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**WESTERN
AUSTRALIA**



UWA
Public Policy
Institute

Climate Health WA Inquiry

UWA Response

The University of Western Australia (UWA) welcomes the Minister for Health's announcement of the Climate Health WA Inquiry, and provides the following submission.

UWA's response focusses in particular on:

- The current lack of detailed WA-specific knowledge on the implications of climate change for health and urgent need for research to rectify this;
- The need for the rapid introduction of evidence-based measures to protect the public from the harmful health effects of climate change;
- The investigation of measures that can strengthen the preparedness and resilience of communities and health services against extreme weather events.

We make the following three recommendations:

- 1. A systematic review of the entire State Government Planning policy with reference to human adaptation to current and future climate change and low-carbon transition models for the health sector;**
- 2. State-funded research into assessing the types and extent of negative effects of climate change on health in Western Australia, including already occurring harm, as well as into targeted strategies to predict and minimise future health risks, in particular addressing the specific health needs of high-risk and vulnerable groups, and associated future policy options;**
- 3. Inclusive and forward-looking decision-making processes that combine state-level approaches with community driven initiatives, priorities, and aspirations to strengthen the resilience of Western Australia's people and the preparedness of the state's health services.**

Current knowledge on the implications of climate change for health in Western Australia and a framework for evaluating future risks and harm

Current research-derived information on the implications of climate change on health in Australia remains inadequate and knowledge specific to Western Australia limited, despite a key report, Health impacts of climate change: Adaptation strategies for Western Australia¹, produced by the WA Department of Health in 2008.

The 2008 WA Department of Health report¹ identified a range of potential limitations in the state's preparedness for climate-related hazards and extreme events (heat waves, fires, storms, and cyclones) and their direct impacts, including: a lack of preparedness/education, especially in remote Indigenous communities; inadequate allocation of resources to accommodate the expansion of activities and populations into North-West of Western Australia; failure to account for the ageing population and other large vulnerable groups; the lack of specific heat wave response plans; and under-resourced mental health/counselling services that would be required from extreme climate-related events such as heat waves and fires.

In order to address these limitations, overcome additional current knowledge gaps, and undertake long overdue and systematic research on present impacts and future risks in Western Australia, the state would be well served by tapping into existing non-governmental sources. This could include the Climate and Health Alliance's (CAHA) National Strategy for Climate, Health and Well-being², and their 2017 framework³, both of which lay out concrete steps toward addressing the climate-health crisis.

We do know that the increase in the frequency and intensity of climate-related emergencies will have multiple impacts on community wellbeing in this state, including: an increase in the direct risk of injury, trauma and death; an elevation of associated morbidity, such as smoke-related cardio-respiratory illness from bushfires; and numerous indirect effects from damage to property, livestock and crops, conservation areas, and coastal areas, such as loss of income, loss of freshwater, and food insecurity, as well as psychological and emotional stress due to the loss of homes, sense of community, and infrastructure, goods, and services. Climate-related emergencies will also affect our neighbours in the Indian Ocean Rim countries, with human displacement predicted to be in the millions and substantial downstream effects on health and well-being in Western Australia. Research is needed to better predict the extent and time-scale of these future impacts so that early and effective countermeasures can be implemented and harm avoided.

The direct effects of rising temperatures, more frequent and severe heat waves and other extreme events, and more erratic rainfall patterns on health are already visible and will become more pronounced in the future. Health is likely to be adversely affected by many factors but the effects will be disproportionately distributed across the community.

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https://ww2.health.wa.gov.au/~/_media/Files/Corporate/general%20documents/Environmental%20health/Climate%20change/Health-impacts-of-climate-change.pdf

² <https://www.caha.org.au/national-strategy-climate-health-wellbeing>

³ <https://www.aph.gov.au/DocumentStore.ashx?id=646904fe-2186-46f0-b784-5c40307576c3&subId=514102>

Population sub-groups at high risk include: children; pregnant women; the elderly, owing to diminished thermoregulatory ability with age; marginalised groups such as homeless people; low-income groups; Aboriginal communities; and regional communities, especially those dependent on rain-fed agriculture with limited livelihood alternatives and those with high proportions of socio-economic disadvantage.

As Western Australian temperatures increase, a decline in child health in the state can be expected, but the scale of this is still unknown. Globally, over 80% of the health effects of climate change are in children^{4,5}, and increasing ambient temperature is the greatest contributor, having already been shown to be a critical determinant across low-, middle-, and high-income countries^{6,7}. Other particular risk factors for child health include air quality decline⁸, increasing population density⁹, lack of access to greenspace¹⁰, the growing range of infectious disease vectors¹¹ and adverse weather events¹².

Pregnant women will be challenged by increasing temperatures, as well as all of the many interdependent environmental consequences of climate change, including adverse effects on food and water supply, biodiversity loss, infections and numerous other stressors. Specifically, efficient heat exchange during pregnancy is crucial to compensate for the metabolic demand of the fetus. With high temperatures, the inability to easily

⁴ Smith, K.R., A. Woodward, D. Campbell-Lendrum, D.D. Chadee, Y. Honda, Q. Liu, J.M. Olwoch, B. Revich, and R. Sauerborn, 2014: Human health: impacts, adaptation, and co-benefits. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 709-754

⁵ Hoegh-Guldberg, O., D. Jacob, M. Taylor, M. Bindi, S. Brown, I. Camilloni, A. Diedhiou, R. Djalante, K.L. Ebi, F. Engelbrecht, J. Guiot, Y. Hijikata, S. Mehrotra, A. Payne, S.I. Seneviratne, A. Thomas, R. Warren, and G. Zhou, 2018: Impacts of 1.5°C Global Warming on Natural and Human Systems. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp 175-311

⁶ Burke M, Heft-Neal S, Bendavid E. Sources of variation in under-5 mortality across sub-Saharan Africa: a spatial analysis. *The Lancet Global health*. 2016;4(12):e936-e45

⁷ Xu Z, Etzel RA, Su H, Huang C, Guo Y, Tong S. Impact of ambient temperature on children's health: a systematic review. *Environmental research*. 2012;117:120-31.

⁸ Heft-Neal S, Burney J, Bendavid E, Burke M. Robust relationship between air quality and infant mortality in Africa. *Nature*. 2018;559(7713):254-8

⁹ Block EP, Zimmerman FJ, Aguilar E, Stanley L, Halfon N. Early Child Development, Residential Crowding, and Commute Time in 8 US States, 2010-2017. *American journal of public health*. 2018;108(11):1550-7.

¹⁰ Wood L, Hooper P, Foster S, Bull F. Public green spaces and positive mental health - investigating the relationship between access, quantity and types of parks and mental wellbeing. *Health & place*. 2017;48:63-71.

¹¹ World Health Organization. A Global View of Vector Borne Diseases. 2014 Contract No.: Document number: WHO_DCO_WHD_2014.1.

¹² Ahdoot S, Pacheco SE. Global Climate Change and Children's Health. *Pediatrics*. 2015;136(5):e1468-84

thermoregulate will challenge maternal and fetal health. This increases the likelihood of stillbirth, preterm birth and fetal growth restriction. Furthermore, and of enormous concern for future generations, are the transgenerational biological effects that are transmitted through epigenetic effects of these stressors on DNA during pregnancy and very early life—this means that the full consequences of these effects may not be fully manifest for several generations.

Work-related injuries and illnesses have been shown to increase during moderate/high-severity heatwaves in Australia¹³. There are particular health and economic implications for outdoor manual workers, as the number of dangerous outdoor working days (defined as a day when core body temperature would approach heat-stroke level within two hours) per year is predicted to increase from the present 1 day to 21 days per year by 2070.

Marginalised populations and people of low socioeconomic status, including homeless people, migrants, and Aboriginal families, are also likely to be at greater risk from increasing temperatures, yet associated negative impacts on these vulnerable groups in WA are poorly understood.

Even less is known about the current and potential future impacts on people in regional Western Australia. The size of our state and the dispersed regional population present significant research and service challenges. Equally limited is our current understanding of the multiple linkages between ecosystem health, including the health of our oceans, and human health and well-being¹⁴.

Protecting the public from the harmful health impacts of climate change

Climate change is an issue of intergenerational and international injustice; it means that future generations will have to live with more severe health impacts than the current generation, and poorer citizens, communities, and countries are already suffering greater impacts despite being the least responsible for emissions. Yet, given the fact that our societies are globally connected, through social and ecological systems, nobody is immune.

Action can be taken in six main areas to mitigate the harmful effects of climate change in Western Australia.

First, we urgently need accurate and high-resolution projections of the magnitude and time-scale of the future adverse effects of climate change on the health of Western Australians, as well as a detailed vulnerability profile for the state. Systematic research

¹³ Varghese BM, et al. 2019. Characterising the impact of heatwaves on work-related injuries and illnesses in three Australian cities using a standard heatwave definition- Excess Heat Factor (EHF) *Journal of Exposure Science & Environmental Epidemiology*. <https://doi.org/10.1038/s41370-019-0138-1>

¹⁴ Richard Meissner (2018) Ocean governance for human health and the role of the social sciences. *The Lancet*. 2. 10.1016/S2542-5196(18)30139-6.

in this area should be seen as a priority for government-funded, health-related research in Western Australia, with a clear emphasis on vulnerable groups noted above as they will be the most affected and need the greatest investment in health infrastructure. With support from State Departments, UWA could use advanced modelling to establish the magnitude and timescale of the increasing burden of disease caused by climate change. Such concentrated research efforts would allow appropriate planning and implementation of health services, making it possible to be ready in time and match the expected increases in demand in order to deliver optimal and inclusive care to Western Australians.

Second, health service planning will benefit from a better understanding of the state's (and the nation's) uneven vulnerability profile¹⁵. Vulnerability is high among people and sectors that have been systematically disadvantaged (e.g. overlooked in state-level policy making, in health, education, housing, employment and other areas). Such structural disadvantage aligns with axes of inequality around age, gender, socio-economic status, remoteness, and geographical location. To reduce harmful effects, more detailed knowledge than currently available is needed regarding the drivers of uneven vulnerability and the factors that keep many people entrapped in vulnerable situations. The latter include, for instance, not knowing what to do before and during an extreme event such as a heat wave, not being able to use everyday forms of communication, not being able to make sense of conflicting or complex information, and lack of trust towards decision makers such as emergency managers.

An important and often used approach for dealing with climatic hazards and extreme events is through hazard probabilities. However, limiting our understanding of risk to such probabilities without considering uneven vulnerability and the seemingly non-rational trade-offs people make in high-risk situations unnecessarily increases the risk of those most vulnerable. Only one study exists to date that examines uneven vulnerability to heat stress in Western Australia¹⁶, with another two comparing Perth with Melbourne and Brisbane^{17,18} with respect to heat wave related injuries and illnesses. A nuanced profile of uneven vulnerabilities and people's preferences and constraints in decision making when faced with a climate-health crisis is long overdue for Western Australia.

Third, our state needs to reduce its emission contribution to climate change. The Terms of Reference suggest that WA health services should take steps to reduce their impacts and transition to a sustainable model. In reality, however, this is a whole-of-government and in

¹⁵ <https://www.aidr.org.au/media/6682/national-resilience-taskforce-profiling-australias-vulnerability.pdf>

¹⁶ Xiao, Jianguo, Tony Spicer, Le Jian, Grace Yajuan Yun, Changying Shao, John Nairn, Robert JB Fawcett, Andrew Robertson, and Tarun Stephen Weeramanthri. "Variation in population vulnerability to heat wave in Western Australia." *Frontiers in public health* 5 (2017): 64

¹⁷ Varghese, Blesson M., Adrian G. Barnett, Alana L. Hansen, Peng Bi, John Nairn, Shelley Rowett, Monika Nitschke et al. "Characterising the impact of heatwaves on work-related injuries and illnesses in three Australian cities using a standard heatwave definition-Excess Heat Factor (EHF)." *Journal of exposure science & environmental epidemiology* (2019): 1.

¹⁸ Varghese BM, Barnett AG, Hansen AL, Bi P, Heyworth JS, Sim MR, Hanson-Easey S, Nitschke M, Rowett S, Pisaniello DL. 2019 Geographical variation in risk of work-related injuries and illnesses associated with ambient temperatures: A multi-city case-crossover study in Australia, 2005-2016. *Science of the Total Environment*; accepted June 6 2019.

fact whole-of-state matter that requires committed action. According to a June 2019 report by Climate Analytics¹⁹, Australia's current 5% contribution to global greenhouse gas emissions could rise to 17% by 2030 if all projected coal and gas explorations are realised and fossil fuel exports are taken into account. This includes major liquefied natural gas (LNG) projects in Western Australia²⁰, mostly the Canning Basin in the Kimberley, which is known for its unique and globally significant terrestrial and marine ecosystems that also carry high cultural significance for their traditional owners. Australia's LNG emissions are projected to triple by 2030, including a doubling of Western Australia's LNG exports.

Fourth, the Department is to be commended on taking a lead in reducing emissions and adopting a more sustainable trajectory in terms of its own operations. Concrete examples are possible within the health sector, as illustrated in the National Health Services England's and Public Health England's plan to reduce the carbon footprint in their health and care system²¹, currently nearly 40% of the public-sector emissions in England. Australia's emissions from the health care system constituted 7% of the state's total emissions in 2014-15, with public hospitals 34%, private hospitals 10%, benefit-paid drugs 9%, other medications 9%, and capital expenditure for buildings 8%²². The WA health sector would reduce its harmful effects from its carbon footprint by following leading examples worldwide²³, particularly from the educational sector, to decarbonise their infrastructure and pursue carbon neutrality. The WA health sector, including individual hospitals, may find inspiration in the Newcastle hospitals in the UK which, in June 2019, were the first to declare a climate emergency and committing to carbon neutrality by 2040²⁴.

Fifth, we need a strong focus on behavioural change and systemic transformation in our society to reconsider and redirect how we live our daily lives, including the types of residences we build and occupy, how we commute and travel, what food we consume, and how we produce and dispose of waste. The State Government's plans to build Metronet and increase the number of dwellings and businesses close to public transport are strong and positive responses, but these actions need to be balanced with increased green space. UWA, through the Australian Urban Design Research Centre and the Planning and Transport Research Centre, along with other academic units, supports this work directly. Behavioural change also includes changes in our diets, as highlighted in the August 2019 IPCC Special Report Climate Change and Land²⁵, and difficult ethical debates around not only nutrition but the current antagonistic relationships between meat producers and vegan advocates.

Sixth, change to the physical urban environment can mitigate the harmful effects of climate change. Research shows that greener suburbs are cooler suburbs, and also that wealthy suburbs are often greener than less wealthy suburbs – with a resulting temperature difference of up to 6 degrees according to The Environmental Protection Authority.

¹⁹ https://www.acf.org.au/evaluating_the_significance_of_australias_global_fossil_fuel_carbon_footprint

²⁰ <https://www.theguardian.com/australia-news/2019/jul/07/fuelling-the-climate-crisis-why-lng-is-no-miracle-cure-for-australias-coal-addiction>

²¹ <https://www.sduhealth.org.uk/policy-strategy/reporting/hcs-carbon-footprint.aspx>

²² [https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(17\)30180-8/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(17)30180-8/fulltext)

²³ <https://www.unenvironment.org/sw/node/24859>

²⁴ <http://www.newcastle-hospitals.org.uk/news/news-item-23892.aspx>

²⁵ https://www.ipcc.ch/2019/08/08/land-is-a-critical-resource_srcl/

Research can and should inform State and Local Government decisions about parks and other urban green areas. For example, larger parks have a greater effect on reducing urban temperatures than an equal ground area of smaller parks. Perth's river foreshore open spaces are under pressure, and these make up a considerable proportion of the city's open spaces. Planning is required to adapt these spaces to sea level rise and where appropriate to move open space function elsewhere. UWA, through the Australian Urban Design Research Centre, is spearheading such efforts. Overall, our city needs a joined-up approach to this and a concrete plan to curb urban heat islands and exposure, perhaps similar to Victoria's Heatwave Planning Guide²⁶ or Queensland's Human Health and Wellbeing Climate Change Adaption Plan²⁷. We recommend that the DOH plays a stronger role in development decisions, particularly via the proposed Public Health Assessments, and considers these through the lens of the climate crisis.

Strengthening the preparedness and resilience of communities and health services against extreme weather events, with a focus on the most vulnerable in the community

While Western Australia might plan for the best, it also needs to prepare for the worst. This is an approach taken by the National Resilience Taskforce within the Department of Home Affairs, for example in its National Disaster Risk Reduction Framework²⁸, which includes climate change impacts.

The WA health sector needs to position itself at the forefront of the 2018 National Disaster Risk Reduction Framework, which outlines four overarching priorities. These include applying existing strategic guidance to anticipate and prepare for the worst, despite uncertainties, for instance through scenarios²⁹. Scenarios of particular relevance for Western Australia, each overlaid with trajectories for societal vulnerability and future exposure, may include: seasonal events such as wild fires gradually becoming more frequent, widespread, longer-lasting or intense ('death by a thousand cuts'); multiple high-consequence events converging such as a series of extreme urban heat waves coupled with extreme fires in the Perth Hills, doubling historic records ('catastrophic events'); or extending chronic stress such as droughts among WA's farming communities and crossing dangerous health thresholds, including farmers suicide and animal deaths ('chronic stress leading to future stress'). While a variety of models and guiding approaches exist³⁰, Western Australia has not produced a far-reaching scenarios analysis for the state, its various sectors (the health sector included) and for its differentially vulnerable populations. This is a dangerous oversight, possibly even negligence.

²⁶ <https://www2.health.vic.gov.au/about/publications/policiesandguidelines/Heatwave-Planning-Guide-Development-of-heatwave-plans-in-local-councils-in-Victoria>

²⁷ https://www.qld.gov.au/data/assets/pdf_file/0022/64237/h-cap-qld.pdf

²⁸ <https://www.homeaffairs.gov.au/emergency/files/national-disaster-risk-reduction-framework.pdf>

²⁹ <https://www.aidr.org.au/media/6932/04-scenarios.pdf>

³⁰ <https://www.aidr.org.au/media/6932/04-scenarios.pdf>

Moreover, the WA health sector would benefit from following the AIDR's 2019 Guidelines on Prioritisation for Climate and Disaster Risks³¹. This entails being explicit about how, where, when and with whom actions can reduce loss and harm while enhancing trust, responsibility, and resilience through improved health and well-being. Resilience, as emphasised by the 2018-19 National Resilience Taskforce, is not a given. It needs to be carefully identified and nurtured rather than expected from every citizen, independent of their vulnerability status. Resilience building in Western Australia means enhancing adaptive capacities amongst the most vulnerable populations and broadening their portfolio of future response options. Western Australia currently lacks both a detailed vulnerability profile and tailored resilience-building strategies for its diverse and growing populations, including Aboriginal communities, low-income families, its aging demographic, and migrants and refugees. Health is one of several crucial determinants of both vulnerability and resilience³², but its contributions to better preparedness and resilience in Western Australia remains poorly understood.

Both worst scenarios to anticipate disaster risk and community-level resilience strategies are needed to forecast, deliberate, and prevent outcomes that further harm already vulnerable and disadvantaged populations in Western Australia, in both urban and rural areas.

With support from State Departments, UWA proposes to collect detailed data and estimate group-specific needs toward Western Australia's health care services, and to evaluate and strengthen the capacity of health systems to address emergencies arising from climate change.

We envision combining such newly collected data with ongoing University research projects that already contribute to strengthening the preparedness and resilience of Western Australian communities. One example is the Australian Research Council Discovery Project "Locating Loss from Climate Change in Everyday Places", led by Prof Petra Tschakert. This study investigates climate change and other stressors across eight communities in Western Australia, from south of Perth into the eastern Wheatbelt, to understand the difficult trade-off urban and rural residents make when negotiating climate change futures, including impacts on their health, well-being, identity, and sense of place and belonging, and how their visions for desirable and dignified futures can be incorporated into state-level adaptation planning.

Another example of ongoing relevant research is the work of the UWA Oceans Institute and the CRC for Productive Coasts on decision-making tools for repairing coastal habitats; modelling the net benefit of coastal rehabilitation to community wellbeing and health; and investment models for green coastal infrastructure. These ongoing efforts could be expanded to strengthen more directly community resilience and enhance preparedness to climatic stressors and changing coastal environments.

³¹ <https://www.aidr.org.au/media/6933/05-prioritisation.pdf>

³² <https://knowledge.aidr.org.au/resources/profiling-australias-vulnerability/>

In addition, we specifically propose to evaluate the following dimensions of health system capacity:

- *Preparedness of health services for current and future climate-related emergency events*, including provisions for emergency medical services and public health services to respond to acute, long-term and delayed outcomes.
- *Health sector 'surge' capacity* to potential increases in number of fatalities and injuries from the direct or indirect effects of emergency events, including emergency department contacts, daily hospital admissions, hospital days, and primary care contacts. This includes management of mass casualty situations and predicted effects of pollution and contamination (such as bushfire smoke), building on worst case scenarios described above.
- *Physiological acclimatisation to heat*. Increase the resilience of emergency services personnel to heat waves by strategically acclimatising to heat. It is well known that such acclimatisation improves the ability of a human to tolerate exposure to extreme conditions. To become heat acclimatised involves being exposed to heat on successive days. Yet, our affluent lifestyle, and use of environmental modification in the form of air conditioning, has reduced exposure to the stimuli that adapt emergency service personnel and many others to heat.
- *Consequences of destruction/disruption of essential services*, including both (1) immediate interruptions to medical services or supply failures for essential items such as food, power and water and (2) acute and long-term health impacts of these disruptions.

A major priority of such collaborative investigations is the creation of scientifically defensible decision-making tools combined with participatory and inclusive consultation processes that bring to the fore otherwise silenced voices from the most vulnerable groups. This integrated approach will (i) help improve the adaptive capacity of Australian communities; and (ii) mitigate health risks from emergency events driven by climate change. Improved health system preparedness and response allows limited resources to be more efficiently and effectively used, thereby reducing morbidity and mortality in disaster situations.

Overall recommendations

1. A systematic review of the entire State Government Planning policy with reference to human adaptation to current and future climate change and low-carbon transition models for the health sector;
2. State-funded research into assessing the types and extent of negative effects of climate change on health in Western Australia, including already occurring harm, as well as into targeted strategies to predict and minimise future health risks, in particular addressing the specific health needs of high-risk and vulnerable groups, and associated future policy options;
3. Inclusive and forward-looking decision-making processes that combine state-level approaches with community driven initiatives, priorities, and aspirations to strengthen the resilience of Western Australia's people and the preparedness of the state's health services.

The University of Western Australia would be pleased to provide further and more detailed information on request, and to attend any face-to-face consultation meetings which may be held.

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