

2 **Comprehensive Socioeconomic and**
3 **Demographic profile of farm households in**
4 **West Bengal, India**

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13 **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 ($\chi^2= 32.55$; $P < .01$), farmers' education ($\chi^2= 46.22$; $P < .01$), farm household education ($\chi^2= 58.42$; $P < .01$), farmers' age ($\chi^2 = 39.94$; $P < .01$), dependency status ($\chi^2 = 30.05$; $P < .01$), labour force participation rate ($\chi^2 = 17.69$; $P = .05$), farmers occupation ($\chi^2 = 27.63$; $P = .05$) and annual net family income ($\chi^2 = 35.33$; $P = .05$) found significant and independent among the

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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.

14 **Keywords:** *Farm households, Cost of Cultivation, Agro climatic zones, Socioeconomic and*
15 *demographic characters*

16 **1. INTRODUCTION**

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

24 A demographic base becomes more relevant to have a comprehensive profile of the farm
25 households [3]. The demographic characteristics like gender, age, family size and
26 dependency ratio, affects the economic conditions and in turn the social conditions (i.e.
27 education) of farm households. The age of the household head is an important factor as it
28 determines whether the household benefits from the experience of older farmers or the risk
29 taking attitude of young farmers [3]. Demographic variables like gender, income and
30 education have a significant relationship with technology adoption and its application [4], age
31 has also shown a significant impact on technology usage behavior [5]. Young farmers *have*
32 *keen* interest in collecting agricultural information for increasing their efficiency in farm
33 operations [6], more aware and ready to adopt new technologies for long term benefits [7].
34 The availability of labour force had shown an influence on different types of farming systems
35 like subsistence farming, transition farming or large scale farming [8]. Economic conditions of
36 the farmers are determined by available capital, occupation and income levels etc. farmers
37 with more wealth cultivate much larger areas and use higher levels of animal traction,
38 resulting in higher levels of household wealth which will alter the status on agricultural
39 practices [9]. The study on demographic profile also *helps in understanding* the attitude of
40 farmers on the adoption of modern production methods and also use of other non-labour

41 inputs for their proper utilization. The rural household economic activity pointed to the
42 significance of household demography, life course transitions, and local economic structures
43 as factors facilitating household labour reallocation [10]. A Comprehensive Scheme for Study
44 on Cost of Cultivation or Production of Principal Crops (CCPC) in India has collected data on
45 costs and returns of various inputs and their prices of principal crops along with social,
46 economic and demographics of farm households in West Bengal. The accurate information
47 that has been generated through these surveys is of paramount importance. Keeping in view
48 of these social, economic and demographic variables of farm households in West Bengal,
49 the present study was undertaken with an objective to identify demographic and
50 socioeconomic distributional pattern and its variability across different agro-climatic zones of
51 West Bengal in India. In this framework, we hypothesized the null hypothesis (H_0): The
52 socioeconomic and demographic characteristics of the farm households in each category do
53 not differ among agro climatic zones of West Bengal against the alternate hypothesis (H_1):
54 The socioeconomic and demographic characteristics of the farm households in each
55 category differ among agro climatic zones of West Bengal.

56 2. MATERIAL AND METHODS

57 The study area (i.e West Bengal) is situated in eastern part of the country between $21^{\circ} 25'$
58 $24''$ to $27^{\circ} 13' 15''$ N latitude and $85^{\circ} 48' 20''$ to $89^{\circ} 53' 04''$ E longitude covering an area of
59 88,752 sq. km which is about 2.7 percent of India's total geographical area. Bengal is
60 predominantly an agrarian state and for the attainment of scientific management of regional
61 resources and sustainable agricultural development, the state has been stratified into six
62 agro-climatic sub-zones viz., hill zone, terai zone, new alluvial zone, old alluvial zone, red
63 lateritic zone and coastal zone. The study excludes hill agro-climatic zone due to non
64 availability of cost of cultivation data.

65 The data relevant to the present study was collected through three-stage stratified
66 Probability Proportional to Size With Replacement (PPSWR) followed by stratified Without
67 Replacement sampling design under the scheme entitled "Comprehensive Scheme for
68 Studying Cost of Cultivation of Principal Crops in India" launched by the Government of India
69 in 1970-71 and is operated by the Directorate of Economics and Statistics, Ministry of
70 Agriculture and Farmers Welfare [11]. The tehsils in agro climatic zone form the first stage
71 sampling units, either a single village or a cluster of villages in the selected tehsils forms the
72 second stage sampling units and an operational holding or a cultivator within a selected
73 village or a cluster of villages is the third and ultimate stage sampling unit. The operational
74 holdings in the selected villages are listed in ascending order of their size and stratified in to
75 five size classes (operational holding with area less than 1 hectare, between 1-2 hectare,

76 between 2-4 hectare, between 4-6 hectare and above 6 hectare). Then the ultimate stage of
 77 sampling units, i.e. the operational holdings or the cultivators growing the selected crop
 78 complex is selected by Stratified Random Sampling without Replacement (SRSWOR) from
 79 each size classes. Two holdings are selected from each class. If in any village or a cluster of
 80 villages, a particular size does not have even two holdings, more holdings are selected from
 81 adjacent classes (see [11] for detail procedure). The representative demographic data of 600
 82 farm households having 3704 household members in different agro-climatic zones of West
 83 Bengal which had been collected under the above said scheme during the block year 2008-
 84 2011 (where one block year consists of a cluster of three years viz. 2008-09, 2009-10 and
 85 2010-11) have been utilized for the present study. The frequency analysis was performed to
 86 determine the share of demographics of farm households for each agro-climatic zone and
 87 comparing these shares to choose a strategy across the farmers in each zone. The chi-
 88 square test has also been performed to assess the significance of differences among k
 89 independent groups (agro-climatic zones). In general, the chi-square test is similar for both
 90 two and k independent samples or groups.

91 2.1. The Chi-square test for k independent samples

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

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

or

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

100 Where

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

102 $E_{ij} = \frac{R_i C_j}{N}$ number of cases expected in the i^{th} row of the j^{th} column

103 $R_i = \sum_{j=1}^k n_{ij}$ = total frequency in the i^{th} row

104 $C_i = \sum_{j=1}^c n_{ij}$ = total frequency in the j^{th} column and the double summation is over all rows and
105 columns of the table (i.e. summation across all cells).
106 The values of χ^2 obtained by using above equations are distributed asymptotically (as N gets
107 large) as χ^2 with $df = (r - 1)(k - 1)$, where r is number of rows and k is number of columns
108 in the contingency table. The Chi square test was performed using Statistical Program for
109 the Social Science (SPSS 25.0).

110 **3. RESULTS AND DISCUSSION**

111 This study deals with demographic characteristics of farmers which are associated with
112 socioeconomic conditions of the farm households. Based on the some existing empirical
113 studies, the variables are selected according to their importance, These included farmers'
114 age, land holding size, household size, level of education, sex ratio, dependency status,
115 labour force participation rate (%), occupation, annual net income of family, as well as other
116 relevant information. The distributions of socioeconomic and demographic characteristics of
117 farm households are helpful in understanding the demographic profile of farm households in
118 different agro-climatic zones of West Bengal.

119 **3.1. Age**

120 Age wise distribution of population helps to know about the proportion of the total labour
121 force, occupational structure, demand pattern and dependency ratios of the population. The
122 findings about the age of the household members including household head (Table 1),
123 revealed that majority of the farm households (65.55%) in West Bengal belongs to the age
124 group of 15-59 years. About 9.77% households were found above the age of 60 years.
125 When comparison is made between the zones, red lateritic zone (68.75%) has maximum
126 number of farm households in the group of 15-59 years followed by new alluvial zone
127 (66.44%), old alluvial zone (64.63%), terai zone (63.56 %) and coastal zone (62.40%). Thus,
128 all the zones have low percentage of children, youth and marginally low percentage of old
129 and substantially high percentage of productive age group (15-59 years). The findings
130 indicate that majority of farm households in the study area were having an average age of 49
131 years and this may be because of much involvement of young and medium age people in
132 farming operations.

133 **Table 1: Age distribution of farm household members in each agro-climatic**
 134 **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**					

135 **Source:** Computed based on cost of cultivation survey data for the block year (2008-11)

136 *Figures in parenthesis indicates per cent distribution of farm households*

137 *** represents statistical significance at 1% level.*

138

139 **3.2. Land holding size**

140 According to land holding size, farmers' are grouped into five categories given in Table 2
 141 [13] viz., marginal (less than 1 ha.), small (1-2 ha.), semi-medium (2-4 ha.), medium (4-10
 142 ha.) and large (more than 10 ha.). From Table 2, it was observed that terai zone has the
 143 highest number of semi-medium land holders (45.71%), while small land holders were
 144 dominated in coastal zone (56.67%) followed by old alluvial (47.78%), red lateritic (46.67%)
 145 and new alluvial (41.76%) zones. Out of 600 surveyed farmers in the study area as a
 146 whole, 44% of farmers are small land holders, 27.17% are semi-medium land holders,
 147 24.83% are marginal land holders, four per cent are medium land holders and no farmers
 148 had above 10 hectares of land (large land holders).

149 **Table 2: Distribution of farm households according to their land holding size**
 150 **(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**					

151 **Source:** Computed based on cost of cultivation survey data for the block year (2008-11)

152 *Figures in parenthesis indicates per cent distribution of farm households*

153 *** represents statistical significance at 1% level.*

154 **3.3. Household size**

155 The demographic factors like family size, sex ratio and dependency may influence the
 156 economic activity of the farm family. The farm households in all agro-climatic zones were
 157 dominated by medium sized farm households (4-6 persons) with an average household
 158 size of six members. The farm households were classified into four categories [14], such as
 159 small (1-3 persons), medium (4-6 persons), large (7-9 persons) and very large (more than
 160 10 persons). The distribution of farm households according to the size of household (Table
 161 3) indicated that majority (52.33%) of farm households in the state of West Bengal have 4
 162 to 6 members (medium size) where as 22.50% belongs to large size families, 12.67%

163 belongs to very large sized families and rest 12.50% farm households have 1 to 3 family
 164 members (small size).

165 **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					

166 **Source:** Computed based on cost of cultivation survey data for the block year (2008-11)

167 *Figures in parenthesis indicates per cent distribution of farm households*

168

169 **3.4. Education**

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

179 education status in the study area may be due to poor access to higher secondary school
 180 and colleges to the farmers.

181 **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**					

182 **Source:** Computed based on cost of cultivation survey data for the block year (2008-11)

183 *Figures in parenthesis indicates per cent distribution of farm households*

184 *** represents statistical significance at 1% level.*

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

192

193

194

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**					

196 **Source:** Computed based on cost of cultivation survey data for the block year (2008-11)

197 *Figures in parenthesis indicates per cent distribution of farm households*

198 *** represents statistical significance at 1% level.*

199 **3.5. Sex ratio**

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

208

209

210 **Table 5: Sex ratio of the farm households in each agro-climatic zone of West**
 211 **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					

212 **Source:** Computed based on cost of cultivation surveys data for the block year (2008-11)

213 *Figures in parenthesis indicates per cent distribution of farm households*

214 **3.6. Dependency status**

215 The socio-economic life of a household is affected by the ratio of dependency i.e. the ratio
 216 between non-working populations to working population. More the number of working
 217 members in a household have higher possibility to lead a better economic life than those
 218 who have less number of working members. The classification of members such as
 219 earners, earning dependents (An earning dependent is not able to earn adequate income
 220 to maintain himself or herself) and dependents are furnished in the Table 6. Out of total
 221 surveyed population, 59.77% are dependents, 18.71% are earning dependents and only
 222 21.52% are earners in the study area. Among the agro-climatic zones, terai zone has
 223 highest percentage of dependents (64.57%) and coastal zone has lowest percentage of
 224 dependents (56%). Approximately 20% of farm households in each agro-climatic zone earn
 225 money for their families.

226

227 **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**					

228 **Source:** Computed based on cost of cultivation survey data for the block year (2008-11)229 *Figures in parenthesis indicates per cent distribution of farm households*230 *** represents statistical significance at 1% level.*231 **3.7. Labour Force Participation Rate (LFPR %)**

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

$$240 \quad \text{Labour Force Participation Rate (\%)} = \frac{\text{Number of working population}}{\text{Total population}} \times 100 \quad (3)$$

241 The results revealed that an average labour force participation rate was 67.30% in West
 242 Bengal (Table 7), where highest participation rate was in the coastal zone (78.57%)
 243 followed by red lateritic zone (77.33%), old alluvial zone (71.94%), new alluvial zone
 244 (59.08%) and lowest in terai zone (54.86%).

245 **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*					

246 **Source:** Computed based on cost of cultivation survey data for the block year (2008-11)

247 * represents statistical significance at 5% level.

248 3.8. Occupation

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

257

258 **Table 8: Distribution of farm household head according to their occupation in**
 259 **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*					

260 **Source:** Computed based on cost of cultivation survey data for the block year (2008-11)

261 *Figures in parenthesis indicates per cent distribution of farm households*

262 ** represents statistical significance at 5% level.*

263 3.9. Annual net family income

264 Income is another important yardstick used in measuring economic conditions of the farm
 265 households. Higher the level of income, better is the living standard of farm households.
 266 The details regarding annual net income of the farm households include net income from
 267 agriculture and other subsidiary sources, business and services during the study period.
 268 The findings revealed that 50.67% of farm households have annual net income of below
 269 Rs. 24,000 (Table 9). While 28.17% falls under the income group of Rs. 24000-60000 per
 270 annum and 13.67% comes under the income group of Rs. 60000-120000 per annum. Less
 271 than 10% of farm households have an annual net income of Rs. 120000 and above in the
 272 study area of West Bengal. Among the agro climatic zones, more than 75% of farm
 273 households have a net income up to Rs. 60,000 per annum except in coastal zone
 274 (63.33%).

275

276 **Table 9: Distribution of farm households based on annual net family income**
 277 **(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*					

278 **Source:** Computed based on cost of cultivation survey data for the block year (2008-11)

279 Figures in parenthesis indicates per cent distribution of farm households

280 * represents statistical significance at 5% level.

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

293 4. CONCLUSION AND RECOMMENDATIONS

294 The cost of cultivation survey data utilized in the present study is an important source for
295 policy makers, administrators and individual researchers for making decisions at the macro
296 as well as micro level. The anatomy of social and demographic characteristics such as
297 farmers' age, size of holding, family size, sex ratio, dependency ratio, occupational

298 structure, literacy level have an influence on the process of economic development. A wide
299 variety of social and economical outcomes are impacted by demographic processes and
300 distributions in a particular locality or region. Thus, this analysis of the socio-demographic
301 aspects of the farm households in the study is crucial as it gives an insight into the degree
302 of openness and competence for capital and education that exists among the farmers. The
303 results from this demographic study identified that majority of them are small and marginal
304 farmers with productive age groups, having low levels of income and education, high LFPR
305 (%) etc. recommended to promoting educational development relevant and suitable to their
306 local situations and functional needs to equip the productive farmers with most wanted
307 technical knowledge and up gradation of skills to pursue a voluntary work as a way to
308 improve their economic conditions. The significance of independence of these
309 demographic characteristics across the agro-climatic zones lies in its contribution to deal
310 with the regional issues and demands of the farmer's community in a constructive ways by
311 investing time, resources and energy with the support of Government or Co-operatives etc.

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318 **COMPETING INTERESTS**

319 "We are declaring that no competing interests exist"

320 **AUTHORS' CONTRIBUTIONS**

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

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