

**AUTHORS:**

Caradee Y. Wright^{1,2} 
 Matthew Chersich³ 
 Angela Mathee^{4,5,6} 

AFFILIATIONS:

¹Environment and Health Research Unit, South African Medical Research Council, Pretoria, South Africa

²Department of Geography, Geoinformatics and Meteorology, University of Pretoria, Pretoria, South Africa

³Wits Reproductive Health and HIV Institute, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

⁴Environment and Health Research Unit, South African Medical Research Council, Johannesburg, South Africa

⁵School of Public Health, University of the Witwatersrand, Johannesburg, South Africa

⁶Environmental Health Department, Faculty of Health Sciences, University of Johannesburg, Johannesburg, South Africa

CORRESPONDENCE TO:

Caradee Wright

EMAIL:

cwright@mrc.ac.za

HOW TO CITE:

Wright CY, Chersich M, Mathee A. National Health Insurance and climate change: Planning for South Africa's future. *S Afr J Sci.* 2019;115(9/10), Art. #5800, 3 pages. <https://doi.org/10.17159/sajs.2019/5800>

ARTICLE INCLUDES:

- Peer review
- Supplementary material

KEYWORDS:

weather, environmental health, prevention, health care

PUBLISHED:

26 September 2019

National Health Insurance and climate change: Planning for South Africa's future

Introduction

In South Africa we have witnessed a gripping drought in the Western Cape, devastating heavy rains, fires, flooding and strong winds caused by an upper-air cut-off low in October 2017 in Durban,¹ and regular heatwave and fire risk warnings in several provinces. One foremost cause of weather-related deaths is heat (leading to heatstroke), which is on the rise as towns and cities across South Africa shatter record all-time high temperatures year-on-year.² In January 2016, for example, the North-West Health Department reported that 11 people (aged 22–58 years) died over a period of 48 h in the province from heatstroke.³ Deaths among groups such as the elderly, those with chronic disease and infants rise during heatwaves. These deaths may not be directly related to 'heat shock', but to the additional physiological stress associated with high heat. While there is some uncertainty as to whether these weather events are linked to climate change, the increase in heat levels generally, extreme weather events and current climate predictions for warming temperatures are strongly indicative that this is the case.

By the end of the 21st century, climate change in South Africa is predicted to result in, on average, temperatures 4 °C warmer than they are now.⁴ Summers may become longer and warmer. Some areas of the country are projected to get drier while other parts may experience unseasonal rainfall. Even though there is some uncertainty around such climate predictions, preparing and adapting for climate change impacts is imperative.

Climate change will exacerbate the already high burden of disease in the country and create new public health challenges.⁵ These challenges include respiratory diseases (from exposure to pollen, mould, smoke and particulate urban air pollution), infectious diseases, disaster-related injury and deaths, and environmental contamination that affects food crops and water supplies. The World Health Organization estimates that 250 000 additional deaths will occur globally each year due to direct and indirect climate change impacts.⁶ If South Africa is going to brave the storm of climate change, as well as threats to morbidity and mortality posed by extreme weather events, our primary health care system needs to be robust, resilient, of high quality, and accessible.

South Africa has had some recent environmental health successes.⁷ The percentage of households connected to electricity has increased from 77% in 2002 to 84% in 2017. Access to electricity lowers the use of solid fuel⁸ combustion which is linked to chronic lung disease, asthma, fire hazards and carcinoma⁹. About 90% of South Africans had access to piped water in 2017 (versus 60% in 2002). These improvements in living conditions shore up resilience of households to climate change. Moreover, they may have contributed to a decline in total mortality from 1481.7/100 000 in 2002 to 1093.6/100 000 in 2015.¹⁰ However, many people still live in unhealthy housing conditions while the public health sector struggles from problems including insufficient funding and inadequate staffing.¹¹ While access to primary health care has reportedly increased in recent decades, especially in rural areas, quality of care has not always kept pace.¹² In addition, South Africa faces a quadruple burden of disease and a mix of health system challenges.¹³ These conditions, in a context of widespread poverty and extreme inequality, limit the chances of optimal adaptation to climate change, but also of implementing a National Health Insurance (NHI) scheme in a cost-effective manner.

In June 2017, the National Department of Health gazetted the White Paper on NHI for implementation by 2025. NHI, or universal health coverage, aims to meet four objectives¹⁴: (1) improve access to quality health services for all South Africans, irrespective of whether they are employed or not; (2) pool risks and funds so that equity and social solidarity will be achieved through creation of a single fund; (3) procure services on behalf of the entire population, and efficiently mobilise and control key financial resources; and (4) strengthen the under-resourced and strained public health sector to improve health systems performance. NHI aims to provide access to a uniform package of quality and affordable health services to South Africans based on needs, not on socio-economic status.

A fundamental goal of NHI is to eliminate inequality in access to primary health care. The inequality is evident from the fact that 82 out of 100 South Africans make use of public health care (with limited resources, poor management and limited service delivery) and private health care is used by 18 out of 100 South Africans.¹⁵ Private health care is characterised by high and rising costs of health care and thus of medical scheme cover, disempowered and uninformed consumers, ineffective constraints on rising volumes of care, practitioners that are subject to little regulation and failures of accountability.¹⁶ NHI will be implemented through the creation of a single fund that is publicly funded and publicly administered. The cost (in 2017 terms) to run NHI is estimated to be at least ZAR369 billion by 2025.¹⁷

NHI is anticipated to be the catalyst behind an improvement in primary health care services and infrastructure across the country; however, one of the World Health Organization's prerequisites for successful universal health coverage is an existing efficient health-care system which is lacking in South Africa.¹⁸ Since 2015, initiatives have been taken to enhance the system¹⁹ through ward-based community primary health care workers conducting home visits, mobile clinics servicing schools, and district clinical specialist teams reaching out to improve maternal and child health. Activities have been on a pilot basis and evaluations show mixed results.¹⁹ There is also speculation around exactly how NHI will be implemented and in this regard we contend that, as NHI is being initiated, serious thought needs to be given to how climate change is likely to impact health and universal health coverage so as to plan for and mitigate the likely effects as soon as possible.

Possible direct and indirect impacts of climate change on NHI

Potential direct impacts on NHI and primary health care include extreme weather events on health service infrastructure such as heatwaves affecting functionality of medical equipment, changes to cold-chain requirements for transporting medicine and vaccines, thermal comfort in hospitals, and working conditions, productivity and staff well-being. Hotter conditions may constrain health workers' outreach work which often involves walking long distances for home visits. Flooding may interrupt water and power supplies, impede the ability of staff to get to work, affect the safety of staff and patients at health centres, and also jeopardise access to, or integrity of, systems for maintaining patient records.

The notion of universal health coverage provides the foundation needed to ensure health and well-being for all South Africans in a changing climate. As temperatures increase, the socio-economic effects of climate-related health impacts will ripple through communities, and especially affect children and infants susceptible to heat impacts²⁰ and child-headed households. High rainfall can lead to increased mould in people's homes, especially in poorly built dwellings with limited ventilation, increasing the likelihood of respiratory diseases and exacerbating conditions such as asthma and tuberculosis.²¹ Changes in precipitation can also impact food production and food security, with possible implications for malnutrition, already a concern in South Africa.²² Climate change health impacts are not mentioned in the White Paper on NHI but this should not suggest that health-care professionals in South Africa are unaware of them.

Ways in which NHI can consider climate change

If South Africans are to benefit from universal health coverage through NHI and simultaneously avoid health risks associated with climate change, then one fundamental NHI principle – *prevention of disease* – needs to be centre stage. This includes a focus on preventing climate-sensitive

conditions, i.e. cholera and dengue fever, and pre-empting infection outbreaks. More stringent standards governing heat levels in occupational settings and promoting a set of interventions for outdoor workers are also key actions. A holistic approach founded on the essential tenets of public health is required to shape climate change responses and should include tracking diseases and trends; investigating disease outbreaks; informing policymakers about health impacts; creating partnerships – with industry and faith communities – to implement solutions; and ensuring health-care service provision following disasters.²³ Training of health-care providers on health aspects of climate change and research on optimal adaptation strategies are also needed.

Synergies between NHI principles and climate change exist: there are risks and opportunities to inform preparedness and help mitigate against adverse health impacts (Table 1).²⁴ Health promotion, preparedness and advocating health protective behaviours, e.g. drinking water in hot conditions, must be among the high priorities. Public awareness campaigns are required for socially isolated and marginalised groups. With a greater emphasis on prevention through behavioural change, especially in relation to environmental factors known to affect health, but also through vaccination, we could aim to reduce clinic and hospital visits during extreme weather events.

NHI is planned specifically to reduce the gap in the standard of health care between rich and poor, thereby reducing susceptibility of vulnerable groups. If this goal is to be achieved in a period of climate change, it will need to be carefully considered through social, spatial and economic lenses. Cities, where air pollution is already a concern, could experience worsening levels of air pollution when temperature rises, which may lead to greater prevalence of asthma, hence health-care facilities in cities may need to be well stocked with the appropriate medication.

Finally, sectors need to be integrated – for example, housing and settlements, labour/occupation and education – in order to cover social

Table 1: Health system building blocks, principle or element of National Health Insurance (NHI) and climate change: Identifying risks and opportunities to prepare and mitigate impacts

Health system building block	NHI principle	Climate change	
		Risk	Opportunity
Leadership / governance	Equity and health care as a public good	<ul style="list-style-type: none"> Failure to work across sectors with Health in all policies results in burdens of morbidity and mortality, and cost-inefficiency 	<ul style="list-style-type: none"> Integrate with Disaster Risk Management, Housing and Settlements, Education etc. Promote health-based guidelines and standards
Health workforce	Efficiency and effectiveness	<ul style="list-style-type: none"> Staff succumbing to extreme weather events etc. Staff unable to reach places of work during extreme weather events Lowered staff productivity during heat waves Need for more environmental health staff, and environmental health compliance checks as mitigation efforts rise 	<ul style="list-style-type: none"> Government increases numbers of health professionals graduating from universities and returns professionals from abroad who could assist in weather-related extreme events, for example Climate and health considerations are included in curricula for all cadres of health workers
Access to essential medicines and technologies	Equity Efficiency Appropriateness	Public-private partnerships could be unsuccessful and not maximise opportunities to embrace new medical technologies	<ul style="list-style-type: none"> Collaboration with NGOs to address preventive measures Threats of increased climate-sensitive infectious diseases used to advocate for increased access to medicines
Health information systems	Health care as a public good	<ul style="list-style-type: none"> Lack of preparedness in hospital and clinics for health impacts from extreme weather events 	<ul style="list-style-type: none"> Paper-based data system replaced with a quality electronic data system for monitoring and analysis Data for engaging in research and modelling. Early-warning systems and better integration with South African Weather Service
Health service delivery	Right to access health care Effectiveness Appropriateness	<ul style="list-style-type: none"> Facilities could experience damage to infrastructure, and water and power shortages Facilities not equipped for thermal comfort Vulnerable people remain left behind if climate change puts pressure on health systems despite NHI in place Higher burden on the vulnerable, reducing long-term prospects for productive society Impacts deepen inequality 	<ul style="list-style-type: none"> Health-care sector as key messengers for climate change impacts, to educate patients about the impacts of climate change and improve preparedness NHI could increase hospital readiness and resilience for severe weather events, e.g. back-up generators, operable windows for ventilation Health-care facilities' emissions reduced by switching to cleaner energy options for powering hospitals and clinics NHI could reduce inequality and provide support to vulnerable groups



determinants of health in implementing NHI, not only for its success but also to alleviate threats of climate change on health, the need for health-care insurance and health-care delivery.^{25,26} Social determinants of health²⁷ warrant special attention in all NHI promotion campaigns for disease prevention. The case study below illustrates the application of a climate change lens to prevailing social challenges to ensure a cost-effective NHI as the health hazard ramifications of climate change unfold.

Need for climate change considerations in all policies

In March 2018, 5-year-old Lumka Mkhethwa died in a pit toilet at a school in Bizana in the Eastern Cape Province. Her death followed that of young Michael Komape who met a similar fate at a school in Limpopo Province in 2014. Understandably, there was widespread public anger over these entirely preventable deaths and calls for urgent replacement of school pit latrines with 'proper' waterborne sewage systems. In an era of climate change, however, there is need for a longer-term view, and a broader perspective on child health and safety at schools.

Human faeces can be one of the most contaminated substances on earth. The purpose of any sanitation system is to remove faeces from human contact as quickly as possible. Most sanitation systems can achieve this if they are properly located, designed, constructed and maintained. Lumka and Michael died, not because they used a pit latrine, but because they had to use pit latrines that were not designed or appropriate for use by children.

During periods of drought, waterborne toilets constitute a major drain on available water supplies, and under certain circumstances, water shortages may render school toilets entirely dysfunctional. Consequences are potentially dire, with school toilets becoming a health hazard, a site for pest infestations, and a source of outbreaks of diarrhoeal diseases. It is possible that well-constructed pit latrines are preferable to waterborne toilets in areas with water scarcity, itself a rapidly expanding concern. But any school toilet must be designed with the health and safety of young children uppermost in mind; children should never be able to fall into pit latrines, no matter the extent of their natural curiosity, or any other circumstance.

Conclusions

It is evident that climate change will present substantial challenges, especially to the communities expected to benefit most from NHI. The aim of NHI is to deliver preventive, promotive, curative and rehabilitative health-care services with an emphasis on disease prevention and health promotion. It is the last two principles that hold particular synergy in adapting to climate change. By making climate change an integral consideration in planning and development it is possible to deliver an NHI that contributes more effectively to reducing inequalities that are likely to stem from evolving environmental hazards to health associated with climate change.

Acknowledgements

A.M. and C.Y.W. receive research support from the South African Medical Research Council and the National Research Foundation (South Africa). We thank Professors S. Fonn and J. Goudge for providing comments on an early draft of this manuscript.

References

1. Durban storm leaves death and destruction in its wake. News24. 2017 October 10. Available from: <https://www.news24.com/SouthAfrica/News/live-massive-storm-hits-durban-causes-flooding-chaos-20171010>
2. Johannesburg temperature hits record high as South Africa drought persists. Reuters. 2016 January 07. Available from: <https://www.reuters.com/article/us-safrica-weather-idUSKBN0UL1F020160107>
3. Heat stroke death toll rises to 11. SABC. 2016 January 10. Available from: <https://www.enca.com/south-africa/heatstroke-death-toll-rises-11>
4. Engelbrecht F, Adegoke J, Bopape MJ, Naidoo M, Garland R, Thatcher M, et al. Projects of rapidly rising surface temperatures over Africa under low mitigation. *Environ Res Lett*. 2015;10, 052004, 16 pages. <https://doi.org/10.1088/1748-9326/10/8/085004>
5. US EPA. Climate change indicators: Understanding the connections between climate change and human health [webpage on the Internet]. c2017 [cited 2018 Sep 27]. Available from: <https://www.epa.gov/climate-indicators/understanding-connections-between-climate-change-and-human-health>

6. World Health Organization. Climate change and health – Key facts [webpage on the Internet]. c2018 [cited 2019 Aug 23]. Available from: <http://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>
7. Statistics South Africa. Statistical release P0318: General Household Survey 2017 [document on the Internet]. c2018 [2019 Aug 23]. Available from: <http://www.statssa.gov.za/publications/P0318/P03182017.pdf>
8. Ye Yuxiang, Koch SF, Zhang J. Determinants of household electricity consumption in South Africa. *Energy Econ*. 2018;75:120–133. <https://doi.org/10.1016/j.eneco.2018.08.005>
9. World Health Organization. Household air pollution and health [webpage on the Internet]. c2018 [cited 2019 Aug 23]. Available from: <http://www.who.int/en/news-room/fact-sheets/detail/household-air-pollution-and-health>
10. World Health Organization. WHO Mortality database [webpage on the Internet]. c2018 [cited 2019 Aug 23]. Available from: http://www.who.int/healthinfo/mortality_data/en/
11. Moyimane MB, Matlala SF, Kekana MP. Experiences of nurses on the critical shortage of medical equipment at a rural district hospital in South Africa: A qualitative study. *Pan Afr Med J*. 2017;28:100. <https://doi.org/10.11604/pamj.2017.28.100.11641>
12. Eygelaar JE, Stellenberg EL. Barriers to quality patient care in rural district hospitals. *Curatiosis*. 2012;35(1), Art. #36, 8 pages. <https://doi.org/10.4102/curatiosis.v35i1.36>
13. Pillay-van Wyk V, Dorrington RE, Bradshaw D. Rapidly changing mortality profiles in South Africa in its nine provinces. *S Afr Med J*. 2017;107(3):168–169. <https://doi.org/10.7196/samj.2017.v107i3.12344>
14. HealthMan. National Health Insurance White Paper 2017 Summary [document on the Internet]. c2017 [cited 2019 Aug 23]. Available from: <https://www.mm3admin.co.za/documents/docmanager/1E9AE2C-B58D-4AED-B5A2-96187D705AEE/00126403.pdf>
15. Statistics South Africa. Public healthcare: How much per person? [webpage on the Internet]. c2017 [cited 2019 Aug 23]. Available from: <http://www.statssa.gov.za/?p=10548>
16. Competition Commission South Africa. Health market inquiry provisional findings and recommendations report [document on the Internet]. c2018 [cited 2019 Aug 23]. Available from: <http://www.compcom.co.za/wp-content/uploads/2018/07/Health-Market-Inquiry-1.pdf>
17. NHI – a healthy way to go? IOL Personal Finance. 2018 March 06. Available from: <https://www.iol.co.za/personal-finance/nhi-a-healthy-way-to-go-12651180>
18. World Health Organization. What is universal health coverage? Geneva: World Health Organization; 2014. <https://doi.org/10.2471/bit.08.060046>
19. Choonara S, Eyles J. National Health Insurance: South Africa's most progressive reform to date. *S Afr Labour Bull*. 2016;40(1):31–34. Available from: <http://ir.nrf.ac.za/handle/10907/2069>
20. Stanberry LR, Thomson MC, James W. Prioritising the needs of children in a changing climate. *PLoS Med*. 2018;15(7), e1002627, 4 pages. <https://doi.org/10.1371/journal.pmed.1002627>
21. Foster N, Vassall A, Cleary S, Cunnamo L, Churchyard G, Sinanovic E. The economic burden of TB diagnosis and treatment in South Africa. *Soc Sci Med*. 2015;130:42–50. <https://doi.org/10.1016/j.socscimed.2015.01.046>
22. Tumushabe JT. Climate change, food security and sustainable development in Africa. In: Olorunfoba S, Falola T, editors. *The Palgrave handbook of African politics, governance and development*. New York: Palgrave Macmillan; 2017. p. 853–868. https://doi.org/10.1057/978-1-349-95232-8_53
23. Messery M. Insurer Climate Risk Disclosure Survey report and scorecard: 2016 Findings and recommendations [webpage on the Internet]. c2016 [cited 2019 Aug 2019]. Available from: <https://www.ceres.org/resources/reports/insurer-climate-risk-disclosure-survey-report-scorecard>
24. Centers for Disease Control and Prevention (CDC). The public health system and the 10 essential public health services [webpage on the Internet]. c2019 [cited 2019 Aug 23]. Available from: <https://www.cdc.gov/sttphublichealth/publichealthservices/essentialhealthservices.html>
25. National Department of Health. National Health Insurance for South Africa – Towards universal health coverage [document on the Internet]. c2015 [cited 2019 Aug 23]. Available from: https://www.gov.za/sites/default/files/National_Health_Insurance_White_Paper_10Dec2015.pdf
26. Curtis S, Fair A, Wistow J, Val DV, Oven K. Impact of extreme weather events and climate change for health and social care systems. *Environ Health*. 2017;16(suppl.1):128. <https://doi.org/10.1186/s12940-017-0324-3>
27. Marmot M. Social determinants of health inequalities. *Lancet*. 2005;365:1099–1104. [https://doi.org/10.1016/s0140-6736\(05\)71146-6](https://doi.org/10.1016/s0140-6736(05)71146-6)