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Income of agricultural households in Cooch Behar district of West Bengal in India

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Abstract
The Study was conducted in Cooch Behar district of West Bengal. Primary data were collected from 50 sample farmers (agricultural households) which were selected by the technique of Simple Random Sampling Without Replacement from 348 agricultural households belonging to Cooch Behar-II block of the district. Crop wise net return was estimated from gross return and Cost C. Tabular method of analysis was extensively used in this study. A multiple regression analysis with explanatory variables like size of agricultural holding, cropped area under vegetables, cropping intensity, income earned from non-farm sources, crop diversification and per hectare cost of cultivation was also attempted in this study. Household income was considered dependent variable in the analysis. The results indicated a positive relationship between average size of earners and average size of family. Household income was found to come from different sources, e.g. crop production, livestock enterprises, non-farm occupations and investments. In crop production the highest net return per hectare was accrued from banana. The other non- food grain crops generating net returns per hectare in descending order were garlic, ridge gourd, bitter gourd, water melon, wax gourd, cucumber, potato, radish, pointed gourd, chilli, beat and jute. Among the food grain crops the highest net return was accrued from lentil.. Among fruit crops banana yielded the highest net return. Average income per household from crop production was found to increase across the larger size classes of farms. Household income earned from dairy was found to decline across larger size classes. As a whole, income earned from this source accounted for 24.25 percent of the total household income. Percentage contribution of income earned from poultry farming and goat rearing were observed to be low. Income earned from crop production was found to influence the distribution of farm income among the households in different size classes. As a whole farm income generated 87.86 percent income of the total household income. Non- farm income accounted for 12.14 percent of the household income with wide differences among the size classes. Similarly wide disparities in average income per earner and per capita income were observed in different size classes. Among the factors taken for multiple regression analysis the size of agricultural holding, cropped area under vegetables and non- farm income were found to significantly influence the level of household income.

Keywords: Cost C, descending order, farm income. non-farm income, per capita income

Introduction
Majority of the people of our country belong to rural areas where agricultural activities dominate the economy. According to World Bank collection of development indicators (2019) rural population in India accounts for 65.53 percent of its total population. Most of the rural households are agricultural households. According to 70th Round Survey of National Sample Survey Office agricultural households account for 57.8 percent of the total rural household in India. Level of income of agricultural households is a major concern of academicians, planners, researchers, etc. To study socio-economic status of people it is necessary to have information on annual income of them. The study on income of agricultural households in India has got momentum in the perspective of an objective of the Government to double income of farmers in 2022. Many information of people are implicit in their level of income. Income of people indirectly expresses a number of information about them .So many studies on income of various categories of people in different countries have been conducted at different points in time. This study was carried out with a view to finding level of income of different size categories of agricultural households.

Materials and Methods
The study was conducted in Cooch Behar district of West Bengal in India. For the purpose of the study two villages namely Sajerpar and Madhya Kalarayer Kutthi from Cooch Behar-II Block of the district were selected purposively.

The study was based on primary data collected by Survey Method from agricultural households. The agricultural households belonging to the villages were completely enumerated in respect of operational holding. From 348 agricultural households a sample of 50 (fifty) agricultural households were selected by the technique of Simple Random Sampling Without Replacement (SRSWOR). Data were collected from sample agricultural households on land holding, allocation of land to different crop enterprises, use of various types of inputs in different crops, prices of inputs, outputs, etc. information was also collected on livestock enterprises. The concept of Cost C was used while estimating net income from farm enterprises. Data on income were also collected from other sources like non-farm occupations and investments. Income of the agricultural households in different size classes was estimated from various sources in this study. The reference period of the study was 2010-11 agricultural year. Tabular method of analysis was extensively used in the study. Statistical tool like Multiple Regression Analysis was employed taking some variables like size of agricultural holding, cropped area under vegetables, cropping intensity, income from non-farm sources, crop diversification, per hectare cost of cultivation as independent ones and household income as dependent variable. Multiple linear regression model is given in the following form :

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots + \beta_k X_k + e$$

Where α is intercept (i.e. value of Y when all X are zero) and β_i (i = 1,2, ... K), the partial regression coefficient associated with the independent variables X_i, represents the amount of changes in Y for each unit change in X_i and e is error due to the fact that the independent X_i do not completely explain Y.

Results and Discussion

Table 1: Distribution of agricultural households and operational holding to different size classes of farms

Size class	Number of agricultural households	Percentage to total households	Area of operational holding (ha)	Average size of operational holding (ha)
Marginal (<1 ha)	36	72	20.60 (42.46%)	0.57
Small (1-2 ha)	10	20	12.06 (24.86%)	1.20
Semi medium (2-4 ha)	2	4	6.00 (12.34%)	3.00
Medium (4-10 ha)	2	4	9.87 (20.34%)	4.93
Large (> 10 ha)	___	___	_____	_____
Combined	50	100	48.53 (100%)	0.97

Distribution of agricultural households and operational holding to different size classes in the area under study is presented in table 1. Agricultural households were found to be distributed in marginal, small, semi medium, and medium size classes of farms. It was noted that agricultural households belonging to marginal size class accounted for 72% of the total agricultural households. The corresponding figures in terms of percentage were 20, 4 and 4 for small, semi-medium and medium size classes of agricultural household respectively. No household was found to exist in the large size class of farm. It was found that operational holding under marginal and small size class accounted for 42.46% and 24.86% respectively. The semi medium and medium size classes of households were observed to have operational holding to the extent of 12.34% and 20.34% respectively. Average size of operational holding irrespective of size classes was noted to be 0.97 hectare.

Table 2: Distribution of earning people to various occupations

Size class Col.1	Crop production Col.2	Others				Total Col.7	% of earners to total family members Col.8	Average number of earners Col.9
		Wage labour Col.3	Ricksha-w pulling Col.4	Small business Col.5	Service Col.6			
Marginal	71 (80.68)	11 (12.50)	3 (3.41)	1 (1.14)	2 (2.27)	88 (100)	44.22 (199)	2.44 (5.52)
Small	20 (80.00)	2 (8.00)	0 (0.00)	1 (4.00)	2 (8.00)	25 (100)	47.16 (53)	2.50 (5.30)
Semi medium	2 (28.57)	0 (0.00)	0 (0.00)	3 (42.86)	2 (28.57)	7 (100)	43.75 (16)	3.50 (8)
Medium	2 (28.57)	0 (0.00)	0 (0.00)	2 (28.57)	3 (42.86)	7 (10)	43.75 (16)	3.50 (8)
Combined	95 (74.80)	13 (10.24)	3 (2.36)	7 (5.51)	9 (7.09)	127 (100)	44.71 (284)	2.54 (5.68)

N.B.: i) Figures in parentheses under columns 2, 3, 4, 5 and 6 indicate percentages to total earning members of column 7.
ii) Figure in parentheses under columns 8 and 9 indicate percentages to total family members and average size of family respectively in different size classes.

The table 2 shows distribution of earning members to various occupations in different size classes of farms. Crop production, wage earning, rickshaw pulling, small business and service were found to be major occupations in the area under study. In case of marginal and small size classes of farms it was observed that majority of the earning members were absorbed in crop production but this was not true in case of the earning people under semi- medium and medium size classes. Majority of the earning people in these size classes were found to be engaged in small business and service. Percentage of earning people to household members was highest in small size class of farm. A positive relationship was found between number of total household members and average size of number of earning people and size of the family. Irrespective of size classes it was observed that about 75% of the earning people were engaged in crop production. Wage earners were found to account for 10%. The earning people engaged in rickshaw pulling, small business and service were noted to account for 2%, 6% and 7% respectively. No one person in the household of any size class was fully engaged in rearing livestock. Household members engaged in primary occupations were reported to have performed this job. Rearing of livestock was a secondary occupation of the household members.

Table 3: Operational land under different crops grown by agricultural households in different size classes.

Size class	Number of agricultural households	Operational holding (ha)	Area under food gain crops (ha)					Area under non-food grain (ha)						
			Aman paddy	Boro paddy	Wheat	Lentil	Total food grain	Mustard	Potato	Chilli	Beat	Radish	Cucumber	Pointed gourd
Col. 1	**Col. 2**	**Col. 3**	**Col. 4**	**Col. 5**	**Col. 6**	**Col. 7**	**Col. 8**	**Col. 9**	**Col. 10**	**Col. 11**	**Col. 12**	**Col. 13**	**Col. 14**	**Col. 15**
Marginal (< 1 ha)	36.00 (72.00)	20.60 (42.45)	13.97 (33.31)	2.13 (5.08)	1.03 (2.45)	0.34 (0.81)	17.47 (41.65)	0.86 (2.05	11.64 (27.75)	0.78 (1.86)	0.06 (0.14)	0.09 (0.21)	0.31 (0.74)	0.03 (0.07)
Small (1-2 ha)	10.00 (20.00)	12.06 (24.85)	8.91 (40.17)	1.47 (6.63)	0.80 (3.61)	-	11.18 (50.41)	0.13 (0.59)	4.28 (19.29)	0.13 (0.59)	-	-	-	0.13 (0.59)
Semi-medium (2-4 ha)	2.00 (4.00)	6.00 (12.36)	5.32 (33.02)	-	-	-	5.32 (33.02)	0.13 (0.81)	5.20 (32.28)	0.13 (0.81)	-	-	-	-
Medium (4-10 ha)	2.00 (4.00)	9.87 (20.34)	9.20 (33.08)	0.13 (0.47)	-	0.13 (0.47)	9.46 (34.02)	-	9.30 (33.44)	0.13 (0.47)	-	-	0.13 (0.47)	-
Combined	50.00 (100.00)	48.53 (100.00)	37.40 (34.62)	3.73 (3.45)	1.83 (1.69)	0.47 (0.44)	43.43 (40.20)	1.12 (1.04)	30.42 (28.16)	1.17 (1.08)	0.06 (0.06)	0.09 (0.08)	0.44 (0.41)	0.16 (0.15)
Marginal (< 1 ha)	0.09 (0.21)	0.03 (0.07)	0.03 (0.07)	0.03 (0.07)	0.03 (0.07)	10.30 (24.56)	0.19 (0.45)	24.47 (58.35)	41.94 (100.00)	203.59				
Small (1-2 ha)	-	-	-	0.40 (1.80)	-	5.93 (26.73)	-	11.00 (49.59)	22.18 (100.00)	183.91				
Semi-medium (2-4 ha)	-	-	-	-	0.53 (3.29)	4.80 (29.79)	-	10.79 (66.98)	16.11 (100.00)	268.50				
Medium (4-10 ha)	-	-	-	-	-	8.79 (31.60)	-	18.35 (65.98)	27.81 (100.00)	281.76				
Combined	0.09 (0.08)	0.03 (0.03)	0.03 (0.03)	0.43 (0.39)	0.56 (0.52)	29.82 (27.60)	0.19 (0.17)	64.61 (59.80)	108.04 (100.00)	222.63				

N.B.: i) Figure in parenthesis in col. 2 & 3 indicate percentage to total of all size classes.
ii) Figure in parenthesis in col. 4, 5....., col. 23 in each individual size class indicates percentage to gross cropped area.

Size class-wise operational holding and its allocation to various crop enterprises are displayed in table 3. Land allocated to aman paddy was noted to account for the highest percentage of the gross cropped area in each of the size classes. In this respect the small size class of agricultural households was found to occupy the highest position. In other size classes of agricultural households percentage allocation of land was more or less same. Irrespective of size classes, i.e. as a whole land allocated to aman paddy accounted for 34.62 percent of the total gross cropped area. Land allocated to food-grain crops was also observed to be highest in small size class of agricultural households. This was found to be lowest in semi-medium size class though a wide difference was not observed in the percentage allocations of land to food grain crops between semi-medium and medium size classes of agricultural households (farms). As a whole, land under food grain crops was noted to account for 40.20 percent of the total gross cropped area (GCA). Among the non-food grain crops potato was found to occupy the highest position in all size classes of farms excepting small size class in respect of percentage allocation of land to non-food grain crops. Land under potato was noted to be highest in medium size class of farm. This was found to be lowest in small size class of farms. As a whole, land under this crop accounted for 28.16 percent of the total GCA. Another important crop was observed to be jute which occupied the highest position among non-food grain crops in respect of allocation of land in small size class of farms. As a whole, land under this crop accounted for 27.60 percent of the total GCA. So many non-food grain crops were found to be grown by marginal size class of farms. Individually these crops excepting mustard and chilli were observed to account for a negligible percentage of GCA. In small size class a similar picture was noted in case of other non-food grain crops excepting garlic which accounted for 1.80% of GCA. In semi-medium size class of farms land allocated to water melon was found to account for 3.29 percent of GCA. Land allocated to non-food grain crops was found to be highest in semi-medium size class and it was lowest in marginal size class of farms. The crop enterprises which were undertaken by each of the size classes of farms are aman paddy, potato, chilli and jute.

Table 4: Net return (in Rupees) earned from various crops grown by agricultural households in different size classes

Size Class	Food grain crops					Non-food crops						
	Aman paddy	Boro paddy	Wheat	Lentil	Total food grain	Mustard	Potato	Chilli	Beat	Radish	Cucumber	Pointed gourd
Marginal	31311 (2241)	10378 (4872)	3181 (3088)	7870 (23147)	52740 (3019)	4948 (5753)	427537 (36730)	8058 (10331)	480 (8006)	2936 (32622)	15368 (49574)	469 (15635)
Small	18230 (2046)	6975 (4745)	4371 (5465)	-	29576 (2645)	895 (6885)	161040 (37626)	950 (7308)	-	-	-	1811 (13928)
Semi-medium	11862 (2230)	-	-	-	11862 (2230)	768 (5908)	115892 (22287)	1021 (7854)	-	-	-	-
Medium	28467 (3095)	920 (7077)	-	2621 (20162)	32017 (3384)	-	336419 (36174)	912 (7015)	-	-	5720 (44000)	-
Combined	89879 (2403)	18273 (4899)	7552 (4127)	10491 (22321)	126195 (2906)	6611 (5903)	1040888 (34217)	10941 (9351)	480 (8006)	2936 (32622)	21088 (47927)	2280 (14250)

Size Class	Non-food crops								
	Bitter gourd	Ridge gourd	Wax gourd	Garlic	Water melon	Jute	Banana	Total non-food grain	All crops
Marginal	5256 (58400)	1983 (66100)	1469 (48967)	5621 (87367)	1770 (59000)	15256 (1481)	33754 (177653)	524905 (21451)	577645 (13773)
Small	-	-	-	4892 (62230)	-	6194 (1045)	-	235782 (21435)	265358 (11964)
Semi-medium	-	-	-	-	27981 (52794)	14986 (3122)	-	160648 (14889)	172510 (10708)
Medium	-	-	-	-	-	11688 (1330)	-	354739 (19332)	386756 (13907)
Combined	5256 (58400)	1983 (66100)	1469 (48967)	70513 (163984)	29751 (53127)	48124 (1614)	33754 (177653)	1276074 (19750)	1402269 (12979)

N.B. : Figure in parenthesis indicates net return per hectare

Crop-wise net return is presented in table 4. Per hectare net returns of aman and boro paddy were estimated to be highest in semi-medium size class. Net returns of these two crops were found to be lowest in small size class of farms. Per hectare net return of wheat was noted to be higher in small size class than in marginal size class of farms. Net return per hectare of food grain crops was found to range from Rs.2230 in semi-medium size class to Rs.3384 in medium size class of farms. Among the food grain crops net return per hectare was estimated to be highest for lentil & this was found to be lowest for aman paddy. Net returns / ha of mustard & wheat were observed to be highest in small size class. In case of mustard the lowest net return/ha were recorded in marginal size class. In case of potato and chilli per hectare net return was estimated to be lowest in semi-medium and medium size classes respectively. Net return/ha of chilli was noted to be highest in marginal size class of farms. Net return / ha of pointed gourd was found to be higher in marginal size class than in small size class. In case of garlic also net return/ha was higher in marginal size class than in small size class of farm. Per ha net return of water melon was recorded to be higher in marginal size-class than in semi-medium size class. Per hectare net return of jute was observed to be highest in semi-medium size class. It was lowest in small size class of farms. Net return of non-food grain crops per ha was noted to range from Rs.14889 in semi-medium size class to Rs.21451 in marginal size class of farms. Among non-food grain crops the net return per hectare was noted to be highest for banana. The other non-food grain crops in descending order of net return per hectare were garlic, ridge gourd, bitter gourd, water melon, wax gourd, cucumber, potato, radish, pointed gourd, chilli, beat, and jute. Per hectare net return of all crops was estimated to be highest in medium size class and the lowest net return was recorded in semi-medium size class of farms.

Table 5: Average income per agricultural household from crop enterprises

Size class	No. of agricultural households	Average size of operational holding (ha)	Average gross cropped area (ha)	Average cost (Rs.)	Average gross return (Rs.)	Average net return (Rs.)
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7
Marginal	36 (199)	0.57	1.16	57434	73480	16046 (2903)
Small	10 (53)	1.20	2.21	103229	129765	26536 (5007)
Semi-medium	2 (16)	3.00	8.05	431148	517403	86255 (10782)
Medium	2 (16)	4.93	13.90	725721	919099	193378 (24172)
Combined	50 (284)	0.97	2.16	108273	136319	28045 (4938)

N.B.: i) Figure in parenthesis under column 2 indicates number of household members in the respective size class.
ii) Figure in parenthesis under column 7 indicates per capita net return (income) from crop enterprises.

Income of agricultural households from crop enterprises is displayed in table 5. Average size of operational holding, average gross cropped area, average cost, average gross return per household are also furnished in this table.

It was found that the size of operational holding and gross cropped area had positive relations with average cost, average gross return and average net return (income). But it was implicit that changes in net return were not proportional to the changes in gross cropped area across the size classes of farms. This was also true in case of two other variables like cost & gross return while comparing with the changes in gross cropped area.

Table 6: Size class wise income per agricultural household from different sources

Size classes (Col.1)	Farm income				Total net farm income (Return) (Col. 6)	Non-farm income (col. 7)	Total income (Co.l 8)	Average income per earner (Col. 9)	Per capita income (Col. 10)
	Net return from Crop production (Col. 2)	Net return from livestock							
		Dairy (Col. 3)	Poultry (Col. 4)	Rearing of Goat (Col. 5)					
Marginal	16046 (49.98)	11683 (36.39)	1468 (4.57)	732 (2.28)	29929 (93.22)	2176 (6.78)	32105 (100.00)	13158	5837
Small	26536 (57.88) (65.37)[1]	13552 (29.56)	1030 (2.24)	560 (1.22)	41678 (90.90) (39.25)[1]	4170 (9.10) (91.69)[1]	45848 (100.00) (42.80)[1]	18339 (39.37)[1]	8651 (48.20)[1]
Semi-medium	86255 (67.52) (225.04)[1]	4500 (3.52)	---------	-------	90755 (71.04) (117.75)[1]	37000 (28.96) (787.29)[1]	127755 (100.00) (178.64)[1]	36501 (99.53)[1]	15969 (84.59)[1]
Medium	193378 (72.62) (124.19)[1]	3000 (1.23)	---------	500 (0.21)	196878 (81.06) (116.93)[1]	46000 (18.94) (24.32)[1]	242878 (100.00) (90.11)[1]	69394 (90.11)[1]	30360 (90.11)[1]
Combined	28045 (59.53)	11422 (24.25)	1263 (2.68)	659 (1.40)	41389 (87.86)	5721 (12.14)	47110 (100.00)	18547	8265

N. B.: i. Figures in parentheses indicate percentages to total net income.
ii.Fingers in parentheses with superscript1 under column 2, 6,7,8,9 and 10 indicate percentage increase in income in a size class in respect of its preceding size class.

The table 6 displays source wise income of the agricultural households. It was observed that the percentage contribution of crop production to total farm income increased with increase in size of the operational holding. As a whole income earned from crop production accounted for 59.53 percent of the total income. Income earned from livestock enterprises was found to be highest in small size class of farms. It was noted to decrease in the subsequent size classes. Percentage contribution of income of these enterprises was found to decrease across the larger size classes. As a whole 28.33 percent of the household income was found to come from livestock enterprises. Percentage contribution of farm enterprises in generating income for the agricultural households was found to be highest in marginal size classes. The lowest percentage of income earned from these sources was recorded in semi- medium size class. As a whole farm income accounted for 87.86 percent of the total income of the households. Percentage of income earned from nonfarm occupations and investments was observed to range from 6.78% to 28.96%. As a whole these sources were observed to generate 12.14% of the total household income. Wide differences in household income were found between a size class and its subsequent one. These were observed in all the sources of income. Income of the agricultural households in medium size class was observed to be 90 percent higher than that of the households in semi- medium size class. Income of the households in this size class was found to be 179 percent higher than that of the households in small size class. Income of the households in this size class was noted to be 43 percent higher than that of the households in marginal size class. As a whole annual average household income was estimated Rs.47110. Wide disparities were also observed in average income per earner and per capita income of the households in different size classes.

Table 7: Result of regression analysis

Variables	Regression coefficient
Household income(Y)	
Size of agricultural holding (X1)	23104.17** (7259.481)
Cropped area under vegetables (X2)	45237.06** (8147.575)
Cropping intensity(X3)	25.150 (16.062)
Income from non-farm sources (X4)	0.954** (0.064)
Crop diversification(X5)	-28049.9 (19335.69)
Per hectare cost of cultivation(X6)	0.001 (0.009)
Value of adjusted R^2	0.963

N.B.: i) ** Significant at the label 0.01.
ii) Figures in parentheses indicate standard errors.

A result of regression analysis is presented in table 7. The result revealed that each of the variables like size of the agricultural holding, cropped area under vegetables and non-farm income had significant positive effect on household income earned from crop production. That is, these variables were important factors in affecting income earned from crop production. The variables like cropping intensity and cost per hectare were found to have positive effect on income from crop production. On the other hand another variable like crop diversification was noted to have a negative effect on income from crop production. In both these cases the effects were not found to be statistically significant ones.

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