The Public Health Implications of Global Warming

Working Paper

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21st December 2006

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Climate change is a natural process that occurs over long periods of time, with our planet experiencing massive climate shifts over time. However, increasing evidence is showing that in the past few decades, human activities are contributing to a global warming change. This global warming change is predicted to have negative consequences on human health (AMA 2004; IPCC 2001; McMichael & Githeko 2001; McMichael & Woodruff 2002; Pats & Kovats 2002; Tanser et al. 2003; WHO 2001, 2002, 2003, 2004). Under mounting scientific evidence that global climate change is already underway, it is becoming increasingly recognized that healthy biospheres and ecosystems are crucial in maintaining long-term population health. Poor communities in particular vitally depend on healthy environmental resources for their livelihoods, which make them the most vulnerable to environmental degradation brought about by the global warming crisis. Developing countries lack the basic public health infrastructure necessary to cope with additional disease burden, raising issues of equity between and within countries. Climate change is not just an environmental issue but part of a wider challenge of sustainable development. This paper aims to outline the process of global warming, and how this translates into unequal social, economic and health consequences among the poorer communities of the world, leading one of the most complex public health crisis humans have ever faced. I will also aim to outline how international cooperation is required to implement sustainable and broader development initiatives that will have real results in reducing poverty and achieving the Millennium Development Goals.

Is Climate Change Really Happening?

Climate is determined by the average state of the Earth’s lower atmosphere, where complex interactions occur between the Sun, oceans, atmosphere, land surface and biosphere. The ‘greenhouse effect’ is a warming process, in which outgoing infrared radiation is absorbed by trace concentrations of water vapour, carbon dioxide, nitrous oxide, methane, halocarbons and ozone (referred to as greenhouse gases). Currently, there is almost universal international consensus that humans have contributed to global climate change through increases in
fossil fuel burning, agricultural activity and other economic activities (IPCC 2001). The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 to review the scientific, technical and socio-economic information in order to assess the risk of human induced climate change. In 2001, the IPCC (pg 10) stated that “there is new and stronger evidence that most warming observed over the last 50 years is attributable to human activities”.

During the 1990s, the world’s average surface temperature increased by roughly 0.6°C, with two-thirds of that warming occurring since 1975. Sophisticated global climate models foresee further warming. The increase in globally averaged surface temperature is projected to rise from 1.4 °C in 1990 to 5.8 °C in 2100 (IPCC 2001). The IPCC states that in order to stabilise the amount of carbon in the atmosphere, reductions in greenhouse gas emissions are necessary. It would take a few decades to stabilize atmospheric concentrations of CO$_2$ at pre-1990 levels.

**Impact of Climate Change on Human Health and Wellbeing**

Global climate change has the ability to transform whole ecosystems and biospheres, with rising sea levels, biodiversity loss, economic disruption, population displacement and civil strife (Stern 2006). The 2002 WHO report stated that mortality and morbidity associated with climate change is likely to increase over time. Health Canada has identified eight significant climate change induced health effects, and they include increased smog episodes, heat waves, water and food borne contamination, vector borne diseases, stratospheric ozone depletion and extreme weather events. Indirect threats to health are expected to result from impaired crop yields, social disruption and population displacement (Shetty 2006). Health Canada state that their eight identified health effects will influence populations in all countries, but vulnerable populations will be particularly affected.
On the 27\textsuperscript{th} of May 2004, the Australian Medical Association released a Position Statement acknowledging the impact of climate change on human health. The Statement went on to state that human population vulnerability to climate change varies in terms of an individual’s location, access to health care services and the availability of critical incident public health infrastructure. However, health outcomes are multi-causal and the extremely complex nature of weather and climate patterns cannot predict the exact manner in which global warming will impact on population health.

A comprehensive WHO project (2002) recently sought to measure disease burdens attributable to climate change in 26 environmental, occupational, behavioural and lifestyle risk factors between 2000 and 2030. The study found increases in the risk of diarrhoea by 10\%, malnutrition varied markedly between regions but a significant increase found in the South East Asia region, an increase in the number of people killed or injured in inland and coastal floods and increases in vector-borne disease. In addition to the human toll of climate change, there are large economic losses associated with natural disasters. From 1960 to 1996, worldwide economic losses resulting from natural disasters rose from $5-8 billion (US dollars) per year to $60-100 billion per year (Maxwell et al. 1997).

Who will suffer the most?

Much of the disease burden will occur in developing countries, who lack the wealth, social institutions, environmental security and robust health to face the challenges (AMA 2004; Haines et al. 2006; IPCC 2001; Milne 2005). The most climate sensitive health outcomes, including malnutrition, diarrhea and malaria, occur in poor populations in the low latitudes (Haines et al. 2006). These communities already suffer multiple stressors, including a high prevalence of HIV/AIDS, economic globalization, privatization of resources and civil strife (Fields 2005). The outcomes of climate change will add to the already massive health burdens of developing countries. Changes in the distribution and seasonal
transmission of vector borne diseases, such as malaria, has been established as a definite outcome of global warming, and is in fact already underway (Tanser et al. 2003; Zell 2004). Climate change has significant potential to affect malaria transmission, in that temperature is a major factor influencing the duration of parasitic cycle and chances of vector survival.

In order to inform future predictions of vector borne disease outbreaks, past WHO (2002) projects divided their investigations into three stages. The first correlated past climate variability and disease occurrence, the second looked at early indicators of climate change of infectious disease transmission and the third used all available evidence to create predictive models of future occurrence. The results found that “changes in infectious disease transmission patterns are likely a major consequence of climate change” (WHO 2002 pg.17). A report assessing the effect of climate change on malaria transmission in Africa predicted that by 2100, there would be a potential continent-wide increase of 16 - 28% in person months of exposure to the disease (Tanser et al. 2003). In areas of existing transmission, there was a greater predicted increase of 28 - 42%.

Patterns of Greenhouse Gas Emissions

How will a population, state, country, or the world for that matter, respond to a crisis with such extraordinary health, social, economic, environmental and political implications? Surely, a global problem requires a global solution? Some warn that global warming is the biggest public health challenge facing the human race yet. The capacity of a country to respond to the global warming crisis will improve depending on the extent to which climate change policies are likely to be incorporated into national development policies, including the economic, social and environmental arenas (Metz 2001). But, in the first instance, are greenhouse gas emissions likely to stabilize, and, if they are not, what is the point of instilling climate change mitigation efforts? Greenhouse gas emissions of industrialized countries are far larger than those of developing countries, but as we have seen, developing countries bear the brunt of the public health consequences.
McMichael & Woodruff (2002 pg. 590) argue that climate change is “one of the largest environmental and health equity challenges of our times”.

OECD countries, with less than a fifth of the world’s population, consumed about 53% of global total primary energy supply in 2002 (Ambuj et al. 2006). Meanwhile, a lack of modern energy services in developing countries prevents 1.2 billion of the world’s population from accessing basic sanitation, education, health and communication services (WHO 2004). Climate change policy makers have recently turned their attention on developing countries, as their energy use has been growing faster than in industrialized countries in the past decade (World Energy Assessment 2004).

But will this growing energy consumption translate into improved, and more equal, public health outcomes for poor countries? Increased access to modern energy services may have positive short-term gains for the developing world, as a correlation exists between per-capita energy consumption and per-capita GDP, as well as between the Human Development Index (Ambuj et al. 2006). However, increasing fossil fuel consumption will only worsen the global warming crisis and all its associated impacts, which have just been described, in the long-term. These effects would soon overshadow short-term gains in the third world’s health and development indicators.

The United Nations Framework Convention on Climate Change (1992), as well as the provisions of the Kyoto Protocol, requires national governments to carry out assessments of the potential impacts of climate change. The Kyoto Protocol was signed by 128 nations, and commits the participating industrialized countries to reduce greenhouse gas emissions by over 5% to below 1990 levels by the period 2008 – 2012. However, the non-participating nations, the United States and us in Australia, are some of the biggest greenhouse gas emitters in the world. The apparent exclusion of certain countries from participating in mitigation
efforts adds to the developing countries' public health burden as well as creating reluctance in developing their own climate change mitigation policies.

**Energy Poverty**

Although energy consumption in the developing world is increasing, nearly two out of five people in these countries still do not have access or the ability to purchase modern energy systems (Ambuj et al. 2006). The inability to purchase or access modern and clean energy supplies has been termed 'energy poverty', and has many public health implications for the developing world. In the absence of an accessible energy supply, the energy poor turn to traditional bio-fuels, such as firewood, crop residues, dung and coal for cooking, lighting, water heating and general heating. Smoke created from wood and coal burning contains an array of hazardous chemicals and particulates, as well as being an inefficient form of cooking and space heating. The collection of these bio-fuels is also a time consuming and laborious process, mainly conducted by women and children, with its own set of health implications. Women engaged in collection do not have time to pursue economic activities that may increase their income, while children collectors cannot pursue educational opportunities (Ambuj et al. 2006).

Indoor air pollution created from biomass and coal use in these poor households has been estimated to cause 1.6 million premature deaths per year, being the sixth largest health risk factor in the developing world (WHO 2002). Indirect health impacts include poor nutrition caused by improper cooking processes and prevalence of diarrhea and other parasitic diseases that result from not boiling drinking water. It appears that developing countries suffer the double burden of the population health impacts resulting from the industrialized world's seemingly unregulated fossil fuel consumption as well as their own increasing consumption. Without a safe and clean energy supply, the rest of the developing world's reliance on traditional biomass creates its own associated health impacts.
Equity in Health and Development

As we have seen, wealthy energy consuming nations are responsible for the large majority of emissions that cause global warming, yet poor countries are the most at risk of its consequences. The AMA states that as a wealthy developed nation, Australia is expected to adjust to the challenges brought about by climate change. Poor countries, lacking the capacity to purchase and maintain resources and technologies, are significantly less likely to meet the health, social, economic and environmental implications of global warming. As a result, health inequities within and between countries will be further exacerbated and social stratification will increase (Metz 2001).

The increased burden of ill-health that climate change that is expected to result in will place added strain on the already collapsing public health infrastructure of developing countries. The few resources and technologies that poor countries would have placed into essential projects to further their economic position would instead be channeled into the next health crisis or disease outbreak (Fields 2005). This vicious cycle hinders the economic development that would have placed that country in a better position to mitigate and adapt to global warming effects. Another problem that will greatly increase health inequities in the long-term for the developing world is that heat health outcomes will continue to worsen in persistently deteriorating environmental conditions, added to the burden of health conditions brought on by extreme weather events.

Actions, or inactions, by the international community to the global warming crisis thus far has shown up the lack of commitment to address the real causes of climate change, which are unjust economic relations and unsustainable energy consumption (Milne 2005). This has resulted in a situation where the poorest and most marginalized communities in the world are bearing the public health brunt of climate change, and where the divide between the wealthy and poor nations is growing all the time.
New Waves of Refugees

The forced migration of people due to their deteriorating environmental conditions, such as drought and declining food security, is not a new phenomenon. However, global warming has the potential to cause new waves of mass migration, and these people have been specifically termed ‘environmental refugees’. In fact, the process is already underway, with the International Cross 2001 World Disasters Report, stating that 25 million people (up to 58% of all current refugees) may already be environmental refugees. The UNHCR State of the World’s Refugees Report paints a different picture, and estimates a decline in the number of the world’s refugees from 18 million in 1992 to just over 9 million in 2004. Indeed, the UNHCR’s main focus seems to be the political causes of displacement, while other causes of refugees are “driven by poverty, fleeing to survive, others are drawn to real or perceived opportunities to better their lives away from home” (p1 2006).

Forced migrations, as a result of climate change induced processes of increased periods of drought, sea level rises, storm surges and more frequent floods, are indeed the new wave of refugees. It has been estimated that sea-level rise alone could displace millions as one-third of the world’s current population live within 60km of a coastline (IUCC 2006). For the most part, environmental refugees come from the rural areas of developing countries, as agriculture is the most sensitive economic sector. The low-lying Pacific Island nation of Tuvalu is particularly susceptible to sea level rises induced by climate change. The nation has signed a landmark agreement with New Zealand to relocate many of its citizens in the coming decades, to form part of an unofficial Environmental Refugee Program. Tuvalu also appealed to the Australian government to create such a program, but Australia, the biggest industrial polluter in the Pacific Region, refused.

Environmentally displaced people are not officially recognized under the United Nations Refugee Convention. Even in the face of ever growing evidence and
almost international consensus on global warming, the UN does not recognize that developing communities and nations are being disproportionately affected by the over-consuming North. Some argue that without a firm definition of who an environmental refugee is, and with historical patterns of people leaving places with harsh environmental conditions, putting in place an international instrument to recognize them may complicate the environmental concerns we face (Black 2001). Over a decade ago, the 1992 Rio Declaration on Environment and Development stated in Principal Two that the actions of one nation should not adversely impact on another nation/s environment. Principal 13 of the 1002 Rio Declaration even goes proposes that “states shall develop national law regarding liability and compensation for adverse effects of environmental damage caused by actions within their jurisdiction or control”.

Adaptive Capacity

In order to reduce the health impacts of climate change, and narrow the health inequities that exist within and between nations, adaptation strategies are essential. The IPCC has termed this process ‘adaptation’. Poverty, inadequate public health infrastructure and other factors create conditions of low adaptive capacity in developing countries. Therefore, these countries are unlikely to take advantage of opportunities or to cope with the consequences of climate change. For less developed countries, adaptations which will enhance that population’s coping ability may defend against current variations in climate as well as safeguard against future changes. The most cost effective and urgently needed adaptation strategy for the developing world against the global warming crisis is the rebuilding and maintaining of public health infrastructure (IPCC 2001).

Equity has been identified by WHO as a major factor in a community’s adaptive capacity, and also when “access to resources within a community, nation or world is equitably distributed” (2001 p27). Indeed, developing countries contain 90% of the world’s disease burden but only have access to 10% of the world’s health resources (WHO 2000). WHO even goes so far as to state that even if
actions and policies that mitigate climate change are not put into place, adaptive strategies are still urgently needed.

**Sustainable Development Strategies**

Even if greenhouse gas emissions are reduced in accord with the Kyoto Protocol requirements today, the earth’s climate will continue to change. Adaptive and sustainable development strategies, formulated in collaboration between the health sector and all other sectors with direct links to health, are required to ensure the long-term health of all communities of the world. For example, transport modes that rely on fossil fuels are projected to have the fastest proportional growth in greenhouse gas emissions in any sector from 1999 to 2020 (Haines et al. 2006). The direct public health consequences include urban air pollution (800,000 deaths per year), road traffic accidents (1.2 million deaths per year) and physical inactivity (1.9 million deaths per year). In developing countries, particularly the fast-growing India and China, creating sustainable transport networks result in the double benefits of reduced greenhouse gas emissions and reducing the above mentioned disease burdens.

Harrison (2006 pg. 62) states that the larger issue is not the disease burdens, injuries and deaths associated with acute weather or flood conditions, but the “chronic long-term consequences of unsustainable carbon based consumption”. One of the eight goals of the 2006 Millennium Development Goals Report is to *Ensure Environmental Sustainability* with a target to “integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources”. Environmentally sustainable strategies to preserve our forests, rivers and other ecosystems are becoming increasingly recognized as an essential requirement for improving public health outcomes, including hunger eradication, and other goals of the Millennium Development Indicators. In addition to creating a more sustainable intervention, environmentally sustainable pathways are generally cheaper and offer longer-
term and more resilient solutions, which is especially important in light of a rapidly changing climate system the world now faces.

Global Partnerships for Sustainability

Intersectoral collaboration is a basic tenet of comprehensive primary health care, and corresponds to the now universal view that a bio-psychosocial or systems approach to health is more effective than a purely biomedical one. Mitigating climate change, achieving the Millennium Goals and addressing poverty in general, is a global responsibility (SEI 2005). The 2006 World Bank report entitled ‘An Investment Framework for Clean Energy & Development: A Progress Report’ has been criticized for its continued focus and investment in greenhouse gas producing energy projects, to the tune of $2-3 billion a year (Bank Information Centre et al. 2006). Furthermore, financing for renewable energy projects made up less than 5% of the World Bank’s overall energy financing in 2005.

In addition to this, the World Bank’s own auditing arm, the Independent Evaluation Group (2006), have stated that the organization has focused too narrowly on economic growth at the expensive of worsening unemployment and poverty rates. The report emphasizes that encouraging broad-based economic growth that links health, education, infrastructure and the environment can have results in poverty reduction. Truly equal and global partnerships require all parties to take responsibility for their actions, which means that all OECD countries must include themselves in climate change mitigation policies. Greenhouse gas alleviation is possible through the implementation of a variety of new technologies and practices (IPCC 2001).

However, implementation of these new and improved technologies and methods is limited by economic, political, technical, institutional, financial and behavioral barriers (Ambuj et al. 2006). As we have seen, climate policies of wealthier nations negatively impact on poorer countries by largely contributing to the
massive public health burden brought about by the consequences of climate change. The other way in which wealthy nations’ climate policies affect the developing world is how mitigation policies are being placed onto them, as commitments to reduce their own greenhouse gas emissions have implications for their own development aspirations (Ambuj et al, 2006). Health Canada states that “international and bi-national cooperation will be needed in efforts to adapt to the impacts of climate change on health and wellbeing (Preface pg. V). The much publicized Stern Report of 2006 heavily emphasizes the need for international cooperation through achieving shared goals in tackling climate change.

Policies to Tackle Climate Change

Some industrialized countries have already started integrating climate change policies into their public health activities and programmes. Once policy makers have received accurate information on the consequences of climate change, the public’s perception of those responses, options for adaptation and technologies for climate change mitigation, policies for action are then able to be developed (WHO 2003). The City of Toronto in Canada has developed two extreme weather alert plans; Extreme Cold Weather Alerts and Heat-Health Alerts. For developing countries, climate change mitigation policies must inevitably be part of a wider development agenda, taking into account poverty reduction measures and economic development. It has even been described that impacts of the expanding energy sector (driven by fossil fuels) not only jeopardises important steps that need to be taken toward achieving the Millennium Development Goals, but undermines progress toward reducing poverty in general (SEI 2005). This multi-targeted mission, coupled with a lack of resources, makes the task for developing countries even more challenging.

Some argue that a lack of clear and accurate information on the full consequences of global warming, combined with the huge development challenges faced by the developing world, makes the formulation of policies
difficult and unrealistic. However, this uncertainty should be more a reason for action than inaction (Kovats et al. 2005). Furthermore, countries with high per-capita emissions, including the US and European Nations, have a moral obligation to take on a leadership role in responding to this looming public health disaster, in terms of accelerating progress for new technologies and integrate poverty reduction strategies into their energy sector planning (Papasian 2006; SEI 2005). Stott (2006 pg. 1386) argues that “health professionals have an enviable record of contributing solutions to previous threats and must do the same for climate change”. Action, through the form of global partnerships is an issue of equity as climate change impacts will lessen the ability for poor communities to move out of poverty. Forming global partnerships against the global warming crisis is essential in ensuring not only that the policy and strategy process will include the developing world’s involvement and equity, but also the long-term and sustainable wellbeing of all communities in the world.
References


