A study on farm women awareness for climate variability and its effect on water resources in Punjab

Abstract

The study was conducted with the aim to study the extent and level of farm women awareness about climate variability and its effect on water resources. The study was conductedin three agro-climatic zones of Punjab, India. One district from each zone was selected purposively for the investigation. A sample of 120 randomly selected farm womenwas interviewed. The data was analyzed using appropriate statistical tools like frequency, percentages, mean weighted scores.Majority of the farm women (>60%)arefully aware that pollution, deforestation, paddy straw burning and cultivation of paddy arethe reasons for climate change. Most of them(>70%)arefully aware that increase in temperature and variation in rainfall were due to change in climate. Majority of them (80%)arefully aware that change in climate is leading to stress on waterresources in Punjab and sixty per cent respondents perceived that more area under paddy cultivation was the major factor responsible for depleting groundwater. Most of the farm women(98%) were fully aware that water is wasted while performing various household tasks like washing of clothes, utensils, cleaning the floor, bathing animals with water pipes etc. The studyconcluded that majority of the farm women(59%) had medium level of awareness regarding reasons of climate change whereas most of them(80%)had low level of awareness regarding factors accountable for depletion of water.Ninety seven per centrespondents had high level of awareness regarding wastage of water while performing household tasks.The study recommended that there istheneed to evolve compatible water saving technologies, its effective extension and the enactment of proper legislation to prevent exploitation of water at household level.

***Key Words**:* climate change, awareness, farm women, household activities

Introduction

There is no denying the fact that there has been a significant increase in agricultural production and productivity in Punjab. However, intensive agricultural practices have also led to the depletion of natural resources (Sidhu, 2002; PSFCreport, 2013).Up to 1995, the average fall of water table in Punjab was about 23 cm per year (Khepar*et al* 2001) which during the next 6 years (1997-2003) increased to 53 cm per year (Hira *et al* 2004) and 51.5 cm per year during 1998-2006 (Kaur *et al* 2011).

The dropping water levels are largely attributed to unsustainable consumption of groundwater for irrigation and other uses along with increased runoff and/or evapo-transpiration, which is exacerbated byclimate change. These climatic changes present an additional burden on the world's economy, especially on agricultural and natural resource systems which are already

coping with the growing food demand driven by population growth and higher purchasing power (Charles *et al* 2012).Every year, farmers set paddy stubble ablaze to prepare ground for next crop, thereby damage soil quality and cause pollution(Anoymous, 2016).Further increased use of generators, industrialization, mechanization and so on are also accountable for climate change.

Not only agriculture but household activities performed by farm women during bathing, cleaning the floor, washing clothes and utensils, cookingare also responsible for ground water depletion. Injudicious use of water at household level creates an additional burden to ground water table.Keeping this in view, the present study was conducted with the objective to assess the extent and level of awarenessamong farm women on climate variability and its effect on water resources.

MATERIAL AND METHODS

The Punjab state represents 1.5 per cent geographical area of India with its latitudinal extent from 29˚33' to 32˚34' N and longitudinal extent from 73˚53' to76˚56' E.The climate of Punjab is mainly sub-tropical, semi-arid and monsoon type. The annual average maximum and minimum temperature ranges between 29˚ to 32˚C and 15˚ to 20˚C, respectively. The mean annual rainfall in the State and different locations ranges from 400 to 1300mm (Kaur *et al,*2016).Punjab has been the top food producer in India for a very long time. In order to maximize grain productivity, vast areas have been put under intensified rice and wheat cropping system. Paddy occupies 28.51 lakh hectares in *Kharif* and wheat occupies 35.12 lakh hectare in *Rabi* season. The net irrigated area of the State is 41.15 lakh hectare (81.71%), out of which 29.82 lakh hectares (72.5%) is irrigated by tubewells and remaining area of 11.33 lakh hectare (27.5%) is irrigated by canals (Anonymous 2014). The number of electric tubewells had increased 13 times from 1970-71 to 2013-14 i.e 0.91 lakh in 1970-71 to 12.35 lakh in 2014-15(Anonymous 2015).

The three agro climatic zones of Punjab i.e. north-east zone, central zone and south-west zone(based on water resources)werepurposivelyselected (fig1).One district from each of the zone was selected on the basis of rate of ground water depletion viz. districts -Ropar, Ludhiana and Faridkot. One village was randomly selected from each selecteddistricts namely*Sandhua, TalwandiKhurd* and *Ransingh Wala*.All the three villageswere following paddy-wheat rotation and had 50 cm/year rate of ground water depletion (Anonymous 2015).All the three zones had distinct water problems. The north east zone having high rainfall but deep water table. The

central zone having more and increased number of tubewells, having higher rate of ground water depletion. The south west zone having the problem of water logging and alkalinity of soil.Fortyfarm women wererandomly selectedfrom each village, comprising a sample of 120 farm women for the study.The data was collected with the help of interview schedule and analyzed using the statistical tools like frequency, percentages and weighted mean score. Extent of awareness was measured on three pointscontinuum 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.

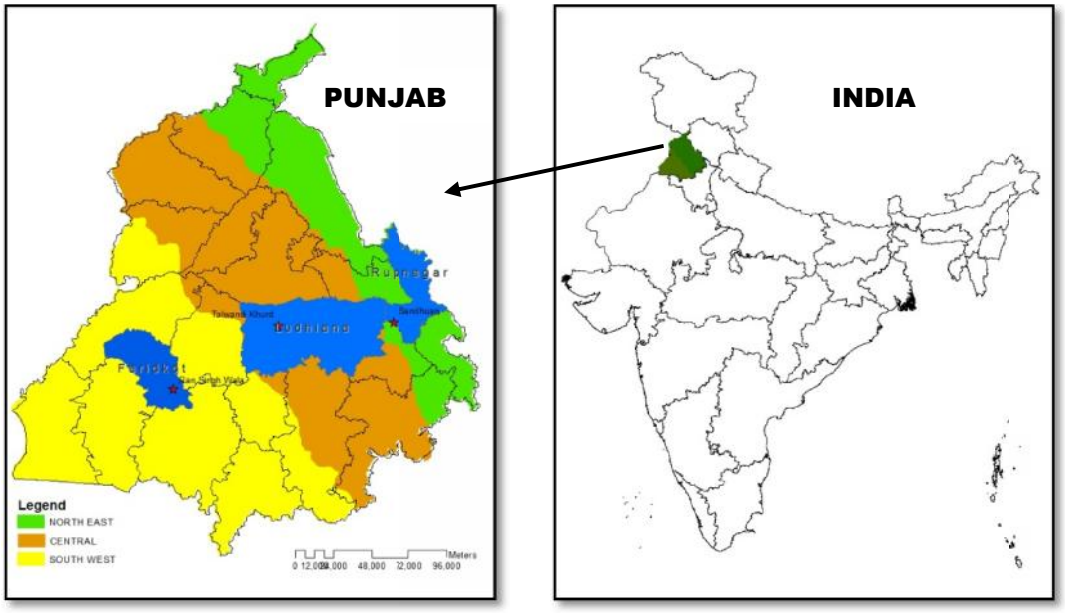

Fig.1 Location of selected districts in different agro-climatic zones ofPunjab, India.

RESULTS AND DISCUSSION

Socio-demographic characteristics

The scrutiny of data in Table 1 revealed that about half of the respondents (47%) were young belonging to age group of 18-38 years while 44 per cent belonged to the age group of 39-59 years. Nine per cent of the respondents were old (60-80 years).

Majority of the respondents (90%) were literate out of which nearly one fourth respondents had educational qualification up to primary (25%)and matriculation (29%).A large

majority of the respondents (97%) belonged to general category while 2.5 per cent belonged to other backward class (OBC).

Data further revealed that majority of the respondents (84%) belonged to joint family whereas only 16 per cent of the respondents belonged to nuclear family.The results were in agreement 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.

With regards to family size, most of the respondents (62%) had a family size of 2-6 members (average 6 members) while 35 per cent had a family size of 7-11 members(average 10 members). It can be concluded that majority belonged to the joint families with family size of 6 members.

Table 1: Socio-demographic characteristics of the respondents n=120

Characteristic	Frequency
Age(years)	
18-38	56 (47)
39-59	53 (44)
60-80	11 (9)
Education	
Illiterate	12 (10)
Primary	30 (25)
Middle	10 (8)
Matriculation	34 (29)
Secondary	17 (14)
Graduates	17 (14)
Caste	
General	116 (97)
Backward Caste	1 (1)
OBC	3 (2)
Family type	
Nuclear	19 (16)
Joint	101 (84)
Family size(No. of members)	
2-6	74 (62)
7-11	42 (35)

12-16	4(3)

*Figures in parentheses indicates percentages

Extent of awareness about reasons of climate change

A perusal of data in Table 2 showed that majority of respondents (87%) were 'fully aware' that pollution was major reason responsible for climate change. It was followed by 64 per cent respondents who perceived deforestation, burning of paddy straw (62%) and paddy cultivation (54%) as other reasons of climate change. In Rangareddy district of Telangana, India, 32 % of the respondents perceived climate change as being caused by deforestation and bush burning(Vani and Kumar 2016).

Table2: Distribution of respondents according to theextent of awareness about reasons of climate change **n=120**

Reasons	Fully aware (%)	Somewhat aware (%)	Not at all aware (%)
Paddy cultivation	54	1	45
Burning of paddy straw	62	4	33
Increased use of generators	12	1	87
Pollution	87	3	10
Industrialization	19	2	78
Mechanization	43	3	53
More use of pesticides	21	3	76
Deforestation	64	3	32

Majority of the respondents (>75%)were 'not at all' aware that increased use of generators ,industrialization and more use of pesticides also played major role in climate change.

Awareness about effects of climate change

Figure 2indicated the awareness of farm women regarding various effects of climate change. Most of the respondents (90%) were fully aware that increase in temperature was one of the effects of climate change followed by seventy three percent respondents who perceived variation in rainfall and fifty eight percent respondents perceived shifting of season as other effects of climate change. Nearly one-fourth respondents (25% and 28%) were also aware that change in soil moisture and increased risk of drought were other effects of climate change.The

findings were supported by Mandleni and Anim(2011), Oduniyi(2013) and Vani and Kumar (2016) who reported thatmajority of the farmers perceived increase in temperature and variation in rainfall was due to climate change. The findings were in tune with the study conducted by Vani and Kumar (2016) who also reported that very low percentage of farmers perceived raise of soil temperature and fast evaporation of soil moisture as other effects of climate change.It can be concluded that farm women were aware about major effects of climate change.

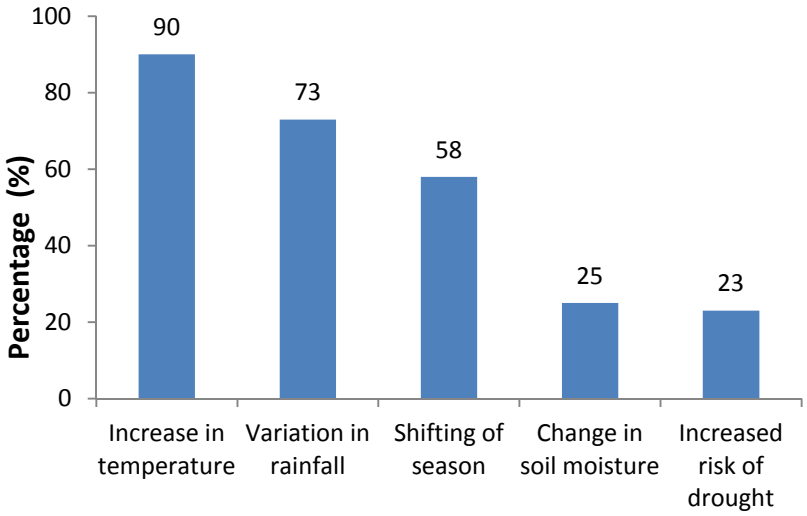

Fig.2:Awareness of farm women about effects of climate change

Extent of awareness about effect of climate change on water resources

The data in Table 4 indicated that majority of the respondents (80%) were 'fully aware' that water table depletion was the resultof climate changefollowed byvariation in rainfall(67%) and increase in number of tubewells(47%).Report of Central Groundwater Board (2014) also reported that number of over exploited blocks have rapidly increased in last few decadesin Punjab. The Table 4 concluded that farm women were aware about various effects of climate on water resources.

Table4:Distribution of respondents according to the extent of awareness about effect of climate changeon water resources **n=120**

Effects	Fully aware (%)	Somewhat aware (%)	Not at all aware (%)

Water table depletion	80	5	15
Variation in rainfall	66	7	27
Increase in number of tubewells	47	7	46

Extent of awareness aboutfactors responsible for depletion of water

A scrutiny of the data in Table 5revealed that majority of the respondents (63%) were'fully aware' that more area under paddy cultivation was major factor responsible for depletion of water.However, onlyone-third respondents were 'fully aware' that increase in number of tubewells(37%) and declining trendof rainfall (37%) were also accountable for depletion of water.It is evident from the fact that total water availability in Punjab falls short of the available water supply by 1.28 Mha-m and the deficit is being met by over exploitation of groundwater resources (Aggarwal et al, 2016).

Table5: Distribution of respondents according to the extent of awareness aboutfactors responsible for depletion of water **n=120**

Factors	**Fully aware (%)**	**Somewhat aware (%)**	**Not at all aware (%)**
More area under paddy cultivation	63	-	37
Over irrigation of crop	12	1	87
Wrong practices of irrigation	6	-	94
Early transplanting of paddy	16	2	82
Stick to rice-wheat rotation only	4	1	95
Increase in number of tubewells	37	4	59
Declining trend of rainfall	36	2	62

Perusal of datafurther revealed that most of the respondents(>80%) were not at all aware about other factors responsible for depletion of water such as wrong practices of irrigation, sticking to rice-wheat rotation , over irrigation of crop and early transplanting of paddy. This is a matter of concern. The results of Tables 4 and 5concludedthat although majority of the farm women were fully aware about water table depletion asone of the effects of climate change but most of them werenot at all aware about various factors responsible for it. Here the role of extension agents is very important in creating awareness about various factors contributing to

water table depletion.Singh and Grover (2013) reported that extension can help farmers prepare for greater climate variability and uncertainty, create contingency measures to deal with exponentially increasing risk and alleviate the consequences of climate change by providing advice on how to deal with droughts, floods and so forth. Extension can also help with mitigation of climate change.

Extent of awareness about wastage of water while performing household tasks

Table 6 depicts the awareness of farm women about wastage of water while performing household tasks. Almost all the respondents (98%) were 'fully aware' that water is wasted during performing various household tasks like washing of clothes and utensils, cleaning the floor, bathing animals with water pipes etc. The data suggests that there is a need to train farm women in using different water saving technologies while performing household activities. Researches proved that training can help in changing the behavior of people.Studies of Gupta and Singh (2012), Kaur (2014) observed that there was an increase in knowledge(91.5%), change in attitude(84.5%)and development of skill(84%)of farm women after participating in the training programme.

Table 6: Distribution of farm women according to the extent of awareness about wastage of water while performing household tasksn=120

Tasks	Fully aware (%)	Somewhat aware (%)	Not at all aware (%)
Washing of clothes directly under running tap	98	2	-
Washing of utensils directly under running tap	98	2	-
Washing of vegetables directly under running tap	97	3	-
Over flowing of water tanks	94	5	1
Cleaning the floor with water	98	2	-
Bathing under shower	90	7	3
Running the water tap continuously while brushing, shaving etc.	95	5	0
Washing household and agricultural machinery with water pipes	97	3	-
Cleaning/washing animal shed with water pipes	92	6	2
Bathing animals with water pipes	98	2	-
Leakage of water taps and pipes	97	-	3
Children play under running water	95	4	1

Level of awareness regarding climate change

The level of awareness regarding climate changewas analyzed on four parameters viz. reasons of climate change, effect of climate change on water resources, factors responsible for depletion of water and wastage of water while performing household tasks.The data showed that majority of the farm women (59%) had medium level of awareness regarding reasons of climate change followed by forty five per cent respondents who had medium level of awareness regardingeffect of climate change on water resources. Most of the respondents (80%) had low level of awareness regarding factors responsible for depletion of water. It was interesting to note that awareness level was high (97%)with respect towastage of water in performing household tasks (fig.3). This showed that people were aware that lot of water was wasted during washing clothes, bathing etc. Still no action is taken to manage the wastage of water for future generation. It shows the need of developing and promotingeasy to use water saving technologies as people use easy way to complete their task/work inspite of awareness regarding its after effects.

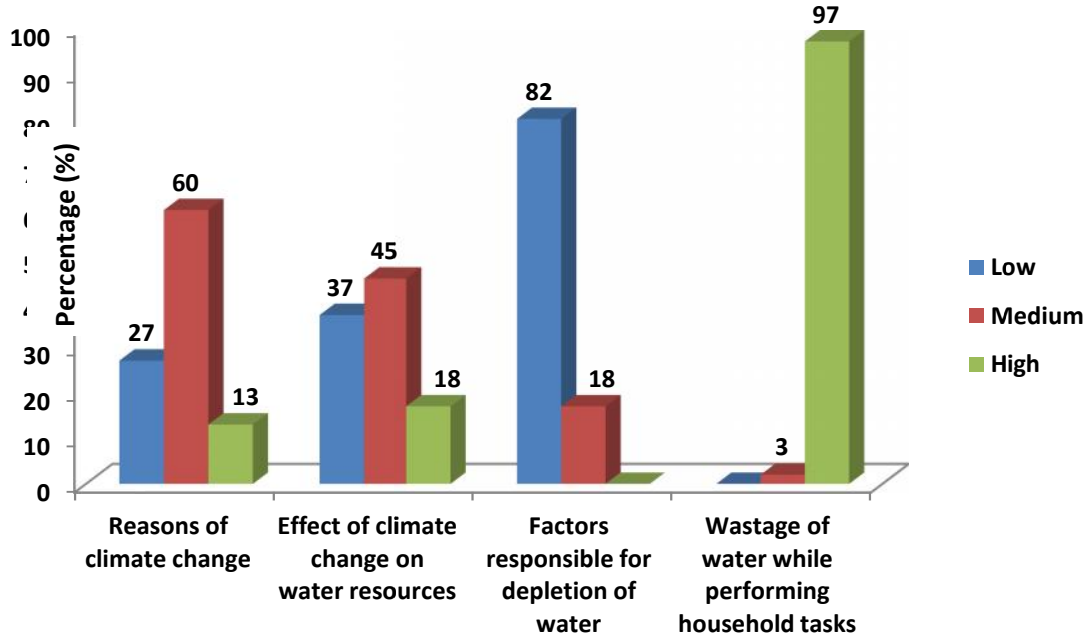

Fig.3:Distribution of farm women according to level of awareness regarding climate change

Suggestions to save water resources from depletion

Suggestions to save water resources from depletion were recorded through open ended questions which are presented in Table 8. The data revealed that about half of the respondents(48%) suggested that wastage of water at home should be avoided while 37per cent suggested that bucket should be used for washing clothes and utensils ratherthanunder running taps. Nearly one third of the respondents (33%)suggested avoiding running taps when not in use and closing the tap after use. Approximately one fourth of the respondents (29%) suggested that bathing under shower should be avoided rather use bucket and mug.

Table 8: Solutions suggested by farm women to save water at household level

n=120

Suggestions	**Frequency**	**%**
Avoid wastage at home	58	48
Use bucket for washing clothes and utensils	45	37
Avoid running taps and close the tap after use	40	33
Avoid bathing under shower and use bucket and mug for bathing	29	24
Use bucket and mop for cleaning the floor	22	18
Remaining water should be used to water the plants	9	7
Crop diversification should be adopted	8	7
Bath animals at two days interval	7	6
Keep check at children and teach them not to waste water	7	6
Use alarm bell to fill the tank	6	5
Bath animals in ponds or use bucket and mug while bathing animals	5	4
Avoid flushing the toilet unnecessarily	5	4
Save rain water (rain water harvesting)	5	4
Avoid washing of car with pipes	4	3
Wash vegetables in utensils	3	2
Wash clothes by hand	3	2
Use remaining water of filter for other purposes	2	2
Ban on paddy cultivation	2	2
Remaining water should be used to clean the floor and animal shed	2	2

Wash utensils at end	1	1

*Multiple response

Conclusion

The study concluded that farm women were fully aware about the reasons of climate change like pollution, deforestation, paddy straw burning etc. but majority of them had medium level of awareness. Majority of them were fully aware about effects of climate change on water resources but most of them had low level of awareness about factors responsible for depleting water table. The findings suggested that there is a need to createawareness regarding reasons and effects of climate change through media and extension functionaries. Findings further suggested that farm women had high level of awareness regarding wastage of water during performing household tasks which raised need of evolving compatible water saving technologies and educating farm women in using these techniques. Role of extension functionaries/ home scientists shouldincrease to train farm women in reducing the effects of climate change by adopting appropriate technologies.

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