Australasian Society of Infectious Diseases Position Statement on Planetary Health and Infectious Diseases
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Background

Planetary health is a framework that recognises the vital dependence of human health on natural systems, and the stewardship of those natural systems. It acknowledges the delicate interplay of ecology, environmental sustainability, and health, and the catastrophic threat to this balance posed by climate change[1].

Anthropogenic climate change, driven by fossil fuel consumption, is the greatest threat to global health of the 21st century[2]. Together with biodiversity loss and pollution, this "triple planetary health crisis" has multiple and significant impacts on human health.

The 2015 Paris Agreement outlined international commitment to reduce greenhouse gas emissions to maintain global temperatures to within 2 degrees Celsius compared to pre-industrial levels, and as close to 1.5 degrees as possible. However, progress has been limited by ongoing consumption of fossil fuels. The threshold of 1.5 degrees increase in mean annual temperatures was breached in 2024[3].

Australia and Aotearoa New Zealand are already experiencing impacts of climate change including heatwaves, bushfires, and other extreme weather events[3, 4]. Increased frequency of extreme weather events poses both direct and indirect risks to health, and strain on healthcare resources and systems. Recent estimates project heat-related mortality in Australia to increase by up to 444% with a rise in temperatures of 3 degrees Celsius[4]. The impacts of climate change disproportionately affect the most vulnerable, including people at extremes of age, people living with chronic diseases, and people from low socioeconomic backgrounds. In Australia, climate change may have multiple impacts on health and wellbeing amongst Aboriginal and Torres Strait Islander people including exacerbation of health inequalities and disruption of connection to Country[5]. In Aotearoa New Zealand, Maori people may also be disproportionately impacted by climate change given existing health and socioeconomic inequalities, including low-income housing in regions susceptible to flooding and rising sea levels[6]. Climate change also disproportionately affects low- and middle-income countries (LMIC), exacerbating inequalities in regions that are vulnerable to impacts from increased temperatures and extreme weather events yet also face challenges with limited resources and infrastructure [7].

Climate change and infectious diseases

Climate change increases the risk and burden of multiple infectious diseases through impacts on pathogens, vectors, hosts, and disease transmission[8, 9]. Mora et al (2022) found that 58% of human infectious diseases have already been exacerbated by climate hazards[10].

A "climate-sensitive" infectious disease is defined as one which has seasonality, a specific geographic distribution, and interannual variations in incidence, all of which are affected by average, variable, and extreme climate conditions[11]. The potential impact of climate change on individual infectious diseases is complex and related to multiple factors, including differences in this climate-sensitivity, transmission risk, and preventability (e.g. availability of effective vaccines). It is also impacted by the degree of existing management capacity including surveillance, and familiarity of the health system and its workforce in responding to outbreaks and providing clinical care, especially given emergence of infectious diseases in previously non-endemic areas[12].

Vector borne diseases, particularly mosquito-borne diseases, are the most climate-sensitive communicable diseases in Australia and Aotearoa New Zealand, with warming, rainfall, and flooding key aggravating factors[12]. Dengue is one of the most significant climate-sensitive infectious diseases. Globally, an additional 2.5 billion people could be at risk for dengue fever under a moderate warming scenario by 2080[13]. Increased temperature, rainfall and humidity heighten the transmission potential of the *Aedes aegypti* and *Aedes albopictus* vectors through shortened extrinsic incubation period, increased egg hatching, rate of larval growth and frequency of biting; and prolonged duration of mosquito seasons[14, 15]. Australia's tropical monsoon zones are projected to expand by 50% by 2050, potentially increasing the habitable zone of the Aedes mosquito vector and the Australian population at risk of local transmission[12]. Whilst not currently endemic in Aotearoa New Zealand, there is risk of future emergence due to altered climatic conditions[6]. Additionally, there is an increased risk of overseas-acquired dengue amongst Australian and Aotearoa New Zealand travellers.

Other climate-sensitive vector-borne diseases of relevance to Australia and Aotearoa New Zealand include Ross River virus, Bahmah Forest virus, Murray Valley encephalitis, tick-borne diseases, and the recently emerged Japanese Encephalitis virus (JEV) in Southeastern Australian states[12, 16, 17]. Previously only detected in the Torres Strait of Australia, the 2021-2022 outbreak of JEV in mainland Australia followed periods of heavy rain and flooding[18, 19]. Given zoonotic transmission between migratory birds, pigs, and humans, this highlights the need for collaboration across human, animal, and environmental health as part of a One Health response.

Other infectious diseases are directly or indirectly impacted by climate hazards[10, 12]. The risk of food-borne salmonellosis rises with increasing temperatures[20, 21]. Soil-borne infections are highly climate-sensitive, for example, increased incidence of melioidosis with heavy rainfall and extreme weather events [12, 22, 23]. There is a risk of increasing waterborne infections due to rising temperatures and extreme weather events such as floods, including cryptosporidiosis and leptospirosis[12, 24]. Rising sea temperatures have been associated with increased cases of *Vibrio vulnificans* in previously non-endemic areas, and outbreaks have occurred following extreme weather events such as hurricanes and heatwaves[25].

Climate change, air pollution, and extreme weather events including bushfires are associated with increased incidence of respiratory infections, with people at extremes of age and living with chronic respiratory conditions particularly vulnerable[26, 27]. Air pollution due to fossil fuel combustion releasing pollutants such as carbon dioxide (CO_2), nitrogen dioxide, and particulate matter, was attributed to 4.2 million premature deaths in 2019. The majority were due to cardiovascular disease and stroke, followed by chronic respiratory disease and respiratory infections[28].

Antimicrobial resistance (AMR) is closely related to climate change and environmental pollution. Antimicrobials enter the environment through various pathways including healthcare wastewater, agriculture, and antibiotic distribution in farm animals. Increased temperatures compound AMR through increased bacterial growth and horizontal gene transfer[29]. Plastics (including microplastics and nanoplastics) also contribute to AMR spread through formation of biofilms on microplastic surfaces[30].

Climate change, environmental degradation, and biodiversity loss increase the risk of zoonotic spillover and zoonotic infections, including future risk of pandemics[31]. Many high consequence infectious diseases, such as highly pathogenic avian influenza (HPAI), Ebola virus disease, and Nipah virus, occur through zoonotic transmission and there is a need for greater evidence to understand the role of climate change as specific drivers of such pathogens[31 12].

Climate change and rising global temperatures are drivers of fungal infections including expanding distribution of endemic mycoses such as histoplasmosis and coccidioidomycosis, and outbreaks of invasive fungal infections such as *Aspergillus* spp. following natural disasters[32]. Rising temperatures due to anthropogenic climate change are believed to be an important factor contributing to the emergence of *Candida auris*, a previously environmental pathogen hypothesised to have breached the mammalian temperature barrier by gaining thermotolerance[33]. These issues highlight the critical importance of applying a planetary health lens to the practice of Infectious Diseases medicine.

Asia Pacific regional impact

Climate change disproportionately impacts LMICs, and many countries in the Asia Pacific region are highly vulnerable to rising sea levels and extreme weather events such as cyclones and floods[34, 35]. Extreme weather events cause direct health impacts such as injuries, infections, trauma and mental health impacts; damage infrastructure including healthcare facilities; and contribute to forced displacement. Water insecurity and limited basic water, sanitation and hygiene (WASH) infrastructure exacerbates risk of waterborne and food-borne infections including outbreaks[36].

In the Philippines, one of the most disaster-prone countries, with twenty typhoons on average annually and 74% of the population living in hazard-prone areas, outbreaks of leptospirosis hospitalisations follow periods of heavy rainfall and flooding, and communicable diseases represented 88% of medical consultations following Typhoon Yolanda[37]. Pakistan has experienced over 150 environmental crisis events between 1999 and 2018, causing damage to almost 200 000 villages and 10 million acres of crops. Devastating floods in 2022 displaced eight million people, pushed an additional nine million people below the poverty line, increased malaria incidence by 280% and dengue incidence by 860%[36].

Pacific Island Countries and Territories (PICT), despite accounting for just 0.02% of global emissions, are vulnerable to some of the worst impacts of climate change[38]. Irreversible rises in sea levels are predicted regardless of climate action in the short term, posing an existential threat to these nations[38, 39]. Health facilities in low lying PICT are highly vulnerable to extreme weather events. Cyclone Winston damaged or destroyed 88 health facilities in Fiji in 2016[40]. All medical facilities in the low-lying atoll nations of Kiribati, Marshall Islands, Nauru, Palau, Tuvalu and Tokelau reside within 500 metres of the coastline[41].

In PICT such as Kiribati, climate change exacerbates food insecurity through reduced agricultural potential, and ocean warming and acidification threatening fish ecosystems. In addition to dietary transitions and reliance on processed imported foods, this contributes to increased burden of both malnutrition and non-communicable diseases[42]. Childhood malnutrition heightens vulnerability to infectious diseases and worsens childhood mortality rates [43, 44]. For example, in Timor-Leste, where childhood malnutrition rates are the highest in the Asia Pacific region, high childhood mortality is largely due to diarrhoeal diseases[45].

Climate-sensitive vector-borne infectious diseases are anticipated to be a growing burden for the Asia Pacific region, in particular dengue and malaria[46]. Alterations in temperature, rainfall and extreme weather events are anticipated to facilitate increased incidence of these diseases, and resurgence in areas with previously low transmission or even elimination[43]. In Papua New Guinea, a country with the highest malaria incidence outside of Africa, malaria has historically been restricted to low-lying regions and rarely transmitted in highland regions above 1600m elevation[47]. However, rising temperatures are projected to increase susceptibility with seven million additional people expected to be at risk of malaria by 2040. This risk of spread to new areas raises concerns for infection in non-immune individuals, and the need for greater surveillance, diagnostic and treatment infrastructure[43, 47].

Environmental sustainability and infectious diseases

The health sector is a significant contributor to climate change, responsible for 4-5% of global emissions[48]. The need to address the environmental impact of health care is increasingly recognised by governments, health facilities, and health professional organisations[49-51]. The Australian healthcare sector contributes to 5.44% of national greenhouse gas emissions[52, 53]. The Australian National Health and Climate Strategy outlines a whole-of-system strategy to address health and wellbeing impacts of climate change and reduce the carbon footprint of the health sector[53]. Health New Zealand has also established an emissions reductions plan and highlights associated health co-benefits with improved environmental sustainability[54].

In 2024 the Australian Safety and Quality Commission, the interim Australian Centre for Disease Control, and medical colleges published a joint statement supporting the need to develop lowemission, climate-resilient and culturally safe models of care delivering on the principles of sustainable healthcare[51]:

1. Investing in prevention, to improve health while reducing healthcare demand and associated emissions
2. Minimising potentially harmful and wasteful care
3. Minimising emissions associated with the delivery of high-value care.

There are multiple opportunities to improve the environmental sustainability of infectious diseases practice, including existing and overlapping values and activities such as infection prevention and control (IPC), antimicrobial and diagnostic stewardship[49]. Keeping patients healthy and well in the community, through prevention of infection and strong primary healthcare and outpatient management, averts complications and hospitalisations and their associated higher carbon emissions[49, 51, 55]. Increased evidence supporting shorter duration of antimicrobial treatment for various infectious diseases, and oral-based treatment regimens, also have associated benefits on reduced environmental footprint. Compared to inpatient intravenous administration of antibiotics, outpatient administration (either at home or in outpatient clinics) reduces CO_2 emissions by up to 85%[56]. Oral antibiotics, where clinically appropriate, have a lower carbon footprint than intravenous options as they don't require associated equipment such as lines and giving sets, and can be administered easily in the community[57].

Integration of planetary health and environmental sustainability principles with Infection Prevention and Control (IPC) is an area of increasing attention[58]. Effective implementation of IPC is vital to prevent healthcare associated infections including spread of AMR. However, escalating production and consumption of plastics, especially single use personal protection equipment (PPE) contributes to carbon emissions, environmental degradation, and the paradox of exacerbating climate change and associated adverse health outcomes[58]. The WHO estimated that 87,000 tonnes of PPE was shipped during the COVID-19 pandemic alone[59]. There are opportunities for improvement including through appropriate waste management, hand hygiene, reviewing evidence for reusable versus single use devices, and improved measurement of sustainability indicators [49]. Life cycle assessments of some reusable items demonstrate reduced environmental impact compared to single use alternatives (for example, 66% reduction in carbon emissions with reusable surgical gowns)[60]. Appropriate implementation of single versus reusable items requires collaboration with infectious diseases and IPC clinicians. There is a need to ensure patient safety and prevention of infection whilst also recognising and addressing the environmental impacts of healthcare practices.

Safeguarding the health of patients and the broader community against emerging public health threats is core to the practice of infectious diseases, and climate change represents the greatest threat to health of the 21st century. Infectious diseases clinicians are well-placed to be leaders in planetary health and sustainability and to advocate for evidence-based responses.

Calls to action and recommendations

This position statement:

- Affirms ASID's commitment to education, research, and advocacy on the impacts of climate change on human health, especially infectious diseases
- Affirms ASID's vision to improve health and well-being for all, and its responsibility to support and advocate for climate action, mitigation and adaptation in relation to infectious diseases and environmental sustainability across the Asia-Pacific region
- Calls for an evidence-based, equitable, and public-health informed response to climate change adaptation and mitigation in Australia and Aotearoa New Zealand
- Acknowledges the interconnectedness of infectious diseases and human health with the environment, and the importance of cross-sectoral collaboration
- Promotes the implementation of environmental sustainability within infectious diseases clinical practice and organisational management
- Acknowledges the benefits to health and wellbeing of carbon reduction and other environmental sustainability strategies

Summary of action areas

Action areas	Recommendations / Examples
Education	Promote education and training (e.g. journal clubs, grand rounds, conferences, trainee teaching)
Research & Quality Improvement	Engage in research on infectious diseases and planetary health and/or sustainable healthcare Quality Improvement projects on healthcare sustainability (e.g. audits, carbon foot printing of clinical practices) Develop community of practice to foster collaboration and knowledge sharing Develop audit tools for infectious diseases and environmental sustainability
Advocacy	Engage in broader advocacy around health impacts of climate change driven by fossil fuels, climate resilience and adaptation Collaborate with other health professional organisations
Organisational	Develop organisational strategies and policies around planetary health and environmental sustainability Support integration of sustainability into routine organisational governance, in addition to participation in broader sustainability committees Avoid financial investments in fossil fuels Minimise flight travel to conferences/meetings (and consider carbon offsetting), promote online attendance options Sustainable conference and meeting practices Reduce carbon emissions from electricity and infrastructure
Clinical care	Prevention of infection including promotion of immunisation and primary health care Reduce low-value care Diagnostic and antimicrobial stewardship Intravenous to oral switch Optimizing options for outpatient care / care closer to home through e.g. hospital in the home (HITH) or telehealth
Infection prevention and control	Appropriate waste management Evidence and technical support around implementation of reusable medical devices and personal protective equipment Promote hand hygiene, avoid unnecessary glove and gown use

Other	Encourage active/public transport for staff and patients Optimise energy efficiency within buildings and offices Minimise hardcopy printing

Conclusion

Climate change is predicted to impact on the burden of various infectious diseases worldwide through complex mechanisms. Health systems actively contribute to the problem through significant carbon emissions and waste production, yet are also at risk of future strain on resources and incapacity to respond to changing threats. It is essential that infectious diseases professionals, who have historically demonstrated leadership during public health crises, are adequately educated and prepared to respond to the escalating threat of climate change and the changing epidemiology of infectious diseases.

Position statements of other medical colleges and organisations

The College of Intensive Care Medicine of Australia and New Zealand. Statement on Sustainability. 2019.

Royal Australasian College of Anaesthetists. Environmental Sustainability.

Pediatric Infectious Diseases Society. PIDS Statement and Articles on Sustainability and Climate.

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