



Climate Change and Women Health Nexus: Evidence from District Gujranwala

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Abstract

Climate change is one of the main challenges that affect human health. This study focused on the changing climate patterns and women's health in District Gujranwala, Punjab, Pakistan. This study used logistic regression for a sample size of 350 ever-married women and the data were collected (Jan, 2019-Mar, 2019) using convenience sampling. In univariate analysis, it found that, out of 350 sampled female participants, there were 66.3% of women who have good physical health and 51.70% have their own health care decision. However, 67.40% of women's health was affected by changing patterns of weather, 30.60% of women suffered a lot due to air pollution, 39.40% were affected by high temperature, and 2.3% by floods, 04.90% by drought, 03.40% by short & intense rains, 05.10% by dry spells and 71.70% were harmed by climate change. The results of logistic regression analysis depicted that the married women have 3.265 times more chances to have good physical health as compared to the women whose marital status is currently separate. The women affected by smoke/smog/blur vision due to the air pollution, have 3.912 times more chances to have bad physical health. The woman interviewed at the household has 1.88 times more chances to have good physical health as compared to those women who were interviewed at the workplace. This study concludes that the climate changes (increasing rate of heat, dry spells, non-forecasted rains and some other factors) affect women's health severely.

Keywords: Climate Change, Weather Conditions, Physical health, Women's Health, Pakistan

JEL Codes: I10, Q54

1. Introduction

Climate change is a state of the climate that comes as an outcome of changes in its properties and characteristics over a longer period usually ten years or more. Human health - referred to as a condition of absolute physical, mental and social welfare, without any disease or sickness - is affected by various socio-economic, demographic and environmental factors. The climate along with other stressors of health influences physical as well as mental health in numerous. Climate change influences several environmental and social factors that help in determining health such as clean water, fresh air, secure accommodation and adequate availability of food. According to WHO (World Health Organization) due to climate change about 250,000 individuals are expected to die per year from 2030 to 2050. Overall environmental change is an Anthropocene issue of human-exhibited environmental adjustments, for instance, land debasement, ocean ageing, and disrupting impact or annihilation of the Ozone Centre, soil readiness, freshwater resources, biodiversity stocks and organic framework working, and overall nitrogen cycles. Besides that, cutting of trees and ocean spread have added to Earth's temperature through a reduction in the point of confinements of extra carbon dioxide. In addition, cosmological and geographical effects include regular appointments in the heat and air (Michael, 2013). Climate change is an extraordinary threat to health. The biggest contributors to climate change are economic recovery and rapid urbanization of immature countries. The creation of urban areas due to climate change is posing real health risks (Lendrum & Corvalan, 2007).

Recently the concern regarding how a change in climate can impact health and social solidity is gaining attention (Dyer, 2010; Haider and Ali, 2015; Werrell and Femia 2017; Sajid and Ali, 2018; Kassem et al., 2019; Roussel et al., 2021; Senturk and Ali, 2021; Mehmood et al., 2022). Barnett and Adger (2007) linked climate change with detrimental health outcomes and social uncertainty comprising reduced services Provided by ecosystem, diminished obtainability of natural resources, changed livelihoods, and strained capacity of government to offer prospects that aid in sustaining individuals livelihood. Gleick (2014) and Guha-Sapir et al. (2018) linked climate change with conflicts/clashes and their health consequences. For example, recent conflict in Syria (that was in part result of drought, caused approximately 143,000 deaths till 2016).

Climate change may affect the production capacity by reducing the working capacities of labour. To do work efficiently, the abrupt changes in temperature are not suitable. It decreases the efficiency of labour by disturbing their health. Climate change is also distressing native weather with the prevalence of inert air events and regular high temperature that influences human health (Ahern et al., 2005).

This study intends to empirically investigate the impact of climate change on human health in Pakistan as it is a distressing factor of human health. The change in weather and temperature measures the climate change. Various studies have showed that the human health is negatively influenced by the climate change (Patil & Deepa, 2007; Kovats & Akhtar, 2008). In their examination Patz et al. (2005) found that heat related deaths, and environmental

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change associated with more diseases are two principle climatic effects on wellbeing. The various dangers to human prosperity are because of complex nature of natural change and its environmental and social signs. A three-route gathering of these risks and causal pathways are showed in Table 1.

Table 1: Types of climate change risks to health, according to causal pathway

Risk Category	Causal Pathway
Primary	Direct biologic consequences of risky weather events, temperature enhanced stages of urban air pollutants and heat waves.
Secondary	Risks mediated by changes in mostly food yields; biophysically and ecologically based processes and systems, infectious-disease vectors, (for zoonotic diseases) intermediate host ecology and water flows.
Tertiary	More diffuse effects (e.g., displaced groups, mental health problems in failing farm communities, minority ethnic groups and disadvantaged native) aftereffect of clash and tension owing to climate change–related decrease in basic resources (living space, water, timber, food).

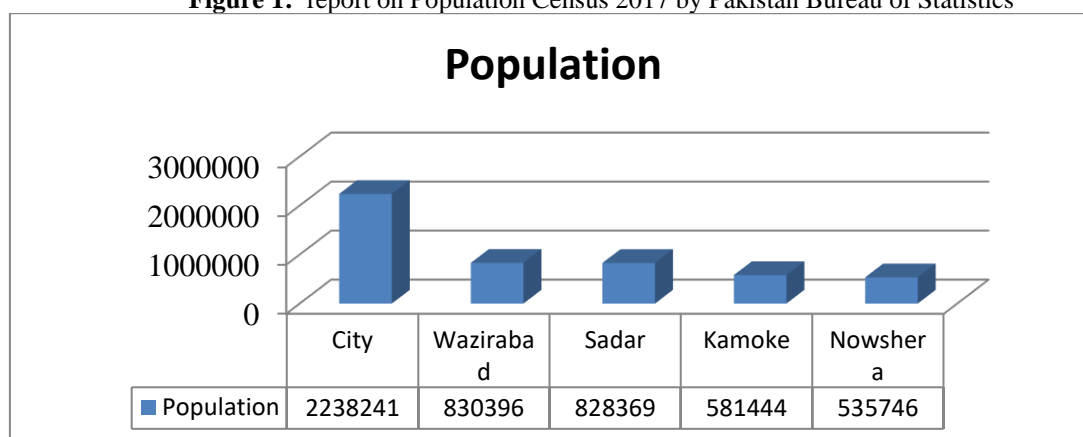
Source: (Michael, 2013).

The effects of environmental change on wellbeing are inseparably. Reducing environmental change is a necessary prime undertaking for the whole world. Nevertheless, however the governments keep on battling with this uncommon, confounded political and moral assignment, the more moment challenge for the wellbeing division is to perceive the fundamental local wellbeing dangers made by environmental change and confirm the improvement of hazard diminishing alterations (Michael, 2013).

The Gujranwala District established in year 1849. The region arranged in the middle of two primary urban areas, in North is the Gujrat and in South, there are Sheikhpura and Lahore. The Chenab River shapes the Northern limit of the locale. Most of the populace lives in the provincial zones and generally procures their pay through agribusiness and other partnered disciplines. It has 9800 Villages with the complete territory of 892067 acres of land, out of which 783339 acres (88%) land developed (Portal, 2019).

The town was original found by Gojar / Gurjars and renamed as Khanpur by SansiJatts of Amritsar, Place of Birth of Raja Ranjeet Singh. The area was conquered and occupied by British Empire in 1848, District HQ was established in 1849, Municipality created in 1867, Railway Line laid in 1881, Divisional Headquarters established in June 1982, District is ranged first with an average population growth of 3.49%. Broadly, it is an agricultural and industrial hub of the province, famous for its cuisine. There is a District Headquarters Hospital / Teaching Hospital, (bed strength = 700). Three Tehsil Headquarter Hospitals (bed strength = 60, 60 & 40), 12 Rural Health Centres (bed strength = 20 each), 93 Basic Health Units (bed strength = 2 each), 22 Government Rural Dispensaries, 10 M.C.H Centers, 33 Zila Council and Municipal Dispensaries, One T.B. Clinic, 1728 Health Houses, 34 Sub Health Centre and 14 Municipal Services Dispensaries, only (District Profile, 2018). The population detail is mentioned in Figure 1.

Figure 1: report on Population Census 2017 by Pakistan Bureau of Statistics



Source: A report on Population Census 2017 by Pakistan Bureau of Statistics

Climate change threatens to exacerbate Pakistan's already low health indicators (e.g., life expectancy, maternal and child mortality, malnutrition). The majority of Pakistan's population lives along the flood-prone Indus River, and diarrheal disease from contaminated water are a leading source of morbidity and mortality.

Higher temperatures increase the risk of heatstroke. In 2015, an unprecedented heat wave with temperature 49°C killed more than 1,200 in Karachi. In 2010, unprecedented monsoon rainfall flooded 20 percent of the country,

affecting 21 million people and triggering infectious disease outbreaks and diarrheal illness due to contaminated drinking water and unhygienic conditions in makeshift camps (Baqir et al., 2012). The climate risks to food safety, such as crop loss / failure, could also have consequences for malnutrition, which is already severe in Pakistan –almost half of all children are undernourished.

2. Literature Review

Proactive and preventive physician action and policy support at the individual and federal levels may include climate change and advise proper prevention and response (Bunyavanich et al., 2003). There was strong and consistent relationship between outdoor air pollution and short-term rise in hospital admission for children Barnett et al. (2005). The climate change would increase the frequency and intensity of heat waves. A number of interventions such as improvement in living conditions, treatment of chronic diseases, and formal care of the elderly and the vulnerable, will need to decrease future impacts of heat (Kovats & Hajat, 2008). Literature showed that several human ailments comprising morbidity, undernourishment, mortality and infectious diseases are associated with fluctuations in climate that is extreme storms, heats and cold (Patz et al., 1996 and Stott et al., 2004)

A study conducted by Omoruyi & Kunle (2012) indicated that there is an increase in the risk of health and morbidity rate due to climate change. According to Khani et al. (2016) 1 °C rise in maximum temperature in a given month was associated with a 15% increase in malaria incidence and 19% increase in the same and succeeding month with a significance value = 0.001.

The climate change and heat in particular can affect maternal and neonatal health outcomes (Kuehn et al., 2017). Flood of 2010 have affected 78 out of 141 Districts of Pakistan. It badly damaged infrastructure of the country and had long term physiological and social impacts (Fatima & Rana, 2017). The strength of positive relationship between temperature and various measures of mortality decrease with age (Husnain et al., 2017). The climatic changes affect women' health adversely (Ajaz & Majeed, 2018). It caused environmental stressors to pose a threat to human mental health (Obradovich et al., 2018). The loss of job and efficiency due to the climate change has significant effects on global supply of goods (Dally et al., 2018).

The impact of CO₂ emissions on health care has been comparatively greater, consuming higher health care expenses (Apergis et al., 1966-2009). Barreca (2011) found the distributional impacts of temperature and humidity on mortality for United States. The study found that mortality rates decrease in cold and dry areas, but increases in hot and humid areas.

In order to inhibit the detrimental impact of climate change on Women's health, attention must be given to prevent changes in physical environment that is caused by increased temperatures outside and inside the homes and discharge toxin chemicals in the atmosphere. Although there is a lot of literature that focuses on climatic conditions and its associated effects on individual health but there are few studies that has paid attention on women's health particularly in Pakistan. In lower income group Women are more exposed to environmental problem as they have to perform household task as well as outdoor activities regardless of climatic conditions. To bridge this gap, this study focuses on women's health and how it is impacted by environmental changes.

The main objective of this study is to study the changing climate patterns and impact on married women health of District Gujranwala, Pakistan. Verbal consent was sought before initiation of data collection. Eventually the research results would be beneficial for the collaborative organization, the society and core department as well. The identity of respondents was not disclosed in any case.

3. Methods and Data

In order to examine the climatic conditions, which devalue human wellbeing. This study is following Ried and Ulrich (1994) experimental model. The model takes following structure.

$$H_i = \alpha_i + \beta_i X_i + u_i \quad (1)$$

Where, H_i stands for self-rated physical health of women. On the other hand, vector X_i includes climate change, demographic and socioeconomic factors presented in Table 2 & 3.

4. Data Source, Collection and Technique

As the study is a field based research, the survey was conducted in the district Gujranwala. Data was collected through convenience sampling from the field through closed ended questionnaire. Verbal consent was taken from each of the total 350 ever married female participants. The nature of this research is totally asymptotical based on questionnaire. Verbal consent was sought before initiation of data collection. Table 2 provide a brief analysis of the data.

Table 2: Statistical Analysis

Sr.#	Description of variables	Mean	Std.Dev.	Minimum	Maximum
1	What is your current self-rated Physical Health?	0.66	0.473	0	1
2	What is your current marital status?	1.2400	0.60995	1	4
3	What is the gender of your household head?	0.7257	0.44679	1	0
4	What is your monthly household income?	3.0971	1.24009	1	6
5	Age (in complete years)	34.9286	10.11753	17	74
6	What is your current employment status?	3.4171	1.00870	1	4
7	Do you think you have enough food available for three meals a day?	3.7943	0.93819	1	5
8	What is your opinion take your Own health care decision?	1.4829	0.50042	1	2
9	What is the level of education of your husband?	2.9571	1.70147	1	7
10	Does the changing patterns of weather affect your health?	1.4486	0.70319	1	3
11	How much your health got affected by the smoke / smog / blur vision due to air pollution?	2.2086	1.05137	1	4
12	How much your health got affected by the smell air pollution?	2.1629	1.01241	1	4
13	How much your health got affected by the noise pollution?	2.3771	1.02716	1	4
14	In your opinion, does your home ventilation affects your health?	0.6143	0.48746	0	1
15	Your health is exposed to which weather condition at high risk?	3.2257	1.83032	1	8
16	In your opinion, other women are likely or liable to be influenced or harmed by climate change?	0.7171	0.45103	0	1

5. Results and Discussion

In univariate analysis, we presented the study variables with their number of occurrences (frequencies) and explore these variables through descriptive analysis using percentages and standard deviations; also the Pie chart for each variable is presented for visual understanding of the data. Summary of the descriptive statistics of some variables is discussed in this section.

It can be noted from table 3 that out of the total 350 sampled female participants, there were 118 women only, who rated themselves to have poor health currently, which counted 33.70 % of the total sample. However, 66.3% respondents expressed their opinion about their current physical health as good health. It is worth mentioning that later women were double of the participants with an opinion of having poor health with a standard deviation of 0.473. Only 51.70% women rated themselves to have own health care decision currently, 48.30% respondents do not have. However, 67.40% women's health was affected by changing patterns of weather, however, 20.30% respondents were not affected. 30.60% women suffered a lot from smoke / smog / blur vision due to air pollution, where as 34.30% suffered a little and 16.30% respondents were not affected at all. Also, 30.60% women affected by the smell air pollution a lot, 36.30% a little, 19.40% not very much, 13.70% were not affected. Similarly, 24.30 % women were affected by the noise pollution a lot, 30.30% a little, 28.90% not very much, 16.60% were not affected. The health of 38.60% women were not affected by absence of proper home ventilation, but 61.40% were affected. There were 9.10% females only, who admitted that they were affected by too much rain, 30.00% by low temperature, 39.40% by high temperature, 02.30% by floods, 04.90% by drought, 03.40% by short & intense rains, 05.70% by delay in rains, and 5.10% by dry spells. There were 28.30 % women who were not harmed by climate change, however 71.70% were harmed. It is worth mentioning that later women were double of the participants with an opinion of having weather affect.

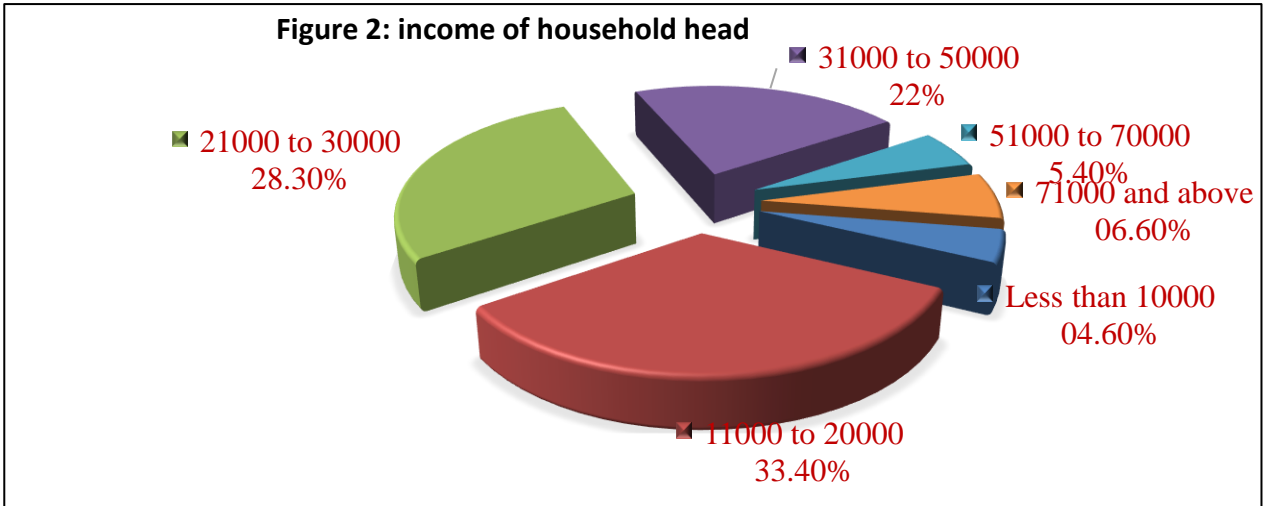
Table 3: Frequency Distribution (n=350)

Sr.#	Description of variables	Categories	Frequency	%age
1	What is your current self-rated Physical Health?	Poor Health	118	33.70 %
		Good Health	232	66.30 %
2	What is your current marital status?	Married	294	84.00 %
		Widowed	33	9.40 %
		Divorced	18	5.10 %
		Separated	5	1.40 %
3	What is the gender of your household head?	Female	96	27.40 %
		Male	254	72.60
4	What is your monthly household income?	Less than 10000	16	4.60
		11000 to 20000	117	33.40
		21000 to 30000	99	28.30
		31000 to 50000	76	21.70

		51000 to 70000	19	5.40
		71000 and above	23	6.60
5	Age (in complete years)	Up to 27 Years	102	29.10
		28-33 Years	74	21.2
		34-41 Years	97	27.7
		Above 41 Years	77	22.0
6	What is your current employment status?	Government employee	37	10.60
		Private employee	24	6.90
		Self employed	45	12.90
		Housewife	244	69.70
7	Do you think you have enough food available for three meals a day?	Dissatisfied	10	2.90
		Uncertain	17	4.90
		Neutral	86	24.60
		Satisfied	159	45.40
		Very satisfied	78	22.30
8	What is your opinion taking your Own health care decision?	Wife dominance	181	51.70
		Husband dominance	169	48.30
9	What is the level of education of your husband?	Primary or less	105	30.00
		Middle	42	12.00
		Matric	77	22.00
		Intermediate	54	15.40
		Bachelors	39	11.10
		Masters	27	7.70
		M.Phil. and above	6	1.70
10	Does the changing pattern of weather affect your health?	Yes	236	67.40
		No	71	20.30
		Do not know	43	12.30
11	How much your health got affected by the smoke / smog / blur vision due to air pollution?	A lot	107	30.60
		A little	120	34.30
		Not very much	66	18.90
		Not at all	57	16.30
12	How much your health got affected by the smell air pollution?	A lot	107	30.60
		A little	127	36.30
		Not very much	68	19.40
		Not at all	48	13.70
13	How much your health got affected by the noise pollution?	A lot	85	24.30
		A little	106	30.30
		Not very much	101	28.90
		Not at all	58	16.60
14	In your opinion, does your home ventilation affects your health?	No	135	38.60
		Yes	215	61.40
15	Your health is exposed to which weather condition at high risk?	Too much rains	32	9.10
		Low temperature	105	30.00
		High temperature	138	39.40
		Floods	8	2.30
		Drought	17	4.90
		Short & intense rains	12	3.40
		Delay in rains	20	5.70
		Dry spells	18	5.10
16	In your opinion, other women are likely or liable to be influenced or harmed by climate change?	No	99	28.30
		Yes	251	71.70
17	In which area do you live?	Urban	209	59.70
		Rural	141	40.30
18	Place of interview	Household	144	41.10
		Hospital	156	44.60
		Others	50	14.30

5.1 Graphical Representation

The variable income of household head portrays that out of the total 350 sampled females respondents, 16 (4.60%) women only have less than 10000 rupees monthly household income, 99 (28.30%) women have 21000 to 300000 monthly household income and so on (Figure 2).



On studying the respondent's demographical information, we found that there were 102 women (29.1% of the total sample) with age up to 27. 74 (21.2%) women were 28-33 years old, 97 (27.7%) women were 34-41 years old and 77 (22.0%) women aged above 41 years (Figure 3).

The distribution of current employment status, portrays that out of the 350 selected females, 37 (10.60%) women were working as Government employees, 24 (6.90%) respondents were private employees, 45 (12.90%) sampled women had own job work and 244 (69.70%) of sampled women expressed that they have no job and act only as housewives (Figure 4).

Figure 3: Age of Respondent

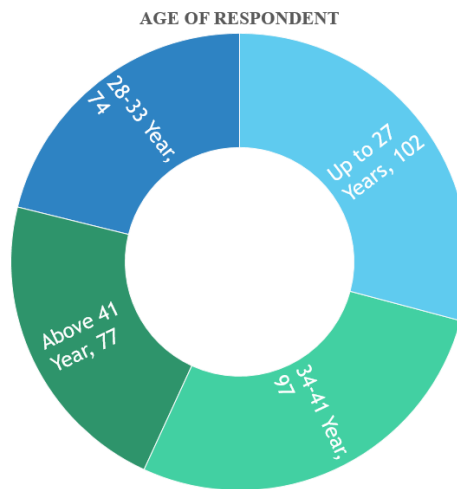
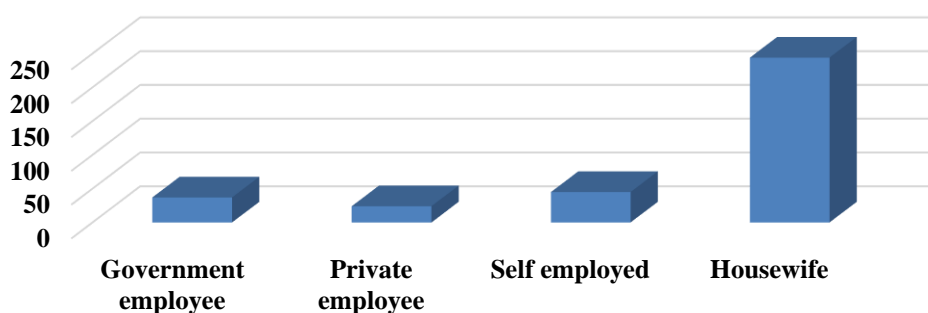
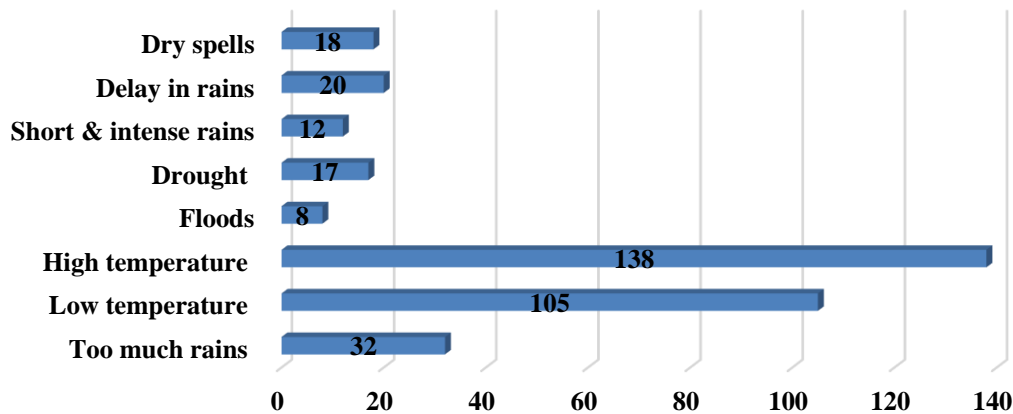


Figure 4: EMPLOYEMENT STATUS

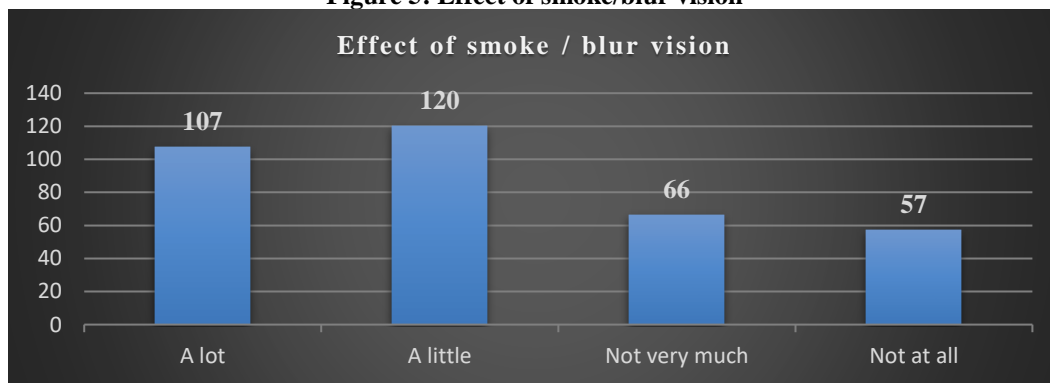


The data narrate that out of total 350 selected females, there are 105 females are married to someone whose level of education was Primary or less currently. Study found that 236 (67.40%) participants have effect of changing



patterns of weather, 71 (20.30%) were having an opposed opinion, 43 (12.30%) females felt that they do not know about health effects.

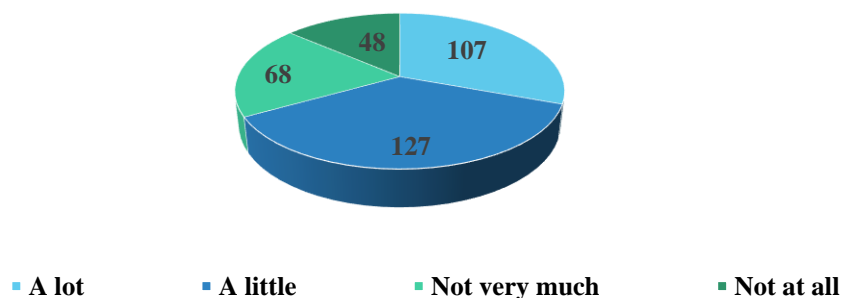
Figure 5: Effect of smoke/blur vision



Study found that 107 (30.60%) women rated themselves to have a lot of effect of smoke / blur vision on their health, 120 (34.30%) respondents expressed their opinion a little and 57 (16.30%) respondent have opinion that their health is not affected by air pollution (Figure 5).

Similarly, 107 (30.60 %) women reported that smell have a lot of effect on their health, 127 (36.30%) respondents expressed their opinion a little, 48 (13.70%) respondent reported they are not affected at all (Figure 6).

Figure 6: Effect of the smell / air pollution

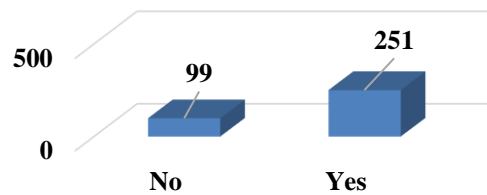


However, 135(38.60 %) women were found to have no effect on health due to poor home ventilation, 215 (61.40%) respondents expressed their opinion about their own health affects due to poor home ventilation.

32 (9.10%) females admitted that their health is affected because of too much rain.105 (30%) respondents have affected due to Low temperature. 138 (39.40%) sampled females have affected due to High temperature.8 (2.30%) affected due to Floods.17 (4.90%) have affected Drought.12 (3.40%) affected by Short & intense rains (Figure 7).

However, 99 (28.30%) women, who rated themselves to have no effect on health due to climate changes. 251 (71.70%) respondents expressed their opinion about their health affected by the climate changes. It is worth mentioning that later women were double of the participants with an opinion of having weather affect (Figure 8).

Figure 8: Harmed by Climate Change



Human wellbeing is seriously influenced by the effects of change in climate. Particularly, South Asian wedded women (rural) endure more family unit obligations than men regarding bringing water and gathering biomass fuel for cooking and warming. To get these assets, ladies need to go out and are increasingly exposed to open air condition.

This section critically investigated the impact of predictor variables (categorical) on the response variable by using logistic regression. The brief summary of results is discussed below.

5.2 Goodness of Fit Model

For determining goodness of model following hypothesis was tested.

H_0 : Model is good fit.

H_1 : Model is not good fit.

The Hosmer & Lemeshow Statistic encourages to test and check the null hypothesis that whether the fitted model is good or not. It can be seen in Table 4, it produced a high p-value against the chi-square statistics i.e., 0.439 which indicates no evidence of poor fit. Thus we can say that the fitted model is good.

The Nagelkerke R-Square value suggests that 32.1% of the variation in the response variable is explained by the explanatory variables incorporated into the model.

Table 4: Results of Goodness of fit Test

Nagelkerke R-Square	Chi-square	Degrees of freedom	Significance Value(p-value)
32.10	8.693	8	0.439

5.3 Results of Logistic Regression Analysis

The results of logistic regression analysis in terms of odds ratio depicted that the married women have 1.6 times more chances to have a good physical health as compared to those women who's marital status is currently separated with a p-value = 0.007 showing statistical significance of the variable current marital status having 95% confidence interval (0.165~64.557) for the odd ratio. The results are presented in Table 5.

The results of logistic regression showed statistical significance (p-value = 0.043) of the variable age of women with 95% confidence interval (1.234~7.343) for the odd ratio suggesting that the women of young age (less than 27 years) have 3.234% more chances to have a good physical health as compared to those women who are aged greater than 41 years. Similarly, the variable current employment status were statistically significant (p-value = 0.015) suggesting that the women working as Government employees have 2.61 times more chances to have a bad physical health as compared to those women who are housewives. The 95% confidence interval was (3.607~5.255) for the odd ratio.

The availability of enough food three meals a day is an interesting variable and was found statistically significant (p-value = 0.041) with 95% confidence interval (1.027~5.570) for the odd ratio suggesting that a women with three meals available a day will have 2.7 times more chances of having good physical health as compared to those women who do not have enough food available for three meals a day. The odds ratios of husband's education suggest that women married to husband with education MPhil, and above have 14.0% more chances of having good physical health as compared to those women whose the husband's education is primary or less. A p-value 0.029 shows statistical significance of the variable level of education of husband having 95% confidence interval (1.077~16.962) for the odd ratio.

The women affected by the smoke/smog/blur vision due to the air pollution have 29.1 times more chances to have a bad physical health comparing to those women who are affected by the smoke/smog/blur vision due to the air pollution. This affect is statistical significance with a p-value = 0.038 95%. Bunyavanich *et al.* (2003)

worked on Environmental change. According to them anthropogenic changes including the air pollution, and different ultraviolet radiation affects and disturbs the climate change. There are 43.8 times more chances of women's health affected by the smell air pollution than the women who have an opinion that their health does not affected (statistically significant with p-value = 0.007) having 95% confidence interval (1.231~5.213) for the odd ratio.

There may be 18.8 times more chances of women with opinion about health affected by the smell, noise pollution to have a bad physical health as compared to those women who's opinion is opposed (p-value = 0.023 with 95% confidence interval 1.414~3.459 for the odd ratio). Women with opinion that their health is not affected with no proper home ventilation have 37.7 times more chances of having good physical health of as compared to those women who's opinion is opposed (p-value = 0.043 with 95% confidence interval 1.414~5.459 for the odd ratio). The results depicts that the odds ratio of 1.642 suggests that the condition of weather i.e. dry spells have 64.2% more chances to have a bad physical health as compared to those women who's opinion that their health is affected by too much rains with a p-value = 0.029 showing statistical significance of the variable exposed weather condition at high risk having 95% confidence interval (1.005~7.787) for the odd ratio. Also, the women with opinion that other woman are to be influenced or harmed by climate change have 10 times more chances to have a good physical health as compared to those women who's opinion is opposed (p-value = 0.003 showing statistical significance having 95% confidence interval for the odd ratio).

This study revealed that the woman who reside in rural areas will have 1.77 times more chances of having good physical health as compared to those women who belongs to urban areas with a p-value = 0.044 having 95% confidence interval (1.398~2.495) for the odd ratio showing statistical significance of the variable locality of women. Similarly, logistic regression analysis depicts that the woman interviewed at the household have 8.7 times more chances to have a good physical health as compared to those women were interviewed at workplace with a p-value = 0.009 showing statistical significance of the variable place of interview having 95% confidence interval (1.317~2.417) for the odd ratio.

Table 5: Logistic regression coefficients with confidence interval for Odds ratios

Variables	Categories	Coeff.	St. Error	Wald test	p-value	Odds ratio	95% C.I.	
							Lower	Upper
Constant	-	23.553	2.883	0.503	1.000	0.003	-	-
Marital status	Married	1.183	1.523	0.604	0.007	3.265	0.165	64.557
	Widowed	0.172	1.559	0.604	0.037	1.188	1.056	25.211
	Divorced	1.130	0.359	0.506	0.019	1.323	1.014	7.270
	Separated	-	-	-	-	1.00	-	-
Gender of household head	Female	0.40	0.357	0.013	0.047	1.041	1.005	2.095
	Male	-	-	-	-	1.00	-	-
Monthly household income	Less than 10000	-	-	-	-	1.00	-	-
	11000 to 20000	1.090	1.749	0.014	0.009	1.914	1.210	3.971
	21000 to 30000	1.585	0.747	0.613	0.034	1.795	1.415	7.766
	31000 to 50000	1.866	0.808	1.149	0.008	2.378	2.068	11.597
	51000 to 70000	1.907	1.058	0.736	0.039	2.477	1.312	19.687
	71000 and above	2.260	1.029	0.064	0.018	1.771	1.103	5.798
Age (in years)	Less than 27	3.499	1.748	1.345	0.043	3.234	1.234	7.343
	Between 27 &33	3.441	1.739	1.376	0.046	3.456	2.453	7.231
	Between 33&41	2.905	1.723	1.389	0.049	3.671	2.344	7.902
	Greater than 41	-	-	-	-	1.00	-	-
Current employment status	Government employee	1.485	0.850	1.326	0.015	3.616	3.607	5.255
	Private employee	1.092	1.793	1.895	0.016	2.335	2.331	7.589
	Self employed	1.998	1.703	2.016	0.015	1.369	2.093	4.462
	Housewife	-	-	-	-	1.00	-	-
Enough food available for three meals a day	Dissatisfied	-	-	-	-	1.00	-	-
	Uncertain	2.443	1.980	6.216	0.013	3.087	3.031	5.593
	Neutral	3.341	1.800	8.555	0.003	2.096	1.020	2.462
	Satisfied	1.149	2.479	1.906	0.016	2.317	2.302	5.810
	Very satisfied	1.426	2.330	1.295	0.041	1.653	1.027	5.570
Own health care decision	Wife dominance	-	-	-	-	1.00	-	-
	Husband dominance	0.375	0.330	1.295	0.025	1.455	1.076	2.778
	Primary or less	-	-	-	-	1.00	-	-

Level of education of husband	Middle	0.367	0.482	0.580	0.046	2.444	1.561	3.715
	Matric	1.001	0.420	0.002	0.037	1.011	1.001	2.280
	Intermediate	2.379	0.548	1.479	0.048	1.685	1.234	2.003
	Bachelors	0.593	0.675	1.771	0.038	1.809	1.482	6.797
	Masters	1.971	1.888	1.194	0.027	2.640	1.463	15.053
	M.Phil. and above	1.131	1.378	0.009	0.029	1.140	1.077	16.962
Changing patterns of weather affect your health	Yes	-	-	-	-	1.00	-	-
	No	1.404	1.409	1.977	0.032	1.498	1.272	3.340
	Do not know	1.437	1.452	1.935	0.033	1.646	1.266	2.566
Health affected by smoke / smog / blur vision	A lot	0.092	0.436	0.045	0.038	3.912	1.438	4.143
	A little	0.018	0.637	0.024	0.027	2.983	1.282	3.425
	Not very much	0.027	0.766	0.056	0.049	1.973	1.217	4.369
	Not at all	-	-	-	-	1.00	-	-
Health affected by the smell	A lot	-	-	-	-	1.00	-	-
	A little	0.008	0.426	0.045	0.049	3.008	1.438	3.322
	Not very much	0.087	0.640	0.039	0.019	2.091	1.312	4.824
	Not at all	0.092	0.795	0.013	0.007	1.096	1.231	5.213
Health affected by the noise pollution	A lot	-	-	-	-	1.00	-	-
	A little	2.658	1.445	2.188	0.013	4.931	2.807	5.816
	Not very much	0.754	1.456	2.734	0.009	2.125	1.870	5.195
	Not at all	0.631	0.535	1.390	0.023	2.880	1.414	3.459
Effect of home ventilation	No	-	-	-	-	1.00	-	-
	Yes	1.252	0.321	0.616	0.043	4.777	1.414	5.459
Health exposure to weather condition at high risk	Too much rains	-	-	-	-	1.00	-	-
	Low temperature	0.634	0.840	0.569	0.045	5.884	3.234	9.778
	High temperature	0.002	0.711	0.456	0.049	3.998	2.455	4.019
	Floods	1.180	0.705	1.065	0.009	3.197	1.344	4.767
	Drought	1.196	1.196	0.045	0.013	2.302	2.034	3.152
	Short & intense rains	1.729	1.144	2.284	0.048	5.632	4.455	7.994
	Delay in rains	2.267	0.994	1.072	0.013	1.766	1.091	5.344
	Dry spells	0.496	0.956	1.269	0.029	1.642	1.005	7.787
Other women are likely or liable to be influenced or harmed by climate change	No	1.144	0.371	1.507	0.003	2.002	1.517	6.496
	Yes	-	-	-	-	1.00	-	-
Locality	Urban	-	-	-	-	1.00	-	-
	Rural	1.260	1.338	1.593	0.044	1.771	1.398	2.495
Place of interviewed	Household	1.133	1.518	1.066	0.009	1.876	1.317	2.417
	Hospitals	1.752	1.593	1.605	0.002	2.121	1.663	6.787
	Others	-	-	-	-	1.00	-	-

6. Conclusion

The result of this study asserts that the climate change and the changing weather pattern have unfavourable effect on married women health. This research focussed on impact of changing climate patterns on women health in District Gujranwala, Punjab, Pakistan. This study used logistic regression and the sample size 350 of ever-married women. Results attained from univariate analysis revealed that out of 350 sampled female participants, there were 66.3% of women who have good physical health and 51.70% have their own health care decision. However, 67.40% women's health was affected by changing patterns of weather, 30.60% women suffered a lot due to air pollution, 39.40% were affected by high temperature, 02.30% by floods, 04.90% by drought, 03.40% by short & intense rains, 05.10% by dry spells and 71.70% were harmed by climate change. The results of logistic regression analysis, in terms of the odds ratio, depicted that the married women have 3.265 times more likely to have good physical health as compared to the women whose marital status is currently separate.

The women affected by smoke/smog/blur vision due to the air pollution, have 3.912 times more chances to have bad physical health. The odds ratio is 1.642 suggesting that the condition of weather i.e., dry spells have 64.2% more chances to physical adversely influence health. Women from rural areas have 1.77 times more chances to have good physical health as compared to those women who belong to urban areas. The woman interviewed at the household has 1.88 times more chances to have good physical health as compared to those women were interviewed at the workplace. This study concludes that the changes in climate (increasing rate of heat, dry spells, non-forecasted rains and some other factors) affect women health severely. The results suggest that there is dire need by the Government and policy makers to focus on the factors influencing the women health occurred by climate change in Punjab for better data directed decisions. Our results show that climatic changes affect women (ever married) health badly. The Government should take following steps to reduce health risks associated with climate change. Government should:

- Improve the climate by offering effective environmental policies.
- Encourage reforestation, the plantation in and outside homes.
- Increase green areas within urban locality.
- Create awareness to safeguards the people from disastrous effects of changing climate.

This study focussed on the changing climate patterns and the women (married) health by conducting an empirical analysis for the District Gujranwala using logistic regression technique. However, this work can also be extended in the following directions.

- This study can be extended by gathering data from all the cities of Punjab.
- The variables relating to some respiratory diseases can be also considered.
- Cluster analysis and Factor analysis techniques can be utilized for exploring and data directed decisions.

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