Original Research Article

Link Between the Socio-economic Profile of Farmers in North Eastern Haryana and the Over-exploitation of Irrigation Resources~~Socio-economicProfile of Farmers of North Eastern Haryana with Reference to Over-exploitation of Irrigation Resources~~

ABSTRACT

Aim: The main aim of this study was to ~~know~~ ascertainthe socio-economic profile of farmers ~~of~~ inNorth Eastern Haryana, in relation ~~with reference~~ to over-exploitation of irrigation resources.

Place and Duration of Study: The study was carried out in the purposively selected five districts of Haryana state due to the intensification and extensiveness of ~~ve~~ agricultural practices in recent times.~~followed in these districtsduring 2021~~.

Methodology: The data were collected from 150 respondents comprising 15 respondents from randomly selected ten villages through a well-prepared interview guide~~schedule~~. ~~The variables were Age, Education, Family type, Family size, Occupation, land holding, cropping pattern, Irrigation facilities, Irrigation methods, Water conservation structure, Mass media exposure, Extension contact and perception.~~

Results: The study revealed that majority of respondents belonged to the middle age group, 34.00 per cent of the respondents had the level of education up to matric only, more than two-thirds of respondents were living in joint familiesy, nearly half of the respondents had medium size family, majority of respondents had farming as major occupation, nearly one third of respondents had the medium size land holding, most of the respondents were following only double cropping pattern, most of the respondents were using only tubewell/borewell/submersible for irrigation, all respondents were using only flood irrigation method, vast majority of respondents had only natural pond as a water conservation structure, more than half of respondents had the medium level of mass media exposure, and majority of respondents had high level of extension contacts and high level of perception.

Keywords: *Irrigation, Over-exploitation, Respondents, Socio-economic, Variables*

INTRODUCTION

Agriculture is a significant part of India's social and political economy. India is one of the world's largest food producers, making the sustainability of its agricultural system of global significance. While, most of India's agricultural production chain are small scale in nature, yet they account for about 20.00 per cent of India's GDP and are India's largest employers. Moreover, the agriculture sector is the primary food supplier for India's 1.2 billion people. India is also one of the world's largest agricultural producers, and exports close to $39 billion in raw agricultural products and over 4.4 million tons of milled rice annually. (GOI 2020 and FAO 2015).Back in mid 1960s, India was fully dependent on imports from other nations to meet domestic demands of their food products. However, two years of severe drought in 1965 and 1966 prompted India to modify its agricultural

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Comment [K1]: Title:
-The title must read as **"Link Between the Socio-economic Profile of Farmers in North Eastern Haryana and the Over-exploitation of Irrigation Resources"**

Comment [K2]: Abstract:
-Lines 13-15: No need to state the variables, it is advisable to state the data analysis technique/approach used briefly in just a sentence.

Comment [K3]: -I humble suggest the authors break Lines **16-24** into 3-4 sentences using full stops or the correct punctuation. Current for of how the results are presented/summarized in the abstract is lengthy and vague. Readers or the audience must at least swallow something.

-Kindly add a concluding part which states the relevance or significance of findings to sector players as a concluding sentence or make a recommendation based on study findings in the abstract.

policies and realized that it could no longer rely on foreign help and imports to ensure food security. These initiatives atwereimmensely was supported even more by India's Green Revolution. That leads to the decision of introducing high yielding varieties, disease resistant varieties and improved agricultural techniques to increase productivity.

Groundwater extraction in India accounts for 25.00 per cent of total groundwater extraction globally. More than 80.00 per cent of the total land in Uttar Pradesh is irrigated by groundwater. Similarly, groundwater provides 77.00 per cent of Punjab's and 54.00 per cent of Haryana's irrigation water resources, as well as 85.00 per cent of India's drinking water demands. (Moench*et al*. 2011). Water resources over-exploitation has led to drastic declines in groundwater levels, threatening to push this vital resource out of reach for millions of small-scale farmers. Historically, losing access to groundwater has decreased agricultural production and increased poverty. Over-exploitation of groundwater and intensive irrigation in major canal commands has posed serious problems for groundwater. Depletion of water tables, saltwater encroachment, drying of aquifers, groundwater pollution, water logging and salinity, etc. are major consequences of over-exploitation and intensive irrigation. Many of India's peninsular rivers are facing a serious post monsoon crisis. The flows and water tables are falling in mostly parts of India with fluoride, arsenic, mercury, even uranium found in groundwater. Overexploitation of ground water is a very serious threat to natural resources. (Anonymous, 2019).

Water crisis has evolved as a rising global challenge, particularly for rural communities depending on rainfed farming. Water scarcity continues to be a major limiting factor driving farmer vulnerability in the face of growing demand from urbanization, cultivation of water exhaustive crops, agricultural intensification, misuses and over extraction, population pressures, and the consequences of climate variability. The efficient utilization of water has great importance to increase the ground water availability. So, there are numerous methods to reduce over-exploitation of groundwater such as mulching, cropping pattern, more planting of trees, utilization of fog or dew, transfer of water from surplus areas to deficit areas by interlinking water systems through canals, use of efficient watering systems such as drip irrigation and sprinklers. Haryana must review its current trend of producing water intensive crops, such as sugarcane and paddy in water scarce areas. Also, it should review its policies related to exporting of water intensive crops such as paddy and cotton. While keeping in view of above facts, the present study was conducted to know ascertainthe socio-economic profile of farmers of inNorth Eastern Haryana, in relation with reference to over-exploitation of irrigation resource.

MATERIALS AND METHODS

In this study, the investigator has attempted to describe the socio-economic variables of the farmers. The study was conducted in North Eastern part of Haryana. The data collection related to this study was carried out in the year 2021. Exploratory research design was employed has beenfollowed in thise study. The state Haryana was purposively selected based on the need and relevancy of the research problem. Taking into consideration the agricultural importance and over-

exploitation of irrigation resource, five districts ~~of~~ inHaryana state constituting ~~named~~ Ambala, Karnal, Kaithal, Kurukshetra, and Yamunanagar, were purposively selected~~,~~ due to the intensive and extensive agricultural practices currently on-going ~~practiced~~ in these districts.Furthermore, two villages from each district were selected randomly. Overall, ten villages namely Jansui and Niharsi from Ambala, Kaul and Chandlana from Kaithal, Raison and Karsa from Karnal, Kirmich and Harthira from Kurukshetra, Aurangabad and Damla from Yamunanagar were selected randomly. Furthermore, fifteen farmers from each village were selected randomly. Thus, a total number of 150 respondents were interviewed for to study their personal and socio-economic characteristics.

The variables were Age, Education, Family type, Family size, Occupation, land holding, cropping pattern, Irrigation facilities, Irrigation methods, Water conservation structure, Mass media exposure, Extension contact and perception. The information collected from respondents in form of responses by schedule was appropriately coded and analysed with the help of SPSS software to develop meaningful inferences by using statistical techniques.

RESULTS ~~AND DISCUSSION~~

It could be inferred from data present in table 1 that nearly half (48.67 per cent) of the respondents belonged to the medium (35-50 years) age group followed by 31.33 per cent to the old (above 50 years) age group, while only 20.00 per cent of respondents belonged to young (below 35 years) age group. The data shows that fewer respondents belonged to young age group as compared to medium and old age group. Generally, farmers of middle age group look after agriculture with great interest, while young age group is shifting from agriculture to the service sector and other occupation. Results of present study are supported the results obtained by Saliba*et al.* (2018).

As evident from data that 99.00 per cent of respondents were literate and about one third of respondents (34.00 per cent) were having the education up to matric, while 30.67 per cent of respondents were having the education level of graduate and above followed by 18.00 per cent of the respondents having education up to senior secondary. Only13.33 per cent of respondents were having education level up to middle level and ~~0~~2.67 per cent of respondents were having education up to primary, while only ~~0~~1.33 per cent of total respondents were illiterate. Similar findings were also reported by Sharma *et al.* (2017) during the study conducted in Punjab region while assessing the awareness level of respondents towards the climate change and its effect on water resources.

It can be seen from table that more than three fourth (77.33 per cent) of respondents live in joint family while only 22.67 per cent respondents live in nuclear family. It may be due to traditional value and culture of the respondents as they like to live in joint family with their family members. Sharma *et al.* (2017) found the similar results in Punjab region as most of respondents belonged to joint family type.

It can be computed from data that about half (47.33 per cent) of respondents had medium (5-7 members) size family group followed by 30.00 per cent of respondents with large (more than 7 members) size family group, while only 22.67 per cent of respondents had small size family group. Kidane *et al.* (2019) also reported the same findings.

Comment [K4]: Materials and methods:
-How representative is this sample size in drawing general conclusions for the study?
-Did authors consider bias judgements, if so, how did they deal with it as a means of not influencing the validity/reliability of study findings?
These parameters must be justified briefly considering the subjective nature of the approach used.

Comment [K5]: -Line 85: The specific version of SPSS software used must be stated.

Comment [K6]: Results:
For clarity and consistency, the discussion section must be separated from the results section.
-The results must be presented in orderly manner based on the study objectives, without any further discussion or explanation.
-All detailed explanations must be done appropriately in the discussion section.

It can be computed that majority (83.33 per cent) of respondents were engaged in farming as their main occupation, followed by shopkeeper and service sector (06.67 per cent). Further only 03.33 per cent of respondents had the main occupation as business while, none of respondents belonged to agricultural labour class. The reason might be non avalablity of jobs.

The data from table revealed that nearly one third (34.67 per cent) of respondents had medium size land holding, 30.00 per cent respondents had large size land holding and about one fourth (23.33 per cent) of respondents had small size land holding. Further only 12.00 per cent of respondents had marginal land holding. It could be due to that most of the respondents live in joint family. Latif *et al.* (2009) reported the same results as most of the farmers had medium size land holding.

The data from table revealed that majority (96.00 per cent) of respondents follow double cropping (mainly paddy-wheat) pattern, while only ~~0~~4.00 per cent of respondents follow mono cropping (sugarcane) pattern and none of them left their land vacant. It could be due to assured irrigation facilities and high cropping intensity of the area. Malik *et al.* (2014) found the same results as the cropping intensity of area was very high.

It is depicted from the data that majority (88.00 per cent) of respondents had tubewell/borewell as source of irrigation, while only 12.00 per cent of respondents had both canal and tubewell/borewell for irrigation purpose. The reason could be that availability of canal water is not sufficient for paddy-wheat cropping pattern which is particularly followed by most of the respondents. Ahmad *et al.* (2007)reported almost the same findings.

Table 1 Personal profile of respondents ~~(n=150)~~

Sr. No.	Attributes	Categories	Frequency (n=150)	Percentage
1.	Age	Young Middle Old	30 73 47	20.00 48.67 31.33
2.	Education	Illiterate Primary Middle High Senior Secondary Graduate & above	02 04 20 51 27 46	01.33 02.67 13.33 34.00 18.00 30.67
3.	Family type	Nuclear Joint	34 116	22.67 77.33
4.	Family size	Small (up to four members) Medium (five to seven members) Large (more than seven members)	34 71 45	22.67 47.33 30.00
5.	Occupation	Farming Agricultural Labor Shopkeeper Service Businessman	125 00 10 10 05	83.33 00.00 06.67 06.67 03.33

Comment [K7]: Table 1 must be moved up and placed immediately after introducing the results section briefly.

6.	Land holding	Marginal (< 2.5 acres) Small (2.5-5 acres) Medium (5.1-10 acres) Large (more than 10 acres)	18 45 52 35	12.00 30.00 34.67 23.33
7.	Cropping pattern	Fellow land Mono cropping Double cropping Multiple cropping	00 06 144 00	00.00 04.00 96.00 00.00
8.	Irrigation facilities	Canal Tubewell/borewell/submersible Both On hiring basis	00 132 18 00	00.00 88.00 12.00 00.00
9.	Irrigation methods	Flood irrigation Drip irrigation Sprinkler Mixed (Flood + Drip + sprinkler)	150 00 00 00	100 00.00 00.00 00.00
10.	Water conservation structures	Natural ponds Small ponds near field/ dig ponds Micro-dam reservoir/soil bunds Rain water harvesting in tanks Percolation tanks	141 09 00 00 00	94.00 06.00 00.00 00.00 00.00
11.	Mass media exposure	Low Medium High	32 80 38	21.33 53.34 25.33
12.	Extension contacts	Low Medium High	08 121 21	05.33 80.67 14.00
13.	Perception	Agree Undecided Disagree	107 22 21	71.71 14.38 13.91

It is depicted from data that 94.00 per cent of respondents were using common or natural pond of their villages as water conservation structure, while only ~~0~~6.00 per cent had small pond near their field. The reason might be that most of respondents didn't want to leave their field vacant for water conservation. Similar results were obtained by Varua *et al.* (2017) in Rajasthan.

The data from table revealed that more than half (53.34 per cent) of the respondents were from medium category of mass media exposure, one fourth (25.33 per cent) of the respondents were from high category of mass media exposure, while only 21.33 per cent of respondents were from low category of mass media exposure. This could be due to availability of literature and other mass media devices.

It is observed from data that more than three fourth (80.67 per cent) of respondents were having medium level of extension contacts followed by 14.00 per cent with high level of extension contacts, while only 05.33 per cent respondents belonged to low category of extension contacts. It could be due to shortage of extension professionals.

It is observed from data that more than two third (71.71 per cent) of respondents agreed towards the over-exploitation for irrigation water, and 14.38 per cent of respondents remained

undecided towards the over-exploitation for irrigation water, while only 13.91 per cent disagreed about the over-exploitation for irrigation water. Similar results were found by Shubham *et al*. (2021) that most of the respondents agreed towards the over-exploitation of water.

DISCUSSION

CONCLUSION

In conclusion, the study revealed that majority of respondents (48.67 per cent) belonged to the middle age group (35-50 year), 34.00 per cent of the respondents had the level of education up to matric only, more than two third (77.33 per cent) of respondents were living in joint family, nearly half (47.33 per cent) of the respondents had medium size (5-7 members) family, majority of respondents (83.33 per cent) had farming as major occupation, 34.67 per cent of respondents had the medium (5.1-10 acres) size land holding, most of the respondents (96 per cent) were following only double cropping pattern (mainly paddy-wheat), most of the respondents (88 per cent) were using only tubewell/borewell/submersible for irrigation, all respondents were using only flood irrigation method, vast majority of respondents (94 per cent) had only natural pond as a water conservation structure, more than half (53.34 per cent) of respondents had the medium level of mass media exposure, and 80.67 per cent of respondents had high level of extension contacts. The majority of respondents had high level of perception towards over-exploitation of water resources. So, there is a need to increase awareness level of farmers to elevate the adoption rate of water management practice through various methods like awareness campaigns, trainings, result and method demonstrations and providing rewards and incentives timely to the all adopters.

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Comment [K8]: Discussion:
-Kindly re-organize or move the discussion aspect here.
-They must be placed in subsections or paragraphs. Each paragraph must present a particular idea linked to the study objective and results in an orderly manner.
-Each finding must be compared to existing literature or other studies in similar scope conducted elsewhere.
-Authors can consider establishing a correlation or link between some variables like age, education and experience of the farmers to the overexploitation of resources. Does elite or highly educated/knowledgeable/trained farmers engage in such acts as compared to those without high education/training?...same could be done for experience and so on. Such links could be considered to enrich the first part of the discussion section.
-Please integrate more literature to enrich, compare and substantiate findings.
-Kindly organize the sections appropriately for easy read by readers without ambiguity or confusion.

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Comment [K9]: Conclusion:
-No need to re-paste findings this way. The key findings of this study must be summarized and not repeated verbatim or directly as done here.
-Kindly remove the statistics in brackets and present the key findings clearly or in a concise manner.
-What were some of the limitations or opportunities or gaps in this study that could drive future research? These must be integrated briefly in the conclusion.
-What are some of the significance of study findings to sectoral players and the international research community or decision-makers? Please integrate that briefly in the conclusion.

Other comments:
-Moderate to major grammatical defects and syntax errors were identified throughout the manuscript. Few were corrected. I humbly suggest the authors thoroughly check and correct them prior to re-submission.

Comment [K10]: References:
-Some of the references are incomplete or incorrect. Kindly check and add the details like: titles, publisher, volume (issue), and page numbers where necessary for articles and other information. Taken from sites or anonymous platforms without the names of the authors.

Comment [K11]: Incorrect/incomplete

Comment [K12]: Incorrect/incomplete

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