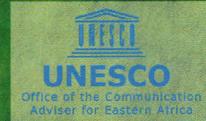


STATUS OF ENVIRONMENTAL HEALTH EDUCATION IN THE EASTERN AFRICA REGION: OPPORTUNITIES, CHALLENGES AND THE WAY FORWARD



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The Potential Impacts of Climate Change on Human Health and the Need for Health Education in Kenya

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Abstract

Human health is dependent on a good and clean environment and many of the factors that lead to a deteriorated environment also lead to poor health. Pollution of the atmosphere, lack of sufficient and/or polluted water supplies and other forms of environmental degradation, for instance, present serious dangers to human health and well being and contribute to the spread of various diseases. Many of these factors tend to be exacerbated through climate change while increased incidences of climate hazards such as droughts and floods lead to higher human health risks from a variety of causes. In this paper the potential effects of climate change on human health are highlighted and the need for appropriate research and training needs with a view to establishing appropriate measures and mechanisms for adapting and/or responding to the various climate change-human health related effects proposed.

Introduction

Various environmental changes have been noted to impact on human health a great deal. These changes include climate change, desertification and chemical pollution. Other factors such as ecological changes, human demographics and behavior, technology and industry, microbial adaptation and change and a breakdown in public health measures have also significantly affected human health (Morse, 1995). The associated diseases arising out of these factors include schistosomiasis, Rift Valley fever, HIV/Aids, 'airport' malaria, haemolytic uraemic syndrome, opportunistic infections, tuberculosis and cholera, diphtheria and malaria.

The potential effects of climate change on human health occur through various pathways as summarized in the Fig. 1. The types of vulnerability to health impacts include social, economic, technological and demographic and are directly related to the driving forces of global change. At the community level, causes of vulnerability to ill health due to environmental stress include the level of dependency and geographical isolation. For instance, communities that are poor and lack social institutions, environmental security and robust health are likely to be more vulnerable and at greatest risk of health effects due to climate change. At the individual level, the degree of vulnerability to ill health is dependent on several factors.

These factors include age, gender, disability, social engagement, income levels, cultural knowledge, legal rights, access to health services, political power, physical resources and built and natural environment (WHO, 2000). The major driving forces of global environmental changes causing significant impacts on health include population dynamics, urbanization, poverty, science and technology, consumption and production patterns and economic development (WHO, 1997).

Assessment of human health impacts due to climate change

Health impacts of climate change may be assessed using various methods. These methods are summarized in Table 1 and rely either on past and present climatic impacts on health or on components of disease transmission cycles described in the laboratory (McMichael and Kovats, 2000). Also, global and/or regional models are used to predict changes in the distribution and seasonality of vector-borne diseases such as malaria and dengue (Martens *et al.*, 1999).

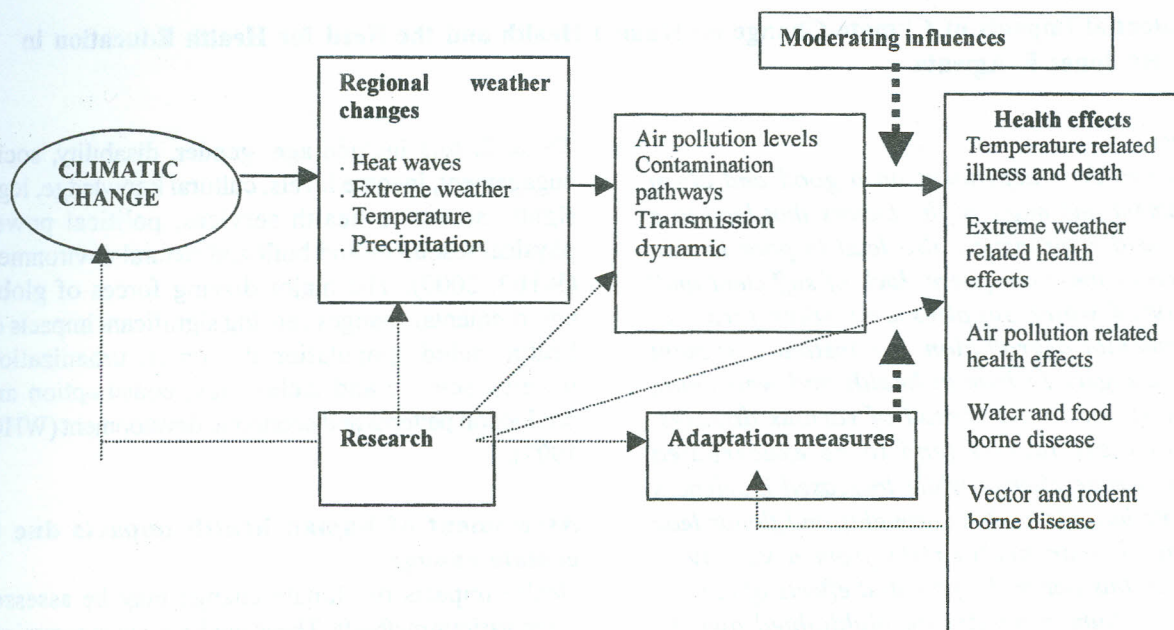


Figure 1. Pathways by which climate change affects health (Patz *et al.*, 2000)

Table 1 Methods of assessing the potential impacts of climate change on human health

Method type	Technique	Examples
Analogue studies	Empirical/statistical	<i>Analogue of a warming trend</i> e.g. increased malaria in highland region with a local trend in warming <i>Analogue of extreme events</i> such as assessment of the mortality impact of heat wave <i>Description of basic or recurrent climate/heat relationships</i> e. g. interannual variation in malaria correlated with minimum seasonal temperature using time series data
Predictive models	Empirical-statistical models Process based or biological models Integrated assessment model	<i>Extrapolation of simple climate/disease relationships using univariate regression</i> e.g. daily temperature and mortality <i>Extrapolation of climate/vector/disease relationship using mapping and statistical methods for use with spatially correlated data</i> e.g. mapping tick abundance with climate and other variables <i>Models derived from accepted theory can be applied universally</i> e.g. forecasting changes in areas suitable for vector borne disease transmission using a vectorial capacity model <i>Multidisciplinary process-based and/or empirical-statistical models linked together horizontally or vertically</i> e.g impact of climate change on food supply and risk of hunger

Source: McMichael and Kovats, 2000

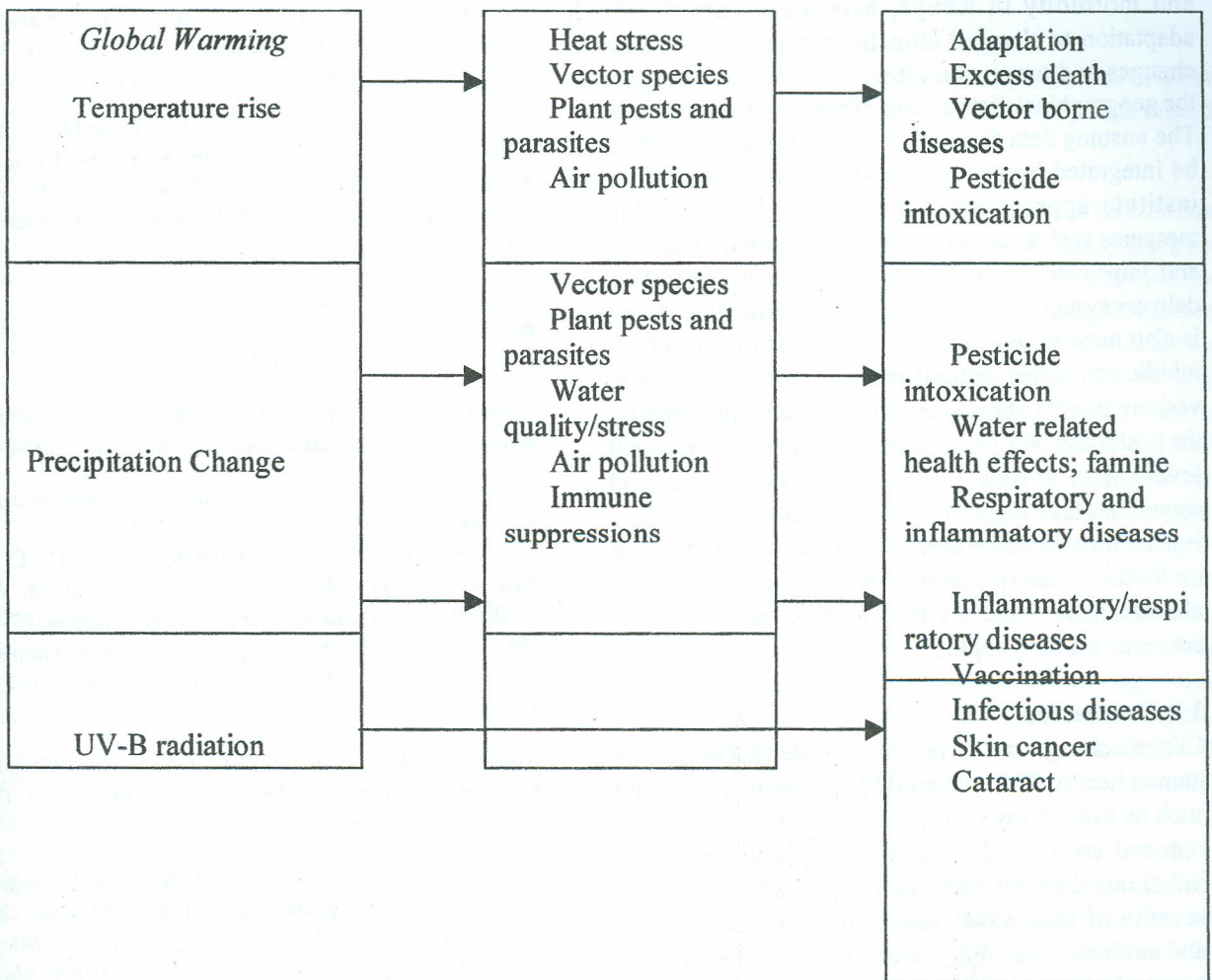


Figure 2 Potential impacts of climate change on human health (Source: IPCC, 1990)

However, several differences and difficulties arise in quantifying the influence of climate change on human health. These differences are due to the fact that most diseases have multiple causes, there exists a great diversity in disease types, the many uncertainties regarding the biological and physical processes by which climate affects health, the long term nature of the changes involved and fact that most epidemiological studies have been done on a local basis, making application on a wider scale difficult. The methods that are available may be grouped into direct or top-down and indirect or bottom up methods (Parry and Carter, 1998; WHO, 2000). Whereas the direct methods are scenario-driven and require outputs to be downscaled to the local level, the indirect approaches often deal with questions such as ‘what aspects of the climate change will affect the system?’ and ‘how much climate change can be tolerated?’ In assessing the potential health impacts of climate change, several uncertainties arise.

These uncertainties may be scientific and/or due to social, economic and technical changes and responses and include future emissions of green house gases, assumptions inherent in global climate models that generate climatic scenarios, other non-climate factors

that influence health and incomplete knowledge about the structural relationships represented in the impact models (WHO, 2000). The increase in the concentrations of green house gases in the atmosphere such as carbon dioxide, ozone, methane, nitrous oxide and chlorofluorocarbons have the potential of influencing human health in a major significant way. This happens via temperature rises, changes in precipitation patterns and increase in ultra violet radiation. The associated impacts of these changes on human health are summarized in Figure 2 from which it can be noted that the climate-change induced global warming on human health gives rise to temperature rises and precipitation changes and an increase in the ultra-violet radiation reaching the Earth’s surface.

Research and training needs

Currently, the direction and magnitude of potential impacts of climate change on health are still unknown. This is mainly due to the fact that the impacts are likely to take place against a background of increased environmental problems and changed socio-economic conditions. There is therefore need for research to determine the trends in the major causes of mortality

and morbidity in Kenya, assess the capacity of adaptation to changed climatic patterns and weather changes and assess the effect of global warming on the geographical distribution of major disease vectors. The ensuing data from the research findings can then be integrated into socio-economic planning so as to institute appropriate and sustainable adaptation measures such as control of disease vectors, expansion and improvement of health services and healthcare delivery systems and water supply and sanitation. There is also need to develop appropriate curricula in both middle and higher institutions of learning dealing with various aspects of climate change and its influence on the health and well being of people at local and national levels with a view to managing the serious and sometimes fatal impacts on communities. Further there is need for awareness creation on simple but effective methods of environmental stewardship to reduce climate related factors that lead to serious health concerns on the people.

3.0 Conclusion

Climate change can have serious potential effects on human health. This occurs through various pathways such as availability and quality of freshwater supply, reduced crop yields; fluctuations in vector borne infectious diseases such as malaria and frequency/severity of heat waves that lead to excess mortality and morbidity especially in urban areas. There is need to develop appropriate methods for quantifying and estimating the health impacts of current and future climate changes. This will assist decision and policy makers to appreciate the magnitude of the problem and to aid in adaptation as a key response strategy to minimize potential health impacts arising out of climate change.

There is also need to develop inter-sectoral policies that promote ecologically sustainable development. This requires use of appropriate strategies to deal with the impacts of climate change on health and selecting of indicators related to climate-environmental health to monitor the situation at local and national levels; a strong public health infrastructure and a well informed and active community to effectively respond to information from surveillance systems. The need for capacity building for adaptation and mitigation strategies is necessary and should encompass appropriate education, training, awareness raising, creation of legal frameworks, institutions and a conducive environment that enables people to make well informed decisions for the well fare of society.

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