

The Impact of Climate Change on Household Food Security (Afghanistan): A Review

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ABSTRACT

Climate change is predicted to adversely affect agricultural yields, particularly in Asian countries, where crop production heavily relies on environmental factors such as rainfall and temperature. However, there have been limited studies on the effects of climate change dynamics on food security in Asia, particularly at the household level. Consequently We conducte analysis of local climatic changes, the status of household food security, climate-related causes of food insecurity, food security determinants and the adaptation strategies employed by local farmers. The research revealed that the Climate change over the last three decades negatively impacted the food security status of households. Crop production faced constraints due to inadequate rainfall, severe erosion and rising temperatures. Additionaly factors such as unpredictability of rainfall, pests and diseases further contributed to the challenges. Using the calorie intake approach, 60.5% of sampled respondents were food insecure. Further analysis utalizing the logistic regression model showed that age and family size, as well as the amount of cultivated land and rainfall, were the significant ($p < 0.05$) factors influencing household food security status. A substantial proportion (69.8%) of farmers incorporated adapting strategies into farm management parctice. These strategies included improved use of crop varieties and livestock production, in addition to income diversification. Taken together, these findings show that improving climate change awareness, facilitating the participation of female-led households in income generation and strengthening existing adaptation measures have positive impacts on food security.

Keywords: Climate Change, Food Security, House Hold, Temperature

INTRODUCTION

Changes in the average and/or variability of properties like temperature and precipitation over a prolonged period are indicative of climate change. Elevated atmospheric carbon dioxide (CO₂) concentrations, a contributing factor to climate change, are also taken into consideration in this paper. Over the past several centuries, Earth's climate has undergone significant changes due to human activities (Fekad & Bekalu, 2020). Climate change, a result of natural or man-made factors, poses severe consequences on human life, society, livelihood, and food security, highlighting its detrimental effects on the planet's future. (Akudugu & Dittoh, 2012). This term describes the rise in global temperature rise caused by the atmospheric release of gases such as CO₂, CH₄, CFCs, N₂O, and O₃. Additionally, environmental factors including temperature, precipitation, humidity, and pressure, either individually or in combination with other elements, have an impact on growth of plants (Oseni & Masarirambi, 2011).

Food security has four primary components, according to the Food and Agricultural Organization: food availability, food accessibility, food usage, and food system stability or cost (Akudugu, 2012). Climate change is expected to significantly impact global, regional, and local food security, disrupting food supplies, restricting access, and complicating its use, particularly in tropical areas and impoverished populations (Fekad & Bekalu, 2020).

The biggest environmental hazard of the twenty-first century was climate change (Fonta et al., 2011). The agricultural industry has been under pressure from climate change for many years, and the industry is more vulnerable to weather patterns. Climate change has a major impact on food security in the Sahel (Zakari et al., 2022). It will certainly result in more intense and frequent weather conditions, which will harm both rural and urban populations' welfare and food security status due to diminished opportunities, low land availability, and inadequate food production. (Ogunpaimo et al., 2021). Food security is being directly impacted by climate change and an increase in natural disasters in many parts of the globe. Natural disasters have impacted about 200 million people yearly during the past ten years, a number seven times greater than fighting has. Moreover, several studies have demonstrated that the degree of food insecurity in mountainous regions is noticeably greater than in plain regions (Poudel et al., 2017). The research on the susceptibility of climate change relates to food insecurity and the disintegration of food systems to rising temperatures, variable precipitation, acidifying the oceans, droughts, and flooding (Lam et al., 2022). Global acceptance of climate change and its persistence has led to a significant concern (Javadi et al., 2023).

Additionally, there are ways to mitigate the detrimental effects of climate change on biodiversity. A few straightforward steps, such as improving both the quantity and the diversity of habitats, can concurrently address several causes. However, decisions over land use can potentially negatively affect a population's "adaptable capability" (Fekad & Bekalu, 2020).

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Climate Change and Parameters

Climate change is identified by changes over an extended period in the average and/or variability of properties such as temperature and precipitation, in contrast both a drop in rainfall (associated with drought events) and an increase in rainfall (associated with floods) may promote migration in the area of interests. Although precipitation also has a nonlinear impact on migration, its impact is less pronounced than that of temperature (Petroliagkis & Alessandrini 2021).

Food Security

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Household Food Security

Reduced yields are caused by climate change, which also has an impact on farmers' access to food and affordability. The food security of the household is affected by this. Based on present consumption, the state of food security in the home was evaluated (recall of one week). According to the study results, out of 185 families surveyed, 60.5% consumed fewer calories per day than the minimal average adult calorie consumption norm (2200 kcal/day); on the other hand, 39.5% ingested more calories per day than the recommended range of 2201–2500 kcal/day for a life of good health. (Mekonnen & Haile, 2021)

The recognition of climate change as a worldwide phenomenon with potentially extensive consequences is growing. Climate change is real and is predicted to get worse over the next few decades, according to scientific research. The availability of water and other pressures for crops are changing due to increasing temperatures and precipitation variations; these changes have an impact on crop productivity, income, and poverty. With almost three hundred million undernourished people, South Asia has the highest concentration of food-insecure people (Ali and Erenstein, 2017). It is important to remember that while climate variability and change are intimately related to the problem of food security, yield is not solely determined by climate, and food security is not solely shaped by the physical environment (Emaziye et al., 2013). Three main elements contribute to climate change: natural processes, human activity such as the release of greenhouse gases and methane (CH₄) emissions, and changes in land use. Global crop productivity has been seriously threatened by low-temperature stress. As a result, the agriculture sector suffered a significant economic loss of US\$ 108 billion between 2008 and 2018 due to damaged or decreased crop and livestock production (Farooq et al., 2022). Despite its possible inadequacy in masking personal preferences and status, home food security research presumes the household offers the fundamental reflections and patterns of food security status (Mohammed & Uruguchi, 2013). In 2011–2012, 2.8 million people and 1.5 million children under the age of 18 were estimated to be part of Canada's 12.6% of households that experienced food insecurity (Schnitter & Berry, 2019). South Asian countries are probably going to be most impacted by climate change in terms of crop production. For instance, a 3–10% decrease in rice yield in Punjab could result from a temperature increase of 1.0°C to 3.0°C. A 4°C temperature increase in Tamil Nadu resulted in a 41% decline in rice yield (Chen et al., 2021). Numerous studies have looked at how climate change can affect global food costs, mostly for grains. Any policy response to climate change is thought to need adaptation to lessen the negative effects on agriculture. Strategies for agriculture to adapt to climate change include (a) micro-level measures including crop diversity and timing adjustments (b) market reactions, like credit programs and diversification of income (c) modifications to institutions, mostly the result of government actions, such as the creation of agricultural markets, subsidies, and taxes; and (d) technological advancements, such as the creation and marketing of new crop varieties and improvements in water management strategies (Ali & Erenstein, 2017).

CONCLUSION

The Islamic Republic of Afghanistan was 6th in the list of countries which was mostly affected by climate changes in March 2019, the mentioned year was the most devastating—approximately 120000 people were affected, and 12000 homes were either damaged by the flood and landslide. Currently, climate change has become a reality and the food security of the households in the study area is highly affected by these changes and adaptation strategies should be developed in its response. The coefficient of rainfall variation showed there is a high variability during the main cropping season in the area. Demographic variables such as age, family size, and economic factors such as cultivated land and annual income affect the food security status of the farmers. Farmers in the district have developed adaptation mechanisms mainly focused on using improved crop and livestock production, changing the date of planting and harvesting, soil and water conservation practices, irrigation, and income source diversification. Moreover, working on an improved land management system, providing timely climate information, widening the income sources, and adopting improved varieties are the most important adaptation strategies that should be taken into account to reduce the food security risks of the area in times of climate change.

REFERENCES

- Akudugu, M. A., & Alhassan, A. R. (2012). The climate change menace, food security, livelihoods and social safety in Northern Ghana. *International Journal of Sustainable Development & World Policy*, 1(3), 80.
- Ali, A., & Erenstein, O. (2017). Assessing farmer use of climate change adaptation practices and impacts on food security and poverty in Pakistan. *Climate Risk Management*, 16, 183-194.
- Chen, M., Atiqul Haq, S. M., Ahmed, K. J., Hussain, A. B., & Ahmed, M. N. Q. (2021). The link between climate change, food security, and fertility: The case of Bangladesh. *PLoS One*, 16(10), e0258196.
- Emaziye, P. O., Okoh, R. N., & Ike, P. C. (2013). An evaluation of the effect of climate change on food security of rural households in cross river state, Nigeria. *Asian Journal of Agricultural Sciences*, 5(4), 56-61.
- Farooq, M. S., Uzair, M., Raza, A., Habib, M., Xu, Y., Yousuf, M., ... & Ramzan Khan, M. (2022). Uncovering the research gaps to alleviate the negative impacts of climate change on food security: a review. *Frontiers in plant science*, 13, 927535.
- Fekad, M., & Bekalu, Y. (2020). Climate change impacts on household food security and its adaptation options in rural Ethiopia: a systematic review. *EPR Int. J. Res.*
- Fonta, W., Edame, G., Anam, B. E., & Duru, E. J. C. (2011). Climate Change, Food Security and Agricultural Productivity in Africa: Issues and policy directions.
- Hossain, M. S., & Majumder, A. K. (2018). Impact of climate change on agricultural production and food security: a review on coastal regions of Bangladesh. *International Journal of Agricultural Research, Innovation and Technology (IJARIT)*, 8(2355-2020-1646), 62-69.
- Javadi, A., Ghahremanzadeh, M., Sassi, M., Javanbakht, O., & Hayati, B. (2023). Economic evaluation of the climate changes on food security in Iran: application of CGE model. *Theoretical and applied climatology*, 151(1-2), 567-585.
- Lam, Y., Winch, P. J., Nizame, F. A., Broaddus-Shea, E. T., Harun, M. G. D., & Surkan, P. J. (2022). Salinity and food security in southwest coastal Bangladesh: impacts on household food production and strategies for adaptation. *Food Security*, 1-20.
- Lemma, Y., Beyene, F., & Hundie, B. (2013). Climate change and variability: implications for household foodsecurity in agro-pastoral areas of Jigjiga District., *Ethiopian Journal of Economics*, 22(1), 71-106.
- MA Akudugu, S Dittoh, E. M. (2012). The implications of climate change on food security and rural livelihoods: Experiences from Northern Ghana. *Journal of Environment and Earth Science*.
- Mekonnen, A., Tessema, A., Ganewo, Z., & Haile, A. (2021). Climate change impacts on household food security and farmers' adaptation strategies. *Journal of Agriculture and Food Research*, 6, 100197.
- Mohammed, E. Y., & Uraguchi, Z. B. (2013). Impacts of climate change on fisheries: Implications for food security in Sub-Saharan Africa. *Global Food Security*, Nova Science Publishers, Inc, 114-135.
- Ogunpaimo, O. R., Oyetunde-Usman, Z., & Surajudeen, J. (2021). Impact of Climate Change Adaptation on Household Food Security in Nigeria—A Difference-in-Difference Approach. *Sustainability*, 13(3), 1444.
- Oseni, T. O., & Masarirambi, M. T. (2011). Effect of climate change on maize (*Zea mays*) production and food security in Swaziland. *change*, 2(3), 3.
- Petroliagkis, T. I., & Alessandrini, A. (2021). Screening and selecting climate change impact parameters as potential drivers of migration. *Publications Office of the European Union*.
- Poudel, S., Funakawa, S., & Shinjo, H. (2017). Household perceptions about the impacts of climate change on food security in the mountainous region of Nepal. *Sustainability*, 9(4), 641.
- Zakari, S., Ibro, G., Moussa, B., & Abdoulaye, T. (2022). Adaptation strategies to climate change and impacts on household income and food security: Evidence from the Sahelian region of Niger.