100	Maharashtra	0.237
Orissa	0.167	Crissa ^{2/}	0.228
Madras	0.721	Tamil Nadu	0.922
United Provinces	0.090	Uttar Pradesh	0.166
Bengal	0.071	West Bengal	0.269

Sources: Rice Marketing Committee Report, 1941, op.cit., Appendix IV
Indian Agricultural Statistics, 1967-68 to 1969-70, Vol.II

Notes: 1. Includes both East and West Bengal
2. Data refer to 1967-68.

TABLE IV: Transplanted Area as a % of total rice area

	1934-35 to 1936-37	1946-47 to 1948-49
Assam	0.825	0.80
Bihar		0.55
- Bihar proper	0.623	
- Chhota Nagpur and Santal Parganas	0.407	
Central Provinces and Berar	0.187	0.20
Orissa	0.460	0.35
Madras	0.718	0.86
United Provinces	0.393	0.40
Bengal	0.496	0.80 ^{1/}

Sources: Rice Marketing Committee Report, 1941, op.cit.,
Appendix XXXIV

Rice Economy of India, Government of India, Ministry
of Food and Agriculture, 1961, p.41 (taken from the
Report on the Marketing of Rice in India, 1954)

Notes: 1. Only West Bengal.

Table Va : I regression results

(Dependent variable - ratio of women agricultural labourers to the female rural population, 1971)

Independent variable	Coefficient	Std. error	t-value
Intercept	- 0.1276	0.0527	2.4194*
Gini coefficient of owned land	0.3392	0.0713	4.7600***
Population density	- 0.0036	0.0014	2.6962**
<u>Rice area</u> GCA under foodgrains	0.0267	0.0195	1.3721
<u>Gross Cropped area</u> Net sown area	- 0.0044	0.0223	0.1961
<u>Irrigated area</u> GCA	- 0.0343	0.0316	1.0864
<u>Irrigated rice area</u> GCA under rice	0.0910	0.0157	5.8122***

n = 96; $\bar{R}^2 = 0.472$

- * - 5% significance level
- ** - 1% significance level
- *** - 0.1% significance level

Table Vb: Regression results

(Dependent variable - ratio of women agricultural labourers to the female rural population, 1971)

Independent variable	Coefficient	Std.error	t-value
Intercept	- 0.1209	0.0413	2.9246 ^{**}
Gini coefficient of owned land	0.3304	0.0690	4.7389 ^{***}
Population density	- 0.0031	0.0013	2.4099 [*]
<u>Irrigated rice area</u>			
CCA under rice	0.0777	0.0106	7.3609 ^{***}

n = 96,

$\bar{R}^2 = 0.470$

* - 5% significance level

** - 1% significance level

*** - 0.1% significance level

Table VI : Correlation matrix

<u>Women agricultural labourers</u>				
Female rural population	1.0			
Gini coefficient of owned land	0.394	1.0		
Population density	-0.190	- 0.122	1.0	
<u>Irrigated rice area</u>				
CCA under rice	0.548	0.017	0.067	1.0

Table VII : Regional Distribution of Workers in dehusking, 1961

	Total workers		Household industry workers		Household industry workers as a % of total workers
	Females	Males	Females	Males	
India	286,255	349,121	178,641	115,630	0.463
Andhra Pradesh	7,634	29,947	877	1,168	0.054
Assam	5,130	5,234	4,043	257	0.415
Bihar	40,497	17,287	35,003	7,449	0.735
Karnataka	7,843	13,674	2,185	3,404	0.260
Madhya Pradesh	24,329	24,140	20,128	10,700	0.636
Maharashtra	5,624	29,060	3,495	6,675	0.293
Orissa	19,561	3,994	15,470	1,830	0.734
Tamil Nadu	12,154	32,296	2,343	845	0.070
Uttar Pradesh	51,000	32,850	48,388	54,101	0.762
West Bengal	56,619	31,792	30,415	3,019	0.378

Source: Census of India, 1961, Vol. I Part II-B(i), General Economic Tables

The data refer to workers in minor occupational group 200 - "production of rice, atta, flour etc. by milling, dehusking and processing of cereals and foodgrains".

Table VIII : Regional Distribution of workers dehushing,
1931

	Number of "rice pound- ing, suckers and floor granaries" Establishments		Number employed per million tons of rice produced
	Females	Males	
India (British territory plus states and agencies)	462,187	117,933	
Assam	6,773	561	4,594
Bihar and Orissa	82,699	2,465	16,000
Central Provinces and Berar	5,910	3,321	5,240
Bombay	4,254	2,229	11
Madras	41,449	13,299	10,050
United Provinces	126,493	9,675	67,000
Bengal	158,390	10,964	15,750

Sources: Census of India, 1931, Vol. I, Part II - Imperial Tables,
Table X, p.230.

The data refer to occupational group 71, and include
"principal earners", "working dependents" and those for
whom this is a "subsidiary occupation"; the first two
categories include the bulk of the workers.



Table IX : Number of rice mills

	End of 1960	End of 1965	1970-71	Jan.1, 1975
India	34,527	47,175	71,023	91,333
Andhra Pradesh	4,667	7,735	9,605	15,366
Assam	338	441	441	2,295
Bihar	745	1,808	1,828	4,678
Karnataka	2,996	4,284	7,171	8,013
Kerala	2,832	3,643	4,619	8,368
Madhya Pradesh	1,904	2,567	5,198	5,428
Maharashtra	2,208	2,608	4,852	5,626
Orissa	1,386	1,850	1,921	3,243
Tamil Nadu	7,411	8,903	12,455	11,722
Uttar Pradesh	1,444	1,699	5,524	6,380
West Bengal	5,211	6,957	6,829	6,507

Source: Bulletin of Food Statistics, various issues.

The data include hullers, shellers and modern rice mills. Each year's data represent the latest available figure for a particular state.

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Table X : Estimated amount of rice milled, 1959-60

	Milled rice as % of total pro- duction, 1959-60	Rice produc- tion 1959-60 (1000 tons)	Estimate of rice milled 1959-60 (1000 tons)
Andhra Pradesh	49.9	3614	1803
Assam	34.0	1629	554
Bihar	2.6	3886	101
Kannataka	95.7	1289	1234
Kerala	30.5	1025	313
Madhya Pradesh	20.9	3116	651
Maharashtra	61.5	1586 ^{1/}	975 ^{1/}
Orissa	12.8	2137	274
Tamil Nadu	91.6	3406	3127
Uttar Pradesh	34.0	2370	806
West Bengal	29.8	4172	1245

Source: Rice Economy of India, 1961, op.cit., pp.55, 117-118

Notes: 1/ Includes Gujarat

Table XI : Marketable surplus^{1/} and milled proportion,
1934-35 - 1956-57

	Marketable surplus as % of production less seed	Milled rice as % of production less seed
Assam	6	3
Bihar & Orissa	33	10
Central Provinces & Berar	38	30
United Provinces	38	7
Madras	67	62
Bengal ^{2/}	48	16

Sources: Rice Marketing Committee Report, 1941, op.cit.,
 Appendices XXIV and XXV.

Notes: 1/ Marketable surplus is defined as total production
 minus the amount retained for domestic consumption,
 barter, payments-in-kind and seed.

2/ Includes East Bengal.

Footnot

- 1/ See G.Sen, "Women agricultural labourers - regional variations in incidence and enrollment", Centre for Development Studies, Working Paper No.168, April 1983.
- 2/ We have excluded Punjab from our analysis; although rice production has made rapid gains there in the last 5-10 years, it is not traditionally a very important rice area.
- 3/ See C.R.Srinivasan, Report of the rice production and trade in the Madras Presidency Madras, Government Press, 1934, Appendix 2, pp.83-84. Unfortunately we do not know whether this refers to gross or net area irrigated.
- 4/ Transplanting is not inevitably women's work, though it is largely so. See F.Bray, "Recent changes in padi farming in Kelantan, Malaysia", Report for the Royal Academy, the British Society and the East Asia History of Science Trust, September 1977, for an example of male labour in transplanting.
- 5/ We have focussed on women agricultural labourers rather than women cultivators (including family labour). There is, if anything, a negative correlation between the presence of women cultivators in the female rural population and the proportion of gross cropped foodgrain area under paddy.
- 6/ Ibid., pp.17-21.
- 7/ I am grateful to N.Krishnaji for pointing this out. He suggested an alternative index, viz. the number of women agricultural labourers per hectare of gross cropped area, which will be tried in further analysis.
- 8/ Kerala, Orissa and Assam were excluded from the regression since I did not have access to district-wise irrigation data.
- 9/ The low incidence of women agricultural labourers despite widespread transplanting in Assam and West Bengal remains somewhat puzzling. The residuals of the estimated from the actuals show that the regressor tends to overestimate the proportion of women agricultural labourers by an average of 1 percentage point in almost all districts of West Bengal. This indicate some additional factors at work in West Bengal, depressing the proportion of women agricultural labourers. One such may be the tendency to use seasonal migrant labourers for peak seasons in at least some districts.

- 10/ An exception is the work of Mukul Mukhopadhyay. See "Impact of modernisation on women's occupations: a case study of the rice husking industry of Bengal", Indian Economic and Social History Review, Vol.XX, No.1, January-March 1983, pp.27-46.
- 11/ See Report on the Marketing of Rice in India and Burma, 1941, Rice Economy of India, 1961. Three other reports to which I have not had direct access are Report on the Marketing of rice in India, 1954, Report of the Rice Milling Committee, 1955, and Rice Economy of India, 1973.
- 12/ According to him, while part of the decline was due to a change in occupational categories, ".....there seems to be reasons to believe that the very laborious occupation of husking rice in pits with enormous pestles, and the almost equally laborious occupation of grinding flour by hand (otherwise than for purely domestic needs) have given place to mechanical methods, which render necessary a very much smaller number of persons...." (Census of India, 1921, VIII, Bombay Presidency, Part I, General Report, p.229).
- 13/ These numbers are obtained from the Census of India, Imperial Tables on occupations for 1911, 1921 and 1931. The data cover British territories, states and agencies for the occupation "rice pounders, huskers, and flour grinders" which was occupational group number 56 in 1911, 65 in 1921 and 71 in 1931. They include "actual workers" plus "partially agriculturists" and "subsidiary occupations" in 1931. Between 1911 and 1921, total workers plus their dependents in this occupational groups declined from 1,575,122 to 1,139,345.
- 14/ While small hullers had an annual output rating of 12,000 maunds, large hullers can process 48,000 maunds. (1 maund = 373.22 Kg). See A S Bhalra, "Choosing technique : handpounding versus machine - milling of rice - an Indian case", Oxford Economic Papers, Vol.17, No.1., March 1965, pp.147-157.
- 15/ The rank correlation coefficient for the eleven states is 0.845, significant at almost the 0.1% level. The rank correlation coefficient between the estimated amount milled and the proportion of employed in the non-household sector of rice processing in 1961 is 0.641, significant at the 5% level.
- 16/ See Mukhopadhyay, op.cit., p.39-40, using the Report of the Rice Milling Committee, 1955 as the source.
- 17/ The rank correlation coefficient for the nine provinces for which data are provided is 0.767, significant at the 5% level.
- 18/ In 1953-54, the unit cost of processing paddy in a rice mill had between half to three-fourths the cost of handpounding in six of the main rice producing states. (Mukhopadhyay, op.cit., p.41, the Report of the Rice Milling Committee, 1955 is the source).
- 19/ Report of the Rice Marketing Committee, 1941, op.cit., p.163.