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Farmers' awareness level and their perceptions of climate change: A case of Khyber Pakhtunkhwa province, Pakistan

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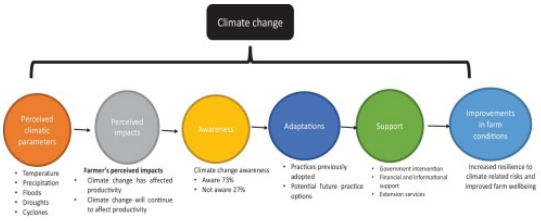
Abstract

Climate change is an environmental threat to all the sectors, especially the agricultural sector around the globe. Pakistan is one of the most vulnerable regions to extreme climatic events in developing world especially in Southeast Asia. Pakistan has detrimentally affected by the climatic variations due to its high exposure to extreme climatic events. Several studies have reported the farm households' perception, adaptation and mitigation about climate change but there is inadequate knowledge available on the awareness of farm households about climate change in Pakistan. To fill this research gap, the purpose of research aims to examine the Pakistani farm household's awareness level of climate change and its associated factors. By using structured questionnaire in data of 400 study participants were collected from four districts of Khyber Pakhtunkhwa (KP) province of Pakistan through a household's survey. A stratified random sampling technique was utilized for collection of primary data. A probit model approach was employed to analyze the farm households' awareness of climate change and its associated socioeconomic and demographic variables. Results of our study exposed that 73 % farm households were aware of climate change. Socio economics and demographic variables such as age of farm households, education level, farming experience, land ownership status, extension and information sources access were pointedly related to farm households' awareness of climate change. Further, results of our study showed that the evaluation of farm households' adaptation behavior suggests that farm households are active in using several adaptation strategies such as crop diversification and use of irrigation etc. It is expected that the findings of the present research will be helpful to guide governmental agencies and policymakers and contribute to the construction of sustainable adaptation measures in Pakistan and other regions in the framework of climate change.

Graphical abstract



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Introduction

Variation in climate is one of the core universal environmental challenges facing society (Steffen et al., 2015). Climatic change has affected all the regions of around the world, which causes extensive perturbations that have unavoidable effects on the economy (Beniston and Haeberli (2001); Kohler and Maseli, 2009; Huong et al., 2018a). There has been a focus on innumerable obstructed aspects like agriculture, fisheries, water resources, forestry, infrastructures, human health and ecological system, that are considered to be very essential to livelihood (Beniston (2003); Pulhin et al., 2006). Climatic changes have affected many ecosystem changes in the form of intensifying temperature, rising sea levels, changes in rainfall patterns, melting of glaciers and devastating floods (IPCC, 2007). According to (IPCC 2001), during the last century average temperature was increased with 0.6 °C, and it is expected that by the end of present century the temperature will increase by 2–3 °C (IPCC, 2007). As a result, it is expected that due to greenhouse gas omissions the changes in climate will be larger than the previous century (Pachauri and Spreng, 2011).

Climate change is a major concern for developing countries where poverty is a common phenomenon and agriculture is the main driving force of people's livelihood (Huong et al., 2018a; Fahad et al., 2018a). With the climatic variations, the occurrence of climatic hazards such as drought, floods, cyclones, coastal storms, heat or cold waves and storm-generated surges has increased universally (Field, 2012; Zhang et al., 2013; Huong et al., 2017). The climatic risks such as production, financial risks and marketing risks are the major characteristics of agrarian sector (Velandia et al., 2009). The rural, increased population, low literacy rate, unmanaged settlement, and lack of awareness are the major contributing factors to the susceptibility of society to climatic hazards that mostly hit the poor communities (Fahad and Wang, 2018; Huong et al., 2018b). Impacts of climatic variations vary region to region, the farm households in developing regions are expected to suffer more due to a number of reasons including low level of awareness, lack of diversification capacity, low adaptive capacity, lack of skills, lack of education, limited infrastructure, limited financial capacity, the incapability to predict the extreme climatic events (Kurukulasuriya, 2007).

Pakistan is among the hugely vulnerable countries in the world hugely affected by the climatic events, large population of the country are extremely poor and who are highly vulnerable to the adverse impacts of natural disasters. Various parts of Pakistan are under different climatic stress such as floods, droughts, snowstorms, avalanches and landslides. Agriculture sector in Pakistan contributes 22 % to gross domestic product (GDP) and employs 45 % of the Pakistan's total work force, as well as almost 60 % of the population; thus, any adverse repercussion of climate events might influence the livelihoods of millions of populations (GOP, 2013). Natural disasters such as recent endured three floods of 2010, 2011, and 2014 that badly affected the farming sector and the economy of the region that caused immense damage to different sectors such fisheries, forestry, infrastructure, livestock, tube wells, animal sheds, seed stocks, houses, fertilizers and other agrarian equipment. Moreover, around 250,000 farm households and almost 1 million acres of land (cultivated land) was affected (NDMA, 2014; Fahad and Jing, 2018).

Various literature has explored the farm households' awareness level, climate change vulnerability, adaptation and as well as it's negative effects across the regions. But such study has been taken in consideration at Pakistan that is more vulnerable to climate hazards. Climate variations, awareness and perceptions of climate change differ across the regions (Mandleni and Anim, 2011). Awareness of climatic changes and its adverse effects are imperative for farm households to cope with those impacts. Following the existing literature (Maddison, 2007; Hassan and Nhemachena, 2008; Idrisa et al., 2012; Mtambanengwe et al., 2012; Ajuang et al., 2016; Huong et al., 2018a), It is concluded that the farm households' decision about climate change adaptation strategies is directly associated with the climate change awareness level of farm households, which might resulted in vulnerability reduction and improvement in livelihoods.

Surprisingly, the studies concerning awareness of climate change that is directly associated with farm households' adaptation strategies are still in initial stages in the Khyber Pakhtunkhwa province of Pakistan, which is one of the most affected provinces of Pakistan by climatic events. In order to fill the research gap, this research is anticipated to deliver evidences of the farm households awareness level of climate change and the affecting determinants that could provision pertinent measures by private and public organizations. Therefore, the research study pursues to scrutinize the farm households' climate change awareness level and the main affecting factors.

The remainder of this manuscript is arranged as follows: The methodology of this study is defined in the Section 2. The Section 3 discusses results and discussion portion, while Section 4 concludes the study.

Section snippets

Sampling design

A household survey was conducted in the most vulnerable districts of Khyber Pakhtunkhwa (KP) province of Pakistan. A random sampling technique was utilized and a structured questionnaire was used for data collection. A household survey was conducted using face-to-interview method, as its appropriate the socio-economic nature of farm households in the surveyed districts (study area) and it was not possible to follow postal or web based survey procedure. The survey team consist of four expert…

Farmers' awareness of climate change

The farm households were asked about their climate change awareness level. The results showed that a majority of study participants (73 %) have noticed and had awareness of climatic variations, and almost 27 % study participants were not aware of climatic changes as shown in Table 2. For instance, majority of the study participants have reported that the temperature in both seasons winter and summer (Rabi and Kharif) increased significantly. Our findings are in agreement with the official…

Discussion

Among the socio-economic variables, the variable age had as positive and significant relationship with the climate change awareness; as age increases, farm households' awareness level also increases. This significant relationship shows that aged farmers are more aware of climatic changes than the younger farm households. Our findings are supporting previous studies of (Bayard et al., 2007; Olajide et al., 2011), who stated that aged farm households are more aware of climatic changes than young…

Conclusion

The farm household's awareness level is influenced by several factors, such as socio-economic factors and demographic factors. 400 farm households sample was used in the present study from Khyber Pakhtunkhwa province of Pakistan by using random sampling method. The results of our research showed that majority of farm households in the surveyed districts (study area) were aware of climatic changes. The findings show that the farm households who are severely affected by the adverse effect of…

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…Moreover, social networks play a very important role in shaping farmers' knowledge and perceptions on ecology and climate (Bohensky et al., 2016). This is in line with (Fahad et al., 2020) who reported a significant relationship between access to external information and farmers' knowledge on climate change. Previous research by Li et al. (2021) showed that the role of mass media, namely television and internet, as well as access to extension services affected the knowledge and perceptions of farmers on climate variability, thereby, increasing their awareness of its impact on agricultural production.…

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