# Public health and the climate: addressing the challenges for Southern Africa

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The Lancet has declared that the changing climate and its impact on health is the most serious health threat of the 21st century (1). When an institution such as The Lancet makes such a declaration, it is incumbent on us as health professionals to take notice. By placing health on the climate change agenda, we, as public health professionals, have the opportunity of focusing the climate challenge on human impacts as compared to the other broader environmental impact that have dominated the agenda to date. According to the best available science, the impact of climate on the global population is likely to develop to castastrophic proportions over the next 4-5 decades. Addressing risks that our children and their children will face can no longer be left to the politicians or international agencies – the outcomes of COP17 were nowhere near the drastic and urgent solutions that are needed to resolve the crisis. If we are to address global population health, it must become the task of health professionals to provide the lead.

There continues to be a grouping of denialists who question the phenomenon of the changing climate, supported by prominent scientists, and arguing questionable science. The former US National Academy of Sciences president Dr. Frederick Seitz, stated in the 1980s that "Global warming is far more a matter of politics than of climate" (2). In 1998, Seitz endorsed the "Oregon Petition" (3), a document drafted in opposition to the Kyoto protocol, boasting the signatures of over 9000 scientists with doctoral qualifications! The petition and its accompanying scientific documentation claimed: "The proposed limits on greenhouse gases would harm the environment, hinder the advance of science and technology, and damage the health and welfare of mankind. There is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gases is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate." (3) It went on to say: We are living in an increasingly lush environment of plants and animals as a result of the carbon dioxide increase. Our children will enjoy an Earth with far more plant and animal life than that with which we now are blessed." (3)

While the denialists are in retreat, particularly at the substantial scientific burden of proof, they are no less deterred. As recently as last year, the Heartland Institute, a conservative think-tank organisation, supported by industry and the conservative elite in the US has promoted a 2011 publication called "Climate Change Reconsidered" (4). According to this report "natural causes are very likely to be (the) dominant cause of climate change that took place in the twentieth and at the start of the twenty-first centuries". The authors of the latest report go on to say "the net effect of continued warming and rising carbon dioxide concentrations in the atmosphere is most likely to be beneficial to humans, plants, and wildlife." (4)

The determination with which these denialists approach their mission, the seemingly rational arguments that they present to the politicians and broader public and the funding that they have access to, to achieve their goals, implies that we cannot be simply dismissive of them.

However, we need to put these shady theories to bed, and get on with looking at how we need to approach this critical challenge for Southern Africa. Without doubt, climate change is a reality that requires our urgent attention. The temperature of the planet is increasing – current trends suggest that this will exceed the arbitrary 2 degrees Celcius ($^{o}$C) rise threshhold by the end of this century (5). This change is a result of a combination of natural changes, and human factors. According to the Intergovernmental Panel on Climate Change (the IPCC), the latter is the most important cause for this climate change (5). Currently our levels of CO2 are around 430ppm from about 230ppm before the Industrial Revolution. This increase has led to global warming of more than 0.75 $^{o}$C. If emissions continue at the current rate (and all evidence in the last decade says otherwise), the stock of greenhouse gases by 2050 will be about 550ppm. However, emissions continue to rise, having increased by 49% since 1990 and by an accelerated annual rate of 5.9% in 2010 (6). Best case scenarios inform us that this 550ppm level will be reached by 2035, reaching between 650 – 1000ppm by the end of the century. Only the denialists, poorly informed and optimists believe that we will remain below the 2 $^{o}$C rise by the end of the century.

The evidence for climate change is overwhelming (5):

- Eighty-five percent of the ice-cap on Mount Kilimanjaro that was present in 1912 has disappeared.
- Modelling of the earth's surface temperature reveals warming temperature since 1880.
- This increase has become most apparent since the 1970s. The 20 warmest years have been experienced since 1981, while the 10 hottest years occurring in the past 12 years.
- The oceans have shown warming of 0.6 $^{o}$C since 1969.
- There has been a rise of about 17 centimetres of the sea levels in the last century, with the rate in the past 10 years being double that of the past century.

While the largest emitters of CO2 are the US, China and Europe, South Africa is responsible for 40% of Africa's emission, producing more tons per capita than even China (7). The rising temperature of Africa and Southern Africa, is in similar trends as that of the rest of the world. By 2025 all countries in Africa will experience some form vulnerability with regards to water availability. Countries such as South Africa would have progressed to a stage of water scarcity.

*The effects on health*

Climate change in itself will not bring about new diseases – but has already dramatically changed the face of many existing diseases and will continue to do so.

According to the WHO, an extra 150 000 deaths per year in the last 50 years can be attributed to climate change, mainly due to diarrhoea, malaria, and malnutrition. Should surface temperatures go up 1°C, an expected 300 000 deaths per year can be expected (8). The often quoted ceiling 2°C rise will potentially cause a decrease of 20 - 30% in water availability in some vulnerable regions, particularly Southern Africa and the Mediterranean and consequently a 5-10% decline in crop yield in Africa. Dry spells are contrasted with excess water, as up to 10 million more people will be affected by coastal flooding each year. Malaria risk will also rise markedly: 40 – 60 million more people will be exposed to malaria in Africa (6). Should we not stabilise temperature increase at this arbitrary level, the risks will rise exponentially.

The estimates from the WHO indicate that the biggest burden of climate related deaths will be borne by the sub-Saharan countries, and that climate change will contribute approximately 2% to the overall total of deaths related to diarrhoeal diseases, malaria and malnutrition (7). The health effects of climate change in South Africa are well documented elsewhere (9).

The challenges facing us in Southern Africa include the multiple health priorities of infectious diseases, non-communicable diseases and now, the impacts due to climate change. Our strategies have to be balanced by the resources available in addressing the various health goals set. We are losing the struggle against achieving the Millennium Development Goals (MDGs), and clearly impacts of climate change on health are likely to place further obstacles in our path. According to the latest report on South Africa's progression towards achieving the MDGs, our infant mortality is 53 per 1000 and under-5 mortality rate 104 per 1000 - deterioration in both indicators from the 1994 baseline (10). And although we are making progress toward achieving the goals for treatment of HIV, TB and malaria, we dare not consider diverting resources away from these priorities.

The data for the impacts of climate change on health in sub-Saharan Africa is limited. Only a handful of publications have reported actual health studies done in this region over the last 10 years. Two examples of these include a study from Limpopo which reviewed the impact of climate on child health, using 21 years of historically collected data and 12 years of hospital records of what the researchers phrased "clinically diagnosed climate-related ailments among children" (11) and the South African study on the effects of housing type on mortality due to temperature (12). Much of the health outcomes work has been conducted by environmental scientists fitting existing or previously collected health data to a variety of computer-based climate change models. Many of these prediction models have yet to be validated – but it remains the best available climate-related health data that we have available at this point in time. A shortcoming of many of these models is the use of previously collected health data – ranging from well validated surveillance data to poorly collected institutional linked information. Scientists lacking sufficient experience in health generally, or on health surveillance and health information systems may not fully appreciate the weaknesses of data not collected for research purposes. Thus, such inputs into computer models undermine their predictive ability.

This is the critical challenge for South African researchers in the public health domain. Understanding the impacts of climate on health requires a new paradigm in research – our usual epidemiological methods do not suffice – our usual study designs, health outcome measures, exposure assessments are not generally applicable when attempting to determine responses to a changing climate. Multidisciplinary research teams consisting of epidemiologists, environmental scientists, computer scientists and other experts are required to define research questions, identify appropriate models, determine data availability or develop strategies for new data collection. As health professionals and researchers, we need to particularly improve our methods of surveillance on disease outcomes if we are to engage with the environmental scientists in truly understanding the impacts of climate on population health.

These scientific paradigms will highlight that the modest figures from the WHO of 150 000 excess climate change deaths cannot be painting the complete picture (7).

*The role of the health sector*

The health sector has become key to climate change – it is a significant contributor to global warming and has to become a player in responding to the health impacts. The global health care sector spends R43billion on energy every year. The health care sector in the US uses 73billion kWh electricity per year. The National Health Service (NHS) in the United Kingdom contributes 25% of the total public sector emissions - more than 18 million tonnes of $CO_2$ produced each year. This implies that a portion of the ill-health associated with climate change can be traced back to the sector that has as its mission the protection of health (13).

"To honour its commitment to first, do no harm, the health sector has a responsibility to put its own house in order so that its practices, the products it consumes and the buildings it operates do not harm human health and the environment", according to the international Non-Governmental Organisation, Health Care Without Harm (13). There is much that the health care sector can do urgently to address its contribution to the changing climate. This includes improving hospital design, systems to reduce and sustainably manage waste, using safer chemicals, monitoring use of resources such as water and energy, and purchasing environmentally-friendly products.

*What is to be done?*

The South African government has implemented mitigation and adaptation policy initiatives (14). However, without the dramatic turnaround by the major producers of greenhouse gases, reverting to the key principles of the Kyoto Agreement, mitigation strategies by countries like South Africa have limited impact. We clearly need global responses to this crisis. Organisations such as PHASA and RuDASA need to build international alliances, ensure that the impacts of climate on the health of the marginalised urban and rural poor are placed firmly on the global agenda. Through the mobilisation of non-governmental organisations nationally and internationally, community based structures and international agencies, we need to bring pressure to bear on those with the power to make the changes. As a signatory to the "Global Call to Action" launched in Durban in December 2011, PHASA has joined a growing band of international health organisations taking up this challenge.

However, these activist strategies must work together with strategies of adaptation. We urgently need to develop a research agenda that determines the human impacts of climate change, prioritise those impacts likely to produce the most adverse outcomes, and develop strategies to address these. These approaches require multidisciplinary engagement, from health professionals, environmental scientists, urban planners, architects, engineers and many more. In my experience, no-one but public health professionals understand and are best equipped to develop these multidisciplinary approaches, it is therefore incumbent on us here to take the lead in these initiatives and to a large extent we need to lead by example: greening the healthcare sector is one small step.

Placing climate change on the agenda of this joint national meeting of PHASA and RuDASA is particularly significant: the populations most vulnerable to climate change are the marginalised in the cities and the rural poor: whether it is the spread of malaria, cholera or increase in respiratory diseases, whether it is the destruction of food sources and homes, loss of

employment, forced migration – the marginalised and vulnerable will be at the receiving end of this onslaught. It is therefore incumbent on both PHASA and RuDASA to play the leading roles in addressing this challenge.

*Note that the views expressed in this article are those of the author(s) and do not necessarily represent the views of PHASA.*

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