

Socio-Economic Status of Farming Community in Eastern Zone of Bihar under Changing Climate

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ABSTRACT: A vigilant study of the socio-economic conditions of farmers is a precondition for implementing of government development programme in order to apply appropriate design. A survey was conducted in three districts of north alluvial plain zone of Bihar namely West Champaran, Sheohar, and Begusarai during the year 2019-20 keeping in view the changing climatic conditions. For this, primary data was collected through a set of structured questionnaires from a sample of 645 farmers. From the survey it was found that the farming community is dominated by male members and in only 19.07% family head was female member. The farmers had very small land holdings which is one of the major constraints. Illiteracy is the other major constraint in Bihar. The heads of 77.98% families had no matriculation degree. The participation of young people whose age was less than 35 years is only 27.29%. The farmers of these areas had limited plant protection and irrigation equipment. Among 645 respondents, only one had sprinkler and five had drip irrigation systems. The annual income of 92.40 farm families was less than 1.5 lakh per annum which indicates the poor economic conditions of farmers. However, they were aware of Krishi Vigyan Kendras (KVKs) and non-governmental organizations (NGOs). The farmers prefer to visit these institutes seasonally. They were also interested in increasing their awareness through active participation in *Kisan Gosthi*, group discussions, etc. organized by the KVKs. Under differential climatic stress years, it was observed that cold stress and flood situations led to reduction in average annual income. By improving the socio-economic condition, it is possible to adapt during these stressful years.

Keywords: Socio-economic status, farming community, profitability, climate change, benchmark

Introduction

In the changing climatic conditions, the socio-economic condition of farmers in Bihar is totally dependent on cultivation of cereals, vegetables, pulses, other crops, and allied activities like livestock and part-time agricultural work. Most of the population is engaged in farming completely linked to agriculture and its associated activities, and only a few are engaged in other activities (MGNREGA, small vendors, etc.) (Vijoy, 2014). Many people are still dependent on indigenous technologies for agricultural and allied activities (Mishra *et al.*, 2011). Crop production is highly dependent on monsoon showers and temperature during the crop growth period. Crops are affected due to recurrent climatic vulnerability like floods during the rainy season and high temperatures coupled with the hot western wind (*Pachhua* wind). The cropping system of north Bihar is mainly cereal crops (rice-wheat) but a slight change was noticed in the cropping pattern during the last four decades due to climate-related factors like heat stress during maturity of *rabi* season crops; cold stress during winter and unusual flood or drought once in every 4-5 years. Production and productivity of all the principal crops increased. However, the performance of rice, which is the staple food crop of the region, under rainfed and waterlogged situations is still alarming. Maize cultivation and its productivity increased due to the adoption of *rabi* maize and the introduction of hybrid variety on a large scale.

However, pulses and oilseeds production witnessed a setback due to a decline in area and almost stagnant productivity (Kumar *et al.*, 2017). The major constraints of agriculture in Bihar are flood, frost, and hot western wind (loo) coupled with small and fragmented land holdings. The other farming constraints are the non-availability of quality seed/planting material, high cost of input, severe incidence of pests and diseases, and less mechanization. In case of livestock production, infertility, lack of proper dairy management practices, unavailability of improved breeds, and lack of balancing rationing are the major constraints (Bhutia *et al.*, 2017). Chaubey *et al.* (2018) stated that a rise in minimum support prices raised the farmers' income by 13-26%. Diversification with high-value crops, smart farming, and credit support to farming are the other strategies that can enhance the income of farmers in Bihar. Timely transfer of relevant information like weather forecasts also plays a crucial role in the success of farm activities which ultimately plays a role in increasing the income of farmers. However, generally, only young farmers access mobile phones among the information and communication technology tools (Anand *et al.*, 2022). The present investigation was carried out to study the socio-economic profile of farmers of the north alluvial plain of Bihar to assess the soundness of extension programs being implemented under the climate change scenario.

Materials and Methods

A survey was organized under the New Extension Methodology and Approaches (NEMA) program to study the socio-economic profile of farmers of zone I (north alluvial plain) of Bihar in the year 2019. KVKs of three districts (West Champaran, Sheohar and Begusarai) which are located in the north, central, and south portions of the zone were selected for the study. Total 645 respondents participated of which 121, 136, and 418 were from Sheohar, Begusarai and West Champaran, respectively. The selection of respondents was done by a simple random sampling method. Extension workers of KVKs went door to door and contacted the head of the family or person involved in agricultural activities during the study. Ten variables, viz, gender, categories of farmers, education, age group, distance from market, distance from nearest extension service provider, equipment available, and annual income of family were selected for study of socio-economic profile of farmers and seven variables viz; contact frequency with KVK, NGO, and State Agriculture department, *Kisan Gosthi*, *Kisan Mela*, group discussion and others (radio, TV and newspaper) were selected to study the source of information of farmers of this area. Data pertaining to cold stress (Maximum temperature (°C), Minimum temperature (°C), spell of low temp <10 °C (days), and winter rainfall (mm)) and flood (intensive rainfall >60 mm spell (days), >100 mm spell (days), >200 mm spell (days), flood duration (days), and water depth (cm)) was also collected so as to differentiate the impact of these events on annual income of the farmers.

Results and Discussion

Climatic stress during the study period

The meteorological variables varied in the years 2019 and 2020 (Fig. 1) where it was observed that the year 2020 was more stressful than the year 2019. Flood was more severe during 2020 in all the selected districts due to higher water depth, and intensive rainfall of all categories (>60 mm, >100 mm, >200 mm spells), however, flood duration was little higher during 2019. Every flood event is unique and its impact varies in different areas. Similarly, the cold wave was more severe in the selected districts owing to winter rainfall, greater dip of temperature, greater difference in diurnal maximum-minimum temperature, etc.

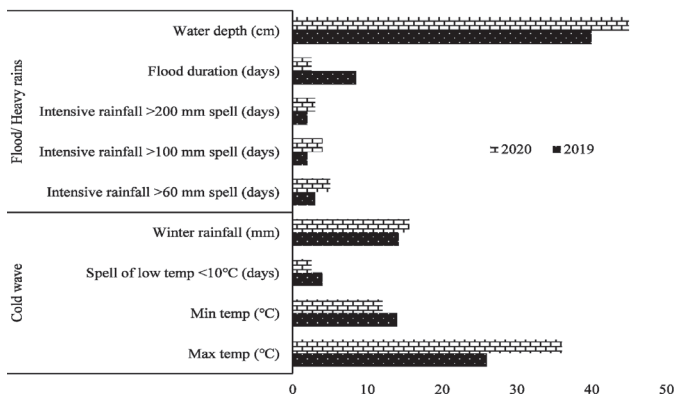


Fig. 1: Average meteorological information of West Champaran, Sheohar and Begusarai in 2019 and 2020

The socio-economic profile of the farmers and source of information and their periodicity data are recorded and presented in Table 1 and Table 2. Accordingly, the results are discussed below:

Occupation

It is clear from Table 1 that majority of the farmers (83.88%) were involved in agriculture + livestock activities, while the remaining (8.06%) had agriculture and 7.44% of farmers were involved in livestock alone and a very negligible group of farmers were involved in agriculture along with small business activities. The majority of the farmers belong to marginal and small categories, which necessitates them to take up livestock as a subsidiary occupation to improve their livelihood and income.

Table 1: Distribution of farmers based on the occupation

Parameters / traits	Category	Frequency	Percentage	Cumulative (%)
Occupation	Agriculture	52	8.06	8.06
	Livestock	48	7.44	15.50
	Agriculture + Livestock	541	83.88	99.38
	Agriculture + small business	04	0.62	100.00
	Total	645	100	

Gender

On the basis of data (Table 2), it was found that decision-making and information-seeking behaviour are taken jointly (together) with a frequency distribution of 360 (55.82%) followed by male 202 (31.31%). This indicates less participation of females alone in agricultural work and most of the work was performed together. The majority of female workers were found engaged in household work but a substantial proportion was also engaged in agriculture (Kumari *et al.*, 2015).

Table 2: Distribution of farmers based on decision making and information seeking behaviors

Traits	Category	Frequency	Percentage	Cumulative (%)
Gender	Male	202	31.31	31.31
	Female	83	12.87	44.18
	Together	360	55.82	100.00
	Total	645	100	

Caste composition

The results of the investigation carried out are presented in Fig. 2, showing the socio-economic profile of the farmers of these three districts. Around 66.87% of farmers belong to OBCs categories and only 12.86% of farmers are from General categories and 11.76% belong to Scheduled Tribe (ST). This indicates that family and its composition are related to occupation and income.

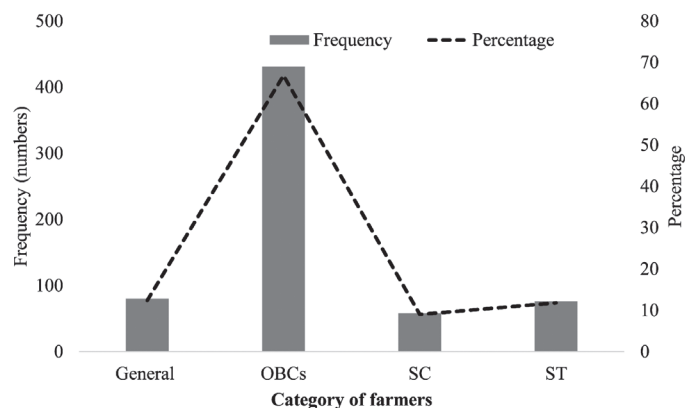


Fig. 2: Distribution of farmers-based on caste categories

Land holding

Land holding is an important criterion for deciding the socio-economic status of the farmers. Data presented in **Table 3** revealed that 29.15% of the farmers fall under marginal categories on the basis of land holding area. Those farmers were either landless or had less than one ha of land holding. About 25.27% of farmers belong to small categories and 22.48% to semi-medium categories (2-4 ha). A cumulative study of per cent shows that 76.90% had less than 4 ha of land and 4.18% of farmers are under large categories.

Table 3: Distribution of farmers based on land holding size

Traits	Category	Frequency	Percentage	Cumulative (%)
Land Holding Size	Marginal (< 1 ha)	188	29.15	29.15
	Small (1-2 ha)	163	25.27	54.42
	Semi-Medium (2-4 ha)	145	22.48	76.90
	Medium (4-10 ha)	118	18.29	95.19
	Large (>10 ha)	31	4.81	100.00
Total		645	100.00	

Education level

Education is one of the important socio-economic parameters that is related to learning, understanding, and technology adoption. **Table 4** revealed that very few (8.37%) of the respondents were illiterate whereas, no formal schooling was 17.83%. It was found that more than 50 per cent of farmers (51.78%) had formal schooling maximum up to 10th standard. Only 14.89% of farmers were matric passed whereas 7.13% of farmers were graduates. This finding is in line with the findings of Nagabhushan and Nanjaiyan (1998) who reported that 28.30% of farm women were illiterate.

Table 4: Distribution of farmers based on educational level and age group

Traits	Category	Frequency	Percentage	Cumulative (%)
Education	Illiterate	54	8.37	8.37
	No Formal Schooling	115	17.83	26.20
	Formal	334	51.78	77.98
	Metric	96	14.88	92.87
	Graduate	46	7.13	100.00
	Total	645	100.00	
Age Group	Young (< 35 year)	176	27.29	27.29
	Middle (35-45 year)	228	35.35	62.64
	Old (> 45 year)	241	37.36	100.00
	Total	645	100.00	

Age group

Age is an issue that determines the level of participation. Most of the participants in the study area were either middle (35.35%) or old (37.36%) aged (**Table 4**). It shows less attention from young people towards agriculture or more inclination towards salary-based activities. Maurya *et al.* (2022) said that the migration of youth from rural to urban areas in the last 25 years is unavoidable because youth feel that agriculture is not a financially rewarding enterprise.

Market

The agricultural market plays a vital role not only in stimulating production and consumption but also in accelerating the pace of economic development in the region and country as a whole. In the process of shifting from traditional to modern agriculture, marketing emerges as the biggest challenge. About 49.92% of respondent lived in an area where the market lies between 5-10 km distance whereas 37.36 per cent people had the benefit of having the market in a nearby area up to 5 km (**Table 5**). The remaining 12.72 per cent of persons suffered from the problem of long-distance market.

Table 5: Distribution of farmers based on distance from market and extension service provider

Traits	Category	Frequency	Percentage	Cumulative (%)
Distance of Market	Up to 5 Km	241	37.36	37.36
	5-10 Km	322	49.92	87.29
	10-15 Km	51	7.91	95.19
	15-20 Km	31	4.81	100.00
	Total	645	100.00	
Distance from nearest Extension Service Provider	Up to 10 Km	399	61.86	61.86
	10-20 Km	214	33.18	95.04
	20-30 Km	26	4.03	99.07
	More Than 30 Km	6	0.93	100.00
	Total	645	100.00	

Table 6: Annual income per family in the zone under variable climatic stress years

Category (annual income in Rs.)	Years	Frequency	Percentage	Cumulative (%)
Upto 50,000	2019	102	15.81	15.81
	2020	123	19.07	19.07
50,000-1 Lakh	2019	397	61.55	77.36
	2020	436	67.60	86.67
1-1.5 Lakh	2019	97	15.04	92.40
	2020	74	11.47	98.14
Above 1.5 Lakh	2019	49	7.60	100.00
	2020	12	1.86	100.00

Extension service

Distance from the nearest extension service provider is one of the critical points that regulates the speed of transfer of technology in the present day. People who live in nearby areas get more benefits from the extension service provider/institution. A perusal of the data presented in **Table 5** revealed that 61.86% of participants lived within a radius of 10 km of the extension service provider and 95.04 per cent lived in a radius of up to 20 km.

Farm equipment and machinery

Farm equipment and machinery make farming easier because it is directly related to the success of management in combining land, labour, and capital for a satisfactory profit. Among respondents, only 41.15 per cent had plant protection equipment and 31.59 per cent had irrigation facilities. Only five farmers (0.66%) had drip irrigation system and one had (0.13%) sprinkler irrigation system (**Fig. 3**). Farmers used tractors along with machinery to perform operations like ploughing, sowing, and harrowing. Tractor was also a source of income by renting out. However, due to the high cost of tractors, only 10.09% of farmers had tractors. Only 2.23 per cent of respondents had harvesting machinery. This is mainly due to small size of land holding. The loss caused by insect pest insect pests in vegetable crops is higher than in many natural disasters (Kabir and Rainis, 2013). Hence, farmers focus more on plant protection measures.

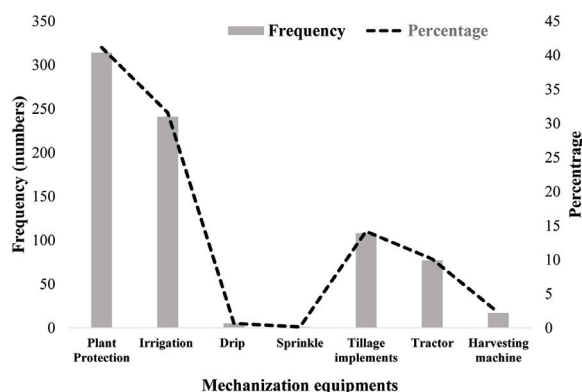


Fig. 3: Distribution of farmers based on farm equipment and machinery

Annual income

It can be observed from **Table 6** that the annual family income of 77.36% of respondents was below Rs. one

lakh during the year 2019. However, a small proportion of farmers (7.60%) earns more than 1.5 lakh per annum. The low annual income of respondent farmers shows that youth feel that agriculture is not profitable. The other reason may be that urbanization is considered as a sign of modern lifestyle (Kumari *et al.*, 2022).

Since, the year 2020 was more stressful than the year 2019 in terms of cold stress as well as flood severity, the annual income categories varied accordingly. Annual income per family was impacted badly during the year 2020 where families under the earning category of above 1.5 Lakh was reduced by 5.74 per cent and earning category of families under 1-1.5 Lakh category was reduced by 3.57 per cent. This reduction was compensated by more families falling under lower income category of 50,000 to 1.0 Lakh and below Rs. 50,000 categories.

Consumption pattern

Information related to consumption pattern (expenditure) under different heads was also recorded and presented in **Table 7** which comprises food items, agriculture, health, education, clothing, and other social activities. The average expenditure on food items apart from own farm production was worked out to be Rs. 2000/- per month. The average expenditure related to agricultural production/livestock management except own produce worked out to be Rs. 1800 per month. Expenditure incurred on school books, notebooks, pens, conveyance and school dresses, shoes, school bags, etc. worked out and estimated to be Rs. 1100 per child per month. Similarly, health expenditure plays a major role in the total expenditure. Though it was not a fixed component However, average monthly expenditure was Rs. 1000/-. Though clothing and shoes are not purchased frequently; before major festivals, winter, and family functions, people buy new clothes for their families for which an average consumption of Rs. 1100/- was observed. Thus, altogether average monthly expenditure was Rs. 7000/-. In addition to this, unforeseen expenditures on guests, attending family function marriage/ birthday/social function at village or distant level and expenditure on mobile recharging, electricity, etc. an average sum of Rs. 2500/- per month also was incurred. Thus, the total monthly expenditure was recorded as a sum of Rs. 9500/-.

Table 7: Share of expenditure under different heads (in Rupees)

Criteria	Food items	Agriculture	Education	Health	Clothing	Other	Total
Rs.	2000	1800	1100	1000	1100	2500	9500
Per cent of total	21.05	18.95	11.58	10.53	11.58	26.32	100.00

Source of information

Data depicted in **Table 8** shows that farmers of agroclimatic zone I of Bihar contact KVKs, Department of Agriculture, and NGOs to gather information related to agriculture or allied activities. They also actively participate in *Kisan Gosthi* and *Kisan Mela* organized by the State Agricultural University (SAU), KVKs, or other organizations. The farm families which had radio, television, or newspaper facilities also tried to grasp knowledge from these sources of information. They also share knowledge grasped from different sources with their neighbors or friends through group discussion.

KVK and NGO contact frequency

In the survey, it was found that 96.43 per cent of participants were in contact with experts of KVK and benefited from agricultural activities, but the frequency of contact varies. Most of the farmers contact KVK seasonally or need-based, generally 4-5 times in a year followed by another group (28.37%) who contact monthly. It was also noticed during the survey that the frequency of contact varies with the satisfaction of the person from the work of KVKs. A small proportion of participants (8.37%) was very happy with the work of KVKs and they contacted on weekly basis. However, among 645 participants 23 were not interested in ideas of KVKs. A more or less similar trend was noticed with NGOs. But satisfaction level of participants with NGOs was less compared to KVK. A total of 81.09% of farmers accepted that they were in contact with the extension service provider of NGOs. Most of the respondents (49.77%) visit or make contact with experts of NGOs only seasonally or need-based (4-5 times a year). However, 18.91% of participants had a view that NGOs are a not good source of information for agriculture.

(i) Contact frequency to the Department of Agriculture

Only 79.23 per cent of respondents were aware that the Department of Agriculture may also be used as a source of information in agricultural activities. Most of the respondents (71.01%) said that they visited the Agriculture Department when they heard about new schemes of the state or central government. Only 2.68% of participants visited monthly basis while 5.58% annually.

(ii) Kisan Gosthi & Kisan Mela

Kisan Gosthi is one of the common and most popular methodologies of technology transfer by the experts of SAU, KVK, and other organizations. It was found that 83.57% of farmers in the area benefited from the *Kisan Gosthi*. Most of the participants (55.04%) regularly participated in *Kisan Gosthi*

while 28.53% participated only when they felt a need. Farmers get the opportunity to become aware of the farmer-friendly technologies, some equipment, etc. in *Kisan Mela*. It was found that 67.91% of people visited *Kisan Mela* when it was arranged in the nearby area.

(iii) Group discussion

Group discussion is one of the ways to transfer knowledge among the farmers. In this survey, it was found that 63.57% of people take part in group discussions organized in nearby areas only. A small proportion (14.42%) of the participants were very active and took part in group discussions regularly. Participants also gather information from other sources of information like radio (44.19%), TV (31.01%) and newspaper (24.81%).

Table 8: Source of information and their periodicity

Particulars	Periodicity	No.	Per cent
KVK Contact Frequency	Weekly	54	8.37
	Monthly	183	28.37
	Seasonally /Need Based (4-5 times/year)	321	49.77
	Annually	64	9.92
	No	23	3.57
NGO Contact Frequency	Weekly	32	4.96
	Monthly	121	18.76
	Seasonally/ Need Based (4-5 times/year)	321	49.77
	Annually	49	7.60
	No	122	18.91
Department Contact Frequency	Monthly	17	2.64
	New Scheme launched	458	71.01
	Annually	36	5.58
	No	134	20.78
<i>Kisan Gosthi</i>	Regularly	355	55.04
	Need Based/sometimes	184	28.53
	No	106	16.43
<i>Kisan Mela</i>	Yes	438	67.91
	No	207	32.09
Group Discussion	Regularly	93	14.42
	Need Based/sometimes	317	49.15
	No	235	36.43
Others	Newspaper	160	24.81
	Radio	285	44.19
	TV	200	31.01

Conclusion

Small and fragmented land, low education, and dominance of males in the agriculture system are the major constraints which impact the annual income of farmers during stressful years. In spite of the many government schemes, the socio-economic conditions of the farmers have not risen to expected level among the study group. Socio-economic profile imparts resilience in agriculture production system by the way of reduced vulnerability. Further studies need to be conducted to segregate the reasons of low productivity and annual income during stressful years and specific measures to be adopted to deal with them.

References

- Anand S, Prakash S and Singh AK. 2022. Determination of ICT tools accessibility by farmers in Bihar, *Indian Journal of Extension Education*. 58(3): 186-189.
- Bhutia TL, Kumari KR, Snataashree M and Kumar U. 2017. Constraint analysis in the crop-livestock farming system of small and marginal farmers of Bihar. *SKUAST Journal of Research*, 19(1): 92-96.
- Chaubey D, Prakash V, Chand T and Singh G. 2018. Doubling of farmers' income through integrated farming system approaches in Bihar. *International Journal of Current Microbiology and Applied Science*, 7(12): 1602-1613.
- Kabir MH, and Rainis R. 2013. Determinants and methods of integrated pest management adoption in Bangladesh: An environment friendly approach. *American Eurasian Journal of Sustainable Agriculture*, 7(2): 99-107.
- Kumar A, Singh RKP, Bharati RC, Chandra N and Kumar U. 2017. Growth performance of principal crops in North Bihar during last four decades: Empirical Evidences. *Journal of AgriSearch*, 4(2): 154-159.
- Kumari K, Singh KM, and Ahmad N. 2022. Impact of migration on women empowerment: a situational analysis of North-Bihar. *Indian Journal of Extension Education*, 58(1): 101-105.
- Kumari M, Meena LK and Bairwa SL. 2015. Socio economic assessment of chickpea growers in Bihar, India. *International Journal of Agricultural Science and Research*, 5(4): 21-28.
- Maurya AS, Mishra BA and Malik JS. 2022. Migration behavior of rural youth in Haryana. *Indian Journal of Extension Education*, 58(3): 93-98.
- Mishra OP, Singh AK and Kumar S. 2011. Indigenous knowledge of Bihar farmers. *Journal of Community Mobilization and Sustainable Development*, 6(1): 46-49.
- Nagabhushanam K and Nanjaiyan K. 1998. Perceived opinion of trained farm women on institutional training. *Journal of Extension Education*, 9(3): 2120-2123.
- Vijoy P. 2014. Agricultural development and out migration in Bihar. *International Journal of Research in Commerce, Economics and Management*. 4(5): 30-33.