



Henry Ko, Australia

HIGH-TECH, LOW-TECH AND
BACK-TO-BASICS SOLUTIONS
FOR HEALTH RESEARCH

I love a sunburnt country,
A land of sweeping plains,
Of ragged mountain ranges,
Of droughts and flooding rains.
I love her far horizons,
I love her jewel-sea,
Her beauty and her terror –
The wide brown land for me!

From “My Country” by Dorothea Mackellar (1885–1968)

It’s a sunny, hot and dry hillside dotted with yellow–brown patches of bushes and scrubs in rural Australia. I’m standing here looking out at the patchwork of farmland in the plains below. It’s far from Australia’s outback region, one of the most isolated and toughest environments in the world that the majority of Australians tend to shy away from, but rural Australia is tough nonetheless. It’s hard to imagine at the moment how access to anything, especially health care, for rural and remote communities could equal that of urban communities. As a child growing up in rural Australia, I remember that one of the most beautiful poems about this island continent was “My Country” by Dorothea Mackellar. It captured the essence of the environment – both its tenderness and its toughness. I’m not sure if climate change was high on the political agenda in her day, but her words hold a light to how climate controls our lives, especially for people like me, who live or have lived in regional, rural or remote Australia.

In Australia approximately 31.5% of the population lives in remote regions and rural areas.¹ Access to health research outcomes and services, its suitability for our needs and the economic sustainability of supplying it to us have been problems in the past, and with climate change I envisage it will only get more difficult unless innovative solutions are developed quickly.

Only in recent years have we understood how intricately dependent we are on the land, water and weather to provide sustenance and a home for us. Our well-being is dependent on the quality of the biosphere we live in. Those who have had a rural upbringing know that “Mother Nature” controls our livelihood. We know this from the day we are born to the day we die. Urban communities are now more acutely aware of the problems of food production security, the effects of disease transmission and the impacts of changing demographics on health research and health service provision. I truly believe it is time for agricultural and environmental research to share centre stage with biomedical research in improving human health outcomes.

Climate change is challenging food production security in our vast land. Reduced land quality has resulted in reduced grazing land for animals and agricultural crops. Salinity and poor topsoil conditions have also reduced the quality of farmable land. Record-breaking droughts, and then unexpected floods and storms have further made the predictability of farming harder. Add to this the unexpected and relatively sudden changes in seasonal weather, which may be attributed to El Niño and La Niña, and there is a grim picture for the vulnerable farmers and populations who reside in our rural and remote countryside.

Disease transmission is also another climate change issue. Rural and regional areas in Australia depend heavily on livestock to make a living. Australia is lucky that it is an island and has stringently enforced quarantine protocols that prevent diseased animals and plants from entering our ecosystem, and ultimately affect the health of the community. Animal and plant diseases are also a constant threat to our food supply. The most recent threat to our livestock was from equine influenza. The security of our food supplies also depends on preventing an outbreak of avian influenza and Newcastle disease that is a threat to our country's birds, poultry and even humans. Ensuring that we remain free of bovine spongiform encephalopathy, one of the few countries in the world to remain so, has been another important biosecurity aim. For biosecurity, prevention is the primary solution to remaining disease-free and healthy. Research into "techno-prevention" tools, such as advanced detection systems, quarantine protocols and high-tech animal and plant tracking systems, are high priorities.

But not all threats from climate change are due to climate and organisms – they can be economic as well. In recent years the need for alternative energies has meant that soft commodities have become valued economic elements, with their prices rocketing upwards, due partly to the trade-off for them to be used either as food or for bioethanol production. This causes rising food prices, which again has affected those least able to afford price rises – populations with low incomes, especially those living in rural and remote regions who have already been hit hard by poor agricultural and environmental conditions.

Forget the "techno-cures" of super-expensive, big breakthrough vaccine or blockbuster drugs, climate change and extreme weather patterns will change the health research playing field. Even though I believe that research into biomedical techno-cures can help, they are not the main solution to addressing both the "10/90" divide and climate change. These techno-cures include laboratory-grown meat. If climate change makes land no longer farmable, if there is a biosecurity breach in our animal livestock, or if demand in meat far outstrips the supply of livestock (especially from countries such as China and India that are increasing their dietary protein intake), this could be a solution to satisfy demand. Imaginative groups such as SymbioticA, from western Australia, have made this idea a reality through public scientific art installations of their laboratory-grown meat. Agricultural biotechnology research may encourage improved population nutrition due to the consumption of fruit and vegetables engineered with vaccines, micronutrients or macronutrients, as well as crops that can grow and thrive in harsh environments.

Renewable resource technologies, such as solar power and geothermal energy, are seen as solutions to ease global warming. Recent focus has also been on recycling,

water management and wind power. All these are aimed at improving the standard of living as well as easing the burden on our environment. If these technologies become economical, effective and widespread enough, we could see remote and rural areas being able to reliably and sustainably generate energy for powering hospitals and medical clinics. Other amenities currently lacking in these communities could be powered, such as water purifiers, sanitation and sewerage-processing facilities, which would improve the health of people living in these areas.

Rural and remote health services have been underfunded and underresourced for a long time and have not gotten the same attention as urban areas. In times of extreme weather conditions, an important rural service like the Royal Flying Doctor Service of Australia may find it hard to reach people. Electronic health, or e-health, could improve access of some health services. Even though it may not be a substitute for the flying doctor service, what telemedicine can do is bring some health services, such as doctor consultations, to isolated homes via satellite transmission.

I have participated in debates between the supporters of techno-cures and those of more holistic low-tech solutions. I attended the First World Forum on Science and Civilization at the University of Oxford, as well as the World Life Sciences Forum BioVision in Lyon, France, where the theme was the life sciences contribution to the United Nations Millennium Development Goals. I believe going for the scientifically exciting techno-cures to improving health may not be the wisest move. All too easily we forget to consult history for what really advanced humanity's healthy society is – being able to pump in clean water and drain out and treat wastes from inhabited areas. A professor of civil engineering once told me that this was the one major thing that improved humanity's health. It was not complex biomedical techno-cures. It was low-tech civil and environmental engineering. We should not dismiss low-tech solutions. The economist Jeffrey Sachs, speaking at BioVision, maintained that using bednets could drastically reduce the incidence of malaria. As a bioengineer and health researcher, I see this as a simple, economical and elegant solution to preventing a disease. Similarly, in the face of global climate change, using water tanks to store clean water is a simple and economical tool for water-scarce regions. Teaching environmentally friendly practices like water conservation and skills in sustainable farming may help improve community health and nutrition.

Even though I have left the dry sunburnt rural and remote countryside of my youth, I truly believe that combining research efforts for relevant techno-cures and robust low-tech solutions can improve health outcomes for the people who live there. Climate change, and the dramatic physical, economical and social environmental impacts it brings to all parts of our society, may finally force us to re-evaluate the priorities and strategies for health research from techno-cures to more holistic sustainable low-tech approaches that challenge the “10/90 gap” as well as environmental problems. I can only hope that re-prioritization happens quickly before more droughts, storms, floods and unpredictable weather destroy the land and communities that I grew up with.

1 Regional population growth, Australia, 2006–2007. Australian Bureau of Statistics (<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/3218.0Main%20Features32006-07?opendocument&tabname=Summary&prodno=3218.0&issue=2006-07&num=&view=>; accessed 30 April 2008).

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