

## **Relationship of Socio-Economic Characteristics with Level of Farmers' Awareness about Climate Change Effect on Water Resources**

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### **ABSTRACT**

The present study was conducted to know the relationship of socio-economic variables with the level of awareness of farmers. The study was conducted in three villages of Punjab with a sample of 120 farmers which was drawn randomly from villages Talwandi Khurd, Sandhuan and Ran Singhwala. The results indicated that most of the respondents belonged to the middle age group (40.83%), matriculates (23.33%), had joint family (77.5%) and had family size of 2-6 members (68.33%). The data further showed that majority of the farmers had high level of awareness regarding effect of climate change on water resources (71.67%) and effect of heavy rainfall (57.5%). Results further revealed that awareness regarding reasons of climate change was associated with family size (268.0), farm area (563.72) and mass media exposure (201.62) at one percent level of significance. The study recommends that there is a need to create awareness among farmers and extension personnel should play important role in educating the farmers about climate change, mitigation and adaptation.

**Keywords:** Awareness, climate change, relationship, socio-economic

### **INTRODUCTION**

Punjab, the "breadbasket" of India, was historically considered to be one of the most fertile areas on earth, producing wheat, cotton, sugarcane and vegetables. In the 1970s, however, the Indian government's "Green Revolution" sought to combat famine and poverty in the region by increasing yields in Punjab. The green fields of Punjab, which are known to produce a golden harvest year after year to cater to the country's food grain needs, have a dark side *i.e.* water scarcity. Large areas in the state are staring at low water availability that has the potential of damaging the state's agrarian livelihood in the coming years. Punjab, the land of five rivers, is staring at a dark future on the water front. The groundwater level is fast depleting. Tube wells are being bored at between

300 and 400 feet. Every year, the level goes down by 10 feet. The situation is very alarming (Sarin, 2016).

The intensive agriculture dominated by paddy-wheat cropping system in Punjab has led to manifold increase in irrigation water demand. National Geophysical Research Institute has found that due to over-exploitation, groundwater levels are going down by 60 cm every year. Punjab has, in less than 30 years, used up groundwater reserves that were built up over the last 105 years, which is more alarming than as thought earlier. Many organisations including NASA, PAU and Columbia Water Centre have already raised their concerns to combat the issue of severe water depletion in northern India (Anonymous, 2015). The problem of water depletion is being aggravated more with the impact of climate change.

Climate change constitutes a very serious threat to sustainable agricultural production and food security in many parts of the world. Climate change impacts on agriculture include biological effect on crop yield, the resulting impact on prices, production, consumption and the impact on per capital calorie consumption and malnutrition (Vani and Kumar, 2016). Awareness of climate change in many studies has been of great concern. Farmers of Punjab are facing the problem of water table depletion, almost every year but there is lack of awareness among them regarding its causes, effects and mitigation strategies. Therefore, the present study is conducted with the objective to study the level of awareness regarding effects of climate change on water resources among farmers of Punjab and its relationship with their socio-economic characteristics.

### METHODOLOGY

The three agro-climatic zones of Punjab *i.e.* North-east zone, Central zone and South-west zone were selected purposively. One district from each of the zone was selected randomly *viz.* Ropar, Ludhiana and Faridkot. One village each from the selected district was selected randomly namely Sandhua, Talwandi Khurd and Ransingh Wala. A sample of 40 farmers was randomly selected from each village, comprising a sample of 120 farmers for the study. The data was collected with the help of interview schedule and analyzed with the statistical tools like frequency and percentages. The extent of awareness was measured on three point continuum *i.e.* fully aware, somewhat aware and not at all aware with the scoring of 2, 1 and 0 respectively. Level of awareness was further calculated as high, medium and low.

### RESULTS AND DISCUSSIONS

**Socio-personal profile of the respondents:** More than forty per cent of the respondents (40.83%) belonged to the middle age group (39-59 years) while 31.67 per cent of the respondents were young (18-38 years). Only 27.5 per cent of the respondents were old (60-80 years). Thirty per cent of the respondents

had educational qualifications till senior secondary while 23.33 per cent of the respondents were educated up to matric. Fifteen percent of the respondents were middle school passed and graduates respectively. Regarding caste, a large majority of the respondents (99.17 %) belonged to general category while very few respondents (0.83%) belonged to backward class.

An overview of the family type revealed that majority of the respondents (77.5 %) belonged to joint family whereas 22.5 per cent of the respondents belonged to nuclear family. The results were in track with the findings of Latha and Chandrakumar (2012), Kalra *et al*, (2012), Baite (2014) and Kaur (2014) which shows that joint family system is still widely prevalent in rural areas. As regards as family size, majority of the respondents (68.33%) had a family size of 2-6 members (average 6 members) while 29.17

**Table 1: Socio-personal characteristics of the respondents**

<b>n=120</b>	
<b>Socio-personal characteristics</b>	<b>f (%)</b>
<b>Age(years)</b>	
18-38	38 (31.67)
39-59	49 (40.83)
60-80	33 (27.50)
<b>Education</b>	
Illiterate	13 (10.83)
Primary	6 (5.00)
Middle	19 (15.83)
Matric	28 (23.33)
Senior Secondary	36 (30.00)
Graduates	18 (15.00)
<b>Caste</b>	
General	119 (99.17)
Backward Caste	1 (0.83)
OBC	-
<b>Family type</b>	
Nuclear	27 (22.50)
Joint	93 (77.50)
<b>Family size(members)</b>	
2-6	82 (68.33)
7-11	35 (29.17)
12-16	3 (2.50)

per cent had a family size of 7-11 members (average 10 members). Very little percentage of the respondents had a family size of 12-16 members.

**Agricultural profile of the area:** The data in Table 2 dealt with agricultural profile of the respondents. It revealed that nearly forty per cent of the respondents (39.17%) belonged to semi-medium category having operational land holding of 5-10 acres while one third respondents (33.33%) had small farms under land holding of 2.5-5 acres. Further, twenty per cent respondents fall under medium category having operational land holding of 10-25 acres. It showed that majority of the farmers belonged to small and semi-medium category of operational land holding. It was further found that very small percentage of farmers leased in land for cultivation purpose.

Regarding irrigation sources in the field, it was revealed that large majority of the respondents (98.33%) used tube wells with submersible pumps as major source of irrigation which is one of major causes of depletion of water in Punjab. About seventy per cent of the respondents installed one tube well on their land followed by 15 and 10.83 per cent who installed two and three tube wells respectively. On the subject of location of tube wells 77.5 per cent respondents installed at one corner while 72.5 per cent installed in the centre of the farm.

The scrutiny of data in Table 2 revealed that 44.17 per cent installed tube wells at a depth of 201-350 feet while 32.5 per cent installed tube wells at a depth of 50-200 feet. Report of central ground water board in 2015-16 observed that water table in south west zone was the deepest as compared to other zone. A large majority of the respondents cultivated rice (97.5%) and wheat (100%) during *kharif* and *rabi* season. The other crops grown by the respondents were sugarcane (13.33%), moong (10.83%), potato (6.67%) and maize (4.17%). As regards as structure of irrigation channels, more than half of the respondents (58.33%) had *Katcha* water channels while 20.83 per cent of the respondents had *Pucca* water channels.

Further look at family income refers to the total amount of money earned by the farmers in a year stated that majority of the respondents (65.83%) earned in the range of Rs.1-5 lakhs per annum while 27.5 per cent of the respondents earned in the range of Rs.6-10 lakhs per annum.

**Table 2: Agricultural profile of the respondents**

Agricultural profile	n=120 f (%)
<b>Operational land holding</b>	
<b>Land owned (acres)</b>	
Marginal (less than 2.5)	08 (6.66)
Small (2.5-5)	40 (33.33)
Semi-medium (5-10)	47 (39.17)
Medium (10-25)	25 (20.83)
Large (25 and above)	-
<b>Land leased in (acres)</b>	
3-12	04 (3.33)
13-22	02 (1.67)
23-32	04 (3.33)
<b>Land leased out (acres)</b>	
25 acres	01 (0.83)
<b>Sources of irrigation for your field</b>	
Canal	01 (0.83)
Tube well with centrifugal pumps	01 (0.83)
Tube well with submersible pumps	118 (98.33)
Storage tanks/ Ponds	-
<b>Number of tube wells in the field</b>	
One	83 (69.17)
Two	18 (15.00)
Three	13 (10.83)
Four	04 (3.33)
Five	02 (1.67)
<b>Location of tube well in your farm *</b>	
In the centre of farm	87 (72.50)
At one corner	93 (77.50)
Any other location	04 (3.33)
<b>Type of pump</b>	
Submersible	119 (99.17)
Centrifugal	01 (0.83)
<b>Depth of pump (feet)</b>	
50-200	39 (32.50)
201-350	53 (44.17)
351-500	28 (23.33)

Agricultural profile	f (%)
<b>Capacity of pump (Horsepower)</b>	
5-8	22 (18.33)
9-12	72 (60.00)
13-16	26 (21.67)
<b>Crops to be irrigated (Kharif)*</b>	
Rice	117 (97.50)
Basmati rice	04 (3.33)
<b>Crops to be irrigated (Rabi)*</b>	
Wheat	120 (100)
Sugarcane	16 (13.33)
Moong	13 (10.83)
Cucumber	01 (0.83)
Onion	02 (1.67)
Ginger	01(0.83)
Capsicum	01 (0.83)
Maize	05 (4.17)
Potato	08 (6.67)
Mint	02 (1.67)
<b>Structure of irrigation channels in your fields</b>	
Katcha water channels	70 (58.33)
Pucca water channels	25 (20.83)
Underground water pipes	08 (6.67)
Katcha+ Pucca water channels	14 (11.67)
Katcha+ Underground water pipes	02 (1.67)
Katcha+ Drip irrigation	01 (0.83)
<b>Family income in lakhs (Rs/annum)</b>	
1-5	79 (65.83)
6-10	33 (27.50)
11-15	08 (6.67)

\*Multiple response

**Level of awareness regarding climate change:**

Table 3 deals with the level of awareness of farmers towards climate change and its effect on water resources. The data was analyzed on six parameters

viz. reasons of climate change, effect of climate change on water resources, effect of increase in temperature, effect of heavy rainfall, effect of little rainfall and factors responsible for depletion of water. The data showed that majority of the farmers had high level of awareness regarding effects of climate change on water resources (71.67%) and effect of heavy rainfall (57.5%) while 55 and 36.67 per cent of the farmers had medium level of awareness regarding reasons of climate change and effect of increase in temperature. More than fifty per cent of the respondents (53.33) had low level of awareness regarding factors responsible for depletion of water in Punjab.

The table concludes that although majority of farmers were aware about effect of climate change on water resources but they had low level of awareness regarding factors responsible for depletion of water. Thus, there is a need to create awareness among farm community regarding factors responsible for water depletion. As there is less awareness, people are not able to take mitigating strategies to combat with the problem of climate change and water depletion.

**Relational analysis:** Table 4 discusses the association of socio-economic characteristics of respondents and level of awareness regarding climate change. It revealed that awareness regarding reasons of climate change was associated with family size (268.0), farm area (563.72) and mass media exposure (201.62) at one percent level of significance. Association of effects of climate change on water resources was found with age, education, caste, farm area and family income. Awareness regarding effect of increase in temperature was found associated with age and education at 10 and 5 per cent level of

**Table 3: Distribution of farmers according to level of awareness regarding climate change**

Parameters	Low (0-0.67)	Medium (0.68-1.35)	High (1.36-2.0)
Reasons of climate change	39 (32.50)	66 (55.00)	15 (12.50)
Effect of climate change on water resources	9 (7.50)	25 (20.83)	86 (71.67)
Effect of increase in temperature	43 (35.83)	44 (36.67)	33 (27.50)
Effect of heavy rainfall	15 (12.50)	36 (30.00)	69 (57.50)
Effect of little rainfall	53 (44.17)	49 (40.83)	18 (15.00)
Factors responsible for depletion of water	64 (53.33)	52 (43.33)	4 (3.33)

significance. Farm area was found associated with awareness regarding effect of heavy rainfall while age, education and media exposure was found associated with awareness regarding effect of little rainfall. The results of Bagri *et al*, 2016 indicated that education, social participation, type of family, land holding, mass media exposure, attitude towards natural resource management were found to have significant association with extent of awareness regarding natural resource management at 5 per cent level of significance.

It can be concluded from Table 4 that level of awareness had association with various socio-economic characteristics of respondents. Age, education and owned farm area were associated with majority of the awareness parameters regarding climate change and its effects. It is recommended that for creating awareness the extension personnel can take help of middle ages educated people. Education plays an important role in creating awareness among farmers and farm women. Mass media exposure too is helpful in creating awareness.

### CONCLUSION

The study concluded that socio-economic characteristics of individuals play important role in creating awareness among farmers. High awareness level was found in awareness regarding effects of climate change on water resources while low awareness level was found in awareness regarding factors responsible for depletion of water. Age,

education, farm area and mass media exposure were found associated with majority of the awareness parameters of climate change. Study recommends that farmers should be educated to create more awareness and extension personnel can take help of middle aged educated farmers in creating awareness.

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**Table 4: Association of various socio-economic characteristics and level of awareness regarding climate change**

Association	Value of chi-square						
	Age	Education	Caste	Family size	Farm Area	Media exposure	Family income
Reasons of climate change	585.90	81.668	13.59	268.00***	563.72***	201.62***	326.4
Effects of climate change on water resources	370.00***	40.61*	24.04**	72.355	309.40***	80.11	167.70**
Effect of increase in temperature	344.30*	49.801**	8.30	86.143	201.60	61.57	97.83
Effect of heavy rainfall	268.10	36.750	2.895	62.989	219.00**	63.130	102.30
Effect of little rainfall	492.20**	78.085***	2.353	98.760	243.20	189.60***	196.90

\*\*\*, \*\* and \* significant at one, five and ten per cent level of probability

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