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Locals Perspectives towards Climate Change and Its Effect in Buner District of KPK, Pakistan

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Abstract

Purpose: This study was conducted during September 2015-August 2016 to know the perception of people living in expansive territory of district Buner, KP Pakistan on CC. Methodology: Sample size of 384 was selected. This study was based on stratified random sampling technique using a structured and detailed questionnaire for collection of data. Among educated respondents (84.48%) questionnaires were distributed while from illiterate ones (15.10%) semi structured interviews were conducted. Sociodemographic variables and knowledge of CC was explored by cross tabulation and measured using chi square tests.

Results: The study revealed that majority of the participants (86.7%) had some knowledge of CC but (13.3%) did not. Respondents (89.5%) claimed that CC had negative impacts on the livelihoods of residents. The people in the area have realized the causes of the CC that is deforestation, anthropogenic activities and increased population.

Conclusion: The recruited respondents had sufficient knowledge of CC and its impact on their livelihoods. Present study revealed that extreme cold winters of district Buner has been changed to a warmer and mild weather over time. The impacts of CC were in the form of negatively affected livelihoods which is still in progression on the majority of the participants. Negative impacts of CC experienced by respondents (89.50%) are in the form of flooding, loss of biodiversity and various diseases while some respondents (10.50%) experienced positive impact of CC.

Recommendations: Human activities contributing to CC should be reduced. Communities should be made aware of CC and its harmful effects through different awareness campaigns.

Keywords: climate change, perception, greenhouse gases.

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Introduction

Fluctuation in atmospheric temperature and periodic rainfalls patterns referred as CC is observed throughout world due to industrial revolution and advancements in different fields (Ullah *et al.,* 2015). CC is due to increase atmospheric concentration of greenhouse gases such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO_2) and other anthropogenic activities (Khan *et al*., 2012; Ishaq *et al*., 2015). In last few decades extreme climate events with increased incidence frequency and intensity has been observed throughout the world. About 40% of Pakistan population is subjected to disasters with rise

in sea level, variation in rainfall patterns resulting in floods and droughts due to increased temperatures (Shakoor *et al*., 2011; Salma *et al*., 2012).

On global scale decreased precipitation level and increased surface temperature is the result of excessive deforestation, thus generating major global threat to biodiversity and natural ecosystems (Ishaq *et al*., 2015; Pandit *et al*., 2017). Due to deforestation and massive use of fuels an increase in CO_2 concentration has been noted from 280ppm to 380ppm (Shakoor *et al*., 2011). Among twelve highly exposed countries to CC, Pakistan is also having higher degree of risk to face the ill impacts of CC (Ullah *et al.,* 2015). In Pakistan, 2010 flood caused approximately 2000 mortalities and destroyed more than 700,000 buildings, houses and other infrastructures (Salma *et al*., 2012).

Underdeveloped countries depends on agricultural sector that accounts for large share in gross domestic products (GDP). So a country should make its agriculture sector efficient to promote economic growth. Northern areas of Pakistan including district Buner plays a pivotal role in the agriculture sector. According to an estimate temperatures will rise by 3°C till 2040 and 5-6°C by the end of this decade due to which Asia can lose 50% of its wheat production (MoE, 2009; Ashraf and Iftekhar, 2013). Owing to the unpredictable and unexpected scenario of CC, the present preliminary study was aimed to find out the perception of people towards CC and its impacts on their livelihoods at District Buner KP, Pakistan.

Study Area
District Buner situated in the northern part of Pakistan is at latitude of 34.6° to 34.18° north and longitude of 72.48° to 72.5° East (Khan *et al*., 2012). It is bounded on the north by district Swat, on the south by district Mardan, on the West by Malakand agency and by river Indus and Hazara divisionon the east. District Buner is having elevation from 1200ft in Totalai to 9,550ft of Dosara peak. River Barandu, the largest river of the district originates from many springs and streams (Hamayun *et al*., 2003). River Barandu after flowing in tehsil Daggar enters to tehsil Gagra and ultimately falls into the river Indus at Kala Dhaka (Saeed *et al.,* 2013). District Buner comprises of 6 Tehsils i.e. Tehsil Daggar, Tehsil Gagra, Tehsil Gadaizi, Tehsil Chamla, Tehsil Totalai and Tehsil Chagharzai. Figure 1 is showing study area.
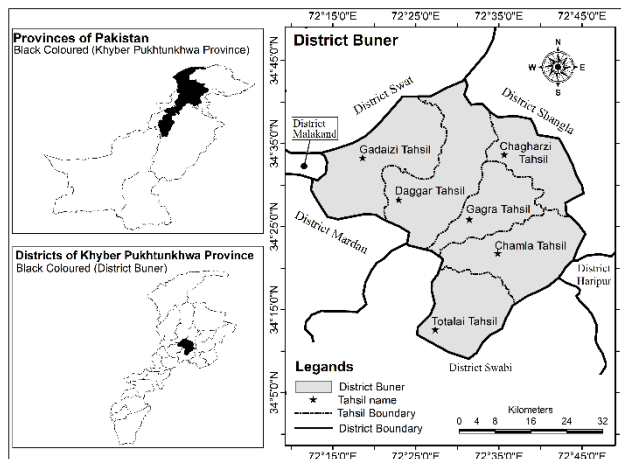

Fig. 1: Geographical division of the study area (District Buner KP Pakistan).

Materials and Methods

This study was based on stratified random sampling technique using a structured and detailed questionnaire for collection of data. The actual sample size (N) was calculated for all Tehsils of district Buner. The following formula (Maryam *et al.,* 2014) was used where sample size N along margin of error E (5%) is given by:

$$X = Z(c/100)^2 r (100-r)$$
$$N = N x / ((N-1) E^2 + x)$$
$$E = Sqrt [(N - n) x /n (N-1)]$$

Where N is the population size, r is the fraction of responses (50%) that authors were interested in, and Z(c/100) is the critical value for the confidence level c (95%). The population of the 6 tehsils of district Buner is 506048 (Census Report of Pakistan (1998)). The sample size (N) is 384. It was calculated by putting values in the above mentioned formula. The following formula (Gutierrez *et al*., 2013) was used for sample selection from each tehsil:

ni = n. Ni/N   Where,
ni = Sample Size to be selected from each Tehsil
n = Total Sample size
Ni = Total population in each Tehsil
N= Population in 6 Tehsils.

The sample size from each tehsil is given in Table 2. A total of 70 respondents were interviewed in Tehsil Gagra, 53 in Tehsil Totalai, 88 in Tehsil Daggar, 58 in Tehsil Gadaizi, 38 in Tehsil Chagharzi and 77 in Tehsil Chamla respectively. The questionnaire were

having introductory questions like social status, age, educational level, occupation, origin (rural/ urban) and more focused on the causes and impacts of climate change on livelihoods of residents of Buner. The questions in the questionnaire and interviewed from respondents are given in (Table 1). Questionnaire was distributed among 384 respondents of district Buner, KP Pakistan. Illiterate respondents were interviewed in local language Pashto, to know their perceptions about CC in their locality. Map for the study area was prepared using *ArcGIS 10.3.1* version.

Table – 1: Questions included in the questionnaire / asked during interviewing the respondents.

Q. No	Questions asked
1	Have you heard of climate change?
2	Where you heard about climate change?
3	What do you think causes climate change? (Deforestation, anthropogenic activities, increased population, improper disposal etc)
4	How important is the issue of climate change to local community (positive and negative impacts)?
5	Several possible locals (your community) climate change impacts on human health-related illness, tourism, agriculture etc.
6	Several possible regional climate change impacts (Longer summers, extreme drought, warmer winter, habitat and species shift, diminishes ice cover, increased wind speed, decreased rainfall, rise in sea level etc)
7	Economic impacts of climate change?

Table – 2: Sample size selected for each tehsil of district Buner.

Tehsil name	Pop. Per Census Report (1998) (Ni)	Sample size selected for study n. Ni/N
Gagra	92702	70
Totalai	70458	53
Daggar	115927	88
Gadaizi	76257	58
Chagharzi	50356	38
Chamla	100348	77

Statistical analysis
The acquired data was analyzed through Statistical Package for Social Sciences (SPSS), Version 23. The percentages of variables were calculated using descriptive analysis. Sociodemographic variables and knowledge of CC was explored by cross tabulation and measured using chi square tests with 95% confidence intervals (CI).

Results and discussion

The response rate was identified for the credibility of the research results by standard method suggested by Council of American Survey Research Organization (CASRO) (Table 3). In response to question about knowledge of CC, 333 (86.7%) of the participants acquired knowledge about CC from some source and 51 (13.3%) had not heard of CC at all. The results are similar in two other studies conducted in Bangladesh by Kabir *et al*., (2016) and in Nigeria by Asekun-Olarinmoye *et al*., (2014). Where 54.2% and 54% respectively, of the participant reported they know about CC. During the study period respondents from different age groups were recruited to view perception and their knowledge about CC on basis of their life experiences. Of the total respondents, 44.40% were between 16-25 years, 20.57% in 26-35 years, 16.60% in 36-45 years, 11.55% in 46-55 years and 6.85% in 56-65 years (Figure 2).

Table –3: Cumulative and response rate of the total interviews.

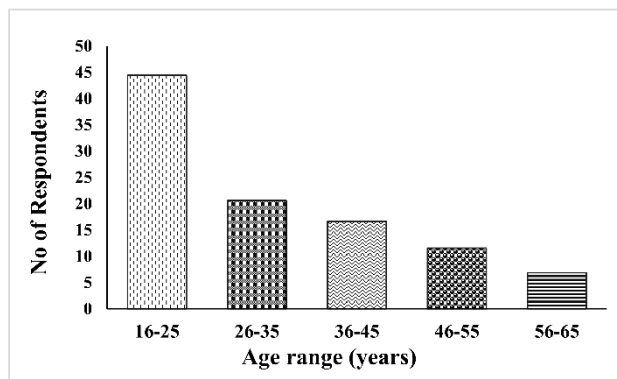| Call	Attempts	People interviewed	Cumulative	Response rate (%)
1	201	103	103	51
2	165	81	184	55.2
3	143	74	258	65.3
4	101	51	309	69.2
5	90	43	252	77
6	80	32	384	84.2

Fig 2: Age groups of the respondents

All participants were comprising of 171 (44.53%) males and 213 (55.46%) females. Of the total respondents 15.10% were illiterate and 84.48% were educated. Among educated respondents 8.66% having 5 years of education, 35.10% having 10 years, 31.40% having 12 years and 9.74% were graduates (Figure 3). During this survey 58.84% of the respondents belong from rural areas while 41.15% respondent's origin was urban. In contrast a study conducted by Kabir *et al.*, (2016), most participants were male, illiterate and were from the rural areas.

Male and female sex were not significantly associated with knowledge of CC (P > 0.05) while age, origin and education were significantly associated with knowledge of CC (P < 0.05) (Table 4).

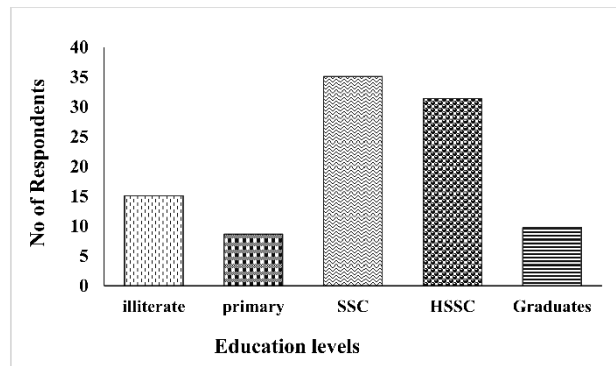**Fig 3:** Education and literacy level of the respondents

Table –4: Association between sociodemographic variables and knowledge of CC.

Variables		Knowledge of climate change			Statistics
		Yes	No	Total	
Sex	Male	151	20	171	$X^2 = 0.897$
	Female	181	32	213	$df = 1$
	Total	332	52	384	$p = 0.344$
Age	16-25	154	16	170	
	26-35	65	14	79	$X^2 = 9.937$
	36-45	58	6	64	$df = 4$
	46-55	35	9	44	$p = .041$
	56-65	20	7	27	
	Total	332	52	384	
Origin	Rural	184	42	226	$X^2 = 11.928$
	Urban	148	10	158	$df = 1$
	Total	332	52	384	$p = .001$
Education	illiterate	39	18	57	
	primary	25	9	34	$X^2 = 29.109$
	SSC	125	10	135	$df = 4$
	HSSC	112	9	121	$p = .000$
	Graduates	31	6	37	
	Total	332	52	384	

Among the knowledgeable participants (n = 333), respondents viewed that they get information about CC from different sources i.e., friends or family 178 (53.7%), newspaper 57 (17.2%), internet 41 (12.5%), television 33 (9.3%), and schools 24 (7.3%). This is incompatible with the study conducted by Ullah *et al.,* (2015). From the list of probable causes presented on the questionnaire, deforestation, anthropogenic activities and increased population, were the most common causes, with 83% choosing these responses as main causes of CC. These results also supported by a study conducted by Asekun-Olarinmoye *et al.*, (2014). Some of the respondents (10.50%) claimed CC to have positive impacts on their lives while CC had negative impacts on 89.5% respondents. Supporters of the negative impacts of CC proclaimed that due to change in climate, loss of biodiversity and various diseases *i.e.,* heat strokes, pneumonia, malaria, dengue fever, and vector borne diseases occurred. Similarly Kabir *et al.,* (2016) conducted a similar study in Bangladesh. They concluded that there will be increased incidence of CC related diseases such as

malaria, dengue fever, pneumonia and diarrheal diseases. Findings of Sayed, (2011) and Ullah *et al.,* (2015) proposed that various diseases, glaciers melting and floods occur due to warmer temperature, heavy rain fall and increased humidity. Breeding sites for insects and other infectious agents were formed due to heavy rainfalls, humid environment and warmer temperature which can pose epidemic diseases. According to Lutambi *et al.,* (2013) mosquito serves as vector of many diseases. Respondents further added that warmer climate can lead to spreading of different types of skin diseases including pigmentation on skin and ring worms etc. Study conducted by Maryam *et al.,* (2014) in upper Swat KP, Pakistan also concluded that hotter seasons has role in diseases transmission thus making people especially elderly prone to skin allergies and respiratory disorders.

According to the respondent's tourism and agriculture of the study area is also badly affected. Likewise according to McMichael *et al.,* (2003) due to CC some countries are at serious risk of losing their valuable ecosystem and economic benefits of fisheries and tourism. Respondents noted that extreme weather including high temperature can also stress livestock. Bormann *et al.,* (2012) explored that in recent decades CC has changed over all life style of people as well as irrigation, agriculture practices and livestock activities. According to respondents CC has vanished some medicinal plants. Similarly studies of Friesinger and Bernatchez, (2010) and Maryam *et al.,* (2014) concluded that many animals and medicinal as well as wild plants have been disappeared because of CC.

Warmer climatic condition also favors reproduction of insects (pests) poisonous reptiles and amphibians resulting in reduced production of corn, fruits and other crops. Respondents further stated that due to rise in temperature the fruits restricted to these colder areas showed reduced production. Similar results shown by studies of Hussain, (2013) and Lutambi *et al*., (2013) respectively.

On account of positive impacts 10.50% of respondents were of view that there is some positive impacts of CC in their area. Respondents stated that due to CC they perform routine life activities especially in winter season which in past was with heavy snowfall and rainfall. According to the survey reports of Maryam *et al*., (2014) and IPCC, (2007) an increase in social, political, educational activates of people has been noted in winter due to change from extreme to moderate climate. Respondents further added that in winters rise in temperature had decreased the risk of

seasonal health disorders such as chest infection. In contrast study conducted by Bush *et al.,* (2011) in India, claimed that an increase in climate will aggravate global health disparities causing many diseases. Few respondents said, in the past due to extreme cold in winter taking care of their herds was hard but now winters are mild so they can easily graze their herds. Our result was supported by study of Sayed, (2011).

Rise in temperature has positive affect on wheat productivity due to longer growing season in cooler regions which allows farmers to have multiple harvests from the same plot. In present study farmers proclaimed that due to rise in temperature growing fruits and vegetables of hot areas i.e., mangos is now possible in these colder areas thus fulfilling demand. Similarly Maryam *et al.,* (2014) and Ahmad *et al.,* (2013) proposed that fruits and crops of warmer areas can be cultivated in areas previously facing extreme climate and ripening of fruits take less time due to CC. Majority of the respondents (72.6%) were of the view that the most possible regional impacts of the CC is extreme drought, warmer winters, habitat and species shift, decrease in rain fall, rise in sea level. Changing climatic conditions greatly affects thereby decreases the productivity of agricultural sector. In the present study area, the negative impact due to CC is greater than the positive effect. Likewise studies conducted by Shakoor *et al.,* 2011, Maryam *et al.,* (2014) and Ullah *et al.,* 2015 also showed greater negative impacts of climate change than its positive impacts.

Conclusion

The recruited respondents had sufficient knowledge of CC and its impact on their communities. Present study revealed that extreme cold winters of district Buner has been changed to a warmer and mild weather over time. The people in the area have realized the causes of the CC i.e., Deforestation, anthropogenic activities and increased population, were the most common causes. The impacts of CC were in the form of negatively affected livelihoods which is still in progression on the majority of the participants. Some respondents (10.50%) experienced positive impact of CC. Respondents stated that due to CC they perform routine life activities in winter season which in past was with heavy snowfall and rainfall. In winters rise in temperature had decreased the risk of seasonal health disorders such as chest infection. Rise in temperature has positive affect on wheat productivity

due to longer growing season in cooler regions which allows farmers to have multiple harvests from the same plot. In present study farmers proclaimed that due to rise in temperature growing fruits and vegetables of hot areas i.e., mangos is now possible in these colder areas. Negative impacts of CC experienced by (89.50%) respondents are in the form of flooding, loss of biodiversity and various diseases. *i.e.,* heat strokes, pneumonia, malaria, dengue fever, and vector borne diseases occurred. different types of skin diseases including pigmentation on skin and ring worms etc. According to the respondents CC has vanished some medicinal plants in the study area. Warmer climatic condition also favors reproduction of insects (pests) poisonous reptiles and amphibians resulting in reduced production of corn, fruits and other crops. Respondents further stated that due to rise in temperature the fruits restricted to these colder areas showed reduced production. Changing climatic conditions greatly affects thereby decreases the productivity of agricultural sector. As a result causes great economic loss.

Recommendations

Human activities contributing to CC should be reduced. Communities should be made aware of CC and its harmful effects through different awareness campaign.

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