

Impacts on Climate Variations on Environment and Human Health-An Overview

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Abstract

Climate change possess major challenges to human society and to Earth systems, ecosystems and thereby affecting human health. Many climate change/variability and extreme weather- associated events, such as sea level rise, hurricanes, and storm surge, as well as other weather extremes, including extreme precipitation and heat waves, have direct and indirect impacts on Environment and human health. The main view of this study is describing health impacts of the climate change through projected trends in climate-change-related health. Vulnerability to the risks associated with Climate Change may exacerbate on going socio-economic challenges.

Key Words: Climate, Ecosystems, Human health, Environment

Introduction

Climate Change mainly a result of ozone layer depletion, is affected by human activities that release greenhouse gases that trap heat within the atmosphere. These human activities include increased use of fossil fuel, land use variation and agriculture¹. An increase in greenhouse gases leads to increased warming of the atmosphere and the Earth's surface. As the concentration of these gases in the atmosphere increases that the average surface temperature will rise by 1.1°C to 6.4 °C in the 21st century, with extremes potentially occurring beyond this range^{2,3}. Climate change can affect human health and comfort through a variety of mechanisms^{4,5,6}. Factors that lead to the difference of infectious agents are complex and dynamic, ranging from deforestation, irrigation, species competition, human and animal migration patterns, drug resistance and changing vector lifecycle due to variations in temperature and rainfall. Usually, the range of the vectors or reservoirs is delineated by temperature and sometimes availability of water bodies⁷. Projected changes in climate and climate impacts will have direct and indirect impacts on human health. Warming is predicted to increase or decrease the incidence of vector-borne diseases. The enhance frequency of droughts and flooding is in turn likely to increase the frequency and extent of epidemics of water-borne diseases, as well as to influence the

incidence of vector borne diseases. Warming will also aggravate the impacts of air pollution on respiratory illnesses^{8,9,10}.

Climate change will affect, in profoundly adverse ways, some of the most fundamental prerequisites for good health: clean air and water, sufficient food, adequate shelter and freedom from diseases¹¹ (WHO, 2009). Most often, extra pressure is placed on health care services by increased demands resulting from weather-related natural hazards such as floods and land-slides. Most often, all infrastructures are designed for a specific climate, such as those related to food production, water management, energy production, drainage and sanitation systems, and housing and health infrastructures. Health risks may arise when any one of these systems fails or becomes compromised - as they may in a changing climate. For instance, limited access to water, electricity and sanitation could increase vulnerability to outbreaks of waterborne diseases including cholera¹². Climate change can increase the number of extreme weather events which can damage buildings, roads, and other infrastructure. This causes trauma to people including relocation to new places, as occurred following the recent rains in Kilosa. This causes trauma to people with forced relocation to new places, since climate change is associated with more extreme precipitation events and rising sea levels, cities will also experience more severe and more frequent flooding¹³. Urbanization creates flood-prone conditions by covering the ground with pavement and buildings, and by building urban drains, causing excess water to move more rapidly into rivers than under natural conditions¹⁴. The urban poor build houses of weak, inadequate materials, often against hillsides that are subject to landslides during heavy rains¹⁵ (Unger & Riley, 2007). Climate change can result in damage to sanitation infrastructure resulting in the spread of disease or threatening a community's ability to maintain its economy, geographic location, or national tradition leading to mental stress.

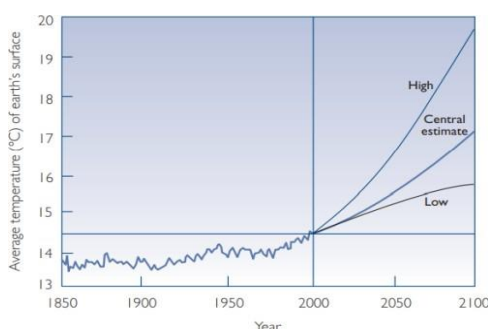


Fig. 1.1 Global temperature record since instrumental recording began in 1860, and projection for coming century, according to Intergovernmental Panel on Climate Change (3). The wide range around the projection reflects uncertainties about aspects of the climate system and future human economic activity and technology choices.

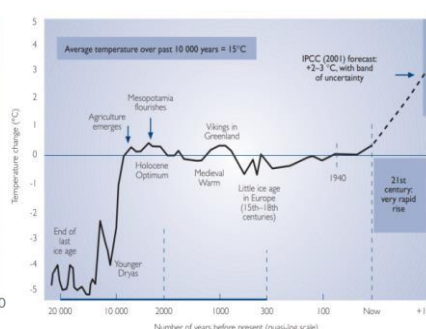


Fig. 1.2. Variations in Earth's average surface temperature

FI.1 Global temperature record, since instrumental recording began in 1860, and projection for coming century, according to Intergovernmental Panel on Climate Change (3). The wide range around the projection reflects uncertainties about aspects of the climate system and future human economic activity and technology choices. World temperature has increased by around 0.4°C since the 1970s and now exceeds the upper limit of natural (historical) variability. Climatologists consider around five-sixths of that recent increase to be due to human influence. The IPCC, established within the UN framework in 1988, was charged

with advising national governments on the causes and processes of climate change likely impacts and their related costs; and ways to lessen the impacts. The IPCC's Third Assessment Report¹⁰ projects an increase in average world surface temperature ranging from 1.4 to 5.8°C over the course of the twenty-first century.

Variations in Earth's average surface temperature

Fig.1.2 Variations in Earth's average surface temperature, over the past 20000 years. Prior to 1860, analogue measures of temperature are necessary. Note the substantial natural fluctuations throughout the period. Note also that (with the logarithmic nature of the time axis) the anticipated rate of increase in world temperature this time is 20–30 times faster than occurred as the planet emerged from the last glaciation, from about 15000 years ago. The IPCC also reported that even if humankind manages to curb excess greenhouse gas emissions within the next half-century, the world's oceans will continue to increase for up to 1000 years, reflecting the great inertial processes as heat is transferred from surface to deep water (10). By that time the sea level rise would have approximated 1–2 metres.

Climate Change Effect on Environment

Global warming and climate change refer to an increase in average global temperatures. This is caused primarily by increases in "greenhouse" gases such as CO₂, CH₄, N₂O and CFC's. Climate change affects all regions around the world. Polar ice shields are melting and the sea is rising. In some regions extreme weather events and rainfall are becoming more common while others are experiencing more extreme heat waves and droughts. Another one impact is altered ecosystems and habitats, as climatic patterns rapidly shift, habitats on land and in the sea are changing, making them inhospitable for some species, while letting others move in and take over. Dependent on sea ice, the animal uses it as a floating platform to catch prey. Experts believe that the Arctic sea ice is melting at a rate of 9% per decade, endangering the polar bear's habitat and existence.

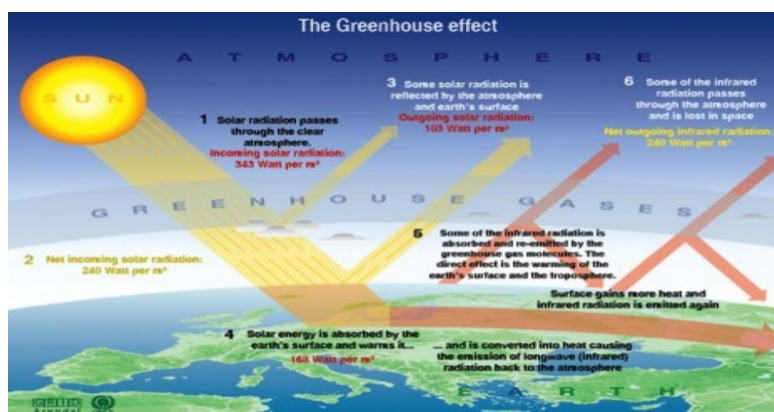


Fig.1.3. Greenhouse Effect

Increases in global temperatures may have different impacts, and the earth receives energy through radiation from the sun. But because of the dependency of humans on the availability and quality of natural resources any changes in the physical characteristics of the environment will be reflected by accumulative interacting social and economic impacts. Their intensity and frequency will not be the same due to variations in site-specific characteristics¹⁶. Coastal areas and communities will be amongst the highest at risk because of their closeness to the sea. Impacts of climate change will depend largely on the density of human populations and characteristics of settlements on the coastal strip¹⁷. The main climate change consequences related to water resources are increases in temperature, shifts in precipitation patterns and snow cover, and a likely increase in the frequency of flooding and droughts. Reduced water levels that may eliminate wetlands or affect their ability to reduce erosion, filter contaminants, and deliver fish and wildlife habitat.

Climate Change influence on Human Health Impacts

The primary challenge facing the world community is to achieve sufficient reduction in greenhouse gas emissions so as to avoid dangerous interference in the climate system. As shown later, much of the resultant risk to human populations and the ecosystems upon which they depend come from the projected extremely rapid rate of change in climatic conditions. Indeed, the prospect of such change has stimulated a great deal of new scientific research over the past decade, much of which is elucidating the complex ecological disturbances that can impact on human well-being and health as in the following example. Though the impact of climate change on health and health systems have been documented in Tanzania, there have not yet been thorough quantitative studies addressing the many processes at work. This is most likely to be because of the complexity of the many interactions or mechanisms that bear on all aspects of the climate change issue. It is therefore important that the government develops a national framework for an integrated assessment of the impacts of climate change on human health. Such a framework will allow identification of potentially important indirect interactions or mechanisms, identification of important research gaps, and a means of integrating targeted research from a variety of disciplines into an enhanced understanding of the whole system.

The biggest challenge is scale. Both the geographical spread of climate-related health problems and the much elongated time spans that often apply, are largely unfamiliar to public health researchers. This category of research is most troublesome to standard epidemiological methods. Researchers in the public health sciences are accustomed to studying geographically localized problems that have a relatively rapid onset and impact directly on human health. There are exceptions i.e. the global spread of AIDS and tobacco related diseases but, typically, health problems are defined by boundaries at a finer scale: neighbourhood, town or province. Weather and climate variability do not fit well the conventional research model, partly because there is no easily identified unexposed control group and little variation in exposures between individuals in a geographical region. Consequently, studies of the effects on health of weather and climate variability need to use ecological designs.

Conclusion

Established the ages human societies have degraded or changed local systems and modified regional climates. Without precedent, the aggregate human impact now has attained a

global scale, reflecting the new rapid increase in population size and energy intensive, high throughput, mass consumption. The world population is encountering unfamiliar human encouraged changes in the lower and middle atmospheres and worldwide depletion of various other natural systems i.e. soil fertility, aquifers, ocean fisheries and biodiversity. Fortunately that is now beginning to change. Indeed, this volume seeks to present a comprehensive discussion of the relationship between global climate change and human population health. Global climate change is likely to change the frequency of dangerous weather events: tropical cyclones may increase as sea surface waters warm; floods may increase as the hydrological cycle intensifies and heat waves may increase in mid continental locations. The production of various air pollutants and of allergenic spores and pollens would be affected by warmer and wetter conditions. Climate change also is expected to affect health via various indirect pathways, including the patterns of infectious diseases. Climate change is expected to alter the path and rate of economic growth due to changes in natural systems and resources, infrastructure, and labour productivity. These changes in disease prevalence and incidence are likely to mediate through biological, ecological, sociological, and epidemiologic processes that interact with each other and which may themselves be influenced by climate change. Climate change will likely result in declining quality and quantity of drinking water, which is a prerequisite for good health, and exacerbate malnutrition by reducing natural resource productivity and threatening food security. Ultimately, societies should be able to avoid, prepare for, and effectively respond to health impacts related to climate change.

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