Modelling the health impacts of climate change

Advice to the Australian Federal Treasury

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The health impacts of climate change are substantial. Modelling the impacts of climate change on health is crucial as Australia faces increasing climate impacts, and will result in a more accurate understanding of the economic costs of climate change to society as a whole.

We commend the Government on the release of Australia's first *National Health and Climate Strategy* ('the National Strategy') and on its *Measuring What Matters* initiative. It was also positive to see that last year's *Intergenerational Report* recognised the importance of climate change to the economy and to population health. The RACP has engaged in these matters through multiple submissions on the National Strategy and *Measuring What Matters* (see here and here for RACP submissions) and a media release on the Intergenerational Report.

In this context of an increasing awareness of the impacts of climate change on both the economy and health, modelling the economic impacts of climate change on health must be a priority. Based on the RACP's health expertise and experience in climate change and health policy we suggest focus areas below for such modelling in the future.

Summary

The health impacts of climate change must be considered in economic modelling that informs climate change mitigation public policy. The impacts of climate change on health as well as the benefits that accrue to health from climate change mitigation must be accounted for.

Economic modelling of the impacts of climate change on health should:

- Embed cultural safety and prioritise Aboriginal and Torres Strait Islander health, knowledge, and leadership;
- Be premised on a Health in All Policies (HiAP) approach to ensure that the health costs and benefits of climate change and climate action in areas outside the health sector are considered;
- Model the health co-benefits of climate health and adaptation and mitigation action both within and outside the health sector and integrate these into decision-making across sectors;
- Model the costs of extreme heat, bushfires, and bushfire smoke on population health;
- Model the costs of climate change on healthcare systems;

- Model the costs and benefits of climate health adaptation and mitigation action within the health sector; and
- Model the costs and benefits of the climate and health impacts of health reform measures.

As part of this process, we consider it important to connect with a range of experts and stakeholders undertaking work in this area, including medical colleges, the Climate and Health Alliance, Doctors for the Environment Australia, and Lowitja Institute.

We have referred to numerous useful resources below. We would like to highlight the WHO's framework for the quantification and economic valuation of health outcomes originating from health and non-health climate change mitigation and adaptation action. The framework was released last year and brings together science, policy, and practice to provide comprehensive guidance on modelling the impacts of climate change on health.

Climate change impacts on health result in healthcare costs, avoidable deaths, and loss of life years

Climate change impacts health and healthcare both directly and indirectly in multiple ways. The adaptation and mitigation measures that can be taken are also varied. Accordingly, attribution and estimation of climate health impact costs and benefits is complex.

Undertaking economic modelling to estimate the costs of climate change on health and to quantify the economic benefits of taking action is an important aspect of informing policy decisions in climate change mitigation and health sector adaptation for climate change.

In its book, Injury Prevention and Environmental Health, the World Bank outlined that accounting for the full costs of climate variability and climate change on health includes three elements:

- Resource costs (medical treatment costs)
- Opportunity costs (lost productivity)
- Welfare costs or disutility (pain or suffering, concern, and inconvenience to family and others)

The RACP-commissioned 2021 report on Climate Change and Australia's Healthcare Systems, includes an economic analysis of the future health burden of bushfires in Australia. The results are discussed below. The costs measured in the analysis include:

- Attributable deaths
- Years of life lost
- Healthcare costs associated with hospital presentations
- Value of statistical life lost
- Broader economic costs were also measured

As climate change impacts on health become long-term and compounding it will become increasingly important to capture how this impacts quality of life, mortality, morbidity, and life expectancy. This can be done through sophisticated health modelling that captures in monetary terms the impact of climate change on disability-adjusted life years (DALY), and health-adjusted life expectancy (HALE) and value of statistical life.

Climate change impacts on health are already predicted to be costly

In recent years, several other institutions have modelled climate change impacts on the Australian economy. This includes the University of Melbourne's Melbourne Sustainable Society Institute report – Australia's Clean Economy Future: Costs and Benefits, a Climate Council report – Compound Costs: How Climate Change is Damaging Australia's Economy in 2019 and a Deloitte report – A new choice: Australia's climate for growth in 2020.

Whilst the parameters and methods vary, the outlook is the same. It is clear that without urgent mitigation and adaptation action, climate change is going to cost the Australian economy trillions of dollars in the coming decades. Costs to health have been included in the reports mentioned above, particularly in relation to productivity implications of extreme heat events. There is a need for a more comprehensive analysis of both costs and benefits from climate change impacts on health.

Climate health impacts are many and varied and as modelling the impacts of climate change on Australia's economy and budget becomes more regular and multi-faceted, it is important that these are comprehensively captured.

It is important that the health costs of climate change are captured economy wide. One way this could be done is through implementing a social cost of carbon throughout Australia, provided it is implemented in a way that accurately captures health costs. We note that the ACT Government is applying a social cost of carbon for public projects. The social cost of carbon assigns a monetary value to damages to society caused by climate change, which is then used by governments and decision-makers in cost-benefit analyses. Correspondence to the Lancet Planetary Health in September 2022 highlighted concerns that health costs and loss of life are not adequately captured in the social cost of carbon and called for disaggregation of market and non-market climate damages by region and sector to better capture climate impacts. Modelling the health costs and benefits of climate change and health will be invaluable to decision-making on policy development, implementation, and funding.

Economic modelling of climate change and health must be culturally safe and prioritise Aboriginal and Torres Strait Islander health, knowledge and leadership

The RACP's Aboriginal and Torres Strait Islander Position Statement:

- "Recognises the cultural diversity among and within Aboriginal and Torres Strait Islander communities, and understands that languages, traditions, and spiritual and cultural beliefs vary;" and
- "Understands that despite this diversity, there is commonality across Aboriginal and Torres Strait Islander peoples with respect to the importance of family, community and kinship networks; a holistic understanding and life course approach to health and wellbeing; and a strong connection to the land and sea."

Connection to sky is also integral to Aboriginal and Torres Strait Islander wellbeing. The connection of Aboriginal and Torres Strait Islander people to Country is intrinsically intertwined with the importance of human, land and sovereign rights to a wellbeing of health and healing. The work of Aboriginal Land Councils, Indigenous land management, custodianship of elders, and cultural ecological approaches with a focus on Indigenous ecological knowledge are

examples of how this connection of Aboriginal and Torres Strait Islander peoples to Country continues to this day and creates greater autonomy of corresponding health benefits.

The RACP has called for the recognition of the ongoing impact of colonisation, dispossession and marginalisation and the prioritisation of self-determination, Indigenous community leadership, community engagement, and cultural safety within the National Health and Climate Strategy. Further, the RACP supports the embedding of Aboriginal and Torres Strait Islander health, conservation and cultural knowledge within the Strategy.

The RACP emphasises the importance of self-determination, cultural safety, and strengths-based discourses. The RACP's Aboriginal and Torres Strait Islander Position Statement recognises "that without self-determination it is not possible for Aboriginal and Torres Strait Islander people to fully overcome the legacy of colonisation and dispossession and its ongoing impacts on health." Further, the RACP Indigenous Strategic Framework notes that "cultural safety is primarily about examining the health professional's own cultural identities and attitudes and being open-minded and flexible in attitudes towards people from cultures other than their own."

Climate change represents another element of colonisation and failure to respond perpetuates and exacerbates systemic injustice. In areas such as Fitzroy Crossing, which is already experiencing extreme weather events such as extreme heat and flooding, there are concerns that "traditional owners of the central Kimberley, after 60,000 years of occupation, will find it very hard to stay". Aboriginal communities face disproportionate impacts due to their close physical and spiritual connection to Country and have higher levels of ill health.

We recommend that economic modelling of the health costs of climate change and the health benefits of climate action should be culturally safe, consider the impacts on Aboriginal and Torres Strait Islander health and communities and be guided by Aboriginal and Torres Strait Islander knowledges, communities, and organisations through meaningful engagement and consultation.

It is important that economic modelling captures the health impacts of climate change on Aboriginal and Torres Strait Islander people and communities and the benefits of Aboriginal and Torres Strait Islander-led climate resilience strategies. This should be done in a respectful, culturally safe manner, with guidance from Aboriginal and Torres people, communities, and organisations on what data is used and collected, and how it is used, collected, analysed, and managed. Indigenous data sovereignty principles and approaches are important here, including the need for Indigenous data to "reflect Aboriginal and Torres Strait Islander interests, values, and priorities, and "be collected with free, prior, and informed consent."

While the concept of cultural safety has come about largely through clinical settings, it can be applied more broadly. A key part of cultural safety is critiquing power structures and challenging one's own biases, assumptions, and prejudices, and this is applicable and possible within clinical settings and beyond them.

The Lowitja Institute Climate Change and Aboriginal and Torres Strait Islander Health Discussion Paper outlines best-practice principles for those working in the climate change and health space in Australia, including the need to value and centre the knowledges of First Peoples and provide "sustainable resourcing and program flexibility to support innovation and long-term monitoring and evaluation". The Discussion Paper emphasises the centrality of community perspectives, and shares examples of wellbeing indicators that were developed with

Aboriginal and Torres Strait Islander communities. Knowledge of relevant principles and work already undertaken in this space would assist in undertaking economic modelling in a culturally safe manner that centres Aboriginal and Torres Strait Islander knowledge and leadership.

Economic modelling of climate change and health must follow a Health in All Policies approach

Policies and approaches in sectors outside the healthcare sector can significantly impact health outcomes and in turn healthcare systems, both positively and negatively. The RACP advocates for a Health in All Policies (HiAP) approach to policy-making. It places health as a key decision-making factor in all areas of policy, by systematically considering the health and health-system implications of policy decisions, by seeking synergies between policy portfolios, and by avoiding harmful health impacts, to improve population health and health equity. HiAP seeks to address social determinants of health.

The social determinants of health are the non-medical factors that influence health outcomes and impact populations in multiple ways. For example, lack of money impacts the ability of people to access nutritious food, and people from lower socioeconomic backgrounds often live in poorer neighbourhoods and have less access to public transport, all of which have an impact on obesity, chronic disease and other health outcomes.

Other social determinants of health include energy affordability, housing quality, education, employment, land-use planning and urban design, access to green space, biodiversity protection, water, and sanitation policies. These social determinants lie outside the immediate remit of the health system, yet they all impact health.

For example, the recent Yuwaya Ngarra-li Briefing Paper: Walgett's Drinking Water outlines health risks linked to the township's poor quality drinking water, including risks from high sodium content, lack of fluoridation, and presence of E. coli and heavy metals. Further, the briefing paper notes that climate change has been a contributing factor to the water insecurity that Walgett is current facing.

The effects of climate change can be compounding, which can exacerbate inequality and impact social determinants and have complex health and health system impacts as was the case in Stanthorpe.

Addressing social determinants improves health and prevents ill health, and thereby reduces demands on the healthcare system. This can significantly impact emissions, given that alongside pharmaceuticals, hospitals contribute the largest share of the health sector's carbon emissions.

Improving health equity and addressing the social determinants of health therefore are climate-health mitigation and adaptation solutions. Health economists have a role to play in quantifying the benefits that arise from addressing the social determinants of health and their impact on the environment. We urge Treasury to consider climate health impacts, not only within the health sector, but in all other portfolios that impact health, including Measuring What Matters, as recommended in our submission.

Health costs of extreme heat must be included in Treasury modelling

Historically, extreme heat events have killed more people in Australia than all other natural hazards. Australia continued to experience warmer than average weather in 2022 with extreme heat events in parts of the country. Heat effects health in numerous ways including respiratory and cardiovascular issues, and heat stroke, resulting in significant healthcare costs. Further, heat is causing significant morbidity and mortality through the urban heat island effect. Extreme heat events also have an impact on mental health.

Heat and humidity pose risks to workers health and work-related heat stress can result in death. This includes outdoor workers and workers exposed to situational health such as firefighters and emergency workers. Given the vast range of workers who are impacted by heat and the increasing frequency and intensity of extreme heat events and bushfires, the occupational health costs, and economic impacts of high heat conditions in Australia are likely to be significant. Heat also impacts labour productivity, as accounted for in the cost analyses by Deloitte and the University of Melbourne.

Heat disproportionately effects the elderly and disadvantaged, as well as populations in suburbs of lower socio-economic background and regional and remote communities, particularly where cooling systems are unavailable or unaffordable and where residential dwellings are crowded.

Given these impacts and as further warming is projected for Australia, it is important that economic modelling includes the health impacts of heat both for the population as a whole and for populations at higher risk of increased mortality and morbidity.

A Health in All Policies approach is important for managing extreme heat events. In the United States, blackouts were found to impact mortality and morbidity. Better electrical grid resilience, more expansive tree canopy cover, and more reflective roofing materials were suggested as potential solutions.

Health costs of bushfires and bushfire smoke must be included in Treasury modelling

The 2019-20 bushfires were unprecedented in their scale and devastation. 33 people lost their lives from the fires and over 3,000 homes were destroyed. The bushfires also coincided with increases in hospitalisations for burns and increased mental health service use coinciding with fire activity. Borchers-Arriagada and colleagues estimated that the bushfire smoke was responsible for 417 excess deaths, 3,151 hospitalisations for cardiovascular and respiratory problems, and 1,305 emergency department presentations for asthma.

Economic analysis in a RACP-commissioned report on Climate Change and Australia's Healthcare Systems suggests that from 2021 to 2030, 1,480 lives will be lost to bushfires and that healthcare costs relating to respiratory and cardiovascular health issues will be $69 million. More recent modelling by Monash University indicates that these costs may be much higher.

Bushfires impact communities across Australia and as we saw in 2019 and 2020, the smoke has the potential to affect most of the country. There are also longer-term health impacts that need to be considered. Accordingly, it is important that the Government's economic modelling builds on existing work and includes bushfire-related health impacts in its modelling.

Costs of climate change impacts on healthcare systems and workforce must be included in Treasury modelling

The RACP's recent work has highlighted climate change impacts healthcare systems as well as health. While economic effects of health harm have been modelled as outlined above, there is a need for focus on healthcare systems. Climate change affects the health system in many ways and can impact healthcare infrastructure, operations, workforce, and service demand. Climate change associated events can disrupt health system energy supply, communications systems, and supply chains. These impacts can be sudden and cause major challenges to the delivery of safe, quality care. This is particularly so in a context where Australia's health emergency departments are busier while its health emergency management capacity has dropped.

There will be increased health service demands because of changing climate – both associated with extreme weather events, but also as a response to the indirect and health and social impacts. This will have subsequent increased pressures on health services and workers, which may lead to unmet demand and increasingly underserviced populations. Delays to elective surgery and chronic disease management during the COVID-19 pandemic demonstrated that there are health and economic costs to delayed diagnosis and care.

Climate change impacts on the health workforce are an important aspect of climate impacts on the healthcare system. Climate change puts further pressure on a workforce that is already facing shortages and burn out. There are flow-on effects from health professionals who are themselves directly impacted by extreme weather events, and challenges presented by climate change exacerbating workforce shortages in rural and remote areas.

Accordingly, economic modelling of climate change impacts must account for impacts on healthcare systems, including workforce impacts.

Costs and benefits of climate change adaptation and mitigation action must be included in Treasury modelling

As well as modelling the costs of climate change impacts on health and healthcare systems, it is important to look at the costs of adaptation and mitigation action and the health benefits of such action. While increasing climate resilience will have significant costs, it will reduce future losses and bring significant benefits. Such measures will need to include investment in managed retreat in high-risk areas.

Benefits should be considered both in relation to targeted adaptation action and broader mitigation efforts to reduce Australia's emissions (for example through differing scenarios within modelling).

Both extreme heat events and bushfires, can be planned and adapted for to reduce the health impacts. This includes building resilience within the healthcare system as well addressing social determinants of health. For example, well-insulated houses with energy efficient cooling systems can reduce heat-related illnesses. The HiAP approach outlined above centres on social determinants and is an important framework for highlighting the health co-benefits arising out of actions taken in other policy areas.

We note that this recent article on heat in northern Australia found that "despite the profound inequity in housing and socioeconomic status and resultant severely impaired access to cooling technologies such as air-conditioned space, Aboriginal people living in the same hot climate do

not have higher heat-associated mortality than non-Indigenous people." The article suggests that social and cultural adaptations are important factors to consider when preparing for climate change. The economic benefits of adaptation policy that considers the social and cultural determinants of health should be included when determining the costs of adaptation and mitigation action.

Understanding the benefits of investment in healthcare sustainability is another key area for consideration because the health sector contributes 7% to Australia's total carbon footprint. The National Health Service England (NHS) has shown considerable savings through the initiatives of its Sustainable Development Unit. Demonstrating the economic savings of sustainability initiatives in Australia provides further support for investing in reducing the sector's carbon footprint.

Last year the WHO released a framework for the quantification and economic valuation of health outcomes originating from health and non-health climate change mitigation and adaptation action. The framework provides an overview of the conceptual framework and methodology as well as implementation examples linked to numerous adaptation actions, including planting trees for heat and flood mitigation.

Costs and benefits of the climate and health impacts of health reform measures must be included in Treasury modelling

We commend the Australian Government's recognition of the nexus between prevention and optimising models of care and climate change mitigation in its draft consultation paper on the National Health and Climate Strategy. In our feedback on the paper, we recommended broadening this to health reform, including the prioritisation of prevention, optimising models of care, evidence-based clinical decision-making, and reduction of low-value care. The RACP's flagship initiative, Evolve, which aims to drive high value high-quality care in Australia and Aotearoa New Zealand, is an example of the latter. Economic modelling on health reform measures such as the above, could assist in driving a healthcare system that is both financially and environmentally sustainable while delivering high quality care.

Future areas for consideration and research

The costs of extreme heat, bushfires, and bushfire smoke on population health, the costs of climate change on healthcare systems, and consideration of the benefits of climate health adaptation and mitigation action are key areas for economic modelling of the impacts of climate change on health. This modelling must be undertaken in a way that prioritises Indigenous justice and a Health in All Policies approach.

However, this is a starting point and not an exhaustive list and we note that there are many other important aspects of climate change and health that warrant consideration. These include extreme weather events such as flooding and drought, and the significant mental health impacts of climate change, and of biodiversity loss and degradation of the natural environment.

Mosquito-borne disease is another area that warrants consideration as climate change continues to impact the transmission and spread of vector-borne disease. International experience suggests that mosquito-borne diseases can result in significant health and economic burdens.

While current knowledge and tools provides a starting point for modelling the costs of climate change and the costs and benefits of climate action, there is a need for more investment in research to better account for these costs and benefits. This research is needed in relation to the areas we note above such as health costs from extreme heat, bushfires, bushfire smoke and mosquito-borne disease. There is also a need for further research on the social cost of carbon to ensure it is accurately capturing and accounting for the impacts of climate change and any interventions.

About The Royal Australasian College of Physicians (RACP)

The RACP trains, educates, and advocates on behalf of over 20,000 physicians and 9,000 trainee physicians, across Australia and Aotearoa New Zealand. The RACP represents a broad range of medical specialties including general medicine, paediatrics and child health, cardiology, respiratory medicine, neurology, oncology, public health medicine, infectious diseases medicine, occupational and environmental medicine, palliative medicine, sexual health medicine, rehabilitation medicine, geriatric medicine, and addiction medicine.

Beyond the drive for medical excellence, the RACP is committed to developing health and social policies which bring vital improvements to the wellbeing of patients and the community. Climate change and health is one of the RACP's priority policy areas and it has position statements on Climate Change and Health, Environmentally Sustainable Healthcare and the Health Benefits of Mitigating Climate Change. More recently the RACP commissioned a report - Climate Change and Australia's Healthcare Systems – A Review of Literature, Policy and Practice, which was endorsed by nine other medical colleges.

Contact us

Thank you for considering our feedback. If you require any further information, please contact Nicola Lewis, Executive General Manager, Policy and Advocacy at Policy@racp.edu.au.