hospitalisation, mortality, or other adverse events. This lower outcome suggests that also within clinical settings, ART programmes might be able to economise, by optimising patients' monitoring schedules and by task shifting to less specialised health workers and to more peripheral health centres.

By the end of 2008, ART coverage in low-income and middle-income countries stood at 42% of an estimated total of 9·5 million people in need.[8] This coverage represents a large increase from 33% at the end of 2007, but the ongoing global economic crisis threatens to slow the scale-up, with uncertainties about sustainability of both domestic and international funding by donors.[9] UNAIDS and international donors now explicitly encourage supported AIDS programmes to be cost effective and efficient in service delivery, and reduce per-person unit cost to improve value for money.[9–13]

The current situation, in which demand for scaling up ART in many high-burden countries meets or exceeds globally available HIV and health funds, is unprecedented. Programme evaluations, including both health outcomes and cost, are more important than ever to plan and budget for optimum sustainable packages of treatment and prevention services.

*Eline L Korenromp, Kirsi M Viisainen
Global Fund to Fight AIDS, Tuberculosis and Malaria, Vernier (Geneva) CH-1214 , Switzerland (ELK, KMV); and Department of Public Health, Erasmus MC, University Medical Center Rotterdam, Netherlands (ELK)
eline.korenromp@theglobalfund.org

Our views do not necessarily represent the decisions, policy, or views of the Global Fund to Fight AIDS, Tuberculosis and Malaria. We declare that we have no conflicts of interest.

1 Jaffar S, Amuron B, Foster S, et al, on behalf of the Jinja trial team. Rates of virological failure in patients treated in a home-based versus a facility-based HIV-care model in Jinja, southeast Uganda: a cluster-randomised equivalence trial. *Lancet* 2009; published online Nov 24. DOI:10.1016/S0140-6736(09)61674-3.
2 Gilks C, Vitoria M. Antiretroviral therapy for HIV infection in adults and adolescents: recommendations for a public health approach. 2006. http://www.who.int/hiv/pub/guidelines/artadultguidelines.pdf (accessed Nov 17, 2009).
3 The Antiretroviral Therapy in Lower Income Countries (ART-LINC) Collaboration and ART Cohort Collaboration (ART-CC) groups. Mortality of HIV-1-infected patients in the first year of antiretroviral therapy: comparison between low-income and high-income countries. *Lancet* 2006; **367:** 817–24.
4 Amuron B, Namara G, Birungi J, et al. Mortality and loss-to-follow-up during the pre-treatment period in an antiretroviral therapy programme under normal health service conditions in Uganda. *BMC Public Health* 2009; **9:** 290.
5 Lawn SD, Myer L, Harling G, et al. Determinants of mortality and nondeath losses from an antiretroviral treatment service in South Africa: implications for program evaluation. *Clin Infect Dis* 2006; **43:** 770–76.
6 Koenig SP, Riviere C, Leger P, et al. The cost of antiretroviral therapy in Haiti. *Cost Eff Resour Alloc* 2008; **6:** 3.
7 Cleary SM, McIntyre D, Boulle AM. The cost-effectiveness of antiretroviral treatment in Khayelitsha, South Africa—a primary data analysis. *Cost Effect Resour Alloc* 2006; **4:** 20.
8 WHO, UNAIDS, UNICEF. Towards universal access: scaling up priority HIV/AIDS interventions in the health sector. 2009. http://www.who.int/hiv/pub/2009progressreport/en (accessed Nov 17, 2009).
9 UNAIDS, World Bank Global HIV/AIDS program. The global economic crisis and HIV prevention and treatment programmes: vulnerabilities and impact. 2009. http://data.unaids.org/pub/Report/2009/jc1734_econ_crisis_hiv_response_en.pdf (accessed Nov 17, 2009).
10 UNAIDS. What countries need: investments needed for 2010 targets. 2009. http://data.unaids.org/pub/Report/2009/JC1681_what_countries_need_en.pdf (accessed Nov 17, 2009).
11 Global Fund to Fight AIDS, Tuberculosis and Malaria. Value for money for Global Fund-supported health programs. 2009. http://www.theglobalfund.org/en/performance/effectiveness/value/?lang=en (accessed Nov 17, 2009).
12 United States Presidential Emergency Plan for AIDS Relief (PEPFAR). An act to authorize appropriations for fiscal years 2009 through 2013 to provide assistance to foreign countries to combat HIV/AIDS, tuberculosis, and malaria, and for other purposes. 2009. http://www.pepfar.gov/documents/organization/108294.pdf (accessed Nov 17, 2009).
13 United Kingdom Department for International Development. Achieving universal access—the UK's strategy for halting and reversing the spread of HIV in the developing world. Monitoring performance and evaluating impact. 2009. http://www.dfid.gov.uk/Documents/publications/achving-uni-access-mon-eval.pdf (accessed Nov 17, 2009).

Aligning climate change and public health policies

Published Online
November 25, 2009
DOI:10.1016/S0140-6736(09)61667-6

See Series pages 2091 and 2104

On Dec 7–18, 2009, representatives from 192 countries will meet in Copenhagen to formulate a climate agreement for 2012 onwards. This conference (called COP15) represents the most important opportunity in decades to achieve international agreement on how to cut emissions of greenhouse gases deeply enough to reduce the likelihood of dangerous climate change.[1]

The case for major reductions in greenhouse-gas emissions is well established.[2] The case is based on the recognition of the multiple adverse effects of climate change not only on population health[3,4] but also on the environment (disruption of ecosystems, species loss), social integrity (population displacement, effects on livelihoods), nutrition (altered agricultural productivity), and the economy (regional and local economic shocks).[5,6]

But there are obstacles to a meaningful outcome at the conference, including: reaching agreement on the relative contributions of emerging economies, such as India, China, and Brazil, and industrialised nations; the

The printed journal includes an image merely for illustration

iStockPhoto

lobbying activities of companies with vested interests in fossil fuels; and the need for upfront investment in new technologies during an economic recession. Therefore the deliberations must be informed by the best available scientific evidence on the benefits and harms of reducing greenhouse-gas emissions. In this respect health professionals have an important role.

Many policies to reduce greenhouse-gas emissions can also have a range of ancillary effects, including effects on health. Examples include reduced air-pollution, improved energy security, or increased rural employment.[7] Better quantification of the health effects of greenhouse-gas mitigation (reduction) policies will contribute to evidence-based policy making by indicating the magnitude of potential near-term health benefits (and in some cases harms) associated with a given strategy and, we hope, will provide additional motivation for action. A Series starting in *The Lancet* today provides indicative estimates of the magnitude of effects (largely positive) on health in four sectors with large global emissions of greenhouse gases: electricity generation, household energy, urban land transport, and food and agriculture.[8–11] A further article shows how reducing emissions of several short-lived greenhouse gases (and black carbon, which is not a gas but contributes to increased warming[12])—which by contrast with carbon dioxide have relatively short atmospheric lifetimes and direct health effects—could benefit health while reducing the rate of climate change in the next few decades.[13] The paper also points out that sulphate aerosols, which have a cooling effect, seem to have adverse health effects. Thus policies to reduce sulphate aerosols, while likely to improve health, will necessitate even greater reductions in greenhouse gases to offset the reduced atmospheric cooling.

The Series is the result of the international collaboration of scientists supported by a consortium of funding bodies coordinated by the Wellcome Trust. The initiative arose from the leadership of the Climate and Health Council, which made a compelling case for independent scientific analysis of the potential health benefits of addressing climate change. The programme focused on quantification of the effects of strategies to reduce greenhouse-gas emissions on public health, because estimates of potential co-benefits to health from such reductions provide a useful guide to policy makers in identifying the most appropriate mix of mitigation policies for different settings, and indicate how they can implement win–win policies that address public health priorities while reducing climate change. Other activities are underway, but on a longer timescale, to update the calculations of the burden of disease arising from climate change.[14]

The public health benefits of mitigation policies have not had sufficient prominence in international negotiations. This Series seeks to address that deficiency and strengthen the case for deep cuts in emissions. Additionally, the Series makes specific contributions to discussion by: illustrating a methodological approach to compare the relative effects on health of different mitigation strategies; showing the extent to which most mitigation choices lead to net health benefit compared with business as usual; and highlighting areas of uncertainty and needs for further research.

Our approach involved modelling exercises relevant to the type of mitigation changes necessary in each of the four sectors in both high-income and low-income settings.[15] We drew heavily on the evidence of Working Group III of the fourth assessment report of the Intergovernmental Panel on Climate Change,[7] and on the first report of the UK's Climate Change Committee,[16] which set necessary mitigation targets, globally and in the UK, and suggested how they might be achieved. The Committee concluded that "global emissions reductions of at least 50% in 2050 [against a baseline of 1990] are required if risks of dangerous climate change are to be kept at acceptable levels...[and that] a UK emissions reduction of 80% is an appropriate contribution to a 50% global cut".[16] We assume that the 80% reduction target by 2050 is also appropriate, although conservative, for most other high-income countries. The contribution of different countries to the achievement of this objective must in some degree reflect the very different current per-head emissions. To achieve international equity,[17] there would need to be convergence on a common annual per-head emission target for greenhouse gases of 2·1–2·6 tonnes of carbon dioxide equivalents. This target is below the year 2000 regional average for all regions of the world except parts of sub-Saharan Africa, and if achieved would result in important welfare benefits to some populations from increased access to energy, transport, and food. According to the Climate Change Committee and other sources,[18] achievement of these targets is feasible with a combination of current technology and technology under development. The cost has been projected to be much less than the cost of dealing with the effects of unrestrained climate change.[6] Even these targets are probably too high in light of recent work showing that climate change is evolving more rapidly than was thought, due to the diminishing capacity of carbon sinks to absorb additional carbon dioxide and several possible feedbacks that increase warming, such as loss of snow and ice cover that reflects heat from the earth's surface.[19]

Mitigation strategies considered in this Series for each sector, therefore, would lead to reductions of greenhouse-gas emissions broadly consistent with a trajectory to meet the 2050 target of 50% reduction in global emissions. For each of the four sectors, the complex connections between mitigation choices and health are described. Pathways for which there is sufficient evidence to quantify the health effects are identified, and we discuss pathways with insufficient evidence. Case studies are used to illustrate the health effects under different emission-reduction scenarios. Because of substantial uncertainties and the hypothetical scenarios, the aim is to be illustrative and analytical rather than to be precise.

The concluding paper in this Series[20] discusses the intersection of policies to mitigate climate change with international development and public health.[21] The Copenhagen conference presents an important opportunity to choose those policies that can not only achieve needed reductions in greenhouse gases, but also move toward development and health goals.

*Andy Haines, Paul Wilkinson, Cathryn Tonne, Ian Roberts
Director's Office (AH), Department of Public Health and Policy (PW, CT), and Department of Epidemiology and Population Health (IR), London School of Hygiene and Tropical Medicine, London WCIE 7HT, UK
Andy.Haines@lshtm.ac.uk

The project that led to today's Series was funded by: the Wellcome Trust; National Institute of Health Research, Department of Health; the Royal College of Physicians; the Academy of Medical Sciences; the Economic and Social Research Council; the US National Institute of Environmental Health Sciences; and WHO. The Royal College of Physicians was supported by an unrestricted educational grant from Pfizer. The Wellcome Trust coordinated the support from the other funding bodies and we thank Nicola Perrin for her coordinating role. We also thank Maria Neira, Diarmid Campbell-Lendrum, and Roberto Bertollini of WHO for their support and advice. Our views in this Comment do not necessarily reflect those of any of the funding bodies. Additionally we gratefully acknowledge the advocacy of the Climate and Health Council that was instrumental in making the case for this programme of work, particularly Robin Stott, Fiona Godlee, Hugh Montgomery, and Mike Gill. We declare that we have no conflicts of interest.

1 Department of Energy and Climate Change. The road to Copenhagen: the Government's case for ambitious international agreement on climate change. London: TSO, 2009.

2 Intergovernmental Panel on Climate Change. Climate change 2007: the physical science basis. 2007. http://www.ipcc.ch/ipccreports/ar4-wg1.htm (accessed Sept 30, 2009).
3 Haines A, Kovats RS, Campbell-Lendrum D, Corvalan C. Climate change and human health: impacts, vulnerability, and mitigation. *Lancet* 2006; **367:** 2101–09.
4 Patz JA, Campbell-Lendrum D, Holloway T, Foley JA. Impact of regional climate change on human health. *Nature* 2005; **438:** 310–17.
5 Intergovernmental Panel on Climate Change. Climate change 2007: impacts, adaptation and vulnerability. 2007. http://www.ipcc.ch/ipccreports/ar4-wg2.htm (accessed Sept 30, 2009).
6 Stern N. Stern review: the economics of climate change. 2006. http://www.hm-treasury.gov.uk/sternreview_index.htm (accessed Sept 30, 2009).
7 Intergovernmental Panel on Climate Change. Climate change 2007: mitigation. 2007. http://www.ipcc.ch/ipccreports/ar4-wg3.htm (accessed Sept 30, 2009).
8 Wilkinson P, Smith KR, Davies M, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: household energy. *Lancet* 2009; published online Nov 25. DOI:10.1016/S0140-6736(09)61713-X.
9 Woodcock J, Edwards P, Tonne C, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport. *Lancet* 2009; published online Nov 25. DOI:10.1016/S0140-6736(09)61714-1.
10 Markandya A, Armstrong BG, Hales S, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: low-carbon electricity generation. *Lancet* 2009; published online Nov 25. DOI:10.1016/S0140-6736(09)61715-3.
11 Friel S, Dangour AD, Garnett T, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: food and agriculture. *Lancet* 2009; published online Nov 25. DOI:10.1016/S0140-6736(09)61753-0.
12 Nature. Time for early action. *Nature* 2009; **460:** 12.
13 Smith KR, Jerrett M, Anderson HR, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: health implications of short-lived greenhouse pollutants. *Lancet* 2009; published online Nov 25. DOI:10.1016/S0140-6736(09)61716-5.
14 Campbell-Lendrum D, Corvalan C, Pruss-Ustun A. How much disease could climate change cause? 2003. http://www.who.int/globalchange/climate/en/chapter7.pdf (accessed Sept 30, 2009).
15 Wilkinson P, Smith KR, Beevers S, Tonne C, Oreszczyn T. Energy, energy efficiency, and the built environment. *Lancet* 2007; **370:** 1175–87.
16 Committee on Climate Change. Building a low-carbon economy—the UK's contribution to tackling climate change. Dec 1, 2008. http://www.theccc.org.uk/reports/building-a-low-carbon-economy (accessed Sept 30, 2009).
17 HM Government. The UK low carbon transition plan: national strategy for climate and energy. London: TS0, 2009.
18 Global Commons Institute. Contraction and convergence: a global solution to a global problem. http://www.gci.org.uk/contconv/cc.html (accessed Sept 30, 2009).
19 Piao SL, Ciais P, Friedlingstein P, et al. Net carbon dioxide losses of northern ecosystems in response to autumn warming. *Nature* 2008; **451:** 49–52.
20 Haines A, McMichael AJ, Smith KR, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: overview and implications for policy makers. *Lancet* 2009; published online Nov 25. DOI:10.1016/S0140-6736(09)61759-1.
21 Haines A, Smith KR, Anderson D, et al. Policies for accelerating access to clean energy, improving health, advancing development, and mitigating climate change. *Lancet* 2007; **370:** 1264–81.

A protocol for labrador retrievers?

On Christmas Day, 2000, Navy, a golden retriever aged 18 months, began a cocktail of celecoxib, tamoxifen, and doxycycline to target blood vessels supplying a tumour on her chest. Her owner Marion Haber, a veterinary student at Tufts University, Boston, MA, USA, was acquainted with the work of angiogenesis pioneer Judah Folkman at the nearby Children's Hospital, Harvard Medical School. Soon, the golden retriever became a golden guineapig. The treatment was blinded to the patient, who unknowingly polished off the regimen with her dog biscuits. 3 months later, Navy was cancer free, and the following year a healthy report was published in a US national newspaper.[1] The excitement around the story led to the drug combination being renamed the Navy protocol, which remains a familiar term in veterinary oncology today.

This was not the first time that this breed of dog had been influential in cancer treatment. A popular media story in the 1980s and 1990s centred around anecdotal reports of labrador retrievers sniffing out tumours. Take Parker, for instance, a pet labrador who repeatedly sniffed what physicians had assumed to be an eczema patch on his owner's left thigh. The itchy lesion, once


Richard Lane

Richard Lane and Simpson