



GLOBAL CLIMATE CHANGE AND RESEARCH AGENDA

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Abstract

Climatic problems, and our perceptions of their current and future health effects, have changed over the decades. About 20–40 years back, public health was most concerned about localized climatic degradation. Although it was often difficult to measure the direct health effects. As a result, some of the localized climatic problems of the 20th century have been solved, at least in the richer parts of the world.¹

We have since become aware, however, of the threats to human health which operate at a much larger geographical scale, and because of their non-localized character, are even more difficult to investigate. All these “global climatic changes” are due to increased human pressure on the environment, of which the main drivers are population growth and an increase in per capita resource use and waste production. Climate change and other changes to the atmosphere, land use changes and soil degradation, freshwater depletion and contamination, and biodiversity loss are four important categories of global climatic change, each of which form potential, although partly or largely unknown, threats to human health.² What should mass education public health research do to help humanity cope with these new climatic problems is the aim of this paper.



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What is known already is interesting.

A better understanding of the health effects of global climatic change is only just emerging, partly based on observations of current exposure–health outcome associations, partly based on scenario analyses, and in both cases surrounded by considerable uncertainty. These health effects are mediated by a number of causal pathways, of which the most important probably are heat waves and other extreme weather events, changes in the spread of micro-organisms, changes in biological productivity of land and water, and pollution of air and water.³

It is beyond the scope of this paper to review these pathways, and therefore a few examples will have to supplement.

- Analyses of the population health effects of global warming suggest that global warming is already causing major health effects, mainly through heat-related mortality and morbidity and climate-induced changes in the incidence of infectious diseases. The largest part of this burden is shouldered by developing countries in Africa and South-East Asia—not by the countries in Western Europe and North America, which have historically contributed most to greenhouse gas emissions.⁴
- A quarter of the Earth's terrestrial surface is now used for human purposes, and deforestation, irrigation and other land use changes are often associated with changes in the spread of micro-organisms. Erosion, desertification and salinization of fertile soils threaten the food production necessary for a rapidly increasing world population, of which a large part is already malnourished.⁵
- Human freshwater use for irrigation, drinking and household purposes exceeds the available supplies and requires withdrawal from groundwater stocks. Many populations already experience freshwater shortages, and the supply of safe water is further threatened by chemical pollution which has already reached the ends of the Earth.⁶
- Destruction of the habitats of other species, introduction by humans of non-native species, pollution of air, water and soil, and overharvesting by hunting and fishing have led to a massive extinction of plant and animal species. Biodiversity losses may indirectly threaten human health by impairing “ecosystem services” such as regulation of infectious disease, pollination, waste removal and serving as a reservoir for new crops and medicines.⁷

Although some of the postulated health effects can already be empirically observed in some populations, most are conjectures with varying degrees of statistical certainty, theoretical justification and dependence on intervening developments.

Unfortunately, healthcare has made, and is still making, major contributions to these global climatic changes. Hospitals consume large amounts of energy, water and materials, and hospital waste contributes substantially to air, water and soil pollution. We must also become aware of the fact that the successful promotion of population health has contributed importantly to the rise in human population numbers, and all the climatic pressures this has generated. This rise has occurred in three great waves, of which the third took place around the middle of the 20th century. This was largely due to public health measures, such as improved water supply and waste removal, insect control, and vaccinations and antibiotics.⁸

The uncertainty inherent in analyses of the current and future health effects of global climatic change contrasts sharply with the relative certainty surrounding the health effects of localized climatic degradation that we read about in public health reports.

We need a better guide to public health policy!

Research questions.

A number of issues that could be answered by public health research, to allow public health institutions and professionals to better cope with these challenges. Issues related to the health effects global climatic changes mentioned above. There is great need for a better qualitative and quantitative understanding of what these effects might be, and this requires both studies of current health effects and scenario analyses of likely future health effects. This should then inform priority setting for adaptation policies, but some of the major threats are already partly known, and we can therefore now start developing adaptation measures—for example, to cope with extreme weather events, emerging infectious diseases and the challenge of sustainable nutrition.

Issues related to the special responsibilities that health workers have for the climatic problems caused by healthcare activities. Both the direct effects (through resource consumption and waste generation) and the indirect effects should be investigated. We should also try to develop practices which are sustainable in resource use and waste generation, accepting that this might reduce our effectiveness or efficiency. An integration of bioethics with climatic ethics may be necessary to guide us in the trade-offs involved.⁹

Until recently, the study of the health effects of global climatic change remained largely outside the scope of public health research, because these research topics require an unusually high degree of multidisciplinary, the development of new research methods that can better deal with non-localized (indirect, delayed, multilevel) effects and a high tolerance for uncertainty which is at odds with conventional scientific attitudes.¹⁰ The fact that an increasing number of studies are reaching the high-impact journals indicates that it is time for research into the health effects of global climatic change to enter the mainstream of public health research.

Research areas for the field of global climatic change and human health.

Better understanding of the health effects of global climatic change

Empirical studies of current health effects, taking advantage of circumstances (extreme weather events) and localities (climatic hotspots) where these effects already manifest themselves.

Case analyses of future health effects, combining empirical data with theoretical insights and expert opinions on quantitative and qualitative modelling exercises.

Integrated assessment analyses of current and future health effects, comparing different climatic changes to facilitate priority setting.

Adaptation to reduce the health effects of global climatic change.

Development of more effective methods for the health management of heat waves, floods and other extreme weather events.

Development of more effective methods to control emerging infectious diseases, such as vector control, vaccination and pharmacological treatment.

Development of diets that are nutritious, palatable and affordable, and do not require unsustainable food production and transportation methods.

Better understanding of the contribution of healthcare to global climatic change.

Assessing the climatic effect (footprinting) of healthcare (including public health) resource use and waste generation.

Assessing the climatic effect of health care (including public health) through population growth, and the potential of health development to help slow population growth.

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