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Review

Non-Infectious Diseases caused by The Risk of Climate Change on Earth

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Global climate change is expected to have broad health impacts. These could occur through various exposure pathways, such as the frequency or intensity of extreme heat waves, floods, and droughts. Warmer air temperatures could also influence local and regional air pollutants and aeroallergens. Less direct health impacts may result from climate-related alteration of ecosystems or water and food supplies, which in turn could affect infectious disease incidence and nutritional status. Finally, sea level rise could potentially lead to massive population displacement and economic disruption. Some of the long-term and complex problems posed by climate change may not be readily discernible from other causal factors. Accordingly, expanded efforts are required in both classical and future-scenario-based risk assessment, to anticipate these problems. In addition, the many health impacts of climate change must be examined in the context of many other environmental and behavioral determinants of disease. Increased disease surveillance, integrated modelling, and the use of geographically-based data systems will enable more anticipatory measures by the public-health and medical communities. There are clear ethical challenges. The regions with the greatest burden of climate-sensitive diseases are often the regions with the lowest capacity to adapt to the new risks.

Keywords: climate change, climate-sensitive diseases ,heat waves, floods, droughts, public-health

INTRODUCTION

The World Health Organization has concluded that the climatic changes that have occurred since the mid-1970s could already be causing annually over 150,000 deaths and five million disability-adjusted life-years (DALY), mainly in developing countries. The less developed countries are, ironically, those least responsible for causing global warming. Many health outcomes and diseases are sensitive to climate, including: heat-related mortality or morbidity; air pollution related illnesses; infectious diseases, particularly those transmitted, indirectly, via water or by insect or rodent vectors; and refugee health issues linked to forced population migration. Yet, changing landscapes can significantly affect local weather more acutely than long-term climate change. Land-cover change can influence micro-climatic conditions, including temperature, evapo-transpiration and surface run-off, which are key determinants in the emergence of many infectious diseases. To improve risk assessment and risk management of these synergistic processes (climate and land-use change), more collaborative efforts in research, training and policy-decision support, across the fields of health, environment, sociology and economics, are required. In the past half-century, global mean temperature has risen by 0.6°C, sea level has risen by a mean of 1-2

cm/decade, and ocean heat content has also measurably increased. The rate of change in climate is faster now than in any period in the last 1,000 years. Between 1990 and 2100, according to the United Nations Intergovernmental Panel on Climate Change (IPPC), mean global temperatures will increase by 1.4-5.8°C and sea level will rise by 9-88 cm, with mid-range estimates of 3°C and 45 cm, respectively (Houghton et al., 2001). However, additional greenhouse-gas releases from warmer oceans (C02) and warmer soils (C02 and methane) will increase the estimated warming from human-induced emission another 2°C by the end of the century (Torn and Harte, 2006). Extremes of the hydrological cycle (e.g., floods and droughts) are expected to accompany the global warming.

Non-Infectious Diseases

1- Heat Waves

Extremes in air temperature, both hot and cold, are associated with higher levels of human morbidity and mortality than seen within an intermediate or 'comfortable' range of temperatures. The relationship between temperature and mortality is typically 'J-shaped,' indicating asymmetry, with a steeper slope at higher temperatures (Curriero et al., 2002). In the U.S.A., heat waves are more deadly than hurricanes, floods and tornadoes combined. The extreme heat wave that hit much of Europe in 2003 is estimated to have killed up to 45,000 people in just 2 weeks (Walker, 2004; Kosatsky, 2005). The summer of 2003 was probably Europe's hottest summer in >500 years, with mean temperatures 3.5°C above normal (Beniston, 2004; Luterbacher et al., 2004; Schar et al., 2004). Although the level of temperature-related mortality seems to vary with geographical location, the temperature-mortality relationship found in European and North-American cities appears similar to that in Sao Paulo, a developing Brazilian city with sub-tropical conditions (Gouveia et al, 2003). The results of the relevant studies conducted so far indicate a clear vulnerability to heat in the relatively cool, temperate regions, and tropical regions may show similar sensitivity as location-specific temperatures rise. Built environments markedly modify the intensity of ambient temperatures, in a phenomenon known as the 'urban heat island effect.' Black asphalt and other dark surfaces (on roads, parking lots or roofs) reduce albedo (reflectivity) and consequently increase the heat retention of the surface. In addition, the loss of trees in urban areas diminishes the cooling effect of evapotranspiration. During heat waves, when stagnant atmospheric conditions may persist, air pollution often compounds the effects of the elevated air temperatures (Frumkin, 2002). Urban areas may therefore suffer from both global and localized warming.

2.1-Severe Storms and Rise in Sea Level

Floods, droughts and extreme storms have claimed millions of lives during the recent past, and have adversely affected the lives of many more people. On average, disasters killed 123,000 people world-wide each year between 1972 and 1996. Africa suffers the highest rate of disaster-related deaths, even though 80 percent of the people affected by natural disasters are in Asia (Loretti and Tegegn, 1996). Disaster-related mental disorders, such as post-traumatic-stress disorder (PTSD), may substantially affect population well-being, depending upon the unexpectedness of the impact, the intensity of the experience, the degree of personal and community disruption, and the long-term exposure to the visual signs of the disaster. Hurricanes only form in regions where sea surface temperatures exceed 26°C, and sea-surface warming by slightly more than 2°C intensifies hurricane wind speeds by 3-7 m/s (or 5 percent-12 percent) (Knutson et al., 1998). Records indicate that sea-surface temperatures have steadily increased over the last 100 years, and more sharply over the last 35 years. The highest mean sea-surface temperatures ever recorded occurred between 1995 and 2004 (Trenberth, 2005). During the first half of this period, there was a doubling in the overall hurricane activity in the North Atlantic and a five-fold increase in such activity in the Caribbean (Goldenberg et al, 2001). The North Atlantic Oscillation (NAO) was in its warm phase at this time, making it difficult to attribute the extra hurricanes to the long-term trends in warming. Sea-surface temperature is, however, correlated with hurricane intensity, and the frequency of higher-category storms has increased in many other parts of the world .

2.2- Rise in sea level Warmer oceans also cause sea levels to increase, primarily as the result of the thermal expansion of salt water. Even if the mid-range predictions of climate change are correct and sea levels in the 2080s are, on average, 'only' 40 cm higher than the current values, the coastal regions at risk of storm surges will become much greater and the population at risk will increase from the current 75 million to 200 million (McCarthy et al, 2001). Rising sea levels will result in the salination of coastal freshwater aquifers and the disruption of storm water drainage and sewage disposal. A case study for Bangladesh (Nicholls and Leatherman, 1995) indicates that >15 percent of the total population would be adversely affected by a 1.5-m rise in sea level.

3- Droughts That droughts cause famines is well recognized. Malnutrition remains one of the largest health crises world-wide, with approximately 800 million people—close to half residing in Africa—currently undernourished (WHO, 2002). Droughts and other climate extremes not only have direct impacts on food crops but can also indirectly influence food supply by altering the ecology of

plant pathogens. While projections of the effect of climate change on global food-crop production appear to be broadly neutral, such change will probably exacerbate regional inequalities in the food supply (Parry et al., 2004). As there is a breakdown in sanitation as water resources become depleted, droughts can also increase the incidence of diarrhoea and diseases, such as scabies, conjunctivitis and trachoma, associated with poor hygiene (Patz and Kovats, 2002).

4-Air Quality and Climate

Air temperature affects the problems posed by air pollutants. Ground-level ozone smog tends to become worse with increasing air temperature but the relationship is nonlinear, with a strong correlation only seen at temperatures above 32°C. In their recent study, Bell et al. (2006) predicted that, because of global warming, the mean number of days exceeding the health-based "8-h ozone standard" will increase by 60 percent in the eastern U.S.A.—from 12 to almost 20 days per summer—by the 2050s. Pollen levels in the air may also increase with global warming, as higher levels of C02 promote growth and reproduction by many plants. When, for example, ragweed (*Ambrosia artemisiifolia*) plants were experimentally exposed to high levels of C02 they increased their pollen production several-fold; this response is perhaps part of the reason for rising levels of ragweed pollen observed in recent decades (Ziska et al. (2003) found that ragweed grew faster, flowered earlier and produced more pollen in urban locations than in rural locations, presumably because of the relatively high air temperatures and C02 levels in the urban areas. Finally, if the frequency of flooding increases, significant exposure to moulds may also pose respiratory health risks during the post-flood clean-ups (Patz et al., 2001).

REFERENCES

Bell ML, Goldberg R, Hogrefe C, Kinney P, Knowlton K, Lynn B, Rosenthal J, Rosenzweig C, Patz JA (2006). Climate change, ambient ozone, and health in 50 U.S. cities. Climatic Change 82(1-2):61-76.

Beniston M (2004). The 2003 heat wave in Europe: a shape of things to come? An analysis based onSwiss climatological data and model simulations. *Geophysical Research Letters* 31:L02202.

Curriero FC, Heiner KS, Samet JM, Zeger SL, Strug L, Patz JA (2002). Temperatureand mortality in 11 cities of the eastern United States. *American Journal of Epidemiology* 155(1):80-87.

Frumkin H (2002). Urban sprawl and public health. Public Health Reports 117:201-217.

Goldenberg SB, Landsea CW, Mestas-Nuhez A, Gray WM (2001). The recent increase in Atlantic hurricane activity: causes and implications. Science 293(5529):474-479.

Gouveia N, Hajat S, Armstrong B (2003). Socioeconomic differentials in the temperature-mortality relationship in Sao Paulo, Brazil. *International Journal of Epidemiology* 32(3):390-397.

Houghton JT, Ding Y, Griggs DI, Noquer M, van der Linden PI, Dai X, Maskell K, Johnson C A eds. (2001). *Climate change 2001: the scientific basis: contribution of working group Ito the third assessment report.* Cambridge, UK: Cambridge University Press.

Knutson TR, Tuleya RE, Kurihara Y (1998). Simulated increase of hurricane intensities in a Co_2- warmed climate. Science 279(5353):1018-1020.

Kosatsky T (2005). The 2003 European heat waves. *Eurosurveillance* 10 (7):148-149.

Loretti A, Tegegn Y (1996). Disasters in Africa: old and new hazards and growing vulnerability. World Health Statistics Quarterly 49(3-4):179-184.

Luterbacher J, Dietrich D, Xoplaki E, Grosjean M, Wanner H (2004). European seasonal and annual temperature variability, trends, and extremes since 1500. *Science* 303(5663):1499-1503.

McCarthy JJ, Canziani O, Leary N, Kokken D, White K (2001). Climate change 2001: impacts, adaptation, and vulnerability. New York: Cambridge University Press.

Nicholls R, Leatherman S (1995). Global sea-level rise. In As climate changes: international impacts and implications, edited by K. Strzepek and J. Smith. New York: Cambridge University Press. Pp. 92-123.

Parry ML, Rosenzweig C, Iglesias A, Livermore M, Fischer G (2004). Effects of climate change on global food production under SRES emissions and socio-economic scenarios. Global Environmental Change 14:53-67.

Patz JA, Kovats RS (2002). Hotspots in climate change and human health. British Medical Journal 325(7372):1094-1098.

Patz JA, McGeehin MA, Bernard SM, Ebi KL, Epstein PR, Grambsch A, Gubler DJ, Reiter P, Romieu I, Rose JB, Samet JM, Trtanj J (2001). The potential health impacts of climate variability and change for the United States. Executive summary of the report of the health sector of the U.S. National Assessment. Journal of Environmental Health 64(2):20-28.

Schar C, Vidale PL, Luthi D, Frei C, Haberli C, Liniger MA, Appenzeller C (2004). Therole of increasing temperature variability in European summer heatwaves. *Nature* 427(6972):332-336.

Torn MS, Harte J (2006). Missing feedbacks, asymmetric uncertainties, and the underestimation of future warming. *Geophysical Research Letters* 33:L10703.

Trenberth K (2005). Uncertainty in hurricanes and global warming. Science 308(5729):1753-1754.

Walker J ed. (2004). *World disasters report 2004.* Geneva, Switzerland: International Federation of Red Cross and Red Crescent Societies.

WHO (2002). The World Health Report 2002. Geneva, Switzerland: World Health Organization.

Ziska LH, Gebhard DE, Frenz DA, Faulkner S, Singer BD, Straka JG (2003). Cities as harbingers of climate change: common ragweed, urbanization, and public health. Journal of Allergy and Clinical Immunology 111(2):290-295.