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Economic Condition and Nutritional Status: A Micro Level Study Among Tribal Population in Rural West Bengal, India

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ABSTRACT

An intensive village study was conducted to determine the income and nutritional status among tribal households in rural West Bengal during 2001. The study population comprised 232 households with cultivation as the principal occupation and distributed over three agrarian class categories viz., owner cultivator, tenant cultivator, and landless labourer. The basic purpose of the study was to examine how different sources of income and occupational groups of tribal households operate in maintaining their nutritional status measured in terms of dietary intake (mainly calorie and protein intake) and BMI of the households. The results showed that owner cultivators were relatively better off in terms of their income and nutritional status as compared to those of tenant cultivators as well as landless labourers. Further, income and nutritional status of landless labourers was relatively better than that of the tenant cultivators. These findings were not in conformity with the findings of some earlier studies, in which it was shown that landless labourers remained always poor compared to cultivators and artisan groups due to their very poor or zero asset base. The present study however, revealed that the availability of work among the landless labourer households was the main criterion of ensuring stable income and in maintaining the better nutritional status of the households. Landless agricultural labourers in this region were able to do so particularly for the development of land-augmenting technology, which created employment throughout the year in the countryside of West Bengal.

INTRODUCTION

It is generally believed that the nutritional status of a person is a function of his/her socio-economic condition. The economic condition of the people belonging to the rural areas is generally influenced by the possession of landholdings, capacity of producing crops, availability of work etc. In fact, socially and economically better off people enjoy high nutritional status. On the other hand, a vast mass of rural people suffers from under-nutrition mainly due to the non-availability of work throughout the year.

It is known that poverty in India has declined considerably. The government of India claims that poverty has declined

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from 56.9 % in 1973-74 to 37.2 % in 1993-94 in rural India (Mehata and Venkatraman, 2000). Several studies have been made in India since the early seventies to study the incidence of poverty of the people in terms of per capita consumer expenditure (PCE) norm or per capita calorie intake (PCI) by the people. There is an active debate in India regarding the use of these norms solely for defining poverty and assessing poverty incidence (Sukhatme, 1982; Vaidyanathan, 2003). It is argued that neither consumption/income nor the nutritional status can exclusively explain the incidence of poverty of the people. It should be combined with some other indicators such as body size, mortality and morbidity, availability and nature of work, which ensure the many facets of healthy living.

Unfortunately, large-scale surveys like the National Sample Survey (NSS) in India do not provide all the information described above and also do not inform much about the very poor people (Bhattacharya *et al*., 1991). In fact, such surveys following the principle of one-shot enquiry very often miss a good part of such information as consumption out of transfers and free collection of the poorer households. It may be mentioned in this context that the tribal population residing in rural India are so poor as not to be able to procure the minimum nourishment for themselves. It was, therefore, felt necessary to study such tribal households through an in-depth enquiry with the help of a questionnaire designed specially for them. The present paper is an outcome of this survey.

Micro-level studies on the rural poor in different parts of India have been carried out by some authors (Deolalikar, 1988; Naidu and Rao, 1994; Roy and Pal, 2000). Most of these studies paid attention to the relationship between nutritional status and socio-economic condition of the people with a view to redefine the poverty norm of the poor households. For example, Deolalikar (1988) has established some positive relationship between labour productivity and nutritional status in terms of weight-for-height among a sample of rural population in South India. Further, Naidu and Rao (1994) examined a link between nutritional status in respect of BMI and different occupational categories using NNMB (National Nutrition Monitoring Bureau) data in the Indian context. Roy and Pal (2000) studied land-labour relationship and the effect on the working efficiency through some anthropometric traits and certain other health variables (e.g., blood pressure) among the Oraon agricultural workers of Jalpaiguri district of West Bengal. However, there is still a wide gap between the methodologies adopted and the variables chosen in measuring nutritional status, in respect of dietary intake, BMI and important household characteristics vis-à-vis the economic condition of the people.

The objective of the present paper is to examine whether any definitive relationship between some important economic variables, such as landholding, occupation and income, and nutritional status could be established by an in-depth study in a tribal belt of rural West Bengal, India.

MATERIALS AND METHODS

Data for the present study were collected from two tribal populations namely, the Kora and the Mahali of Jhargram subdivision of Midnapore District in West Bengal, India. The villages of both tribal populations are situated within 30 kilometers distance from Jhargram subdivision of Midnapore district of West Bengal. Given the purpose of the study, a complete enumeration of both the populations consisting of 232 households was done. Out of 232 households, it was possible to collect data on anthropometry and dietary intake from 221 house-

holds only as the remaining 11 households were not available during the study.

Anthropometric data (height and weight) were obtained from the adult members of the households following the method suggested by Weiner and Lourie (1981). According to this method, the body weight (in Kg.) was taken on a spring weighing machine, asking the subject to stand on it with an erect posture with light apparel. Height is measured by the vertical distance from the floor to the vertex by the anthropometer which was placed at the back and between the heels of the subject, taking care that it is kept absolutely vertical. Reading in centimeter and its fraction was then recorded. Data on height and weight were taken from 310 adult individuals from both sexes depending on their willingness and availability. Body mass index (BMI) of 16 individuals out of the 310 were not included here due to non-availability of data on their socio-economic condition. Based on the data of food intake and anthropometric measurements collected from the same household, BMI was computed to gauge the association between BMI and dietary intake at the household level. Nutritional status of an adult individual was assessed directly through BMI [BMI= Weight (kg) / height (m^2)] and indirectly though calorie and protein consumption. Consumption of both calories and protein was assessed in terms of per consumption unit.

BMI <18.50 has been used as the cut-off point for assessment of CED (chronic energy deficiency) in the present population as proposed by James, Ferro-Luzzi & Waterloo (1988), Ferro-Luzzi *et al*. (1992), Naidu and Rao (1994) and WHO (2000).

As to the question of economic conditions of the households, annual earnings from both principal and secondary occupations were considered. An interesting feature of this survey was to elicit people's responses to questions on their own perceptions of minimum subsistence level of income, without which they would not be able to have a minimum of two square meals a day. It was, in this context, revealed that a household with a per capita monthly income of Rs 280.00 - 300.00 ((US $ 1 = Rs 46.15 at the time survey) was considered by the people themselves as a minimum subsistence level of income. Taking into consideration the income of each household, it was estimated that the median value of income of the study population was Rs 254.00. In order to classify the people lying below or above the subsistence level, the cut-off point was Rs 254.00. Thus, those whose per capita monthly income was less than Rs 254.00 were considered as poor or low-income group. Considering the range of variation of per capita income, the rest of the population under study were considered as belonging to the 'not-so poor category' or moderate category. It may be noted in this context that the official figure estimated for such a poverty line is around Rs 350.00 for West Bengal (Mehata, 2004). Apart from classifying the people under 'poor (low)' and 'non-poor (moderate)' categories, an attempt was made to classify the people in terms of land-ownership distribution viz., owner cultivators, tenant cultivators and landless labourers.

Owner cultivators are those who cultivate their own land and have full control over the land in terms of inheritance, sale or lease. Tenant cultivators are those who lease land from owner cultivators for cultivation and pay a share of produced crops or money to the landowner and obviously do not have control over this land. Similarly, landless labourers do not possess own land and earn their livelihood through wage and other earnings. Data on daily dietary intake from people belonging to these three categories of households were collected through direct measure of each raw food item for one day before cooking using a Salter pan type balance. Sharing of food with guests (if any) or any absentee family members during the day of investigation was also properly record-

ed. The quantum of intakes of such items as oils and sugar, was estimated from their weekly/monthly consumption figures. It may be mentioned that no correction was made for the loss or wastage of food/ nutrients on account of cooking. Thus, there is a possibility of overestimation with regard to dietary intake.

The nutritive values as well as the edible portions were estimated from the food composition tables, prepared by the ICMR (Gopalan, Rama Sastri & Balasubramaniam, 2000). In some cases, food composition tables prepared by Charlotte (1953) and FAO (1954) were also used to estimate some items of food (such as molluscs and crab), which were not available in the ICMR food composition tables. It was noted that drinking of *Handia* (home brewed rice beer) seems to be a common practice, especially among adults of both sexes of the study tribal population. Thus, it was important to compute the nutritive values of *Handia* from the table of nutritive values of alcoholic beverages prepared by Roy (1978).

The calorie need of an individual is taken as the basis of estimation of consumption unit. The consumption unit (c.u.) per household was calculated by the method suggested by Bhattacharya *et al*. (1981) and Bhattacharya, Mandal & Ghosh (1994). An example is illustrated in Table 1 for a household of 7 members having the following age and sex distribution: male 60, 25, 12 and female 55, 21, 18 and 11 years. Besides age and sex of the household members, the physiological status like stage of pregnancy or lactation of the woman of in the household was also taken into consideration.

RESULTS AND DISCUSSION

Since the primary occupation of the present population is cultivation, a close look at the distribution of households by types of landholding was necessary (Table 2). Table 2 shows that 29 (12.50%) households were landless labourers who earned their livelihood mainly through daily wage earning from cultivation and basket making. About 65% of the households of both owner and tenant cultivators possess not more than 0.83 acre of cultivable land, and only about 2% of the households possess 3.4 and more acres of land. The majority of the tenant cultivators belonged to the small and marginal landholding groups. The owner cultivators owned relatively bigger size holdings. Thus, predominance

Table 1. Consumption unit of household by age and sex

Individual	*Age (years)*	*Calories according to ICMR recommended allowance*[1]	*Consumption unit*[2]
Male	60	2875	2875/2875= 1
Male	25	2875	2875/2875= 1
Male	12	2190	2190/2875= 0.76
Female	55	2225	2225/2875= 0.77
Female	21	2225	2225/2875= 0.77
Female	18	2060	2060/2875= 0.72
Female	11	1970	1970/2875 =0.68

[1]Gopalan *et al*. (2000)
[2]Total household consumption unit = 5.70

Table 2. Distribution of landholdings by agrarian categories

Land holding (acres)	*Agrarian categories*			
	Owner	*Tenant*	*Landless*	*Total*
0	0.00	0.00	29	29 (12.50)
Up to 0.83	104 (63.41)	27 (69.23)	0	131 (56.47)
0.84 - 1.66	38 (23.17)	9 (23.08)	0	47 (20.26)
1.67 - 2.59	12 (7.32)	2 (5.53)	0	14 (6.03)
2.60 - 3.33	6 (3.66)	0.00	0	6 (2.59)
3.34 and above	4 (2.44)	1(2.56)	0	5 (2.15)
All	164 (100.00)	39(100.00)	29	232 (100.00)

Figures in parenthesis indicate percentage of total households

of small and marginal cultivating households is a phenomenon of the region under study.

Data presented in Table 3 shows that the mean consumption of calories and protein of 232 households was 2917.76 ± 625.93 kcal and 59.78 ± 15.01g, respectively. The average BMI was found to be 20.61 ± 2.42 kg/m^2 and no significant difference was seen between male (20.81 ± 2.31 kg/m^2) and female (20.42 ± 2.51 kg/m^2) in respect of their BMI ($t=1.42$; $P>0.05$). This suggests somewhat similar patterns of distribution of BMI in both the sexes. It was also observed that only 19.4% of adult individuals were suffering from chronic energy deficiency (CED - BMI<18.5), while the majority of the population possess BMI above this level Thus, the region under study may be regarded as peasant-dominated and yet a moderately better off region in terms of BMI.

Given the landownership background and the nutritional status of the tribal people of the region, a relative efficiency of two types of cultivators may be judged in terms of productivity of land (Table 4). It was observed that the average yield per acre of rice was higher among the owner cultivating farmers compared to the tenant cultivating farmers. This may imply that tenants give less effort in increasing productivity of land particularly for *amon* rice. However, in spite of low productivity of land, their per capita return from cultivation was a little higher than that of owner cultivators. Apparently, the average lower family size of the tenant cultivators has been helpful in keeping their livelihood better than owner cultivators.

Table 5 shows that a higher per capita income and higher calorie and protein intake were enjoyed by the owner cultivators compared to those of tenant cultivators and landless agricultural labourers. This suggests that owner cultivators are better off not only in terms of income but also in respect to dietary intake, while tenant cultivators as well as landless labourers are both lagging behind. However, among the tenant and landless categories, it was interesting to find that the calorie and protein intake and also the average per capita income were higher among the landless than the tenant cultivators. Although tenants are more secured in respect to their employment throughout the year compared to the labourers, very often tenants are not permitted to do work elsewhere other than with their employers, resulting thereby in the sole dependence of their income on lease cultivation. The landless labourers, on the other hand,

Table 3. Descriptive statistics of protein and calorie intake, and body mass index (BMI) for the entire sample

Calories (kcal)	*Protein (g)*	*BMI*					
		Mean±SD					
Mean±SD (232)[1]	*Mean±SD (232)*[1]	*Male (154)*[2]	*Female (156)*[2]	*Both (310)*[2]	*% <18.5 (60)*[2]	*% ≥18.5 (250)*[2]	*All (310)*[2]
2917.76 ± 625.93	59.78±15.01	20.81±2.31	20.42±2.51	20.61±2.42	19.35	80.65	100.00

[1]Number of households
[2]Number of individuals
t-value of BMI between male and female subjects: 1.42; P>0.05

Table 4. Characteristics of households by types of tenure

Types of tenure	*No. of households*	*AHHS*[1]	*Total cultivated land (acre)*			*Avg.yield of rice production per acre (kg)*			*PCRFC2 (Rs)*
			Amon	*Boro*	*Both*	*Amon*	*Boro*	*Both*	
Owner	164	4.97	155.37	34.68	190.05	1485.75	459.99	1285.59	37.31
Tenant	39	4.56	32.66	12.67	45.13	1443.15	582.18	1205.31	41.52
All	203	4.89	186.36	47.15	235.18	1478.94	492.12	1270.17	38.12

Note: Out of 232 households, 29 of them are found to be landless and excluded in the above-mentioned analysis

[1]Average household size
[2]Per capita return from cultivation

Table 5. Households by sources of income, dietary intake and types of tenure

Types of tenure	*No. of house-holds*	*Average PCRFC[1] (Rs)*	*Average PCIFW[2] (Rs)*	*Average PCIFOS[3] (Rs)*	*Average PCIFAS[4] (Rs)*	*Dietary intake*	
						Calorie (kcal) Mean±SD	*Protein (g) Mean±SD*
Owner	155	38.78	164.71	200.87	404.36	2972.17±954.26	60.37±20.91
Tenant	38	41.43	135.14	163.59	350.16	2767.91±667.02	57.57±15.61
Landless	28	0.00	158.93	198.65	357.58	2836.27±624.30	60.72±21.48
All	221	34.33	160.61	194.18	389.12	2919.83±875.73	59.94±20.12

Note: Out of 232 households, 11 households were not available during collection of anthropometric and dietary data

[1]Per capita return from cultivation
[2]Per capita income from wage
[3]Per capita income from other sources
[4]Per capita income from all sources

Table 6. Sources of income, BMI, dietary intake and types of tenure

Types of Tenure	*Average PCRFC[1] (Rs)*	*Average PCIFW[2] (Rs)*	*Average PCIFOS[3] (Rs)*	*Average PCIFAS[4] (Rs)*	*BMI*	
					No. of individuals	*Mean±SD*
Owner	42.98	147.58	161.60	352.34	210	20.93±2.54
Tenant	36.90	97.05	137.64	271.35	47	19.88±1.93
Landless	0.00	153.68	146.66	301.21	37	20.14±2.04
All	35.60	140.23	155.89	332.95	294	20.66±2.43

[1]Per capita return from cultivation
[2]Per capita income from wage
[3]Per capita income from other sources
[4]Per capita income from all sources

can accept any kind of job and they do this as a necessity to maintain a minimum level of living. In fact, wide-spread use of new agricultural technology in different parts of West Bengal has been helpful in providing jobs to the landless labourers throughout the year. Thus, it is observed that their monthly income was higher than tenants and this was reflected by their dietary intakes as well.

The above conjecture is also supported by the data on BMI presented in Table 6. The table shows the higher value of BMI and the higher average per capita income of owner cultivators compared to the tenants and landless labourers. Further, the BMI and the average per capita income was found to be a little higher for the landless labourers than those of the tenants. Thus, the results based on BMI specification, suggest that owner cultivators were better off than the tenants and landless labourers. However, the landless labourers' condition with respect to BMI was better than that of the tenant cultivators. These findings are, however, not in conformity with the findings reported by Naidu and Rao (1994). They have shown, on the contrary, a lower BMI among the landless agricultural group as compared to other higher income groups namely, owner cultivators and artisans.

In order to find out the effect of overall income on nutritional variables, the results presented in Table 7 show that intensity of calorie and protein intake is positively related with the economic conditions of the households. As expected, the moderate income group suffers less from protein and calorie deficiency compared to the low income group. Many earlier authors have observed similar situations in different parts of India (Thimmaymma *et al*., 1982; Khongsdier, 1995; Bharati and Basu, 1988). Considering separately the relationship between BMI and differential income for different socio-economic groups, a positive association between these two was well established (Delpeuch *et al*., 1994; de Vancellos, 1994; Kennedy and Gracia, 1994; Reddy, 1998 and Khongsdier, 2002). However, the present study not only confirmed the direct positive relation between BMI and income but also between income and nutritional variables (Table 8).

In order to bring out the above relationship more clearly, a correlation test was carried out between the variables under study. The result presented in Table 9 showed that all the variables were significant and positively correlated with each other. It was observed that the correlation coefficient between consumption of calorie and protein was relatively high ($r = 0.86$) compared to other variables. This suggests a complementary relationship between calorie and protein intake, which forms a good basis in determining the nutritional status of the households. Further, it was observed that household income was positively and significantly correlated with all the variables under study. This suggests that household income has a direct bearing in determining the nutritional status of the household as well as the BMI of household members in this study population.

CONCLUDING REMARKS

The study addresses the nutritional status of some tribal households in rural West Bengal. The nutritional status of the households was viewed in terms of dietary intake (mainly calorie and protein intake) and BMI. Considering household income as an important explanatory variable in determining the nutritional status of the household, the study examined the relationship between occupational groups of tribal households and their nutritional status.

The owner cultivators seem to be relatively well off in terms of their nutritional status as compared to those of tenant cultivators as well as landless labourers. The nutritional status of the landless

Table 7. Households with calorie and protein intake by economic condition

Dietary intake			*Economic condition*		
			Low	*Moderate*	*All*
Calorie	<RDA*	N (%)	65 (59.63)	55 (49.11)	120 (100.00)
	≥RDA	N (%)	44 (40.37)	57 (50.89)	101(100.00)
	All	N (%)	109 (100.00)	112 (100.00)	221(100.00)
	Mean±SD		2763.86 ± 750.21	3071.62 ± 961.89	2919.83 ± 875.73
Protein	<RDA	N (%)	69 (63.30)	58 (51.79)	127 (100.00)
	≥RDA	N (%)	40 (36.70)	54 (48.21)	94 (100.00)
	All	N (%)	109 (100.00)	112 (100.00)	221 (100.00)
	Mean ± SD		55.86 ± 17.31	63.91± 21.89	59.94 ± 20.12

$F_{(2, 219)}$ between calorie intake and economic condition: 7.01; P<0.01
$F_{(2, 219)}$ between protein intake and economic condition: 9.18; P<0.01
* Recommended Dietary Allowances

Table 8. Protein and calorie intake and BMI by economic condition

Economi condition		*Calorie (kcal)*	*Protein (g)*	*BMI*
	No	*Mean±SD*	*Mean±SD*	*Mean±SD*
Low	62	2736.99±605.53	54.75±14.51	19.94±1.85
Moderate	102	3170.66±1043.84	66.35±23.54	21.16±2.43
All	164	3006.71±925.67	61.96±21.31	20.70±2.30
$F_{(1, 162)}$		8.87; P<0.01	12.22; P<0.01	11.41; P<0.01

Table 9. Correlation coefficients of BMI, calorie and protein intake and economic condition

	BMI	*Calorie*	*Protein*	*Economic condition*
BMI	1.000	0.328*	0.337*	0.257*
Calorie	0.328*	1.000	0.861*	0.228*
Protein	0.337*	0.861*	1.000	0.265*
Economic condition	0.257*	0.228*	0.265*	1.000

*Correlation coefficients; P<0.01

labourers' households was relatively better than that of the tenant cultivators. It is sometimes believed that the nutritional status of landless labourers is relatively weak compared to the cultivators and artisan groups due to their low economic status. The present study, however, does not support this view unequivocally. In fact, this study revealed that availability of work was an important criterion in maintaining good nutritional status of e households, as shown by the condition of the landless agricultural labourers in this region, compared to the tenant cultivators.

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