

Impact of Climate Change on Human Health

KEYWORDS	Global, Environment, health, climate change, effects	
Kiran Kumar		Chetan Kumar T M
Assistant Professor, Department of Management Studies, Karnatak Arts College, Dharwad.		Assistant Professor, Raja Lakahmgouda Law College, Belgaum
ABSTRACT Human pressures on the environment are damaging the world's biophysical and ecological systems. Hu-		

man actions are changing many of the world's natural environmental systems, including the climate system. These systems are intrinsic to life processes and fundamental to human health, and their disruption and depletion make it more difficult to tackle health inequalities. Indeed, we will not achieve the UN millennium development health goals if environmental destruction continues. Health professionals have a vital contributory role in preventing and reducing the health effects of global environmental change. In the coming decades humankind is likely to be subjected to the impacts of rapid environmental change triggered, at least in part, as a result of human activities. While the balance between humans and their resources-base has always been delicate, the accelerated changes resulting from industrialization and significant global population increase over the last century have resulted in definite and sometimes irreversible damage and loss of resources. Global environmental change can be defined as a series of stress factors on the physical and biological systems of the planet. The earth's environment has in the past been continuously subjected to various stresses through natural processes and more recently, through human interference. The so called greenhouse gases (GHGs) are minor gaseous constituents which have radiation properties capable of warming the atmosphere. Human activity through industry, agriculture, energy generation and transport, has released significant amounts of GHGs into the atmosphere since the beginning of the industrial era. A greater frequency and intensity of extreme climatic events may emerge as climate change in the coming decades. Because ecosystems, water quality and quantity, agriculture and air quality are sensitive to weather and climate, any significant and long lasting changes in the climate systems will impact upon human well being, which has subtle dependencies on climate, food security, water quality and environmental health.

Introduction

Climate change endangers human health, affecting all sectors of society, both domestically and globally. The environmental consequences of climate change, both those already observed and those that are anticipated, such as sealevel rise, changes in precipitation resulting in flooding and drought, heat waves, more intense hurricanes and storms, and degraded air quality, will affect human health both directly and indirectly. The effects of climate change on human health is especially challenging because both the surrounding environment and the decisions that people make influence health.¹ Certain adverse health effects can probably be avoided if decision made prior to the heat waves result in such things as identification of vulnerable populations such as children and the elderly and ensured access to preventive measures such as air conditioning. A small change in the Earth's temperature may translate into large modifications to the earth's ecosystem. The weather conditions prevailing here on earth could change substantially. Climate change impacts could lead to severe, adverse effects on health though both direct and indirect means. Potential widespread adverse health effects could include:

- Heat stress-induced illness and death
- Air pollution-related health effects
- Infectious disease, including water, food, vector and rodent-home diseases
- Malnutrition
- Extreme weather-related health effects
- Strom surge-related drowning and injuries and
- Health problems associated with displaced, refugee population²

The idea that humans are systematically transforming the planet and its life support systems at an unprecedented rate has slowly gained recognition over the last two decades. Much of the discussion has been purely scientific in nature. Beginning in the 1980s, the problems of global environmental change have increasingly been linked to human health concerns.

Reasons for Climate Change

It has been painfully difficult, expensive and time consuming to establish links among chloroflurocarbon (CFC) emissions, ozone depletion, increased levels of ultra violet-B radiation on the Earth's surface, and harm to biological systems. This is just one aspect of problem of global environmental change, assembling the case for anthropogenic climate change has been even more difficult.³

There is now widespread agreement among climate scientist that the earth is warming as a result of human activity, primarily due to rising levels of carbon dioxide and other heat trapping atmospheric gases created by burning fossil fuels. It is also clear that current trends in energy use, development and population growth will lead to continuing and more severe climate change over the course of this century and beyond. Climate change is expected to adversely affect the health of all human beings as well. In fact, many communities across the world already experiencing the negative health effects associated with climate change.⁴ 'Climate forcings' whether natural or manmade are events that cause of global climate change.

Carbon dioxide is the second most abundant greenhouse gas after water vapor. With the onset of industrial revolution, commercial growth and economic consumption spawned our reliance on fossil and the subsequent deluge of CO2 into the atmosphere. These increase are only because of manmade activity. The levels of CO2 are increasing global warming and exacerbating climate change. Current levels of greenhouse gas emissions are disrupting the natural balance of the earths temperature and warming the atmosphere at an alarming rate.⁵

RESEARCH PAPER

Who will be Affected

The health effects of global environmental change will vary between countries. These disparities may well increase in coming decades, not only because of regional differences in the intensity of environmental changes (such as water shortages and soil erosion), but also because of exacerbations of differentials in economic conditions, levels of social and human capital, political power, and local environmental dependency.

These differential health risks also reflect the wider issue of access to global and local "public goods." Availability of safe drinking water illustrates the point about access to what, most of the people lack safe drinking water, and basic sanitation. Beyond diarrhoeal disease, water related health risks also arise from chemical contamination—such as arsenic as a cause of skin pigmentation, hyperkeratosis, cardiovascular disease, neuropathy, and cancer. The relation of environmental impoverishment to health risks and inequalities is complex. Environmental degradation impairs health, while health deficits (for example, malnutrition or depletion of the workforce from AIDS) can amplify environmental mismanagement.

The below figure shows the risks to population health from environmental change have far reaching implications for prevention strategies. Global changes result in loss of natural resources.



Relations between human induced global environmental changes affect health and social policy responses. True primary prevention reduces or eliminates the human pressures on environment.

Effect of Climate Change on Health

The changes in global climate that have been forecasted may affect human health directly and indirectly. The below table gives clear information about the direct and indirect effects of global climate change on human health:

Direct

Deaths and illness due to thermal extremes

Injury resulting from floods and storms

Indirect

More widespread vector-borne infections

Increase in other infectious diseases

Respiratory effects of worsening air pollution

- Poor nutrition due to agricultural disruption
- Ill-health due to social dislocation and migration

Volume : 4 | Issue : 1 | Jan 2014 | ISSN - 2249-555X

The direct effects include injury and illness due to the more frequent heat waves and floods. As expected result of higher temperature, extremes of rainfall and thermal expansion of the oceans. The indirect effects are more difficult to specify, but will probably be more important in terms of the magnitude of the disease burden they cause. Indirect effects are mediated via the influence of climate on biological systems such as disease carrying vectors or productive agro-ecosystems or other aspects of the physical environment.⁶

It is often difficult to associate any particular change in the incidence of a particular disease with a given change in a single environmental factor. It is necessary to place the environment related health hazards in a population context, such as age, hygiene practices, socio-economic level. Forecasting the climate change impacts on health is complex, because populations have different vulnerabilities to change and susceptibility to disease.

There are numerous side effects of environmental change that can impact upon health and well-being, including hygrothermal stress and enhanced levels of air-pollution and the modification of natural ecosystems which may have repercussions on such aspects as food production and water quality.

As it is stated above, the impact of climate change on human health are in twofold i.e. direct and indirect. Direct effect related to the physiological effects of heat and cold, and indirect effects such as the spread of vector-borne pathogens into areas where a disease currently does not exist or was eradicated in the past.

Categories of Human Health consequences of Climate Change

- 1. Ashthma, Respiratory Allergies and Airway Diseases
- 2. Cancer
- 3. Cardiovascular Diseases and Stroke
- 4. Foodborne Diseases and Nutrition
- 5. Heat-related Morbidity and Mortality
- 6. Human Development Effects
- 7. Mental health and Stress-related Disorders
- 8. Neurological Diseases and Disorders
- 9. Vectorborne and Zoonotic diseases
- 10. Waterborne diseases
- 11. Weather-related Morbidity and Mortality⁷

Direct Effects of Climate Change on Health

The physiological effects of temperature on the human body are well known, because extreme conditions of heat or cold can be detrimental to many body functions, both directly and in terms of the water stress imposed by high temperatures.⁸

Heat waves, particularly in large urban areas, are associated with episodes of strong pollution often linked to the formation of tropospheric ozone, a gas that is formed by chemical transformation of nitrogen oxides and other "precursor" gases released during the combustion of fossil fuels. Ozone is a highly corrosive gas that can irritate or damage lung tissues in addition to provoking eye irritation. The probable increase in heat waves in a generally warmer climate and the concomitant effects of heat on atmospheric pollution will lead to greater mortality overall, even taking into account the probable reduction in cold-related deaths in many parts of the mid and high latitude countries.

RESEARCH PAPER

Water quality and quantity are also likely to change in the future, as precipitation patterns change and warmer conditions adversely affect the potential levels of aquatic borne pathogens and water pollution. In addition, water quality issues will become even more crucial than today, with possibly over 1 billion people in more than 30 countries without access to a clean water supply.

Shifts in temperature and precipitation patterns can also impact upon agriculture and therefore affect food security in many parts of the world. One of the report suggest that, while global food supply may be maintained through to the middle of 21st century, many regions of the world will experience the adverse effects on crops of heat waves, droughts, and excessive moisture.⁹ Particularly, the developing countries are likely to experience shortfalls of up to 30% in current food production, implying that they will need to import basic foodstuffs from producer countries such as the United States and the European Union.

The combined effects of poorer water quality, increased air pollution, uncertain food security and hygrothermal stress will impact on population of the developing world. Poor people are often exposed to greater health and environmental risks, and in countries with growing populations these risks will increase in the future.

Indirect Effects of Climate Change on Health

The occurrence of vector-borne diseases such as malaria is determined by the abundance of vectors and intermediate and reservoir hosts, the prevalence of disease-causing parasites and pathogens suitably adapted to the vectors, and the human or animal hosts and their resilience in the face of the disease. Local climatic conditions, especially temperature and moisture, are also determinant factors for the establishment and reproduction of the Anopheles mosquito. The possible development of the disease in mountain regions thus has relevance, because populations in uplands where the disease is currently not endemic may face a new threat to their health and wellbeing as malaria progressively invades new regions under climatic conditions favourable to its development.

The occurrence of vector-borne diseases is widespread, ranging from the tropics and subtropics to the temperate climate zones. With few exceptions, they do not occur in the cold climates of the world, and are absent above certain altitudes even in mountain regions of the tropical and equatorial belt. At elevations above 1300–1500 m in Africa and tropical Asia, the Anopheles mosquito can currently neither breed nor survive; as a result, malaria is almost totally absent from many highlands of the tropical zone. Vectors require specific ecosystems for survival and reproduction. These ecosystems are influenced by numerous factors, many of which are climatically controlled. Changes in any of these factors will affect the survival and hence the distribution of vectors. Global climatic change projected by the IPCC may have a considerable impact on the distribution of vector-borne diseases. A permanent change in one of the abiotic factors may lead to an alteration in the equilibrium of the ecosystem, resulting in the creation of either more or less favourable vector habitats. At the present limits of vector distribution the projected increase in average temperature is likely to create more favourable conditions in terms of both latitude and altitude for the vectors, which may then breed in larger numbers and invade formerly inhospitable areas.

Global Health Effects

The developing world will continue to experience the most pronounced health impacts from climate change. The poorest developing countries in Southeast Asia and Southern Africa are suffering under the greatest climate change related health burdens. In addition, climate-induced changes become stress "multipliers" for many existing public health problems. Climate change is expected to increase precipitation in some areas throughout the world. Heavier precipitation is likely, especially in the spring, when the ground is not thawed in many regions. This can lead to intense flooding because the soil cannot easily absorb rainfall.

Climate change will act as a stress multiplier for many existing public health problems that are impacting already burdened and vulnerable populations. However, much is unknown about the impacts of climate change on vulnerable populations. To more fully understand these impacts:

- Better surveillance systems are needed to track key indicator of climate-relevant exposure, vulnerabilities and health impacts; and
- Expanded research is needed to better understand climate-health mechanisms, including vulnerability factors and the ability to project future health impacts under a range of climate change scenarios.

Identifying vulnerable populations and vulnerabilities is complex and requires information at the regional and local levels. Current climate change models make predictions at the global scale, and therefore downscaling to regional and local scales is necessary

Conclusion

Humans have successfully adapted to environmental change over time, from evolving natural physiological responses to the use of science, technology, and knowledge to improve our lives and advance our health. From the dawn of the industrial age, people have made great strides in improving health, and enjoy a markedly improved quality of life.

To prepare for future uncertainties (of which climate change is only one) we need to better understand those factors that currently make some populations vulnerable to ill-health. It is difficult to plan for the future, particularly when the exact nature of climate change is not known, let alone the precise consequences for health. Focussing on vulnerability may be one means of making tractable what appears in the eyes of many to be a distant and diffuse problem. Measures taken to reduce the future impact of climate change will have other benefits sooner. Climatic change presents the decisionmaker with numerous sets of challenges, however. In a set of issues in which there are considerable uncertainties, the policymaker needs to take into account the potential for irreversible damages or costs and the long time frames involved, i.e., decades to centuries.

REFERENCE1. A Human Health Perspective on Climate Change | http://www.cdc.gov/climateandhealth/pubs/HHCC_Final_508.pdf | 2. A J McMichael, S Friel, A Nyong, C Corvalan - Global environmental change and health: impacts, inequalities, and the health sector | http://www.ncbi.nlm. nih.gov/pmc/articles/PMC2214484/ | 3. Climatic change: possible impacts on human health | http://www.nige.ch/climate/Publications/Beniston/SMW02.pdf || 4. CLIMATE CHANGE: MASTERING THE PUBLIC HEALTH ROLE | http://www.apha-environment.org/pdf/APHA_Climate/Publications/Beniston/SMW02.pdf || 5. Dale Jamieson – Global Responsibilities: Ethics, Public Health, and Global Environmental Change, Indiana Journal of Global Legal Studies, Vol 5, Issue 1. http://www.repository.law. indiana.edu || 6. Edward Maibach, Matthew Nisbet & Melinda Weathers – Conveying the Human Implications of Climate Change A Climate Change Communication Primer for Public Health Professionals. http://www.climatechangecommunication.org | 7. Allstair Woodward, Simon Hales & Philip Weinstein – Climate Change and Human health in the Asia Pacific region: who will be most vulnerable?, Climate Research Clim Res, Vol. 11:31-38, 1998, http://climatehealthconnect.org/sites/ climatehealthconnect.huang.radicaldesigns.org/files/resources/AWoodward_0.pdf | 8. Martin Beniston – Climatic change: possible impacts on human health, SWISS MED WKLY 2002. | http://www.unige.ch/climate/Publications/Beniston/SMW02.pdf || 9. IPCC. Climate Change, The IPCC Third Assessment Report, Cambridge and New York: Cambridge University Press; Vol-1, 2001. | New York: Cambridge University Press; Vol-I, 2001. |