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Prevention is key

The new Centre for Disease Control is a valuable step for Australia's disease control and its contribution to global pandemic security. Considering the health, economic, and social burden of COVID-19 and the risk of future pandemics, I am delighted to see the Government has commissioned this inquiry. I am also eager to contribute to the inquiry and the priorities of the CDC.

The adage "a stitch in time saves nine" holds true when it comes to pandemic preparedness. If we had invested in the technology and health systems to prevent the spread of COVID-19, there would have been some economic costs to develop these capabilities, but these would have paled in comparison to the costs of COVID-19. Pike et al in "The Origin and Prevention of Pandemics" show that the "wait-and-respond approach is not sufficient and that the development of systems to prevent pandemics *before* they are established should be considered imperative to human health."

I firmly believe pandemic prevention should be a key priority of the CDC and my submission focuses on a few effective and practical solutions. Our institutions and leaders should not simply concede that pandemics are inevitable.

Sources:

- [The Origin and Prevention of Pandemics - PMC \(nih.gov\)](#)

Clean indoor air would prevent the risk of pandemics and generate economic benefits

As an economist, I am particularly drawn to the benefits of clean indoor air, which would not only reduce the risk of pandemics, but also reduce the health and economic burden of seasonal influenza.

The vast majority of Australians are lucky enough to access clean, safe, and pathogen-free drinking water. Unfortunately, the same does not apply to air quality. Further to Terms of Reference 2, I want to see Australians have comparable access to clean, safe and pathogen-free air. This would be helpful for the ongoing COVID pandemic and for any future pandemic – while also providing co-benefits for individual health and the national economy.

Cholera, a water-borne bacterial disease, caused more than 127,000 deaths in Great Britain in the mid-1800s. Radical improvements in sanitising drinking water as a public health measure have effectively ended waterborne disease in industrialised countries.

The reduction of airborne diseases through clean indoor air is yet to receive the same systematic attention, despite the health and economic burden this class of disease places on Australia. Every winter, seasonal influenza-like illness (ILI) burdens the Australian healthcare system as Australians present with symptoms such as fever, cough, sore throat, and fatigue. In 2022, there were 9,440 reported COVID-19 and 308 influenza-associated deaths. It is my hope that improving indoor air quality (IAQ) can reduce the transmission of airborne pathogens, thus reducing the occurrence of ILI and its associated death toll. Reduced infection rates will also result in an increase in the productivity of Australia's workforce through reducing the number of days that Australians take sick-leave to care for themselves and their loved ones. This will also reduce the burden on Australia's healthcare system, specifically on GPs and hospitals who would otherwise have to treat patients with ILI.

My economics background teaches me that public goods like clean indoor air often suffer from a “tragedy of the commons”, as widespread adoption is needed to yield substantial benefits. Just like clean drinking water, coordinated action is required. I believe this inquiry is well placed to recommend that Australian governments do more to encourage and accelerate the improvement of indoor air quality. Higher-risk indoor environments – such as education facilities, aged care facilities, healthcare facilities and hospitals, food service, public assembly spaces, shopping centres, offices, and places of worship – can be incentivised and supported to improve their indoor air quality through building standards, rebates, tax deductions, or other financial mechanisms. This would allow Australians to enjoy the benefits of these facilities and services with a significantly lower risk of exposing themselves to pathogens.

Unlike disease-specific vaccinations, delivering safe air is pathogen agnostic and can reduce the speed at which future novel pathogens infect communities. Kleinwaks et al’s report [“Air Safety to Combat Global Catastrophic Biorisk”](#) provides modelling for a scenario involving another pandemic of $R_0 = 3$, similar to the first wave of the COVID-19 pandemic in a city of 2 million people. Without any behaviour changes or IAQ improvements, there would be 365,000 infections after 3 weeks. With indoor air quality interventions reducing respiratory disease infections by just 30% to an R_0 of 2.1, after 3 weeks there would only be 9,797 infections. This modelling shows that even modest reductions can flatten curves and buy time for medical countermeasures and healthcare systems. As such, IAQ interventions could shorten lockdowns, lower the likelihood of quarantine leaks and perhaps be able to contain and eliminate a novel pathogen before a pandemic begins. IAQ interventions also don’t require behaviour change – like mask wearing – which can be challenging to achieve.

The inquiry should recommend indoor air as a simple and effective solution to help prevent risk of pandemics. Australia could pursue policies to make indoor air as free from pathogens as drinking water, starting with simple practices like ventilation and existing filtration technologies, and by investing in emerging pathogen inactivation technologies, like far-UVC.

Sources:

- Australian Government, Department of Health and Aged Care, ‘National 2022 Influenza Season Summary’ (2022)
- [Air Safety to Combat Global Catastrophic Biorisk](#), 1Day Sooner & Rethink Priorities

Next-generation PPE and robust government planning is needed to keep critical infrastructure functioning

The maintenance of critical infrastructure, such as water systems, communication networks, transportation systems, and health services, is essential in the case of a severe pandemic. One key risk is that these services all rely on modern power grids, which require constant attention. Therefore, a health emergency that limits the available workforce could cause a cascading collapse, as argued by Wormuth et al in a paper called “Electric Power Grids Under High-Absenteeism Pandemics: History, Context, Response, and Opportunities”. This challenge must be overcome to address Terms of Reference one, two and six.

Wormuth et al argue that COVID-19 was unlike many other historic pandemics because the majority of deaths occurred in people over 65, while the majority of employees essential to the continued operation of the power grid are under 65.

If a future pandemic was more severe in a younger age group, it could lead to cascading failures of critical infrastructure in a way that wasn't possible without highly optimised (and hence brittle) modern infrastructure. That fact leads them to argue that safeguarding the nation's power grid in the face of rapidly evolving outbreaks is among the top priorities.

To help mitigate these risks, the inquiry should recommend a collaborative effort on preparation and response planning for a pandemic that interrupts supply chains and causes workforce shortages in critical infrastructure sectors. This collaborative effort should involve the Office of Supply Chain Resilience, the Home Affairs Critical Infrastructure Centre, and the National Emergency Management Agency.

There are practical steps Government can take to keep critical infrastructure functioning in the event of a pandemic, according to the Wormuth et al paper and a separate paper by Gopal et al titled "Securing Civilisation Against Catastrophic Pandemics". Power generators, transmission providers and distribution providers must have robust pandemic plans and the ability to provide high-quality PPE and other safeguards to their workers during a crisis.

Finally, it is crucial that the workforce has confidence they will be able to stay safe at work in the event of a pandemic. This means the Government's plans and exercises need to include the industry and be transparent to the public.

Sources:

- [Electric Power Grids Under High-Absenteeism Pandemics: History, Context, Response, and Opportunities - PMC \(nih.gov\)](#)
- [Critical infrastructure resilience \(homeaffairs.gov.au\)](#)
- [Office of Supply Chain Resilience | Department of Industry, Science and Resources](#)

The benefits of prevention outweigh the costs

I think preventing future pandemics could be one of the most valuable uses of public funding and resources. Given the vast economic and social burden of the COVID-19 pandemic and potential future pandemics, further investment now is likely to have a high payoff. In addition, these technologies can provide economic dividends in the short-run, such as by improving indoor air quality. I'm very concerned by expert assessments that the risk of pandemics is increasing, particularly with emerging risks such as lab leaks or engineered pathogens. I think this inquiry should carefully consider how future pandemics could start and recommend specific interventions to reduce their likelihood, such as investing in high-quality PPE and technologies like far-UVC.

Thank you for considering my submission,

Lucas