

# The Impact of Climate Change on Human Health and Social Security

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**Abstract:** Climate change not only affects the global ecological environment, but also has profound impacts on human health and social security. With the frequent occurrence of extreme weather events caused by climate change, crop yield and quality are threatened to varying degrees, thereby affecting the stability of the global food supply chain. This impact is particularly prominent in developing countries, where agriculture relies heavily on natural conditions and food shortages directly lead to increased malnutrition and health problems. This article focuses on analyzing how climate change affects the nutritional status of populations through reducing agricultural output, lowering food supply quality, and increasing food prices, and further explores its potential threats to public health and social security.

**Keywords:** Climate Change; Agricultural Output; Grain Supply; Nutritional Intake; Social Security

## 1. Introduction

Climate change is one of the major challenges facing the world today, widely affecting natural ecology, economic development, and human health. In recent years, with the rise of global temperatures and frequent extreme weather events, agricultural production and food supply chains have been seriously threatened. This not only poses a challenge to global food security, but also affects human nutritional intake through the decline in agricultural output and food quality, thereby having adverse effects on health.

Existing research has shown that climate change affects agriculture and food production through multiple pathways. Tschakert & Dietrich, (2023) pointed out in their study on the relationship between climate change and agriculture that rising temperatures, changes in rainfall patterns, and extreme weather events

such as droughts and floods have had a significant negative impact on crop yields, especially in tropical and subtropical regions. Due to the dependence of agriculture in these regions on natural climate conditions, climate change has greatly increased the uncertainty of agricultural production. Berrang-Ford & Lesnikowski, (2021) study further suggest that global warming leads to shortened crop growth periods and decreased yields, especially for major food crops such as wheat, corn, and rice, where the impact of yield reduction is particularly significant. These studies demonstrate the potential threat of climate change to food supply, but in the research process, there has been relatively little attention paid to its profound impact on the nutritional status and health of populations. Regarding the impact of climate change on nutrition and health, Hunt & Wilkins, (2022) found that climate change leads to a decrease in agricultural yields, food shortages, and exacerbates the problem of malnutrition among impoverished populations. In addition, the impact of climate change on food quality has also received much attention. Kovats & Haines, (2021) found that an increase in carbon dioxide concentration may lead to a decrease in the nutritional value of some crops, especially reducing the content of key minerals such as iron, zinc, and other trace elements. Although these studies reveal the potential impact of climate change on nutrient composition, existing research mainly focuses on certain specific crops or regions, lacking global, long-term data support and systematic analysis. In summary, although previous studies have explored the impact of climate change on agricultural production, food supply, and nutritional health, there are still some shortcomings. Therefore, based on the impact of climate change on agricultural output and food supply, this study will further analyze its potential threats to population nutrition intake and health.

## **2. The Impact of Climate Change on Agricultural Output**

### **2.1 The Impact of Climate Change on Crop Yields**

The impact of climate change on crop yields is one of the most direct and significant consequences of climate change (Boulton & Berrang-Ford, 2023). With the increasing global temperature year by year, the growth cycle and yield of crops have undergone significant changes. The rise in temperature directly affects the photosynthetic efficiency of crops, leading to shortened growth periods and disordered flowering periods of some crops, thereby reducing the yield per unit area. Research has shown that the yield of staple crops such as corn, wheat, and rice significantly decrease under high temperatures, especially in tropical and subtropical regions where high temperatures cause crops to mature too quickly and reduce the effective growth period. In addition, climate change has exacerbated the problem of water scarcity, with the increasing frequency and intensity of droughts causing crops to face a water shortage crisis during their growth period, further reducing yields (Mayer & Koch, 2020). Drought accelerates soil moisture evaporation, making it difficult for crops to absorb enough water from the soil for growth and development, especially in areas lacking irrigation systems. Rising temperatures directly pose a huge threat to agricultural production. On the other hand, although climate change may prolong the growth period in some cold regions, the improvement of their agricultural production capacity is limited due to the unsuitable soil, temperature, and ecological conditions for large-scale crop cultivation.

### **2.2 Increase and Impact of Crop Pests and Diseases**

Climate change not only leads to changes in temperature and precipitation patterns, but also alters the ecological environment of pests and diseases, thereby increasing their frequency and severity. With the warming of the climate, the breeding cycle of many pests and diseases is accelerating, and their activity range is expanding to a wider geographical area (Field & Barros, 2022). Diseases and pests that were

originally common in low latitude areas are beginning to spread to high latitude areas, threatening the relatively stable agricultural production in these areas. For example, pests such as aphids reproduce faster in warm environments, causing increasingly severe damage to food crops such as wheat and corn, resulting in reduced crop yields or even crop failure. Diseases and pests not only affect the healthy growth of crops, but also increase the management costs of crops. Farmers have to invest more resources in pest and disease control, such as using pesticides and manual intervention, which not only increases the cost of agricultural production, but also brings potential risks of environmental pollution. At the same time, climate change has also increased the difficulty of preventing and controlling pests and diseases. Such as, commonly used insect resistant varieties of crops may become ineffective when facing new types of pests and diseases, posing new challenges for farmers (Schweikert & Toth, 2021). More importantly, climate change has intensified the sensitivity of crops to pests and diseases, causing previously disease resistant crop varieties to become vulnerable under climate pressure. Under drought or high temperature conditions, the resistance of crops themselves decreases, making them more susceptible to the invasion of pests and diseases.

## **3. The Impact of Climate Change on Nutrient Intake**

### **3.1 Climate Change and the Increase of Malnutrition Related Diseases**

Climate change has a significant impact on the increase of malnutrition related diseases. Due to extreme weather and declining crop yields caused by climate change, global food supply is facing enormous pressure, exacerbating food shortages, especially in developing countries where malnutrition is becoming increasingly severe. The main manifestation of malnutrition is insufficient intake of protein, trace elements, and vitamins, which directly leads to health problems such as weight loss, weakened immunity, and delayed growth and development (Friel & Marmot, 2020). The problems caused by climate change have increased the incidence and mortality rates, especially among children, pregnant women,

and the elderly, who are more sensitive to nutritional intake needs and at higher risk of being affected by climate change. Climate change may indirectly exacerbate malnutrition related diseases. In addition, the water scarcity and deterioration of sanitation conditions caused by climate change have increased the risk of contracting diseases, thereby affecting people's ability to absorb nutrients (Smith & Baer, 2023). For example, intestinal diseases such as diarrhea have become more common due to increased water pollution, and these diseases directly hinder the body's effective absorption of nutrients. Therefore, the increase in climate change and malnutrition related diseases has become an important issue in global public health. To mitigate this trend, the international community needs to take urgent measures, including strengthening adaptive research in the agricultural sector, promoting crop varieties that are resistant to climate stress, improving food distribution mechanisms, and increasing nutritional interventions in areas severely affected by climate change.

### **3.2 The Exacerbation of Food Shortage and Malnutrition**

The negative impact of climate change on food production, especially the frequent occurrence of climate warming and extreme weather events, directly exacerbates the global food shortage problem. Food shortage not only means a reduction in food supply, but also accompanies fluctuations in food prices, making it even more difficult for poor and vulnerable groups to obtain sufficient nutritional intake. The most direct consequence of food shortage is the exacerbation of malnutrition, especially in areas with fragile food security, where high-risk populations such as children and the elderly are the first to suffer. During periods of food shortage, poor families often rely on cheap, low nutrient value staple foods and lack protein, vitamin, and trace element rich foods such as vegetables, meat, and dairy products (Patel & McMannus, 2021). This monotonous dietary structure further exacerbates malnutrition, leading to a series of health problems such as delayed development, anemia, and weakened immunity. The food shortage crisis caused by climate change not only affects individual health, but also has a

profound impact on the stability and development of the entire society. In addition, the worsening food shortage caused by climate change may also trigger social unrest and conflicts, further exacerbating the uncertainty of food supply. In history, food crises have often been closely linked to social unrest, and with the intensification of climate change, this risk has become even more undeniable. The measures taken by countries to address food shortages should not only focus on improving agricultural production technology, but also increase international cooperation to jointly tackle the challenges of global climate change and food security.

### **3.3 Long Term Effects of Nutritional Imbalance on Human Health**

The changes in agricultural production and food supply brought about by climate change not only cause short-term nutritional problems, but also have long-term impacts on human health. With the intensification of climate change, food shortages, increasing pests and diseases, and frequent extreme weather, the diversity and quality of food supply are gradually declining, leading to an imbalance in nutrient intake. Long term nutritional imbalances, especially deficiencies in protein, vitamins, and minerals, pose a serious threat to human health. First, long-term nutritional imbalance will lead to the increase of chronic diseases, such as cardiovascular disease, diabetes and osteoporosis (Prasad & Ghosh, 2022). These diseases not only seriously affect individuals' quality of life, but also impose a huge burden on the public health system. Insufficient or unbalanced nutrient intake prevents the human body from obtaining sufficient energy and essential nutrients, leading to a decline in immune function and making people more susceptible to diseases. Secondly, nutritional imbalance can also affect brain development and cognitive function, especially in children and adolescents. Insufficient nutrition can lead to delayed intellectual development, decreased learning ability, and ultimately affect future work and social development. The nutritional imbalance caused by climate change requires policy makers and health organizations worldwide to take action. By strengthening adaptive research on climate change, promoting diversified crop cultivation, and enhancing the

resilience of agricultural production, we can fundamentally alleviate the long-term threat of climate change to human health.

#### 4. Conclusion

The impact of climate change on agricultural output and nutrient intake has become a major challenge on a global scale. Climate change, frequent extreme weather events, and an increase in pests and diseases have significantly weakened global food production capacity and threatened food security. And food shortages and nutritional imbalances further exacerbate the spread of malnutrition related diseases, which have a profound impact on global public health. To address these challenges, countries must take a series of measures, including strengthening adaptive research in the agricultural sector, promoting climate change resistant agricultural technologies, and improving food distribution mechanisms. In addition, the international community also needs to strengthen cooperation to jointly address the dual threats of climate change to food security and public health.

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