

CHAPTER 28

Research Is Vital to Tackling Climate Change, But It Cannot Succeed Alone



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Summary Our Planet, Our Health is Wellcome’s contribution to the growing field of planetary health. The world needs focused research to better understand how health is affected by global environmental changes, including climate change, and how we can mitigate these health impacts and the environmental changes. We call on researchers to work with us, and on civic society, industry and governments to support researchers, apply their findings and build an equitable movement of research into practice to improve our health. We call on governments, industry and civic society to support these researchers—commit to acknowledging and employing their findings and recommendations. Through policies and legislation, governments can do what no one else can, while foundations like Wellcome and others complement their work, taking risks and doing what governments cannot, and together we can help industry play its part, secure in the knowledge that there is a pipeline of great people and ideas coming through. But if governments step back from progress in planetary health, the gaps cannot be filled by anyone else. There is reason for optimism, if our optimism drives us all to act now for the sake of current and future generations.

Background

In Bangladesh, the dry season runs from November to early May. Less rainfall means shrinking rivers, and what water there is becomes more saline as a result. When the ponds have dried up completely, people can pump groundwater to use for drinking and cooking. But the groundwater, especially in coastal areas, is contami-

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nated with salt, too. Seawater has infiltrated the natural aquifers, a problem that is likely to get worse as climate change threatens to bring even higher sea levels, more floods and tidal surges, and more cyclones (Naser et al., 2017a).

The high salinity of available water in the dry season means people consuming anything from double to eight times the World Health Organization's (WHO) recommended daily intake of sodium. This has important health implications: research has revealed associations between salinity and high blood pressure in adults and preeclampsia in pregnant women. On the other hand, saving and storing rainwater from the wet season may also pose a health risk, as rainwater lacks minerals such as calcium and magnesium, which help protect against heart disease but are often deficient in Bangladeshi diets.

In the 1970s, millions of tube wells were dug to provide new sources of fresh water in Bangladesh. While this reduced gastrointestinal infections and cases of diarrhoea from contaminated surface water, it inadvertently and disastrously exposed the population to naturally occurring arsenic deeper underground (Siddiqi, 2017); arsenic is a major risk factor in heart disease, stroke, cancer and other serious health conditions.

So what solutions are available today? As with all water, sanitation and hygiene (WASH) challenges, any response will require many different sectors of society and will rely on the active engagement and participation of individuals, governments and non-governmental organisations (NGOs). People will need to change the way they obtain, treat and store water, as will farmers and factories, just as governments will have to take on responsibility for implementing and maintaining any new infrastructure, physical or political.

One new idea for securing healthy drinking water in Bangladesh is to recharge the natural underground aquifers with rainwater or surface water—effectively putting fresh water into the ground to dilute the high-salt water already there. Before this can be rolled out everywhere, however, we need to know whether it works. Wellcome has funded a research study to find out (Naser et al., 2017b). It is the first study to assess the health impact of an environmental intervention to reduce the salinity of groundwater in Bangladesh. The randomised controlled trial design being used by Mahbubur Rahman and colleagues at the International Centre for Diarrhoeal Disease Research, Bangladesh, will determine whether managed aquifer recharge lowers the blood pressure of people in communities adopting the new approach. If the results are positive, it can be adopted elsewhere with confidence, supporting more people as the effects of climate change intensify.

Humanity's response to climate change will define the twenty-first century. Pressures on water and sanitation are far from the only issues we face. We expect increased heat stress and droughts as well as floods and more frequent, more powerful storms. Land use and ecological systems will change as the environment changes. Food and nutrition will be harder to provide for all, and more people will migrate or be displaced, experiencing more mental health conditions as a result. Insects will spread to new territories, bringing infectious diseases with them. Air pollution will rise, especially as more people move to cities and other urban locations (Watts et al., 2015, 2016).

People in every part of the world are now coping with increasing challenges. Those in communities that are already vulnerable will be hit hardest, and in recent months and years, we have seen that many people are already suffering and dying from the effects of climate change. That includes severe storms on the southern coast of the USA as well as saline drinking water on the southern coast of Bangladesh. It includes islanders dealing with hurricanes and Europeans responding to intense heat waves (Christidis et al., 2015). The WHO predicts that by 2050 there will be an extra 250,000 deaths a year due to increases in malnutrition, heat stress, diarrhoeal diseases and malaria as a direct result of climate change (WHO, 2017).

To save those lives and avoid further risks to our health, we must act now to protect and sustain the planet. We have to come together to collaborate on devising and delivering solutions to everyone's benefit. We have to change our own behaviour and persuade others to do the same.

Our Planet, Our Health

In 2015, following an earlier exploratory programme, Wellcome launched Our Planet, Our Health as a priority project, with the aim of developing and supporting focused research in the growing field of planetary health (Wellcome Trust, 2017b). The world needs more and higher-quality research, combining different disciplines and spanning all geographies, in order to understand the effects of global environmental change and the actions we might take in response.

The climate change community has done a remarkable job providing research evidence to inform policy. But it has perhaps too often presented the impact of climate change as something that will affect our grandchildren in decades to come. We want to support and spearhead research to show the impact today of climate change on human and animal health and through research help provide answers that we hope will inform policy and behaviour.

Wellcome is by no means the only organisation committed to this area. But we are in a unique position to make a significant contribution. Our experience as an international research funder with global networks across science, innovation and society mean we can bring people together and broker innovative activities.

Our Planet, Our Health has three inter-related pillars. The first pillar is understanding the impact of climate change on human health now and in the future. In partnership with *The Lancet*, we have set up the Lancet Countdown (Watts et al. 2016) an international research collaboration that tracks global progress on climate change (Costello et al., 2017; Watts et al., 2016). This is a first step towards lessening the effects of climate change on health and adapting to its impact.

The second pillar of Our Planet, Our Health is the role of global urbanisation as a major driver of health. More than half the people in the world now live in urban areas—by 2050, it will be close to 70% (United Nations Department of Economic and Social Affairs, 2014). The intersection of social, natural and built environments

in cities brings many benefits but also challenges for human health. We have invested £17.8 million in research looking at how urban design and policy can work to improve health and make cities environmentally friendlier.

The third pillar of Our Planet, Our Health is feeding the world healthy diets without destroying the planet. For example, people tend to switch to eating more meat as they get wealthier, but too much meat consumption is far more damaging than a plant-based diet for both humans and the environment. Food and land use already account for more than one-quarter of greenhouse gas emissions and 70% of water use. We co-founded the EAT Foundation, bringing together scientists, businesses and policy-makers to transform food systems for the future.

We have funded focused research across all of these areas, generating new knowledge, data and models for understanding current and future effects of environmental changes (Wellcome Trust, 2017a). Fifteen pilot projects galvanised collaboration across the globe and across disciplines, from economics and social sciences to epidemiology and ecology. To complement these open funding calls, four major themed programmes were established to nucleate focused centres of excellence and provide a thriving, supportive environment for research, mentorship, policy and training.

For example, one project explored innovative designs for healthy and sustainable low-income housing in the UK, India, Mexico and South Africa. Another looked at the health impacts of poor-quality urban development, from fast-emerging effects like air pollution and heat waves to slower ones such as changing weather patterns and the rise of non-communicable diseases.

A recent paper from another group we funded explored the influence of climate change on infectious disease dynamics (Metcalf et al., 2017). Infections are sensitive to climate change for a variety of reasons—environmental contamination can expose more people to water-borne diseases, while the survival patterns of insects and other disease vectors may change, putting different populations at risk (Altizer et al., 2013). The research led to the conclusion that we need to move beyond simple statistical correlation and association between environmental factors and disease and must develop more mechanistic models to predict trends in incidence.

This year, Our Planet, Our Health announced four major new partnerships, all focusing on providing policy-makers with innovative and interdisciplinary research evidence. Two are in the area of global food systems, looking at everything from farm production to consumer choices and testing how changes could be made. The other two concern urban environments, learning from South America what makes cities healthy or not and looking at greener ways to provide clean water to informal settlements in Indonesia and Fiji.

This last partnership is a good example of how researchers and funders will have to work together if we are to adapt to our changing world. More than a billion people live in slums and other informal settlements around the world. They face serious public health challenges relating to WASH issues. The “big pipes” traditionally used to provide water and sanitation to cities are extremely costly in financial, environmental and social terms and especially impractical in informal settlements.

Revitalising Informal Settlements and their Environments (RISE), a programme led by Rebekah Brown at Monash University in Melbourne, Australia, is testing eco-

logically sustainable water infrastructure—such as grass channels, wetlands and natural filters—in 24 locations in Indonesia and Fiji (Monash University, 2017). In addition to research funding from Wellcome, RISE has received support from the Asian Development Bank and from partners in government, industry and academia. They will determine whether these alternative solutions improve environmental and human health outcomes, such as gastrointestinal infections in children under five. If they do, the challenge will quickly become one of scaling up the solutions and employing them elsewhere without delay.

We see this combination of focused centres of excellence and open research funding calls linked with communication, public engagement, advocacy and policy and framing this as an equitable, civil rights issue as the best way to ensure research will be supported in the best environments, open to a diverse range of new ideas and linked by a commitment to impacting and enhancing all our lives.

Together, Science Can

Our challenge now is to support and encourage more research like this—much more, and of a consistently high quality such that it can be relied on and used at all levels of political decision-making. As we look forward, *Our Planet, Our Health* must grapple with questions of standards, knowledge sharing, interdisciplinarity and scale.

How do we achieve standards of excellence so that governments and communities can trust and apply research findings? How can we share methodologies and findings so that research can be combined to create a clear and useful picture of the situation and potential actions? How do we make sure research is fully interdisciplinary, in order to get the most complete and accurate view of the situation we face? How do we accelerate the translation of research findings into policies and actions that work at scale for communities, cities and countries?

For example, an intervention designed to reduce greenhouse gas emissions that focused on one area, such as food or transport, could have negative impacts on water or land use. Joining up our thinking will help create lasting solutions and avoid shifting potential unintended problems onto other sectors.

This extends across Wellcome's other priority areas, too. We know that issues around migration, water use and farming will affect the emergence of drug-resistant and emerging infections and impact people's mental health. Our priority area around research ecosystems in Africa and Asia is ensuring that the necessary skills, evidence and expertise are supported in regions where climate and environmental change will have the biggest impact. And we must make much more significant progress in the areas of diversity and inclusion in science and research, given that these challenges affect everyone, across every continent and all sectors of society.

Wellcome's Current Platforms

- Diversity and Inclusion
- Drug-Resistant Infections
- Education for Science
- Mental Health
- Our Planet, Our Health
- Research Ecosystems in Africa and Asia
- Vaccines and Epidemics

These are the focused challenges Wellcome is taking on, but we cannot do it alone. No one can.

We call on researchers to accept the challenge with us—apply your skills to the most fundamental health challenge of our time.

We call on governments, industry and civic society to support these researchers—commit to acknowledging and employing their findings and recommendations. Through policies and legislation, governments can do what no one else can, while foundations like Wellcome and others complement their work, taking risks and doing what governments cannot. Together, we can help industry to play its part, secure in the knowledge that there is a pipeline of great people and ideas coming through. But if governments step back from progress in planetary health, the gaps cannot be filled by anyone else.

And we call on communities to engage with research—participate, shape, even lead the development and direction of research. Tell us what you need to be studied, use the results and share your successes. None of the great challenges of our time will be solved by technology alone. We must break down barriers within science, barriers between nations, across industries and especially barriers between science and society. We need the greatest diversity of thought to solve these problems.

The world is changing at an unprecedented rate. Climate and environmental change, demographic shifts, the rise of non-communicable diseases, emerging and endemic infectious diseases, and drug-resistant infections, and mental health—these interconnected challenges are putting our health, and the health of the planet, at risk.

Solutions to the health effects of climate change will be, on the whole, “no regret” solutions (Watts et al., 2015). They will improve people’s health no matter what the climate does. And what is good for us will generally be good for the planet as well and we can be both pro-growth and pro-planet; they are not mutually exclusive and indeed can be mutually reinforcing. Such hope, optimism and confidence have too often been missing from political debates that characterise the options as economic growth versus a sustainable future—it does not have to be so; we can ensure a sustainable future whilst also ensuring more equitable economic growth. We do not have to make people poorer to ensure a healthy planet and build a sustainable future.

Increasing the resilience of national healthcare systems and strengthening health infrastructure through the Sustainable Development Goals and Universal Health

Coverage; reducing poverty and offering support to vulnerable communities; maintaining surveillance of existing and potential health threats and changing cities into places that support and promote healthy lifestyles; creating sustainable food and water systems—such actions will improve the health of our generation but also those of our children, our grandchildren, and all those who will follow.

A commitment to preventing a potential global catastrophe has been made by 196 countries (Costello et al., 2017), and in many places cities have led the way with empowered local government, responsive to the needs of its citizens to be able to make locally driven solutions to enhance sustainability and improve health and well-being. It will be our collective failure if we cannot now use that commitment and goodwill. Science and research are integral to the world's combined response, and science can also help to bring people together. It can be a force for breaking down barriers, building social cohesion and reducing inequality. If we stand together, science can help us understand and define the challenges we all face and, together, solve them.

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