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Farming Community Perceptions about Climate Change in Khyber Pakhtunkhwa Pakistan

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Abstract This study was conducted in Swabi district of Khyber Pakhtunkhwa with the objectives to study the knowledge of small scale farmers about climate change and its impact on livelihood and to pinpoint about the climate changes and temperature during last five years in Swabi district. For this 08 Union Councils (UCs) were selected from 56 UCs of the district randomly, from which 200 respondents were drawn through sample random sampling methods. Primary data were collected at the field survey through interviews structure schedule and were analyzed by using descriptive statistics and Chi-square test. Findings revealed most of the respondents were owner cum tenant and having un-irrigated land. Maize, wheat and tobacco were the main growing crops of the area. Majority of the respondents did not grow any fruit trees due to lack of water and heavy frost. The finds also pointed that changes observed in increased or decreased in temperature and monsoon rain during last 5 years which having drastic affect on the production of crops in the area. Farmer's adoptive and mitigative practices also change by bringing changes in the agronomic practices. The study as a whole concludes that climate change affecting the environment and agriculture sector. It was recommended that there is a need of awareness campaigns, farmer's education, farmers training and skill development, developing high yielding heat, cold/drought tolerant and short duration verities of crop and the adoption of agro forestry for reducing the climate change in agriculture sector.

Keywords: *farming, climate change, temperature and agriculture crop*

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1. Introduction

Climate is the long-term pattern of weather in a particular area and measured by assessing the patterns of variation in temperature, humidity, atmospheric pressure, wind flows, precipitation, atmospheric particle count and other meteorological variables over long periods of time [14]. Climate change arises from any drastic changes in the aforementioned meteorological variables [21]. Thus it is a real threat to life which largely affects water resources, agriculture, coastal regions, freshwater habitats, vegetation, forests, snow cover, geological processes; land sliding, desertification and floods all of which have long-term effects on food security and human health in one way or the other on the world population [10].

Like the other sectors climate changes have its negative impact on agriculture as well on one way or the other. The yield of many crops is being threatened severely due to increase in temperature in many parts of the word [15]. Increase in temperature also results in increasing pests attack and diseases which results in low crop production. Negative impact of climate change on crops and livestock poses a great threat to food security. Climate change negatively affects the livestock production by reducing the availability of feed and fodder. Some of the predicted impacts of climate change include increased variability in monsoon and winter rainfall patterns, increase in average temperatures, warmer winters, deteriorating ecosystems, the depression of glaciers in the Himalayas; and increased frequency of climatic extremes events like floods, cyclones, and droughts [13].

In the world around 1 billion people are living on less than 1$ a day, with the number increasing to 2.6 billion people living on less than 2$ a day' [20]. This pointed that majority of the poor still lives in rural areas and depends on natural capital for their livelihood, apparently, the environment and development agendas in developing countries are not separable from the negative impacts of climate change. This situation pose a great challenge to global public provisioning projects such as the Sustainable Development Goals is how to combine the noble endeavor of feeding the poor and vulnerable populations, while preserving the natural resource base and the environment, responding to environmental crises, global poverty and exclusion in most parts of the world.

Climate change challenges to sustainable development and poverty reduction are different from those prevalent during the 1980s and 1990s. While during the 1980s and 1990s, research on sustainable development tended to

negate economic growth under the limits to the growth hypothesis or to treat it as a poverty reduction misfit has given way to a new dominant paradigm, it considers economic growth a prerequisite for poverty reduction and a positive contributor to better standards of living. Others, of course, continue to treat economic growth as an instrument for wealth generation, accumulation and concentration that can hardly benefit the poor even if better environmental conditions are maintained and higher growth rates are achieved [3].

The effects of climate change on agriculture are characterized by various forms of uncertainty i.e. uncertainties concerning the rate and magnitude of climate change itself, uncertainties around the biological response of agricultural outputs, uncertainties as to how society responds or even has the capacity to respond to projected and expected impacts. Some of these uncertainties can be quantified, but many simply cannot, leaving some level of irreducible ignorance in our understandings of future climate uncertainty [5].

Pakistan is heavily populated country with 2.13 percent of area under trees and forests (World Bank, 2011). It consists of vast areas having very high average temperature. Even small increase in average temperature can cause abnormal weather changes leading to flash floods [1]. In hilly and mountainous regions of Khyber Pakhtunkhwa (KP) and non-irrigated areas of northern Punjab, floods have caused an extensive damage to the crops, livestock and infrastructure in the area and hence made the people more vulnerable in these regions. Excessive rainfall resulted in a poor crop production in highland of KP but seasonal rainfall remained normal during the winter season across the region. However the mean temperature is observed slightly above normal temperature during the winter season across the region [2]. Climate change is likely to exert adverse impacts on productive resources and ultimately on agricultural productivity throughout KP. The major climatic stresses that will exert pressure on agriculture are, increasing temperatures in arable areas, changes in rainfall pattern, increased variability of monsoon, changes in availability of irrigation water, severe water-stressed conditions, and extreme events, such as floods, droughts, heat waves and cold waves because Solar radiation, temperature and precipitation are the main drivers of crop growth as it is a well known fact that agriculture has always been highly dependent on climate pattern and variation. This study was conducted at Swabi District of KP with Community Based Organization, Swabi. District Swabi is highly vulnerable to the impact of climate changes. It already faces the challenges of addressing poverty and food insecurity, especially among the small-scale farmers whose livelihoods are further compromised by extreme weather. Climate change in Swabi is causing severe weather distortions, such as unpredictability in the start of the rainy season, variation in rainfall, and rising temperatures, all of which affect agricultural ecosystems tremendously. This study would provide district Swabi insight on a number of research questions concerning climate change and its impact with the following objectives.

2. Objectives of the Study

The overall objective of this study is to assess the impact of climate change on small scale farmers in Swabi district of Khyber Pakhtunkhwa, Pakistan. The specific objectives are as follows;

I. To assess the knowledge of small scale farmers on climate change and its impact on agriculture sector.
II. To study the adoptive and mitigative measure to climate and temperature changes by the farmers during the last five years in the area.

3. Research Methodology

Present study was carried out in Swabi district of Khyber Pakhtunkhwa-Pakistan, which comprised of four Tehsils and fifty six Union Councils (UCs) and for this study 08 UCs were randomly selected due to time and resources constraints. Farmers of this area were served as population of study. The random sampling methods were applied to choose 200 respondents. Primary data were collected through field survey interviews by means of a questionnaire and were analysed by using descriptive statistics and non- parametric tests as most of the information were qualitative in nature.

4. Results and Discussions

4.1. Tenure Status of the Farmers

Climate change impact on human land use systems and land occupation could potentially have a range of impacts on lands. The likely effects of climate change on land use, land occupation and settlement demand that the mainstreaming of climate change adaptation into national and supranational planning and policy frameworks should include land policy, and access and tenure, with both direct and indirect negative repercussions on human welfare, prosperity and livelihoods. Land tenure refers to the terms under which land and natural resources are held by individuals, households or social groups. The linkages between issues of climate change and variability and questions of land tenure are multiple, complex and indirect. Data in Table 1, present that out of the total sample respondents in whole district are 50% were reported as owner cum tenant, while 32% respondents were reported as tenant and the remaining 18% were owner of their lands. Among the UCs the percent owners was more in Topi UC, followed by tenant percentage in Lahore UC. This shows that the area having mostly small farmers for the cultivation of land. The test result shows that the land distribution is not even in the area and hence it is not significant.

Table 1. Distribution of respondents on tenure status

Tehsils	Tenural status of the respondents			Total
	Owner	Tenant	Owner cum tenant	
Lahore	7 (14)	21 (42)	22 (44)	50
Swabi	6 (12)	18 (26)	26 (52)	50
Razar	10 (20)	12 (24)	28 (56)	50
Toppi	13 (26)	12 (24)	25 (50)	50
Total	36 (18)	63 (32)	101 (50)	200
Chi-square= 7.933 and p value= 0.2430				

Source: Field Survey, 2015
Note: Values in parenthesis are percentages.

4.2. Farmers Land Types

Many studies indicate that in the un-irrigated areas rising temperatures will reduce crop yields in many regions, especially where soil, water and climate resources are already limited, including many food insecure countries. Impacts of increased under-nutrition on human health would further compound negative impacts, especially for smallholder, subsistence farmers and pastoralist communities, whose access to good land, adequate agricultural inputs and viable markets is limited [6]. The impacts of climate change on irrigation requirements will be felt through net changes in precipitation and evaporative demands, including impacts on regional water availability through snow melt, river flow, etc. The latter can be significant. Major changes in precipitation may impact river flow in key irrigated regions of the subcontinent [7]. To ass the impact of climate change land of the sample respondents was divided into irrigated and un-irrigated. Data in Table 2 shows that 58% respondents having un-irrigated land, while 42% having irrigated land. This implies that in the area there is the existence of more un-irrigated land which was more vulnerable to the climate change and hence the farmer are affected by the climate change phenomena by one way or the other. Thus the finding of this study is also supported by the findings of FAO [6]. The Chi-square value pointed that the respondents were not equally distributed in the types of land and hence the result of the test were not significant. Data also pointed that the percent owner of the un-irrigated were more in Lahore and Topi union councils and this is attributed by the fact that the land of these areas are still lacking the facilities of the modern technological irrigation system.

Table 2. Distribution of respondents on the basis of land types

Tehsils	Types of land		Total
	Irrigated	Un-irrigated	
Lahore	17 (34)	33 (66)	50
Swabi	20 (40)	30 (60)	50
Razar	24 (48)	26 (52)	50
Topi	22 (44)	28 (56)	50
Total	83 (42)	117 (58)	200
Chi-square= 2.204 and p value= 0.531			

Source: Field Survey-2015
Note: Values in parenthesis are percentages.

4.3. Main Crops Grown by the Respondents

Climate change has already caused significant impacts on food security, hydropower, human health and water resources. Climate change will add a significant set of challenges to agriculture and its underlying land and water resources. The changes in crop production related climatic variables will possibly have major influences on regional as well as global food production. Climate change will affect the food quality because of the increasing temperature and decreasing crop growth period. In this regards crop grown by the sample respondents were divided in to two main categories i.e. food crop and cash crop. Food crop main includes wheat and maize and cash crop include tobacco only. The Data in Table 3 shows that wheat is one of the most popular crops of the area and overwhelming majority (100%) respondents reported for its cultivation in all the selected union councils in the area. The reason for this may be the lacking of irrigation water in most of the area under study and also the responses preferences for this food staple crop. The data also pointed that 66% of the respondents growing maize in almost all union councils of the study. It was also reported by 34 % of the respondents that they are growing tobacco as a cash crop at their field and the percent distribution of the respondents was more in union council Razar and Swabi. This is because that in these two union councils there were more irrigated area as compared to the others two UCs. It was also reported by the respondents that sugarcane, barley, brassica, millet, cowpea, opium and chickpea were also commonly grown in the past, but due to change in climate these crops are not grown now a days. In some areas sugarcane were also grown by farmers as a cash crop on small scale. This implies that main crops of the area were wheat, maize and sugarcane due to the suitable environment of the area for its growing.

Table 3. Distribution of respondents on the basis of main crops grown

Tehsils	Food and cash crop grown by the respondents		
	Wheat	Maize	Tobacco
Lahore	50 (100)	33 (66)	17 (34)
Swabi	50 (100)	31 (62)	19 (38)
Razar	50 (100)	28 (56)	22 (44)
Toppi	50 (100)	41 (82)	9 (18)
Total	200 (100)	133 (66)	67 (34)
Chi-square= 8.33 and p value= 0.215			

Source: Field Survey-2015
Note: Values in parenthesis are percentages.

4.4. Types of Fruits Trees Grown

Most of the rural people in the world are food insecure and malnourished and most of the households have been reported to experience food shortages by many researcher and development agencies. The households face food insecurity, and poverty is the major factor hampering development in rural areas of the world and especially in Pakistan. Scherr [17] stressed that rural households' survival strategies encompass multiple objectives in maximization of utility, like provision of food and subsistence goods, cash for purchase of goods and services and saving for future needs. Households therefore depend on various activities to sustain their livelihoods. They choose a combination of activities that contribute most towards their multiple objectives and yields greatest utility [11]. Fruit trees are an important component of rural people's basket of natural resources mostly among the marginalize groups in society. In this regards data in Table 4 indicated that the majority of respondents (90%) did not grow any fruit trees due to lack of water and heavy frost. The farmers also informed during discussion that there were orchards of grapes and guava but due to climate change it is also not grown in the area. However the plum fruit orchards lead to 5%, 4% apricot and 1% cantaloupe. The data as a whole stated that mostly the respondents in the area are not grown any kind of fruit trees on the field, implies that there is little agro forestry in the area. The test result is not significant and there is no association in the respondent's opinions about the fruits trees grown in the area.

Table 4. Distribution on the basis of fruits grown

Tehsils	Types of fruits trees grown				Total
	Apricot	Cantaloupe	Plum	Not grown fruits trees	
Lahore	2 (4)	0 (0)	4 (8)	44 (88)	50
Swabi	3 (6)	0 (0)	2 (4)	45 (90)	50
Razar	2 (4)	0 (0)	2 (4)	46 (92)	50
Toppi	2 (4)	1 (2)	2 (4)	45 (90)	50
Total	9 (4)	1 (1)	10 (5)	180 (90)	200
Chi-square= 4. 578 and p value= 0.869					

Source: Field Survey-2015
Note: Values in parenthesis are percentages.

4.5. Types of Vegetables Grown

Vegetable production is one of the human basic skills. The level of success and productivity of vegetables production depend on the local climate and season and the range of species cultivated. Also a successful vegetable production is very much dependent upon supply of satisfactory seeds which grows easily in the available environment. Commercial production of vegetables has extended considerably during the past few decades in many parts of the world as large-scale enterprises to provide for fresh market and export. There are several reasons for growing vegetables, but the most important is for food, as vegetables are essential in diet, provide fiber, trace minerals, vitamins, carbohydrates and proteins [9]. There are some relatively small-scale producers who aim at self- sufficiency in vegetables for the sale or exchange in village communities. Farmers of Swabi district were involved in vegetable production on limited scale due to change in climate. Data in the Table 5, shows that 71% farmers were not growing vegetables. The main vegetables grown were lady finger 9%, turnip 5%, radish 4%, spinach 3%, bitter guard 2%, pumpkin 2%, tomato 2% and carrot 2%. The female respondents during the interviews reported cultivation of tomato, cucurbits, and pumpkins in limited quantities. Most of these were grown on a large scale in the past. Their cultivation has reduced due to environmental conditions, shortage of water and labor. This implies that large numbers of respondents (76%) were not growing vegetables due to some water problems and climate change.

Table 5. Distribution on the basis of vegetables grown

Tehsils	Types of vegetables grown by the farmers								
	A	B	C	D	E	F	G	H	I
Lahore	0 (0)	0 (0)	3 (6)	1 (2)	2 (4)	2 (4)	0 (0)	2 (4)	40 (80)
Swabi	2 (4)	1 (2)	4 (8)	1 (2)	2 (4)	1 (2)	1 (2)	3 (6)	35 (70)
Razar	1 (2)	2 (4)	6 (12)	2 (4)	2 (4)	1 (2)	3 (6)	2 (4)	31 (62)
Toppi	1 (2)	0 (0)	5 (10)	0 ()	3 (6)	2 (4)	0 (0)	3 (6)	36 (72)
Total	4 (2)	3 (2)	18 (9)	4 (2)	9 (4)	6 (3)	4 (2)	10 (5)	142 (71)

A= Bitter gourd, B=Carrot, C= Lady Finger, D= Pumpkin, E=Radish, F=Spinach, G=Tomato, H=Turnip, I= Not grown any vegetables
Source: Field Survey-2015
Note: Values in parenthesis are percentages.

4.6. Perception about Temperature Change Trends

Crops grown in a particular area need a right temperature. Climate change could make it too hot to grow certain crops, and droughts caused by climate change could reduce the amount of water available for irrigation. Climate change is also likely to cause stronger storms and more floods, which can damage crops. Higher temperatures and changing rainfall patterns could help some kinds of weeds and pests to spread to new areas. In this regards farmers were asked about the change in temperature during the last five years. Data in Table 6 present changes observed in temperature during last 5 years. The data in the table pointed that 93% respondents reported for change in the temperature and says that the temperature increase in winter, spring, summer and autumn and 7% of the respondents pointed that the temperature decreased during last five years. During the group discussion, farmers reported that temperature is raising gradually which impact the duration of crop growth and speed up crop growth and shorten the duration between sowing and harvesting. This shortening could have an adverse effect on productivity of crops and fodder for livestock, it also has its negative impact on livestock because young animals are susceptible to high temperature as compared to adult animals which is considered to be the big hurdle for the farmers to rare farm animals. This result verified the findings of Martin [12], who founds that climate change is clearly visible during the last century in Khyber Pakhtunkhwa (KP) province of Pakistan by reporting that temperature is considerably increasing in the months of autumn and winter in high altitudes of North-West frontier Pakistan where growing season is too short for crops to reach maturity. The finding was also supported by the report of (TFFC, 2010) pointed that temperature increase in Pakistan is expected to be higher than the global average which resulting in reduced national agricultural productivity. Warmer temperatures may make many crops grow more quickly, but warmer temperatures could also reduce yields.

Table 6. Perceptions of respondents about climate change trends during last five years

Change in temperature		Lahore	Swabi	Razar	Toppi	Total
Has the temperature increased or decreased during winter, spring, summer, autumn, over the last 5 years changed?	Increase	47 (94)	50 (100)	40 (80)	49 (98)	186 (93)
	Decreased	3 (6)	0 (0)	10 (20)	1 (2)	14 (7)

Source: Field Survey-2015
Note: Values in parenthesis are percentages.

4.7. Changes in Moon Soon during Last Five Years

Seasonality is caused by the tilting of the Earth, while the monsoon weather systems are a result of the land-sea temperature differences caused by solar radiation [8]. When the Earth rotates and revolves around the Sun, different seasons occur due to the different land masses of the northern and southern hemispheres. Monsoonal areas receive summer rainfall maximums and most of double rainfall maximums. Monsoon not only influences Asian countries, but also breaches beyond the tropical latitudes. Monsoon rainfall can also affect regions that were not originally considered as monsoonal [18]. The two main monsoon regimes are specifically named the northeast monsoon (winter monsoon) from November to March, and the southwest monsoon (summer monsoon) from late May to September. Furthermore, October is the transition month from the southwest to northeast monsoon seasons [4]. The data in Table 7 shows perception of the respondents about the change in monsoon occurred. It is evident from the data that 82% respondent reported that monsoon rains comes two weeks earlier, from their normal occurrence while 12% respondents says that the monsoon comes 3 weeks earlier from the normal, where as 6% respondents says that monsoon comes one week earlier . According to respondents change in the timing of monsoon is observed over the last 05 years; however, the intensity of monsoon has decreased. This implies that if monsoon rains comes earlier, then may be crops sowing time are delayed, are also damage crop in young or in maturity stage where irrigation are not necessary, so this climate change can effect farmer's livelihood as well as country's agriculture productivity.

Table 7. Respondents perceptions regarding change in timings of monsoon

Tehsils	Change in timing of monsoon over last 5 years	If yes, monsoon rains received how many weeks earlier (weeks)		
	Change in moon soon timing observed	One week	Two weeks	Three weeks
Lahore	50	3 (6)	40 (80)	7 (14)
Swabi	50	2 (4)	42 (84)	6 (12)
Razar	50	6 (12)	37 (74)	7 (14)
Toppi	50	1 (2)	44 (88)	5 (10)
Total	200	12 (6)	163 (82)	25 (12)
		Chi-square= 5.763 and p value= 0.450		

Source: Field Survey-2015
Note: Values in parenthesis are percentages.

4.8. Changes in Quantity of Monsoon Received

Increasing in temperature in the late 21st century and early 22nd century will cause frequent changes and shifts to the monsoon precipitation up to 70% below normal levels [19]. The small scale regional circulations are more vulnerable to variations in monsoon rainfall [16]. There is no doubt that precipitation patterns have changed globally in recent. Monsoon flooding in Southeast Asia have impacted many people in terms of loss of lives and property damage. In this regards the data in Table 8, shows the changes occurred in quantity of monsoon during the last 5 years. It is evident from the data that 84% of the respondents reported that there is change in the quantity of monsoon, where as 16% pointed that they have not seen any change. Those respondents who have said that change in quantity of monsoon occurred, in which 46% of respondents reported that Monsoon has increased to some extent, 29% mentioned that moon soon has increased heavily and 25% pointed that moon soon has slightly decreased. This implies that change in quantity of monsoon occurred in the area and thus can brings many problems i.e. floods, which destroy all the crops as well as farmer's homes, so it effect farmer's livelihood at a very large scale. The test results pointed that is a significant change took place in the farmer's perceptions regarding the monsoon seasons, while the perceptions results regarding how the monsoon commence was not significant as per Chi-square value.

Table 8. Distribution of respondents on change in quantity of monsoon during last five years

Tehsils	Change in quantity of monsoon		Total	If yes, then how		
	Change	Not change		Monsoon has increased to some extent	Monsoon has increased heavily	Monsoon has slightly decreased
Lahore	41 (82)	9 (18)	50	23 (46)	9 (18)	9 (18)
Swabi	42 (84)	8 (16)	50	22 (44)	13 (26)	7 (14)
Razar	44 (88)	6 (12)	50	18 (36)	15 (30)	11 (22)
Toppi	41 (82)	9 (18)	50	15 (30)	11 (22)	15 (30)
Total	168 (84)	32 (16)	200	78 (39)	48 (24)	42 (21)
Chi-square= 0.893 and p value= 0.827			Chi-square= 6.912 and p value= 0.329			

Source: Field Survey-2015
Note: Values in parenthesis are percentages.

4.9. Changes in Farming Practices due to Climate Change

Climate change is inevitable and unstoppable in its nature. Increases in precipitation and temperature can lead to increased pest and disease pressure on crops and livestock, with changes in overwintering survival, regional distribution, growth rates and outbreaks. In this situation the climate change will add a significant set of challenges to agriculture and its underlying land and water resources. In this the farmers have to adopt or have to mitigate in

order to overcome the problem of climate change. The benefits of adaptation of land and water management are most pronounced with low to moderate warming. A large number of existing farm-level management practices are already available as a basis for devising climate change response strategies needed in coming decades. These include growing new varieties and species that are more adapted to altered thermal and hydrological conditions; rescheduling of farm management practices such as irrigation and nutrient application to better match altered phonological cycles; implementation of technologies that conserve water and soil. By noting this perception of the farmers the data in Table 9 shows changes occurred in farming practices in the last five years. It is evident from the data that 43% of the sample respondents reported for change in the crop verities having more tolerance to the disease and pest. It was also reported by 47% of the sample respondents that to overcome the problem of climate change the farmers of the area change the sowing time of different crops., It was also reported by 27% of the sample respondents that changes occurred in weeding practices, while 23% of the respondents for the change in using fertilizers and 16% of the respondents pointed for change in irrigation practices in the area in-ordered to overcome the problem of water shortage in the area. This implies that these changes occurred due to climate change and the findings also indicates that the farmers need technical direction and guidelines in irrigation, fertilizers use, weeding practices, provision of climate change resistance verities and proper sowing time according to the climate change phenomena. The p-value suggest that the farmers agronomic practices change due to the climate change in the area.

Table 9. Distribution of respondents on changes in farming practices

Practices	Changes reported	Changes not reported
Change in varieties	166 (83)	34 (17)
Change in sowing timing	154 (77)	46 (23)
Change in weeding	146 (73)	54 (27)
Change in irrigation	32 (16)	168 (84)
Change in fertilizers	46 (23)	154 (77)
Chi-square= 247.049 and p value= 0.00001		

Source: Field Survey-2015
Note: Values in parenthesis are percentages.

4.10. Farmer's Expectations about Services

Essential feature of rural agriculture farming is the ability to adapt to natural variability to ensure long-term sustainability of food production. From the technical perspective of needed solutions, many management-level adaptation options are largely extensions or intensifications of existing climate risk management, or of known production enhancement activities, developed over past decades in response to climate variability across a range of plant-growth environments. Data in Table 100 shows the results of the farmers expectation priority of services required to combat climate change and increase production of crops. It was reported by 98% of the sample respondents that agriculture extension services will be required at the field level, 93% of the respondents pointed for the livestock services while 94% of the respondents mentioned that there is a need of meteorological services. It was also mentioned by 86% of the respondents that tunnel farming is a solution to overcome the climate change. The data further pointed that 78% of the respondents mentioned for the provision of irrigation services followed by 73% of the respondents mentioned for the more tolerance verities.

Table 10. Distribution of farmer's expectations about services to be provided

Farmers expectations	Frequencies	Percentages
Agricultural extension services	197	99
Livestock services	186	93
Meteorological services	183	92
Tunnel farming	175	88
Irrigation system	158	79
Varieties development	146	73
Arrange field days	138	69
Demonstration plots	131	66
Capacity building	117	59
Farmers trainings	93	47
Latest information	72	36

Source: Field Survey-2015
Note: Values in parenthesis are percentages.

5. Conclusion and Recommendations

Form the findings it was concluded that majority of respondents having the middle age group and having better knowledge of farming. Household size was large as other parts of rural Pakistan and majority of the respondents were literate. Most of the respondents were owner cum tenant and having un-irrigated land. Popular crop of the area as mentioned by overwhelming majority for its cultivation were maize, wheat and tobacco. Majority of the respondents did not grow any fruit trees due to lack of water and heavy frost. Changes observed in temperature and monsoon during last 5 years by increasing the density of the monsoon and rising in the temperature. Farmers adopting and mitigative practices also change and they are trying to overcome the problem of climate change by one way or the others. On the basis of the repot findings the following recommendations are forwarded for consideration to secure securing the farmer future from the upcoming challenges in the field of agriculture. There is a need for creating awareness campaigns, farmer's education, farmers training and skill development through farmer field schools and mass media about the climate change and irrigation of more land coupled by the developing of high yielding heat, cold tolerant, drought resistant and short duration verities of crops and vegetables.

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