Health risks of climate change: act now or pay later

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There is growing scientific consensus that climate change is happening, is largely human induced, and will have serious consequences for human health. The impact of climate change on global health is probably not yet large, compared with major risk factors, but will become greater later in this century, especially if the world follows one of the so-called high-end emission pathways, such as Representative Concentration Pathway (RCP) 8·5, outlined in the UN Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report.[1,2]

This emission pathway assumes that present trends of relatively unrestrained use of fossil fuels and high population growth will continue. According to this emission pathway, by 2100 the global average temperature will probably be more than 4°C above preindustrial levels (figure), with higher average temperatures over land. Inertia in climate systems would mean that projected global temperatures would continue to rise for several hundred years; the mean estimate for this emission pathway in 2300 would be at least 8°C above preindustrial levels. Long-term global average warming of 12°C or more is possible from unconstrained fossil fuel burning. An increase of 12°C in global average temperature would create conditions in which physiological limits for outdoor activity would be reached during certain times of the year in many heavily populated parts of the world.[3] One study estimates that under RCP 8·5 there would be about a 40% reduction in global labour capacity during the hottest months by 2100.[4]

The effects of climate change on humanity under such high-end emission scenarios are difficult to estimate. No epidemiology is possible, models cannot be validated, and baseline world health and socioeconomic conditions that far into the future are a matter close to conjecture. However, such extreme temperature trends might cross what has been called the "afterlife" threshold—ie, where the impact on humanity is so great as to be a discontinuity in the long-term progression of humanity.[5]

The climate implications of different emission trajectories will not strongly diverge until the middle of the 21st century, whatever progress is achieved in the next few decades in reducing greenhouse-gas emissions. Therefore, the near-term and medium-term (up to about 2050) is a time to promote and fund adaptation measures that will reduce the damage to health caused by climate change, to which the world is already committed. Society also needs to prepare for the possibility of more serious changes later in the century. For example, in the next 20–30 years, net global food production might be maintained as a result of increased crop yields in cooler, high latitudes. However, continued warming after 2050 would adversely affect crop yields in most parts of the world, at a time when demand for food will be rising strongly due to projected population growth and economic development.[6]

Both a high absolute level and a rapid rate of global climate change will severely test biological and social mechanisms for adaptation, with limits to adaptation becoming increasingly evident. Examples range from emergency preparedness in the face of shortening return periods after potentially catastrophic floods, to saltwater intrusion into freshwater lenses in small islands which would potentially compromise water quality to such an extent that migration might be the only option.[7] Furthermore, limits to adaptation will arise when hazards associated with a changing climate

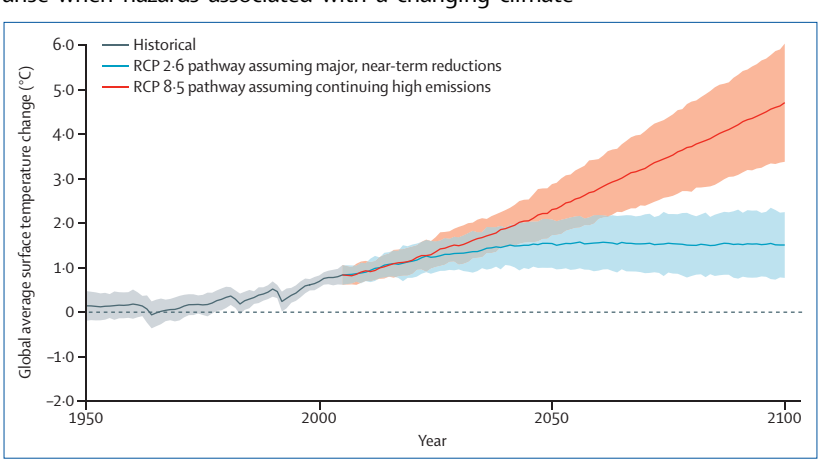

***Figure*: Projected global mean surface temperature change to 2100 compared with 1850–1900**
Pathways showing differences in future world temperatures with differing degrees of control for carbon dioxide and other greenhouse pollutants. The temperature changes from the RCPs are derived from figures SPM.7, 12.5, TS.15, table 12.2 in the IPCC's Fifth Assessment Report.[1] Based on combining the results of many independent models, the high-end emission pathway, RCP 8·5, shows the range of what is likely to occur with current trends of modest emissions controls together with continuing population growth and slow technological and economic progress. The low emission pathway, RCP 2·6, reflects the range with much greater greenhouse control actions started soon. Although the differences in temperature between the two RCPs during the early part of the century are modest, they diverge widely after mid-century, indicating the importance of acting quickly. Importantly, unlike pathways that include aggressive control measures, under the high-end emission pathway the climate does not reach stability even by 2100 when global temperature is still increasing about 0·7°C per decade. Finally, at any mean global temperature rise, over land and in high latitudes the changes would be higher. Under pathway RCP 8·5, by 2100 the mean increase over land is projected to be about 1·1°C higher than shown in the figure. In parts of the Arctic mean temperature increases could reach 12°C from baseline by 2100 under the same high-end emission pathway. Dotted horizontal line represents baseline average temperature between 1850 and 1900. RCP=Representative Concentration Pathway.

interact with inappropriate development pathways—eg, where building occurs on flood plains. Adaptation limits might also occur when health systems fail to proactively design and implement adaptation actions needed to address a particular health risk. The need to strengthen health-system capacity in low-income countries to prepare for, cope with, and recover as far as possible from the health effects of climate change that do occur could be partly addressed by equitable partnerships between high-income and low-income countries.

The health community has a role in the promotion of policies to reduce emissions of all climate-active pollutants, both because many of these pollutants are health hazards now and because all push the climate towards possible extremes within this century. Major reductions in mortality would ensue from measures to reduce combustion of carbon-containing fuel and consequent carbon dioxide and fine particle emissions, for example by curbing coal combustion. Furthermore, there are co-benefits for both health and climate from actions to reduce short-lived climate pollutants, such as black carbon and methane, the second most important greenhouse gas and the primary precursor to ozone in the lower atmosphere.[8,9] Provision of wider access to reproductive health services could also reduce carbon dioxide emissions over the century and improve maternal and child health.[10]

Wise policies to develop low-emission economies that use the full range of available technological options would provide many societal benefits and only have moderate impacts on economic growth projections.[9] Nevertheless, such changes tend to be opposed by those with a stake in current economic pathways.

The burden of disease and injury due to climate change falls mainly on specific vulnerable groups, particularly those living in poverty. Vulnerability to climate change is in many cases inversely related to historical greenhouse gas emissions. Thus, the responsibility for leading policies to reduce these emissions should be shouldered by those nations and commercial interests that have enjoyed the benefits of fossil-fuel-driven development. Since emerging economies are responsible for a growing proportion of emissions, however, they too must move towards development with low greenhouse gas emissions, which some are starting to do.

The timescale is daunting but not a reason for inaction: the health community needs to argue for a long-term perspective on climate change. Article 2 of the United Nations Framework Convention on Climate Change states that the objective is to avoid dangerous anthropogenic interference with the Earth's climate.[11] Without decisive action this objective cannot be achieved. The world's carbon budget to keep global increases in temperature below 2°C is likely to be exceeded by 2040.[9] Society must, therefore, enhance efforts to adapt to reduce adverse effects on human health, particularly for the most vulnerable. The prospect of extreme climates beyond mid-century, however, should impel the health community to promote deep cuts in emissions of climate-active pollutants now for the long-term protection of human welfare, starting with co-benefit actions that protect both health and climate.

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The power of midwifery

Midwifery is commonly misunderstood. The Series of four papers and five Comments we publish today sets out to correct that misunderstanding. One important conclusion is that application of the evidence presented in this Series could avert more than 80% of maternal and newborn deaths,[1] including stillbirths. Midwifery therefore has a pivotal, yet widely neglected, part to play in accelerating progress to end preventable mortality of women and children.

A frequent view is that midwifery is about assisting childbirth. It is, but it is also much more than that. As defined in this Series,[2] midwifery is "skilled, knowledgeable, and compassionate care for childbearing women, newborn infants, and families across the continuum throughout pre-pregnancy, pregnancy, birth, post partum, and the early weeks of life". Midwifery includes family planning and the provision of reproductive health services. The services provided by midwives are best delivered not only in hospital settings but also in communities—midwifery is not a vertical service offered as a narrow segment of the health system. Midwifery services are a core part of universal health coverage.

A re-evaluation of midwifery and midwifery services matters because progress in reducing child and maternal mortality is now revealing critical new obstacles to further success. Superficially, the recent decrease in maternal and child deaths suggests steady gains towards the Millennium Development Goals (MDGs). But two facts provide reasons for a more cautious conclusion. First, the number of maternal deaths, although falling, is doing so at rates that will prevent most countries from achieving MDG-5 by the end of 2015. Second, although overall under-5 mortality has decreased sharply during the past decade, the proportion of under-5 deaths taking place in the newborn period has increased. Indeed, a substantial number of countries with the highest burdens of mortality have seen their absolute numbers of newborn deaths either increase or remain the same. New approaches to defeat maternal and newborn mortality are needed.

Although this Series is about midwives and midwifery services, the frames of reference are the needs of the woman and her newborn infant. The technical evidence this Series summarises is based on a particular set of values and a distinctive philosophy. These values include respect, communication, community knowledge and understanding, and care tailored to a woman's circumstances and needs. The philosophy is equally important—to optimise the normal biological, psychological, social, and cultural processes of childbirth, reducing the use of interventions to a minimum.

Much of the programmatic work on maternal and child health in recent years has focused on delivering life-saving interventions to women. Although important, coverage of women with services is insufficient by itself to improve health outcomes. Attention to quality is needed with equal force. Indeed, the Series calls for "a system-level shift",[3] from fragmented services for women and newborn infants to interdisciplinary and integrated skilled care and teamwork.

The work reported in this Series is not a panacea. Sub-Saharan Africa is identified as a region especially vulnerable to continued difficulty.[4] Here, demographic trends point to large increases in population in coming decades. The expansion of education for midwives to address these population shifts will struggle to meet the rapidly increasing demand. But this challenge is one more reason why the hopeful and pragmatic messages contained within this Series are so important. As governments slowly come to an agreement about development priorities post-2015, it is clear that maternal and newborn health will be essential foundations of any vision for sustainable development between 2015 and 2030. The work

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