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Gender-Based Knowledge Disparities about Micro Scale Water Conservation and Mitigation Strategies of Farming Community in Punjab, India

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Authors' contributions

This work was carried out in collaboration between all authors. Author PS designed the study, performed the statistical analysis, wrote the protocol and improved the final draft of the manuscript. Author LK managed the analyses of the study and wrote the first draft of the manuscript. Authors RM and Samanpreet Kaur managed the literature searches. Author Sukhjeet Kaur managed the discussion part of the study. All authors read and approved the final manuscript.

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ABSTRACT

Climate change is being considered as a serious threat to the livelihood of Indian farmers. Depleting groundwater table is one of the consequences of climate change. Practicing water saving technologies at the farm and household level can mitigate the effects of climate change. Thus, to study the gender-based knowledge disparities of the farming community regarding water saving technologies at the farm and household level, the present research was conducted in three villages each from three water zones of Punjab namely north-east, central and south-west zone. A sample of 240 respondents was randomly selected with equal representation from each zone. Pre and post knowledge test was administered to measure the knowledge level of the farming community. The findings revealed that most of the respondents belonged to the general category, were middle-aged,

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studied till matriculation, had a joint family system and family size in the range of 2-6 members. Furthermore the findings revealed that the knowledge of most of the farmers and farm women regarding water saving technologies was low to medium level, but after intervention, the knowledge level of most of the respondents increased to high to medium level. The study concluded that although the knowledge level of the farming community regarding water saving technology was low to medium yet, it can be increased by imparting knowledge through various communication strategies. Thus the extension workers should make efforts to work on different communication strategies to increase the knowledge level of the farming community so that they can be capacitated to mitigate the effects of climate change.

Keywords: Knowledge; climate change; water saving technologies.

1. INTRODUCTION

Climate change refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, and that is in addition to natural climate variability observed over comparable time periods [1].

Climate change is no more a distant problem. We have been experiencing changes in climatic variables, such as rising temperature, variable rainfall, frequent droughts, hurricane and typhoons [2,3] and have almost failed to reach a global consensus on the mitigation of greenhouse gas (GHG) emissions [4]. Climate change affects agriculture in two ways—direct and indirect. Changes in climatic factors (for example, temperature and rainfall) affect agricultural productivity through physiological changes in crops [5]. In addition, climate change also affects other factors of production in agriculture, such as water availability, soil fertility and pests [6]. The overall effect of climate change on agriculture could be positive or negative; the magnitude of impact can also vary from very low to very high, depending on regional or geographical location and status of socioeconomic development [7,8,9,10]. The agriculture in Punjab is largely dependent on groundwater. Studies reported that groundwater flow in shallow aquifers is part of the hydrological cycle and is affected by climate variability and change through recharge processes [11], as well as by human interventions in many locations [12]. Climate change affects groundwater recharge rates (i.e., the renewable groundwater resources) and depths of groundwater tables.

To date, water managers have typically assumed that the natural resource base is reasonably constant over the medium term and, therefore, that past hydrological experience provides an excellent guide to future conditions. Climate change challenges these conventional assumptions and may alter the reliability of water management systems. Thus, a planned adaptation to water management systems is required. However, it is implemented very infrequently. Water managers in a few countries, including the Netherlands, Australia, the UK, Germany, the USA and Bangladesh, have begun to address directly the implications of climate change as part of their standard flood and water supply management practices. These adaptations have generally taken the form of alterations to methods and procedures, such as design standards and the calculation of climate change allowances. For example, such adaptations have been implemented for flood preparedness in the UK and the Netherlands [13], for water supply in the UK [14], and for water planning in general in Bangladesh. Adaptation to changes in water availability and quality will have to be made, not only by water management agencies but also by individual users of the water environment. These will include industry, farmers (especially irrigators) and individual consumers [15].

Although there is much experience with adaptation to changing demand and legislation, little is known about how such organisations and individuals will be able to adapt to a changing climate. 'Adaptive management' [16], involves the increased use of water management measures that are relatively robust to uncertainty. Such tools include measures to reduce the demand for water and have been advocated as a means of minimising the exposure of a system to climate change.

It is also reported in various studies that climate change is affecting indirectly to farmers' suicides. Increase in debt, repeated crop failures, natural calamities, the increase in the cost of production, groundwater depletion were the main causes of farmers' suicides [17]. The groundwater resources have been depleting at an alarming pace in many parts of the country. Groundwater resources play a major role in ensuring livelihood security across the universe. It is highlighted that the huge extraction of groundwater has been very helpful for agricultural growth but at the same time, it has put a question mark before the sustainability of growth in agriculture in the country [18].

Effective adaptation can only be achieved if the farming community has sufficient awareness and knowledge on climate change issues and its mitigating strategies. But very few studies have been conducted so far in this direction. In a previous study in Punjab, it was found that most of the respondents (80%) perceived that climate change led to stress on water resources in Punjab but very few were aware of water saving technologies as mitigating strategies at agriculture and household level [19]. Thus, a need was felt to measure the knowledge level of the farming community of Punjab to combat the problem of climate change by practising water-saving technologies. With this background, the present paper aimed to study the gender-based knowledge disparities among farmers and farm women regarding micro scale water conservation and mitigating strategies.

2. MATERIALS AND METHODS

The present study was conducted in the state of Punjab. The multistage sampling design was used. At the first stage, all the three water zones namely north-east, central zone and south-west zones were selected for the study. At the second stage, one district from each zone on the basis of least water table and practicing cropping pattern (paddy - wheat) was selected, i.e. Ropar, Ludhiana and Faridkot. Furthermore, at the third stage, one village was randomly selected from each selected district namely *Sandhua*, *Talwandi Khurd* and *Ran Singh Wala* (total 3 villages). A sample of 40 farmers and 40 farm women from each selected village (totalling to 240) were randomly selected for data collection. Pre and post knowledge tests were developed separately for farmers and farm women according to their roles and involvement in daily activities to assess their knowledge level regarding water saving technologies as mitigating strategies for climate

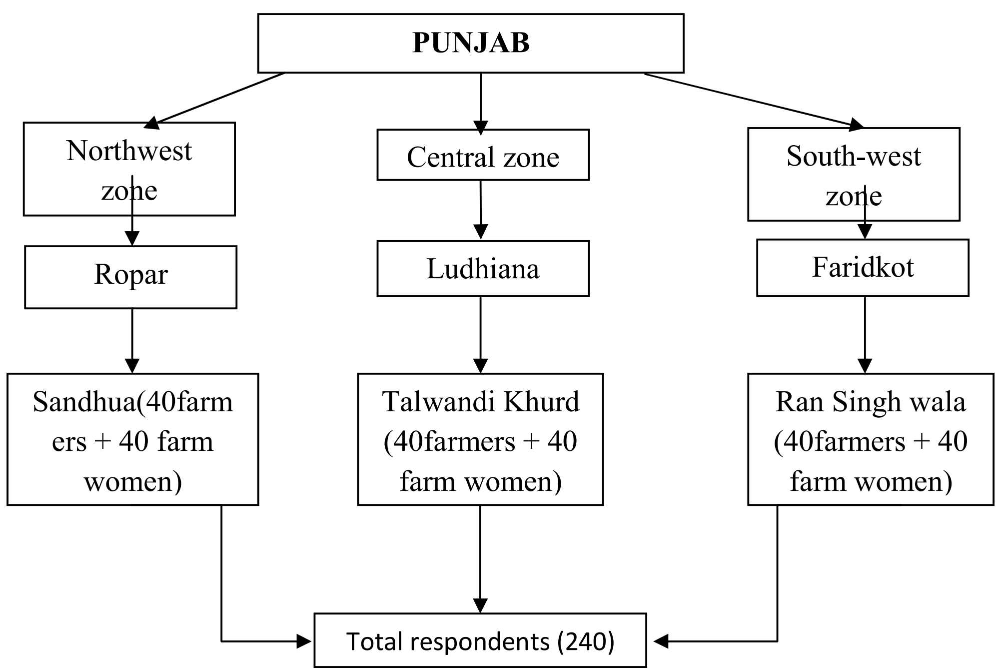

Fig. 1. Sampling technique

change. Awareness campaign '*Jal Dhara*' was conducted to bring awareness and impart knowledge among the respondents about water saving technologies as one of the mitigating strategies for climate change. '*Jal Dhara'* campaign consisted of rally and street play for creating awareness among farming community regarding climate change. Training was imparted through lectures and demonstrations followed by distribution of small water saving devices along with relevant literature to combat the alarming situation. Before training, pre-knowledge test on water-saving technologies as a mitigating strategy for climate change was administered to the selected trainees (240 in number). For farmers, the knowledge test consisted of the multiple -choice questions related to water-saving technologies at farm level and its role in water saving while for farm women, it was related to water-saving technologies at household level mitigating strategies. The knowledge test was administered for 50 and 40 marks each for farmers and farm women respectively. Each multiple-choice question carried one mark for the correct answer and zero marks for an incorrect answer. The individual scores of each of the respondent were calculated. By minimum and maximum scores, knowledge level of farmers and farm women was categorised into three categories, i.e. low, medium and high using category interval method. Further, the respondents were distributed among these categories according to their individual scores. After the training, the same knowledge test was administered on the same trainees to compare the change in knowledge level. The interview schedule was designed to enrich our primary observations. The data was tabulated and analysed using Microsoft Excel spreadsheets and its tools like frequency, percentages etc.

3. RESULTS AND DISCUSSION

Table 1 deal with the socio-personal profile of the selected respondents. The data revealed that more than forty per cent of the farmers (40.83%) belonged to the middle age group (39-59 years) while 31.67 per cent of them were young (18-38 years). Only 27.5 per cent of the farmers were old (60-80 years). A large majority of the farmers, i.e. thirty per cent of them had educational qualifications till senior secondary, and 23.33 per cent of the farmers were educated up to matric. With a vast majority of the farmers having a basic educational qualification, it can be stated that they had limited exposure to the happenings in the world like current issues of global warming, climate change etc. About fifteen percent of the farmers passed middle school (15.83%) and were graduates (15%). Regarding caste, a large majority of the farmers (99.17 %) belonged to the general category while very few respondents (0.83%) belonged to backward class.

An overview of the family type revealed that majority of the farmers (77.5 %) belonged to joint families whereas 22.5 per cent of the farmers belonged to the nuclear families. The results were on track with the findings of previous studies [20,21] which shows that the joint family system is still widely prevalent in rural areas in Punjab, India. But as regards as family size are concerned, the majority of the farmers (68.33%) had a family size of 2-6 members only (average 6 members) while 29.17 per cent farmers had a family size of 7-11 members (average 10 members). Very little percentage of the farmers had a family size of 12-16 members.

The scrutiny of data in Table 1 further revealed that about half of the farm women (46.66%) were young belonging to age group of 18-38 years while 44.16 per cent belonged to the age group of 39-59 years. Nearly ten per cent of the farm women were old (60-80 years).

Majority of the farm women (90%) were literate, out of which nearly one-fourth respondent had educational qualification up to primary (25%) and up to matriculation (28.33%). While comparing the educational qualification of farmers and farm women, then farm women were comparatively less educated and thus restrict their exposure to the outer world. A large majority of the farm women (96.66 %) belonged to general category while 2.5 per cent farm women belonged to other backward class (OBC). Data further revealed that the majority of the farm women (84.17 %) belonged to the joint families whereas only 15.83 per cent of the farm women belonged to the nuclear families. With regards to family size, the majority of the farm women (61.67 %) had a family size of 2-6 members while 35 per cent of them had a family size of 7-11 members. Although 84.17 percent families were joint, majority had comparatively smaller family size. This may be due to the reason that it is difficult to manage a large family in the current scenario.

3.1 Knowledge Level of Farmers

Table 2 discusses the pre and post knowledge level of farmers before and after training. The

Table 1. Socio-personal characteristics of the respondents

n=240

Socio-personal characteristics	**Farmers frequency (%)**	**Farm women frequency (%)**
Age(years)		
18-38	38 (31.67)	56 (46.66)
39-59	49 (40.83)	53 (44.17)
60-80	33 (27.50)	11 (9.17)
Education		
Illiterate	13 (10.83)	12 (10.0)
Primary	6 (5.0)	30 (25.0)
Middle	19 (15.83)	10 (8.33)
Matriculation	28 (23.33)	34 (28.33)
Senior Secondary	36 (30.0)	17 (14.17)
Graduates	18 (15.0)	17 (14.17)
Caste		
General	119 (99.17)	116 (96.67)
Backward Caste	1 (0.83)	1 (0.83)
OBC	-	3 (2.5)
Family type		
Nuclear	27 (22.50)	19 (15.83)
Joint	93 (77.50)	101 (84.17)
Family size(members)		
2-6	82 (68.33)	74 (61.67)
7-11	35 (29.17)	42 (35.0)
12-16	3 (2.50)	4 (3.33)

(Figure in parenthesis show percentage)

knowledge was measured in terms of different water saving technologies at farm level and mitigating strategies for climate change.

Laser land levelling: It is the technique which levels the field within a certain degree of the desired slope using a guided laser beam throughout the field. Once levelled the land does not require any major work for about 4 years. Laser land levelling is meant to optimise water-use efficiency, better distribution of soil moisture, improve crop establishment, reduce the irrigation time and save irrigation water and effort required to manage crop and reduce spatial variability [22]. Before the intervention, most of the farmers (85%) had a medium level of knowledge followed by 15 per cent farmers having high level of knowledge regarding laser land leveller. No farmer was in the low-level category which shows that farmers already had a fair knowledge about Laser land leveller. Post knowledge test data revealed that after the intervention, the knowledge level of 65 per cent farmers increased to high level (which was only 15% in pre-test) followed by 35 per cent farmers at the medium knowledge level.

Time of sowing/transplanting: Timely sowing/ transplanting is particularly important to enhance the crop yield and to restrict the overuse of irrigation water. It is recommended to restrict to the timely sowing of paddy nursery (second fortnight of May) and timely transplanting schedule (second fortnight of June) for better grain quality and water saving. Time of sowing of Maize is recommended in last week of May to end of June, however, optimum sowing time of Basmati rice is 15-30 June. The data of pre-test revealed that seventy-five per cent of the farmers had the low level of knowledge regarding the right time of sowing/ transplanting while twenty per cent of the farmers had medium knowledge followed by 5 per cent farmers having a high level of knowledge. It shows that due to lack of knowledge about proper timing of sowing of crops and its importance in saving water, farmers were fetching out more groundwater than required which was leading to more adverse effects to climate change. After the intervention, as many as forty-five per cent farmers had a medium and high level of knowledge each regarding the time of sowing/transplanting. Ten per cent of the farmers still had low levels of knowledge regarding the time of sowing/transplanting. They need more follow-ups and continuous efforts to change their knowledge level.

Table 2. Distribution of farmers according to the knowledge level of water saving technologies at the farm level

(n=120)

Water saving technology/ knowledge level	Pre test		Post test	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Laser leveling				
Low (1)	-	-	-	-
Medium (2)	102	85.00	42	35.00
High (3)	18	15.00	78	65.00
Time of sowing/transplanting				
Low (0-2)	90	75.00	12	10.00
Medium (3-5)	24	20.00	54	45.00
High (6-8)	6	5.00	54	45.00
Direct seeded rice				
Low (0-1)	102	85.00	12	10.00
Medium (2-3)	18	15.00	66	55.00
High (4-5)		-	42	35.00
Small size plots				
Low (1)	108	90.00	8	6.67
Medium (2)	12	10.00	46	38.33
High (3)		-	66	55.00
Bed planting				
Low (0-2)	42	35.00	12	10.00
Medium (3-5)	72	60.00	48	40.00
High (6-8)	6	5.00	60	50.00
Zero Tillage				
Low (1)	70	58.33	-	-
Medium (2)	30	25.00	24	20.00
High (3)	20	1.67	96	80.00
Irrigation techniques				
Low (0-4)	84	70.00	-	-
Medium (5-9)	36	30.00	72	60.00
High (10-14)	-	-	48	40.00
Others				
Low (0-3)	12	10.00	-	-
Medium (4-7)	90	75.00	18	15.00
High (8-12)	18	15.00	102	85.00
Overall				
Low (1-16)	12	10.00	-	-
Medium (17-33)	108	90.00	51	42.50
High (34-50)	-	-	69	57.50

(Figure in parenthesis show scores for individual technology in each category)

Direct seeded rice: Another way of saving water is adopting direct seeded rice technique. Rice can be directly seeded only in medium to heavy textured soils. Its cultivation is not successful in light textured soils due to severe iron deficiency and lower crop yields. Short duration varieties like PR 126, PR 125 and PR 115 are suitable. Pre-knowledge test was administered to 120 farmers and the findings revealed that their knowledge level regarding direct seeded rice as water saving technique as well as an alternative role for overcoming the problem of global warming i.e. gas emission through conventional paddy cultivation was low as reported by 85 per cent of the farmers while 15 per cent farmers had medium level of knowledge. After the intervention, knowledge was increased to a medium and high level as reported by 55 and 35 per cent of the farmers respectively.

Small size plots: For efficient use of irrigation water, farmers are advised to make 8 plots (*Kiaras)* per acre in heavy textured soils and 16 plots per acre in light textured soils. The data in Table 2 revealed that knowledge of 90 and 10 per cent of the farmers were low and medium before the awareness programme while it was increased to a medium and high level as reported by 38.33 and 55 per cent of the farmers correspondingly after the intervention.

Bed planting of wheat: Cultivation of wheat on beds saves about 30 per cent water. In addition to wheat, crops like *Gobi sarson, Soybean, Maize* and *Potato* can be planted on beds. Before the intervention, majority of the farmers (60%) had a medium level of knowledge about bed planting of wheat whereas 35 per cent and 5 per cent farmers had low and high level of knowledge respectively. Post knowledge test data revealed that knowledge of 50 percent farmers increased to a high level after intervention followed by 40 per cent farmers at medium and 10 per cent at low levels.

Zero tillage: It is a way of growing annual crops (from year to year) without disturbing the soil to improve the texture and quality of the soil. It also saves water at the time of first irrigation. Knowledge before the intervention was found to be low and medium as indicated by 58.33 and 25 per cent of the farmers. About two per cent of the farmers had a high level of knowledge, but Post knowledge test reported that there was a gain in knowledge regarding medium and high level as reported by 20 and 80 per cent farmers respectively.

Irrigation techniques: Water use efficiency in field crops can be increased by using improved irrigation techniques like underground pipeline system, the lining of water courses, drip irrigation, sprinkler irrigation, border irrigation etc. A perusal of data in Table 2 reported that knowledge level regarding various irrigation techniques before 'awareness programme' was low (70%) and medium (30%) which was increased to medium (60%) and high level (40%) after the intervention.

Other techniques: Other techniques for water management includes mulching, use of organic manures, water measuring devices, crop diversification, cultivation of short duration varieties and rainwater harvesting. The pre-test data revealed that 75 per cent farmers had a medium level of knowledge regarding these techniques followed by high (15%) and low (10%) level of knowledge. After the intervention, all the farmers reached high (85%) and medium level (15%) of knowledge about other water saving technologies at the farm level.

The overall data in Table 2 revealed that before the intervention, a large majority of the farmers (90%) had a medium level of knowledge followed by 10 per cent farmers having a low level of knowledge regarding water saving technologies in agriculture for mitigating the effects of climate change. Post knowledge test data revealed that knowledge of 57.5percent farmers increased to a high level after intervention whereas knowledge of 42.5 per cent farmers was at a medium level.

The Table concludes that before intervention (awareness programme '*Jal Dhara*') most of the farmers were at medium to low level of knowledge which increased to high-medium knowledge level regarding various water-saving technologies viz. laser levelling, time of sowing/transplanting, direct seeded rice, small size plots, bed planting, zero tillage, irrigation techniques etc. at farm level.

3.2 Knowledge Level of Farm Women

Table 3 discusses the pre and post knowledge level of farm women before and after the intervention, i.e. awareness campaign '*Jal Dhara*'. The knowledge was measured regarding various water-saving technologies at the household level. As it is previously also discussed that to mitigate the effects of climate change, we need to adopt water management practices in all spheres of life, thus the knowledge level of farm women was also measured for household activities.

Washing of clothes: While washing clothes, one should follow various water-saving practices like soaking clothes for half an hour prior to washing, use alternate buckets to rinse clothes instead of using direct running tap, use appropriate amount of detergent for washing the clothes as more detergent requires more water and the remaining water should be used to clean the floor and animal shed. It is apparent from the data placed in Table 3 that before awareness campaign, knowledge of most of the farm women regarding these practices of washing clothes was found to be medium (51.66%) and high (40%). Knowledge of only ten per cent of the farm women was low. After the awareness campaign, knowledge of farm women was increased to a high and medium level as reported by 60 and 36.67 per cent farm women respectively. It shows that farm women showed their keen interest in an awareness campaign to seek information regarding water saving technologies at the household level.

Kitchen related work: To save water in the kitchen, one should clean utensils with ash or ash mixed with detergent. Further cleaning the utensils, altogether, at the end of cooking, using a pressure cooker for cooking food, not defrosting or melting ice under running water are some water-saving practices. Data revealed that before intervention, majority of the farm women (67.5%) had medium whereas 28.34 per cent of farm women had high level of knowledge related to saving water during kitchen work, and it was inverse after the intervention, most of the farm women (80%) had high while 20 per cent had medium level of knowledge.

Bathing: Taking a bath using a bucket instead of the shower can save around 25 litres of water daily. One should not keep water tap running while brushing teeth, shaving, washing the face and bathing. It may result in a daily saving of 9 litres of water. Pre-knowledge test data indicated that sixty per cent of the farm women had a low level of knowledge followed by 35 and 5 per cent of the farm women who had a medium and high level of knowledge regarding bathing. Post knowledge test revealed that knowledge level of 85 per cent of farm women increased to high level followed by 8.33 per cent farm women at medium and 6.67 per cent at a low level of knowledge.

Cleaning of animal and its shed: One should not wash animal shed with water pipes instead wipe them to clean or wash shed with water on alternate days. Remaining water after washing clothes/ utensils should be used to clean the floor and animal shed. Use mug and bucket for bathing the animal. The knowledge level of farm

Table 3. Distribution of farm women according to the knowledge level of water saving technologies at the household level

(n=120)

Knowledge level	Pre test		Post- test	
	f	%	f	%
Washing of clothes				
Low (0-2)	10	8.34	4	3.33
Medium (3-5)	62	51.66	44	36.67
High (6-8)	48	40	72	60
Kitchen related work				
Low (0-2)	5	4.16		
Medium (3-5)	81	67.5	24	20
High (6-8)	34	28.34	96	80
Bathing				
Low (1)	72	60	8	6.67
Medium (2)	42	35	10	8.33
High (3)	6	5	102	85
Cleaning of animal and its shed				
Low (0-1)	16	13.33	2	1.67
Medium (2-3)	80	66.67	66	55
High (4-5)	24	20	52	43.33
Cleaning the floor and vehicles				
Low (0-1)	5	4.16	-	-
Medium (2-3)	84	70	22	18.33
High (4-5)	31	25.84	98	81.67
Kitchen garden and lawn				
Low (0-1)	6	5	-	-
Medium (2-3)	102	85	36	30
High (4-5)	18	15	84	70
Other techniques				
Low (0-3)	36	30	8	6.67
Medium (4-7)	58	48.33	40	33.33
High (8-12)	26	21.67	72	60
Overall				
Low (1-13)	12	16.0	6	8.0
Medium (14-27)	47	62.66	23	30.66
High (28-40)	16	21.33	46	61.33

women regarding these practices before *Jal Dhara* programme was medium (66.67%), high (20%) and low (13.33%). After the completion of *Jal Dhara* programme, knowledge was increased to high and medium level regarding the cleaning of animals as reported by 43.33 and 55 per cent of the farm women.

Cleaning the floor and vehicles: For cleaning the floor, one should dry brush and spot clean the floor. Sweep up the scraps regularly, and spot mop spills rather than washing the whole floor each time. We should not wash household and agricultural machinery (car, scooter, motorcycle, tractor etc.) with water pipes every day instead wipe them to clean. Knowledge level before the intervention was found to be medium and high as indicated by 25.84 and 70 per cent of the farm women. Only four per cent of the farm women had a low level of knowledge, but post knowledge test reported that there was a gain in knowledge of 81.67 per cent (high level) and 18.33 per cent (medium level) farm women.

Kitchen garden and lawn: To save water, we should irrigate kitchen gardens and lawnswith sprinklers in the morning or evening when the temperature is low so as to minimise evaporation. Knowledge level of farm women regarding irrigation of kitchen garden was low (5%), medium (85%) and high (15%) before the intervention and knowledge was increased after the invention as seventy per cent farm women gained knowledge to high level while 30 per cent of the farm women gained knowledge to medium level.

Other technologies: Other water saving practices include knowledge of repair of leaking water taps and pipes, checking of overflowing water tanks, using small nozzle taps at home. It was found that 48.33 per cent of the farm women had a medium level of knowledge followed by 30 and 21.67 per cent who had a low and high level of knowledge before the intervention regarding these practices at the household level. It was noticed that after the intervention, knowledge was increased to a medium and high level as reported by 33.33 and 60 per cent farm women respectively.

Overall data in Table 3 reported that before the intervention, the majority of the farm women (62.66%) had a medium level of knowledge regarding water saving technologies at household level followed by a high level of knowledge of nearly one-fifth of the respondents (21.33%). After the intervention, the knowledge level of most of the farm women (61.33) was high followed by nearly one third farm women (30.66%) who were at the medium level. Very few farm women (8.0%) had a low level of knowledge during post knowledge test.

The Table concludes that although farm women's knowledge level before the intervention was fairly good after intervention the majority of farm women had a high level of knowledge followed by a medium level. Previous research studies also emphasised that the impact of the training was important to improve the knowledge of participants [23].

4. CONCLUSION

The research paper concludes that the knowledge level of selected respondents for water-saving technologies at the farm and the household level were low to the medium during pre-knowledge test. After intervention as the awareness campaign (rally, street play, lectures, demonstration etc.), the post knowledge of respondents increased to medium to high level. The awareness campaign was successful in changing the knowledge level of respondents regarding the use of water saving technologies to mitigate the effects of climate change. The knowledge regarding water saving technologies is the need of the hour. The paper suggests that the farming community should be exposed to various microscale water conservation technologies and mitigation strategies through different extension methodologies. The extension personnel should make efforts to impart knowledge to the farming community to combat the challenge of climate change through microscale water conservation technologies both at the farm and household level.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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