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Comprehensive Socioeconomic and Demographic Profile of Farm Households in West Bengal, India

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Authors' contributions

This work was carried out as part of doctoral research work. Author GSS wrote the protocol, performed the statistical analysis, managed the literature searches and wrote the first draft of the manuscript. Authors DSG designed the study and supervised the work. Both authors read and approved the final manuscript.

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ABSTRACT

Socio demographic data of Comprehensive Scheme for study on Cost of cultivation of Principal Crops (CCPC) has been utilized in the present study to identify the distribution of social, economic and demographic characteristics of farm households among different agro climatic zones of West Bengal. The demographic study observed that majority farmers in the study area are small farmers (43.83%) with an average land holding size of 1.5 hectares and have crop production as a major occupation. The households in this study are medium sized families (4 to 6 members). The educational status of households revealed that 80.70% were literates and only 19.30% were illiterates. Majority of them have secondary level of education and minimum of two members earn money for their family. The annual family income of farm households revealed that 50.67% farm households annual income range falls below Rs. 24,000 per annum, and they were considered as living under the poverty line. The average labour force participation rate in West Bengal is 67%. Chi square test revealed that the distribution of these characteristics *viz*. land holding size (χ^2= 32.55; *P* < .01), farmers' education (χ^2= 46.22; *P* < .01), farm household education (χ^2= 58.42; *P* < .01), farmers' age (χ^2 = 39.94; *P* < .01), dependency status (χ^2 = 30.05; *P* < .01), labour force

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participation rate (χ^2 = 17.69; *P* = .05), farmers occupation (χ^2 = 27.63; *P* = .05) and annual net family income (χ^2 = 35.33; *P* = .05) found significant and independent among the different agro-climatic zones of West Bengal. It is concluded that the significant socioeconomic and demographic characteristics are crucial as it gives insight into the influence of capital and education on the household economic status. We recommended that the constructive plans should be formulated to take advantage of these aspects, which could positively alter the economic conditions of the farming community.

Keywords: Farm households; cost of cultivation; agro climatic zones; socioeconomic and demographic characters.

1. INTRODUCTION

Agricultural household is referred as "households engaged in self-employment or own account activities in agriculture such as crop production, raising livestock, fishing and forestry-related activities" [1]. Similarly, a household has been described as ''a site in which intense social and economic interdependencies occur between a group of individuals'' [2]. Household demography is one of the capital and labour saving technology, which determines not only the amount of labour available for farming but also determines the amount of land that can be used during the absence of capital and labour.

A demographic base becomes more relevant to have a comprehensive profile of the farm households [3]. The demographic characteristics like gender, age, family size and dependency ratio, affects the economic conditions and in turn the social conditions (i.e. education) of farm households. The age of the household head is an important factor as it determines whether the household benefits from the experience of older farmers or the risk taking attitude of young farmers [3]. Demographic variables like gender, income and education have a significant relationship with technology adoption and its application [4], age has also shown a significant impact on technology usage behavior [5]. Young farmers have keen interest in collecting agricultural information for increasing their efficiency in farm operations [6], more aware and ready to adopt new technologies for long term benefits [7]. The availability of labour force had shown an influence on different types of farming systems like subsistence farming, transition farming or large scale farming [8]. Economic conditions of the farmers are determined by available capital, occupation and income levels etc. farmers with more wealth cultivate much larger areas and use higher levels of animal traction, resulting in higher levels of household wealth which will alter the status on agricultural practices [9]. The study on demographic profile also helps in understanding the attitude of farmers on the adoption of modern production methods and also use of other non-labour inputs for their proper utilization. The rural household economic activity pointed to the significance of household demography, life course transitions, and local economic structures as factors facilitating household labour reallocation [10]. A Comprehensive Scheme for Study on Cost of Cultivation or Production of Principal Crops (CCPC) in India has collected data on costs and returns of various inputs and their prices of principal crops along with social, economic and demographics of farm households in West Bengal. The accurate information that has been generated through these surveys is of paramount importance. Keeping in view of these social, economic and demographic variables of farm households in West Bengal, the present study was undertaken with an objective to identify demographic and socioeconomic distributional pattern and its variability across different agro-climatic zones of West Bengal in India. In this framework, we hypothesized the null hypothesis (H_0): The socioeconomic and demographic characteristics of the farm households in each category do not differ among agro climatic zones of West Bengal against the alternate hypothesis (H_1): The socioeconomic and demographic characteristics of the farm households in each category differ among agro climatic zones of West Bengal.

2. MATERIALS AND METHODS

The study area (i.e West Bengal) is situated in eastern part of the country between 21º25′24′′ to 27º13′15′′ N latitude and 85º48′20′′ to 89º53′04′′ E longitude covering an area of 88,752 sq. km which is about 2.7 percent of India's total geographical area. Bengal is predominantly an agrarian state and for the attainment of scientific management of regional resources and sustainable agricultural development, the state

has been stratified into six agro-climatic sub-zones *viz.,* hill zone, terai zone, new alluvial zone, old alluvial zone, red lateritic zone and coastal zone. The study excludes hill agro-climatic zone due to non availability of cost of cultivation data.

The data relevant to the present study was collected through three-stage stratified Probability Proportional to Size With Replacement (PPSWR) followed by stratified Without Replacement sampling design under the scheme entitled "Comprehensive Scheme for Studying Cost of Cultivation of Principal Crops in India" launched by the Government of India in 1970-71 and is operated by the Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare [11]. The tehsils in agro climatic zone form the first stage sampling units, either a single village or a cluster of villages in the selected tehsils forms the second stage sampling units and an operational holding or a cultivator within a selected village or a cluster of villages is the third and ultimate stage sampling unit. The operational holdings in the selected villages are listed in ascending order of their size and stratified in to five size classes (operational holding with area less than 1 hectare, between 1-2 hectare, between 2-4 hectare, between 4-6 hectare and above 6 hectare). Then the ultimate stage of sampling units, i.e. the operational holdings or the cultivators growing the selected crop complex is selected by Stratified Random Sampling without Replacement (SRSWOR) from each size classes. Two holdings are selected from each class. If in any village or a cluster of villages, a particular size does not have even two holdings, more holdings are selected from adjacent classes (see [11] for detail procedure). The representative demographic data of 600 farm households having 3704 household members in different agro-climatic zones of West Bengal which had been collected under the above said scheme during the block year 2008-2011 (where one block year consists of a cluster of three years *viz.* 2008-09, 2009-10 and 2010-11) have been utilized for the present study. The frequency analysis was performed to determine the share of demographics of farm households for each agro-climatic zone and comparing these shares to choose a strategy across the farmers in each zone. The chi-square test has also been performed to assess the significance of differences among *k* independent groups (agro-climatic zones). In general, the chi-square test is similar for both two and *k* independent samples or groups.

2.1 The Chi-square Test for *k* Independent Samples

Chi-square test is used when the experimental data consist of frequencies in discrete categories (either nominal or categorical or sometimes ordinal) [12]. To apply the chi-square test, first arrange the frequencies in an *r* x *k* contingency table where the data in each column are the frequencies of each of the *r* categorical responses for each of the *k* different groups or samples. The null hypothesis (H_0) is that *k* samples of frequencies have come from the same population or from identical populations i.e. *k* populations do not differ among themselves and Alternate Hypothesis (H_1) is that *k* populations differ among themselves. This hypothesis may be tested by applying the following equations.

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{k}\frac{\left(n_{ij} - E_{ij}\right)^2}{E_{ij}} \quad (1)$$

or

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{k}\frac{{n_{ij}}^2}{E_{ij}} - N \quad (2)$$

where

n_{ij}= observed number of cases categorized in the i^{th} row of the j^{th} column

$E_{ij} = \frac{R_i C_j}{N}$ number of cases expected in the i^{th} row of the j^{th} column

$R_i = \sum_{i=1}^{r} n_{ij}$= total frequency in the i^{th} row

$C_i = \sum_{j=1}^{c} n_{ij}$ = total frequency in the j^{th} column and the double summation is over all rows and columns of the table (i.e. summation across all cells).

The values of χ^2 obtained by using above equations are distributed asymptotically (as *N* gets large) as χ^2 with $df = (r-1)(k-1)$, where *r* is number of rows and *k* is number of columns in the contingency table. The Chi square test was performed using Statistical Program for the Social Science (SPSS 25.0).

3. RESULTS AND DISCUSSION

This study deals with demographic characteristics of farmers which are associated with socioeconomic conditions of the farm households. Based on the some existing

empirical studies, the variables are selected according to their importance, These included farmers' age, land holding size, household size, level of education, sex ratio, dependency status, labour force participation rate (%), occupation, annual net income of family, as well as other relevant information. The distributions of socioeconomic and demographic characteristics of farm households are helpful in understanding the demographic profile of farm households in different agro-climatic zones of West Bengal.

3.1 Age

Age wise distribution of population helps to know about the proportion of the total labour force, occupational structure, demand pattern and dependency ratios of the population. The findings about the age of the household members including household head (Table 1), revealed that majority of the farm households (65.55%) in West Bengal belongs to the age group of 15-59 years. About 9.77% households were found above the age of 60 years. When comparison is made between the zones, red lateritic zone (68.75%) has maximum number of farm households in the group of 15-59 years followed by new alluvial zone (66.44%), old alluvial zone (64.63%), terai zone (63.56 %) and coastal zone (62.40%). Thus, all the zones have low percentage of children, youth and marginally low percentage of old and substantially high percentage of productive age group (15-59 years). The findings indicate that majority of farm households in the study area were having an average age of 49 years and this may be because of much involvement of young and medium age people in farming operations.

3.2 Land Holding Size

According to land holding size, farmers' are grouped into five categories given in Table 2 [13] *viz.,* marginal (less than 1 ha.), small (1-2 ha.), semi-medium (2-4 ha.), medium (4-10 ha.) and large (more than 10 ha.). From Table 2, it was observed that terai zone has the highest number of semi-medium land holders (45.71%), while small land holders were dominated in coastal zone (56.67%) followed by old alluvial (47.78%), red lateritic (46.67%) and new alluvial (41.76%) zones. Out of 600 surveyed farmers in the study area as a whole, 44% of farmers are small land holders, 27.17% are semi-medium land holders, 24.83% are marginal land holders, four per cent are medium land holders and no farmers had above 10 hectares of land (large land holders).

3.3 Household Size

The demographic factors like family size, sex ratio and dependency may influence the economic activity of the farm family. The farm households in all agro-climatic zones were dominated by medium sized farm households (4-6 persons) with an average household size of six members. The farm households were classified into four categories [14], such as small (1-3 persons), medium (4-6 persons), large (7-9 persons) and very large (more than 10 persons). The distribution of farm households according to the size of household (Table 3) indicated that majority (52.33%) of farm households in the state of West Bengal have 4 to 6 members (medium size) where as 22.50% belongs to large size families, 12.67% belongs to very large sized families and rest 12.50% farm households have 1 to 3 family members (small size).

Table 1. Age distribution of farm household members in each agro-climatic zone of West Bengal

Age (in years)	Terai Zone	New alluvial zone	Old alluvial zone	Red lateritic zone	Coastal zone	West Bengal
0 - 9 (Child)	83 (16.80)	133 (12.86)	146 (13.31)	109 (15.48)	58 (15.47)	529 (14.28)
10 – 15 (Youth)	60 (12.15)	122 (11.80)	110 (10.03)	55 (7.81)	38 (10.13)	385 (10.39)
15 – 59 (Adult)	314 (63.56)	687 (66.44)	709 (64.63)	484 (68.75)	234 (62.40)	2428 (65.55)
60 and above (Old)	37 (7.49)	92 (8.90)	132 (12.03)	56 (7.95)	45 (12.00)	362 (9.77)
Total	494 (100.00)	1034 (100.00)	1097 (100.00)	704 (100.00)	375 (100.00)	3704 (100.00)
χ^2	**39.94****					

*Source: Computed based on cost of cultivation survey data for the block year (2008-11); Figures in parenthesis indicates per cent distribution of farm households; ** represents statistical significance at 1% level*

Table 2. Distribution of farm households according to their land holding size (n=600)

Farm Category	Terai zone	New Alluvial Zone	Old Alluvial Zone	Red Lateritic Zone	Coastal Zone	West Bengal
Marginal (<1 ha.)	15 (21.43)	50 (29.41)	43 (23.89)	24 (20.00)	17 (28.33)	149 (24.83)
Small (1-2 ha.)	17 (24.29)	71 (41.76)	86 (47.78)	56 (46.67)	34 (56.67)	264 (44.00)
Semi-Medium (2- 4 ha.)	32 (45.71)	42 (24.71)	47 (26.67)	35 (29.17)	7 (11.67)	163 (27.17)
Medium (4-10 ha.)	6 (8.57)	7 (4.12)	4 (2.22)	5 (4.17)	2 (3.33)	24 (4.00)
Large (>10 ha.)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Total	70 (100.00)	170 (100.00)	180 (100.00)	120 (100.00)	60 (100.00)	600 (100.00)
χ^2	**32.55****					

*Source: Computed based on cost of cultivation survey data for the block year (2008-11); Figures in parenthesis indicates per cent distribution of farm households; ** represents statistical significance at 1% level*

Table 3. Distribution of farmers according to their household size (n=600)

Family Category	Terai Zone	New Alluvial Zone	Old Alluvial Zone	Red Lateritic Zone	Coastal Zone	West Bengal
Small (1-3 persons)	5 (7.14)	26 (15.29)	18 (10.00)	19 (15.83)	7 (11.67)	75 (12.50)
Medium (4-6 persons)	31 (44.29)	84 (49.41)	102 (56.67)	62 (51.67)	35 (58.33)	314 (52.33)
Large (7-9 persons)	24 (34.29)	38 (22.35)	37 (20.56)	25 (20.83)	11 (18.33)	135 (22.50)
Very Large (>= 10 persons)	10 (14.29)	22 (12.94)	23 (12.78)	14 (11.67)	7 (11.67)	76 (12.67)
Total	70 (100.00)	170 (100.00)	180 (100.00)	120 (100.00)	60 (100.00)	600 (100.00)
χ^2	**12.42**					

Source: Computed based on cost of cultivation survey data for the block year (2008-11)
Figures in parenthesis indicates per cent distribution of farm households

3.4 Education

Education is one of the important factors which indicate the social status and development of the family or a society. It also reflects the economic condition of the family, imparts better knowledge and nature of understanding. The distribution of household head and their household members according to their education level are presented in Tables 4 (a) and 4 (b) respectively. From Table 4 (a), it can be observed that 16.67% of farmers in the state of West Bengal were illiterates and 26.17% farmers were educated upto primary school level. Interestingly about 47% had secondary school level of education and only 10.17% farmers have passed higher secondary school. It is also observed that majority farmers have secondary school level of education in all agro-climatic zones of West Bengal. The poor education status in the study area may be due to poor access to higher secondary school and colleges to the farmers.

The Table 4 (b), provides us the information about the educational status of the total household members (3704) of the surveyed 600 farm households and it can be observed that 19.30% of members in household were illiterates and 27.40% of them are with primary level of education. About 45.76% of farm households have secondary level of education and only 7.53% have post secondary level of education in West Bengal. Similar to household head, the household members also have secondary level of education in all agro-climatic zones of West Bengal.

Table 4 (a). Distribution of education of household head in West Bengal (n=600)

Education category	Terai Zone	New Alluvial Zone	Old Alluvial Zone	Red Lateritic Zone	Coastal Zone	West Bengal
Illiterate	20 (28.57)	35 (20.59)	32 (17.78)	12 (10.00)	1 (1.67)	100 (16.67)
Primary	16 (22.86)	57 (33.53)	39 (21.67)	29 (24.17)	16 (26.67)	157 (26.17)
Secondary	32 (45.71)	69 (40.59)	82 (45.56)	68 (56.67)	31 (51.67)	282 (47.00)
Post Secondary	2 (2.86)	9 (5.29)	27 (15.00)	11 (9.17)	12 (20.00)	61 (10.17)
Total	70 (100.00)	170 (100.00)	180 (100.00)	120 (100.00)	60 (100.00)	600 (100.00)
χ^2	**46.22****					

Source: Computed based on cost of cultivation survey data for the block year (2008-11)
Figures in parenthesis indicates per cent distribution of farm households
*** represents statistical significance at 1% level*

Table 4 (b). Distribution of education of household members in West Bengal

Education Category	Terai Zone	New Alluvial Zone	Old Alluvial Zone	Red Lateritic Zone	Coastal Zone	West Bengal
Illiterate	99 (20.04)	244 (23.60)	213 (19.42)	111 (15.77)	48 (12.80)	715 (19.30)
Primary	162 (32.79)	297 (28.72)	257 (23.43)	200 (28.41)	99 (26.40)	1015 (27.40)
Secondary	215 (43.52)	441 (42.65)	521 (47.49)	341 (48.44)	177 (47.20)	1695 (45.76)
Post Secondary	18 (3.64)	52 (5.03)	106 (9.66)	52 (7.39)	51 (13.60)	279 (7.53)
Total	494 (100.00)	1034 (100.00)	1097 (100.00)	704 (100.00)	375 (100.00)	3704 (100.00)
χ^2	**58.42****					

*Source: Computed based on cost of cultivation survey data for the block year (2008-11); Figures in parenthesis indicates per cent distribution of farm households; ** represents statistical significance at 1% level*

Table 5. Sex ratio of the farm households in each agro-climatic zone of West Bengal

Sex	Terai Zone	New Alluvial Zone	Old Alluvial Zone	Red Lateritic Zone	Coastal Zone	West Bengal
Male	276 (55.87)	543 (52.51)	573 (52.23)	380 (53.98)	194 (51.73)	1966 (53.08)
Female	218 (44.13)	491 (47.49)	524 (47.77)	324 (46.02)	181 (48.27)	1738 (46.92)
Total	494 (100.00)	1034 (100.00)	1097 (100.00)	704 (100.00)	375 (100.00)	3704 (100.00)
Male to Female Ratio	1.27	1.11	1.09	1.17	1.07	1.13
Female to Male Ratio	0.79	0.90	0.91	0.85	0.93	0.88
χ^2	**4.69**					

Source: Computed based on cost of cultivation surveys data for the block year (2008-11)
Figures in parenthesis indicates per cent distribution of farm households

3.5 Sex Ratio

Sex ratio may influence the economic power of family especially women [15]. Both male and female are required in the process of farm operations and other economic activities. Response of results revealed that on an average 53.08% are males and 46.92% are females in total household members (3704) of 600 farm households in the study area (Table 5). The male to female ratio is found to be 1.13 and female to male ratio is 0.88. When comparison has made among the agro-climatic zones, terai zone has highest male to female ratio (1.27) and least female to male ratio (0.79), while coastal zone has least male to female ratio (1.07) and highest female to male ratio (0.93).

3.6 Dependency Status

The socio-economic life of a household is affected by the ratio of dependency i.e. the ratio between non-working populations to working population. More the number of working members in a household have higher possibility to lead a better economic life than those who have less number of working members. The classification of members such as earners, earning dependents (An earning dependent is not able to earn adequate income to maintain himself or herself) and dependents are furnished in the Table 6. Out of total surveyed population, 59.77% are dependents, 18.71% are earning dependents and only 21.52% are earners in the study area. Among the agro-climatic zones, terai zone has highest percentage of dependents (64.57%) and coastal zone has lowest percentage of dependents (56%). Approximately 20% of farm households in each agro-climatic zone earn money for their families.

3.7 Labour Force Participation Rate (LFPR %)

The labour force of population determines the level of socioeconomic development. All the members in a population may not participate in production activities but some of them are actually participate in those activities. This population may be termed as economically active population or labour force or working population. The work force participation indicates the number of eligible labour available in the farm households and is calculated by using the formula (3) [16]. The working population in an enterprise generally includes the persons work for pay or profit, unpaid family workers and the persons who involved in production of economic goods and services.

$$\text{Labour Force Participation Rate } (\%) = \frac{\text{Number of working population}}{\text{Total population}} \text{ X } 100 \quad (3)$$

The results revealed that an average labour force participation rate was 67.30% in West Bengal (Table 7), where highest participation rate was in the coastal zone (78.57%) followed by red lateritic zone (77.33%), old alluvial zone (71.94%), new alluvial zone (59.08%) and lowest in terai zone (54.86%).

3.8 Occupation

Majority of the farmers' occupation in India revolves round the land activities, as a cultivator or agricultural labour. Occupational distribution of farmers in various sectors of activities gave us further insight into the economic wellbeing of the farm households. In West Bengal more than 90% of farmers in all agro-climatic zones have crop production as major occupation except coastal zone farmers (73.33%). While considering the occupation in service and other sectors coastal zone farmers' involvement is much more compared to other zone farmers and negligible per cent of sampled farmers is have non-crop agriculture as a major occupation in all agro-climatic zones (Table 8).

3.9 Annual Net Family Income

Income is another important yardstick used in measuring economic conditions of the farm households. Higher the level of income, better is the living standard of farm households. The details regarding annual net income of the farm households include net income from agriculture and other subsidiary sources, business and services during the study period. The findings revealed that 50.67% of farm households have annual net income of below Rs. 24,000 (Table 9). While 28.17% falls under the income group of Rs. 24000-60000 per annum and 13.67% comes under the income group of Rs. 60000-120000 per annum. Less than 10% of farm households have an annual net income of Rs. 120000 and above in the study area of West Bengal. Among the agro climatic zones, more than 75% of farm households have a net income up to Rs. 60,000 per annum except in coastal zone (63.33%).

Table 6. Distribution of household members according to their dependency status

Category	Terai Zone	New Alluvial Zone	Old Alluvial Zone	Red Lateritic Zone	Coastal Zone	West Bengal
Earners	101 (20.45)	215 (20.79)	226 (20.60)	184 (26.14)	71 (18.93)	797 (21.52)
Earning Dependents	74 (14.98)	169 (16.34)	233 (21.24)	123 (17.47)	94 (25.07)	693 (18.71)
Dependents	319 (64.57)	650 (62.86)	638 (58.16)	397 (56.39)	210 (56.00)	2214 (59.77)
Total	494 (100.00)	1034 (100.00)	1097 (100.00)	704 (100.00)	375 (100.00)	3704 (100.00)
χ^2	**30.05****					

*Source: Computed based on cost of cultivation survey data for the block year (2008-11); Figures in parenthesis indicates per cent distribution of farm households; ** represents statistical significance at 1% level*

Table 7. Labour force participation rate of farm households in West Bengal

Members of Labourers	Terai Zone	New Alluvial Zone	Old Alluvial Zone	Red Lateritic Zone	Coastal Zone	West Bengal
Total Population	494	1034	1097	704	375	3704
Working population	175	384	459	307	165	1490
Dependent population	319	650	638	397	210	2214
LFPR (%)	54.86	59.08	71.94	77.33	78.57	67.30
χ^2	**17.69***					

*Source: Computed based on cost of cultivation survey data for the block year (2008-11); * represents statistical significance at 5% level*

Table 8. Distribution of farm household head according to their occupation in West Bengal (n=600)

Occupation	Terai Zone	New Alluvial Zone	Old Alluvial Zone	Red Lateritic Zone	Coastal Zone	West Bengal
Crop production	69 (98.57)	154 (90.59)	165 (91.67)	109 (90.83)	44 (73.33)	541 (90.17)
Non-crop agriculture	0 (0.00)	0 (0.00)	2 (1.11)	0 (0.00)	1 (1.67)	3 (0.50)
Service and other sectors	1 (1.43)	16 (9.41)	13 (7.22)	11 (9.17)	15 (25.00)	56 (9.33)
Total	70 (100.00)	170 (100.00)	180 (100.00)	120 (100.00)	60 (100.00)	600 (100.00)
χ^2	**27.63***					

*Source: Computed based on cost of cultivation survey data for the block year (2008-11); Figures in parenthesis indicates per cent distribution of farm households; * represents statistical significance at 5% level*

The findings of the study are in conformity with [17] and reported that majority of respondents belonged to middle age group, small farmers and medium family income. Finally, the chi-square test of the socioeconomic and demographic characteristics *viz.,* farmers' age (χ^2 = 39.94; P < .01), land holding size (χ^2=32.55; *P* < .01), household head education (χ^2=46.22; *P* < .01), household members education (χ^2=58.42; *P* < .01), dependency status (χ^2=30.05; *P* < .01), labour force participation rate (χ^2=17.69; P < .05), farmers occupation (χ^2=27.63; P < .05) and annual net family income of farm households (χ^2=35.33; P < .05) were found significant and implying that the distribution of these characteristics are independent among the different agro-climatic zones of West Bengal. According to [18] farmer's attained educational status is expected to influence positive change in their socioeconomic status. The chi-square test of household size (χ^2=12.42) and sex of the farm households (χ^2=4.69) had shown non-significant results.

Table 9. Distribution of farm households based on annual net family income (n=600)

Annual family income (Rs.)	Terai Zone	New Alluvial Zone	Old Alluvial Zone	Red Lateritic Zone	Coastal Zone	West Bengal
Below 24000	42 (60.00)	87 (51.18)	76 (42.22)	76 (63.33)	23 (38.33)	304 (50.67)
24000-60000	15 (21.43)	51 (30.00)	65 (36.11)	23 (19.17)	15 (25.00)	169 (28.17)
60000-120000	7 (10.00)	21 (12.35)	30 (16.67)	10 (8.33)	14 (23.33)	82 (13.67)
120000-240000	6 (8.57)	7 (4.12)	7 (3.89)	9 (7.50)	6 (10.00)	35 (5.83)
Above 240000	0 (0.00)	4 (2.35)	2 (1.11)	2 (1.67)	2 (3.33)	10 (1.67)
Total	70 (100.00)	170 (100.00)	180 (100.00)	120 (100.00)	60 (100.00)	600 (100.00)
χ^2	**35.33***					

*Source: Computed based on cost of cultivation survey data for the block year (2008-11); Figures in parenthesis indicates per cent distribution of farm households; * represents statistical significance at 5% level*

4. CONCLUSION AND RECOMMENDATIONS

The cost of cultivation survey data utilized in the present study is an important source for policy makers, administrators and individual researchers for making decisions at the macro as well as micro level. The anatomy of social and demographic characteristics such as farmers' age, size of holding, family size, sex ratio, dependency ratio, occupational structure, literacy level have an influence on the process of economic development. A wide variety of social and economical outcomes are impacted by demographic processes and distributions in a particular locality or region. Thus, this analysis of the socio-demographic aspects of the farm households in the study is crucial as it gives an insight into the degree of openness and competence for capital and education that exists among the farmers. The results from this demographic study identified that majority of them are small and marginal farmers with productive age groups, having low levels of income and education, high LFPR (%) etc. recommended to promoting educational development relevant and suitable to their local situations and functional needs to equip the productive farmers with most wanted technical knowledge and up gradation of skills to pursue a voluntary work as a way to improve their economic conditions. The significance of independence of these demographic characteristics across the agro-climatic zones lies in its contribution to deal with the regional issues and demands of the farmer's community in a constructive ways by investing time, resources and energy with the support of Government or Co-operatives etc.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Food and Agriculture Organization of the United Nations General Statistics Office. National Gender Profile of Agricultural Households, Report based on the 2006 Rural, Agriculture, and Fishery Census. Ministry of Planning Hanoi, Food and Agriculture Organization; 2010. Available:http://www.fao.org/3/k8499e/k8499e00.pdf

2. Ellis F. Rural Livelihoods and Diversity in Developing Countries. Oxford University Press: Oxford; 2000.
3. Samba Siva G, Gupta DS, Debobrata Ghosh. Multivariate approaches to measure the association among socio-economic and demographic factors of the farm households in West Bengal, India. International Journal of Current Micro-biology and Applied Sciences. 2019;8(6): 1280-290.
   (Accessed 20 July 2019)
   Available:DOI: https://doi.org/10.20546/ijcmas.2019.806.155
4. Pooja J, Rekha. Impact of demographic factors: Technology adoption in agri-culture. SCMS Journal of Indian Manage-ment. 2017;14(3):93-102.
   (Accessed 21 July 2018)
   Available:https://www.scms.edu.in/uploads/journal/articles/article_19.pdf
5. Tarhini A, Hone K, Liu X. Measuring the moderating effect of gender and age on e-learning acceptance in England: A structural Equation Modeling Approach of an extended Technology Acceptance Model. Journal of Educational Computing Research. 2014;51(2):163-84.
   (Accessed 15 July 2017)
   Available:http://dx.doi.org/10.2190/EC.51.2.b
6. Prado P, Camara MA, Figueiredo MA. Evaluating ICT adoption in Rural Brazil: A quantitative analysis of Tele centers as agents of social change. Journal of Community Informatics. 2011;7(1-2).
   (Accessed 25 May 2017)
   Available:https://docs.rwu.edu/cgi/viewcontent.cgi?article=1297&context=fcas_fp
7. Polson RA, Spencer DSC. The technology adoption process in subsistence agri-culture: The case of cassava in south-western Nigeria. Agricultural Systems. 1991;36(1):65-78.
   (Accessed 3 June 2016)
   DOI: 10.1016/0308-521X(91)90108-M.
8. Perz SG, Walker RT, Caldas MM. Beyond population and environment: Household life cycle demography and land use allocation among small farm colonists in the Amazon. Human Ecology. 2006;34(6): 829–49.
   (Accessed 25 May 2017)
   DOI: 10.1007/s10745-006-9039-8.
9. Gray C. What kind of intensification? Agricultural practice, soil fertility and socio economic differentiation in rural Burkina Faso. The Geographical Journal. 2005; 171(1):70-82. Accessed 14 March 2017. DOI: 10.1111/j.1475-4959.2005.00150.x
10. Chen F, Korinek K. Family life course transitions and rural household economy during china's market reform. Demo-graphy. 2010;47(4):963–87.
    (Accessed 4 January 2018)
    DOI: 10.1007/BF03213735
11. Central Statistical Organization. Manual on Cost of Cultivation Surveys in India. Ministry of Agriculture and Farmers Welfare, Government of India: New Delhi; 2008.
    (Accessed 7 October 2015)
    Available:http://mospi.nic.in/sites/default/files/publication_reports/manual_cost_cultivation_surveys23july08_0.pdf
12. Siegel S, Castellan Jr, NJ. Nonparametric statistics for the behavioral sciences. 2nd ed. McGraw-Hill international publications: Singapore; 1989.
13. Directorate of Economics and Statistics. Pocket Book of Agricultural Statistics. Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture. Government of India: New Delhi; 2017.
    (Accessed 10 August 2017)
    Available:http://agricoop.nic.in/sites/default/files/pocketbook_0.pdf
14. Patel T. The family in India: Structure and practice. 1st ed. Sage Publications India Pvt. Ltd: New Delhi; 2005.
15. South SJ. Sex ratios, economic power, and women's roles: A theoretical extension and empirical test. Journal of Marriage and Family. 1988;50(1):19-31.
    (Accessed 24 June 2016)
    DOI: 10.2307/352424
16. Suri RK, Chhabra TN. Managing human resource: Techniques and practices. 1st ed. Pentagon Press: New Delhi; 2009.
17. Tomar A, Bhardwaj N, Verma AP, Sawant MN. Association between socio-demographic profile and extent of use of ICT among farmers. International Journal of Agricultural Science and Research. 2016;6(6):161-166.
    (Accessed 21 November 2019)

Available:http://www.tjprc.org/publishpapers/2-50-1482381906-23.Agri%20 Sci%20-%20IJASR-ASSOCIATION% 20BETWEEN%20SOCIO-DEMOGRAPHIC% 20PROFILE%20AND.pdf

18. Adegboye MA. Socio-economic status categories of rural dwellers in northern Nigeria. Advances in Research. 2016;7(2): 1-10.(Accessed 12 May 2019) DOI: 10.9734/AIR/2016/21836

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