Thank you for the opportunity to make a submission and raise my views and experiences about the Government's COVID-19 response. I'm a member of the Effective Altruism (EA) community in [redacted]. EA is a movement about find ways to help individuals maximise good done with the resources available. Like many others in the EA movement, I believe humanity needs to direct special attention to the prevention of both natural and engineered pandemics, and I hope this inquiry does so as well.

More than any other global catastrophic risk, we are able to prevent novel pathogens from emerging and to identify and eliminate them if they do. Given the huge human and economic costs of pandemics – and that pandemics worse than COVID-19 are possible – prevention is the top priority.

The paper "The costs and benefits of primary prevention of zoonotic pandemics" (Bertstein 2022) makes the economic case for a focus on pandemic prevention. The paper shows that – even on pessimistic assumptions and without considering the potential impact of emerging technologies – significant investment in pandemic prevention is overwhelmingly justified.

In light of that analysis, the new Australian Centre for Disease Control should focus on efforts to prevent novel pathogens from emerging and being able to control them if they do.

In my submission, I primarily address 'preventive health measures' listed in terms of reference 3.

Indoor Air Quality

The vast majority of Australians can access clean, safe, and pathogen-free drinking water. 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.

Despite the obvious benefits, I worry that clean indoor air suffers from a "tragedy of the commons" as it is a public good that requires widespread adoption to yield substantial benefits. Just like clean drinking water, coordinated action is required. As such, 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 R0 = 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 R0 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.

I think the inquiry should recommend that Australia pursue policies to make indoor air as free from pathogens as drinking water. With simple practices like ventilation, existing filtration technologies, and emerging pathogen inactivation technologies, like far-UVC, this goal is within reach.

Zoonotic disease

In exchange for cheap meat from factory farms, people are dying of bacterial infections that were trivial to treat a few decades ago and facing escalating rates of pandemics that devastate lives and livelihoods. Simply put, factory farms are pressure cookers in which nature cooks up novel pathogens. According to the UN, there will be an estimated 10 billion people in 2050.

Without paradigm shifts in industry or culture, I'm concerned that accelerating demands for meat will only increase and intensify these risks.

Intensive farming practices produce inexpensive meat due to the supposed efficiencies of increasing livestock density. Animals are being packed closer and closer together in factory farms, breathing and defecating on top of each other. This environment is a breeding ground for novel pathogens whose evolution is accelerated by the density of hosts and the abundance of transmission routes. These practices have a negative public health externality in both antimicrobial resistance and pandemic potential viruses. The Inquiry shouldn't stand for industries that profit by endangering people in Australia and around the world.

Antibiotics are fed to animals to reduce bacterial infections and boost growth – 70% of antibiotics produced globally are used in livestock, and estimates project that Australia will see a 16% increase in antibiotic usage in farming over the decade to 2030. This overuse is a driver of antibiotic-resistant infections globally. In 2020, antimicrobial resistance was attributed to 1,031 deaths, $439 million in costs of premature death and the loss of 27,705 quality-adjusted life years in Australia. I understand that the Australian Government has worked with industry so that its "livestock and seafood industries [have] … little to no resistance to antimicrobials", and these steps should be lauded. However, this same approach to ensuring intensive animal farming doesn't risk human lives needs to be expanded to include viruses - they key cause of pandemics.

Viruses with pandemic potential often originate in wildlife but can cross the species barrier and pose a catastrophic risk to Humans. Wildlife are natural hosts for viruses that can persist without causing significant harm to the animals. Occasionally, these viruses can spill over from wildlife to livestock in farms. In these farms, the viruses encounter new environments and species, providing opportunities for genetic recombination and adaptation. This process can enhance the virus's ability to infect and transmit among different hosts, including humans. The proximity of wildlife, livestock, and humans in certain settings, such as live animal markets, live exports, abattoirs or factory farms, increases the likelihood of interspecies transmission events, potentially leading to the emergence of novel and more transmissible viruses with pandemic potential.

We now know that the 2009 H1N1 flu pandemic which caused an estimated 284,000 excess deaths originated first in swine farms in central Mexico. This quote taken from peer reviewed paper "Origins of the 2009 H1N1 influenza pandemic in swine in Mexico":

" This highlights the critical role that animal trading plays in bringing together diverse viruses from different continents, which can then combine and generate new pandemic viruses."

Australia needs to drastically decrease the pathogen transmission risks from high animal densities in live legal or illegal animal trade, live animal exports and factory farming. Australia's

biosecurity strategies need to require the industry to take practical steps to reduce these risks. Where the risks remain too great or the prevention of pathogen transmission is too costly, Australia has a duty to end these practices to avert pandemics and our slow death from antimicrobial resistance.

The late epidemiologist Professor Mary-Louise McLaws, an expert in infectious disease control and a frequent voice during the COVID-19 pandemic, said on Channel 10's The Project:

"... certainly live animal trade has to stop ... And I don't think it will change until maybe there's an outbreak of some ghastly disease in animals while they're being shipped to other countries."

I think Australia can and needs to do better than Professor McLaws' prediction.

Conclusions

I think pandemics are one of the most important issues of our time, and expert assessments that the risk of pandemics is increasing are alarming. I think this inquiry should carefully consider how future pandemics could start and ensure it makes specific recommendations to reduce their likelihood.

Additionally, the notable public health challenges of history have been solved by innovative people bringing new ideas and perspectives to the challenge of health, and expanding the scope of public health to include emerging issues and new technologies has directly led to substantially better outcomes.

The terms of reference of this inquiry are fundamentally about doing better in the future. Given how terrible future pandemics could be – the best thing the Inquiry could do for the future is to prioritise pandemic prevention, including the novel ways pandemics could occur in the future. While that will require uncomfortable thinking about unexpected topics and emerging technologies, these are the issues that could have the biggest impact towards securing a healthier future.