Gender perceptions and adaptation strategies to climatic hazards—floods in rural areas of District Sialkot, Punjab, Pakistan

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Abstract. Climate change and its ramifications are evident in the form of global warming and fluctuations. Pakistan is mainly on arid geographical profile and resource scarcity, is among the highly vulnerable countries to climate change. This research is a mixture of agricultural income and biophysical indicators to provide an assessment of gender vulnerability to climate change in north east of Pakistan. A mixed methods technique was carried out and desk study was conducted in order to get a full insight into the agricultural practices and the perceptions of gender. A semi-structured questionnaire was developed and an exploration of impacts was made rough in-depth interviews and focus group discussions. The study was discerned information about Adaptation practices of the community and obstacles faced by women were also scrutinized. A simple random sampling technique was deployed and sample of 101 respondents. Data was tabulated and graphs were made using Microsoft Excel. Statistical Analysis was carried out using R- software, and variance was determined by using PCA (Principal Component Analysis). A highest variance of about (35.7%) was observed in gender role in decision making i.e., land allocations, proposing inequality in property rights. A high majority of respondents (n=81) perceived changing climatic conditions. Responses of major climatic hazards encountered were also reported and high variance of (49.3%) was observed for loss of livestock and money. Maximum level of illiteracy among the family members of respondents was observed (n=241) suggesting less awareness among the inhabitants. Presence of health care facility was reported but a small number (n=39) females received antenatal health care. The study also suggests some recommendation to empowering women and achieving environmental education should be important goals in managing climate change and creating a sustainable future.
1. Introduction
Climate change is a phenomenon that has attained highest global attention in the recent years and is apparent in the form of erratic weather patterns, specie extinctions and habitat destruction [1][2]. From the perspective of Pakistan, with its mainly arid geographical profile and resource scarcity, it is among the highly vulnerable countries to climate change [3]. It is one of the countries most affected by climatic changes due to its low adaptive capacity and poor infrastructure [4]. The Global Climate Risk Index (GCRI) 2015 ranked Pakistan number 10th in the list of countries most affected by climate change and extreme weather events [5].

Disasters affect men and women in different ways, with greater impacts on women and children [6]. It is widely acknowledged that women in developing countries are particularly vulnerable to climate change and will be affected most than men because they depend on natural resources and the environment for all of their activities, the basic needs of their families and livelihood.

While women are the main provider of food in Pakistan, they face barrier to their ownership and access to land. 67% of women are engaged in agricultural related activities but only 1% on land. When hit by the negative impact of climate change women loose at the same time their livelihood means and their capacity to cope after a disaster. As a result of climate change domestic chores such as collecting water and firewood become more burdensome and time consuming as girls community assist mothers in performing these tasks, there is less time left for school or any other economic activity [7]. In rural Pakistan, women and children are already an underpaid, overworked and exploited resource and climate change will further increase this work load and accentuate their vulnerability. Yet the gender vulnerability is one the most ignored areas in climate research [8].

Due to scarce gender disaggregated data there has been limited research on how men and women adapt to climate variability and change to maintain their livelihood, and food security as well as health. A lot is being discussed and argued on these issues however, no noteworthy empirical research has been found in the literature [9].

Women can be empowered and their resilience can be enhanced, if gender is mainstreamed in all community-based disaster management activities. Instead of making the compensation to a male member of the family, for instance, this compensation can be made to family's female member [10]. Thus, recognition of gendered vulnerability can improve disaster planning and response and reduce their adverse economic and social effects, particularly when each step in recovery addresses the inherent power structures at play in the community [11]. Therefore, the aim of this study is to explore the gender perception about climate related hazards in the rural settings of the study area and to discern the community adaptation strategies to climate change impacts.

2. Research Methods
2.1. Study area and data collection
For the project work, district Sialkot was selected as a target area. It is a district located in the north-east of Pakistan. The total number of tehsils and union councils recorded was 4 (Sialkot, Pasrur, Daska and Sambrial) and 129 respectively. Further we chose this area for one main reason that it is situated in hazard prone region and is exposed to many risks and uncertainties that can affect both life and property.

Initially from Sialkot tehsil people were interviewed individually and total number of interviewed people was 101. Temperature and precipitation data of last 30 years was collected from Pakistan Meteorological department of Sialkot District i.e. from 1986 to 2016.

Two-stage sampling method was used in selecting communities and households for the study as shown in Figure 1. At the first stage, out of four tehsils i.e. Sialkot, Pasroor Sambrial and Daska only Sialkot tehsil was selected, which is further stratified into union councils. Upon stratification, 11 union councils of tehsil Sialkot were selected. Subsequently, communities within the selected union council and its 21 villages/mauzas were randomly selected for the study shown in Figure 2. At the second stage, purposive sampling was used in selecting households for interviews and questionnaire administration.
2.2. Data analysis
In this study, data based on questionnaires was tabulated in excel for graphical representation. The tabulated data were then imported into software R, for Performing Principle Component Analysis (PCA). Each variable was given a short name. Gender was selected as a key variable and all other variables were determined across it.

3. Result and Discussion
3.1. Socioeconomic profile.
3.1.1. Total income. As shown in Figure 3, majority of the responses were lying in range of 20 thousand to 30 thousand. We chose this variable because responses to climate change through adaptation require sufficient financial wellbeing [12], and according to him, higher income of individuals, the less risk averse. The effect is to boost the women’s financial resources and hence her ability to adapt climate change options.
3.1.2. Family size. As shown in Figure 4, age structure was categorized into different classes. According to the responses given by the respondents, the age class between 15 to 19 years has the highest percentage i.e. 10.80%. This variable is important to be asked because according to Mano and Nhemachena (2006) [13] large household size is mostly inclined to divert part of its labor force into non-farming activities, which increases the chances of adapting to climate change, unlike the small household size.

![Figure 4](image)

**Figure 4.** Percentage of population by both sexes in Sialkot as revealed by the interviewees

3.1.4. Education status of the respondents. Adger et al., (2004) [14] conclude that education exhibits “a strong (negative) relationship with mortality from climate related disasters.” Blankespoor et al., (2010) [15] establish that there are fewer disaster-related deaths in countries that invest in female education. In case of family education, the PCA biplot suggested (58.3%) proportion of variance in PC1 and (18.4%) in PC2. PC1 and PC2 representing highest variance was therefore selected. The category covering no education exhibited variation of (98.4%) in PC1 and (14.5%) in PC2.

![Figure 5](image)

**Figure 5.** Principle Component Analysis bi-plot of education status
3.2. Climate change perception. Figure 6 shows that when asked about the climate change perceptions, (n=52) females and (n=47) males were found aware of climate change while two females were not having any knowledge of it. Knowledge concerning climate change can enable the household to foresee change and identify new livelihood opportunities, which can reduce the vulnerability of the household by bringing further access to resources required to achieve a better adaptive capacity [16].

![Figure 6. Perception of either gender about climate change](image)

3.3. Information sources. Hassan and Nhemachena, (2007) found that access to information about climate change forecasting, adaptation options and other agriculture activities remain important factors determining use of various climate change adaptation option [17]. Majority of the respondents (85.41%) informed that through TV they were getting information about weather conditions and climate change. The full percentage is shown in Table 1.

| Information Sources                | Frequency | Percentage |
|-----------------------------------|-----------|------------|
| TV                                | 86        | 85.41%     |
| Radio                             | 9         | 8.91%      |
| Neighbour                         | 6         | 5.94%      |
| Traditional knowledge             | 5         | 5%         |
| Agricultural department           | 5         | 5%         |
| Relative                          | 3         | 2.97%      |
| Meteorological services           | 1         | 0.99%      |
| Newspaper                         | 0         | 0%         |

3.4. Adaptation Strategies of Community. Different adaptation strategies were being followed by the respondents which are shown in Figure 7. For C.1 which was recorded for self-assistance male respondents (n=33) informed that they were not doing it. While equal number of female respondents revealed that they were adapting it. C.2 i.e. relying on assistance from government/NGOs, majority of respondents (n=67) informed that they were relying. In C.3, respondents (n=70) said that they didn’t sold part of land for alternative. Likewise in C.4 majority of the respondents (n=87) said that they didn’t shift to non-farm employment. While only few (n=14) number of respondents revealed that they shifted to non-farm employment. Majority of the respondents (n=79) informed that there wasn’t any reduction in education level of their children i.e. C.5 due to climatic hazards. In case of C.6 i.e. migration to cities it was reported in positive manner by only (n=22) respondents. While (n=79) respondents informed that there is no migration to cities during climatic hazards. In C.7 i.e. change in cropping strategies, (n=77) respondents informed that there were no change in cropping strategies. While (n=24) respondents said that they made changes in cropping strategies.
To obtain a process of adaptation and move forward from the transient dysfunction, it is important to reduce poverty, increase employment levels, re-engage in education, increase in participation in decision making, and especially the inclusion of women in this process [18].

3.5. Assistance from agriculture department. Figure 8 shows majority of the respondents (n=59) informed that they were not receiving any assistance from agriculture department. Almost similar response was noted among either gender between the respondents. A less than a half respondents affirmed that they do receive some sort of assistance in the agriculture from the department, however, the males and females were disproportionate (n=18M vs n=24 F).

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