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Effect of climate change on food security

Alemitu Worku · Melkamu Terefe*

Ethiopian Forest Development, Jimma center, P.O.BOX 1187, Ethiopia

Corresponding author: melkamu1122@gmail.com

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Summary: In addition to compromising food security, climate change-related extreme weather lowers urban residents' incomes and access to food. Unexpected effects of climate change on food availability are possible. This review paper aims to investigate how climate change affects the availability of food. Climate change can have a wide range of effects on agricultural systems, making it more challenging to sustainably produce enough food and inexpensive, nutrient-dense food. We must broaden our narrow focus from increasing yield and plant productivity to take into account the impact of climate change on the nutritional content of food crops in order to fully comprehend how climate change is affecting our world's food supply. Proactive adaptation can boost capacity to manage climate change by integrating climate change in long-term decision-making and eliminating disincentives to adjust behaviour in response to climate change.
Key words: agriculture, climate change mitigation, food availability, food utilization

Introduction

Our knowledge of the extent to which climate change impacts us and our environment has improved as a result of arguments and evidence on climate change variability (Andric et al., 2019). Due to its extensive impact on numerous social and environmental realms, many decision-makers confront a challenging task in developing effective policies to reduce the climate change hazards. Despite gaps in scientific understanding and ambiguity regarding the most effective ways to contain and mitigate the complex dangers, many governing entities at the international, regional, and national levels have recognized the value of preventive activities and policies (Ciplet et al., 2017). The severity of climate change effects and how much they contribute to the deterioration of food security are slowly becoming more apparent. One important effect of climate change that seriously jeopardizes the viability and sustainability of all life is the susceptibility to future global food security (Leisner, 2020).

In particular, population density, health, food production and distribution, and poverty received considerable consideration at the 1974 World Food Conference with regard to food security (United Nations, 1975). In the 1980s, food security studies focused on the minutiae of access to food, nutrition, and household food entitlements. Prior to that, research on food security at the macro level, including the nation's food production, inventories, and foreign trade, was extensive. Environmental concerns such as deforestation, water scarcity, air quality, overuse, and climate change have taken precedence over food security since 1996 (Firdaus, 2015).

The four aspects of food security were the stability of food availability, access to adequate and nutritious food for all people, use of food to meet all socio-physiological demands, and availability of

sufficient and high-quality food. In addition to the four dimensions, the availability and use of food are regarded as essential aspects of the "sustainability" of the entire food system (Timmer, 2017). Therefore, taking sustainability into account is crucial to achieving food security, which should also be taken into account as a long-term time dimension (Berry et al., 2015).

Resources are impacted by climate change (Cadro et al., 2019; Simunic et al., 2019). Extreme weather brought on by climate change has an impact on urban populations' access to food, incomes, and food security. Apart from its effects on agriculture and food security, climate warming is one of the most urgent concerns facing humanity (Steffen et al., 2015). Future food security is seriously threatened by changes in the temporal and spatial distribution of climate variables as well as a rise in the frequency of extreme weather events (Chen et al., 2015; Zhao, et al., 2015). Additionally, variations in temperature and precipitation can drastically alter regional climates, which have an impact on crop yield.

Method

The information in this review paper was gathered entirely from secondary sources. The information presented here was compiled from sources, such as published articles, books, and dissertations. The majority of the literature spans the years 2015 to 2020, with a few review materials carefully chosen from the preceding period to serve as a foundation for the evaluation.

Result and Discussion

Climate change effect on food availability

Climate change affects food availability by reducing crop yields, fish and cattle productivity, particularly in Sub-Saharan Africa and South Asia, where the majority of food-poor people live. According to Zougmore et al. (2018), without suitable actions, climate change and unpredictability would damage agricultural productivity, food security, and add to the already excessive levels of poverty in Sub-Saharan Africa. The effects of climate change will be most severe in countries where agriculture is mostly rain-fed, such as Sub-Saharan Africa, making it especially vulnerable to climate changes and droughts (Muchuru and Nhamo, 2019).

Climate change would lower the yields and output of major staple crops such as rice (Akinbile et al., 2015) and maize (Freduah et al., 2019). Climate change is also expected to reduce animal output. Some studies have also showed an increase in the occurrence of animal diseases caused by climate change (Hussain et al., 2016). Yield and productivity decreases can have major consequences for the other food security elements, particularly food access and food utilization. Solaymani (2018), for instance, demonstrates the detrimental effects of rainfall and temperature fluctuation on food availability and access to food due to a decrease in the supply of agricultural products, commodity inflation, and typically a decrease in household income.

Climate change effect on food access

The availability of resources to purchase food is referred to as food accessibility. Resources for food production, food values, transportation and trade networks, wholesale and retail systems, accessibility to food, sociocultural norms, food preferences, and distribution channels all play a role (Brown et al., 2015). Food prices would rise as a result of food supply limitations caused by climate change negative effects on production and output. Food price hikes would have a severe impact on low-income people in South Asian communities that already have high rates of hunger and poverty (Tamako and Thamaga, 2017). Sub-Saharan African countries face a number of climate dangers, including abrupt and unpredictable changes in temperature and rainfall patterns, which imperil food production and may increase food costs and food poverty (Tamako and Thamaga, 2017).

Food insecurity and hunger would become more common among impoverished urban and rural populations, the bulk of whom are net food purchaser and already spend a significant portion of their income on food. The situation is extremely concerning for those whose livelihood and income is dependent on agriculture, particularly small-scale farmers (Garcia de Jalon et al., 2018; Williams et al., 2018). They also say that the effects of climate change on agriculture will have a variety of consequences for livelihoods and food security.

Smallholder farmers are particularly vulnerable because they use a variety of farming practices, have few resources, and face a number of hazards. Climate change and variability will have a significant impact on smallholder farmers in Sub-Saharan Africa, who mostly rely on agriculture for a living (Akinseye et al., 2020). There is little doubt that rising food prices and the negative consequences of climate change on their sources of income and agricultural livelihood strategies will have a severe impact on rural inhabitants. Farmers' income and tax revenues are both reduced when agricultural productivity falls (Sultan et al., 2019). As the intensity and frequency of climate-related disasters grow, so will production, as will the loss of assets that support livelihoods (Poudel et al., 2017).

Climate change effect on food utilisation

Climate change influences how food is consumed by diminishing the availability of wild crops and the productivity of small-scale farmers. Climate variability has an impact on child malnutrition among subsistence farmers in low-income nations. Weather changes, according to Phalkey et al. (2015), have a significant relationship with juvenile inhibition at home.

Children and women may be more exposed to the impacts of global warming-induced hunger (Belesova et al. 2019; Bryan et al., 2018). Furthermore, climate change would affect food consumption by decreasing the nutritional value of staple crops and increasing the danger of food contamination. According to Esham et al. (2018), the impacts of climate change on people's ability to attain and use food security remain underappreciated. A comprehensive approach that can ensure the climate resilience of the entire food system and tackle nutritional difficulties caused by climate change effects is required when establishing food security and constructing climate resilient food production systems. This implies widening the narrow focus of climate change effects on agricultural production and yield to include the impact on crop nutritional value and, as a result, diets (Leisner, 2020).

Climate change effect on food system stability

Climate change threatens the sustainability of food systems, particularly for low-income people. In the semi-arid region of Northern Nigeria, for example, decreasing crop and livestock productivity was caused by rising temperatures and a severe drop in rainfall (Parker et al., 2019). Furthermore, it causes the loss of agricultural and grazing lands and increases water scarcity, which has a serious impact on livelihood, household income, and the occurrence of diseases such as malnutrition (Jibrillah et al., 2018).

Climate change has an impact on food security globally, nationally, and locally, which makes it unstable (Schnitter and Berry, 2019). The short-term effects of temperature and rainfall variation on agricultural output may have a long-term impact on the stability of the global food chain. Climate change may have made comprehensive food systems less stable than they once were due to supply changes and increased price volatility (Baldos and Hertel, 2015). A food system strategy must be implemented because it is clear that climate change has an impact on food supply, access, consumption, and stability across time. According to Keller et al. (2018) effective solutions require knowledge of the full spectrum of potential climate change impacts on food use, access, stability, and availability, as well as underlying ecological systems.

Food security, climate change adaptation and mitigation

According to Islam and Wong (2017), research on the relationship between food insecurity and climate change appears to be frequently skewed. Climate change is being blamed for food insecurity, rather than the systems in place to guarantee food security, which are claimed to have exacerbated the problem of climate change. Agriculture, the most climate-dependent human activity, is both a victim and a culprit of climate change, but it also has the capacity to alleviate the problem.

Sustainable intensification is viewed as a win-win strategy for tackling both climate change and food security (van Loon et al., 2019; Ayantunde et al., 2020). However, van Loon et al. (2019) discovered that for Sub-Saharan African cereal cropping, "intensification scenarios are clearly preferable to expansion scenarios in terms of climate change mitigation." Depending on the level of nutrient usage

efficiency achieved, the strengthening will result in considerable increases in fertilizer inputs and associated greenhouse gas emissions.

Some scholars stressed the benefits of employing climate-smart agriculture for both lowering and responding to climate change (Garcia de Jalon et al., 2017; Abegunde et al., 2019). Furthermore, according to Loboguerrero et al. (2019), "climate-smart agriculture can help build synergies between production, adaptation, and mitigation." Decarbonization technologies and practices, such as nuclear power, carbon storage and utilization, fuel switching, renewable energy, and efficiency improvements, are utilized to alleviate climate change. The majority of these advances are well-known and pose a reasonable degree of danger related to climate change (Bustreo et al., 2019).

Although adaptation can mitigate some of the negative consequences of climate change, it cannot prevent it entirely. Climate change adaptation refers to modifications made to the human-environment system in response to existing and future climatic changes, with the goal of reducing or eliminating linked hazards and potentially increasing possibilities of combating climate change. To secure the livelihoods of vulnerable individuals, developing countries must make major adjustments to agricultural production in response to climate change. Adaptation methods are beneficial in assisting locals in dealing with harsh weather and climate change events (Alam et al., 2017). Policymakers, researchers, non-profit organizations (NGOs), communities, extension agents, and farmers should all be involved in the creation of adaptation strategies. These adjustments are generally location-specific and rely on local institutions and the dependents' socioeconomic status (Wei et al., 2017).

Conclusion

Climate change has a long-term, wide-ranging impact on food security. The reviewed evidence indicates that climate change has a detrimental effect on all four aspects of food security (availability, accessibility, utilisation, and stability). Many decision-makers thought it was difficult to develop effective policies to address the dangers of climate change because of its wide-ranging impact on numerous social and natural domains. Therefore, geophysical, social, technical, and cultural contexts and aspects should be considered in adaptation and mitigation methods. Comprehensive efforts combining adaptation and mitigation are required to lessen the consequences of climate change on the food economy. According to numerous studies, social factors define food security more precisely than physical ones. Because of this, poorer countries are more susceptible to weather changes and food shortages than wealthier ones.

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Uticaj klimatskih promena na bezbednost hrane

Alemitu Worku · Melkamu Terefe

Sažetak: Pored toga što ugrožavaju bezbednost hrane, ekstremne vremenske prilike prouzrokovane klimatskim promenama smanjuju prihode stanovništva i pristup hrani. Mogući su neočekivani uticaji klimatskih promena na raspoloživost hrane. Cilj ovog rada je istraživanje uticaja klimatskih promena na dostupnost hrane. Klimatske promene mogu različito uticati na poljoprivredne sisteme otežavajući održivu proizvodnju dovoljnih količina hrane i jeftine hrane bogate hranljivim materijama. Moramo proširiti svoje uske vidike od povećanja prinosa i produktivnosti hrane i uključiti uticaj klimatskih promena na hranljivi sastav useva koji se koriste kao hrana kako bismo u potpunosti shvatili način na koji klimatske promene utiču na svetsku raspoloživost hrane. Proaktivna adaptacija može poboljšati kapacitet za upravljanje klimatskim promenama kroz integraciju klimatskih promena u donošenje dugoročnih odluka i eliminaciju destimulacija u cilju promene ponašanja u odgovoru na klimatske promene.

Ključne reči: dostupnost hrane, korišćenje hrane, poljoprivreda, ublažavanje klimatskih promena