As a concerned member of the public, I think it is great that Australia has announced the creation of a Centre for Disease Control and commissioned this Inquiry.

There's a long-standing public health adage that prevention is better than a cure. The same logic applies to pandemics. Pike et al. in "The Origin and Prevention of Pandemics" showed 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*"[1]. I think this insight should be foundational to the direction of this Inquiry.

My submission highlights two origins for pandemics requiring attention, as they are becoming increasingly dangerous - **zoonoses and malicious engineering**.

Land use change, intensive farming practices, travel and trade, and climate change are known drivers of novel **zoonoses**[2]. The Inquiry should recommend practical interventions that reduce their risk.

Land use change is a known driver of disease spillover from animals to humans[3]. For example, urbanisation causing both nutritional stress and the fragmentation of flying fox habitats is attributed to the spillover of Hendra virus into horses and humans in Queensland[4].

Intensive **farming practices** produce cheaper meat due to increasing livestock density and turnover. 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.

A side effect of **travel and trade** is the spread of disease. There are concerns that activities like the movement of live animals through legal (live animal exports) and illegal (smuggling) trade may propagate spillover risks at each point.

Climate change is increasing the spillover risks from anthropogenic land use[5]. At least 10,000 virus species have the ability to infect humans but, at present, the vast majority are circulating silently in wild mammals. Changes in climate and land use leads to opportunities for viral sharing among previously geographically isolated species. By 2070, it is expected that there will be 300,000 novel animal pair encounters globally which will double the opportunities for one of the estimated 10,000 viruses in wildlife to move between species.
For all four factors, the Inquiry can recommend that Australia, including through national and jurisdictional biosecurity strategies, implement practical interventions and programs to address these trends and risks.

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[1] The Origin and Prevention of Pandemics - PMC (nih.gov)
[2] The Need to Prioritize Prevention of Viral Spillover in the Anthropopandemicene: A Message to Global Health Researchers and Policymakers; Intensity and frequency of extreme novel epidemics
[3] Land Use-Induced Spillover: A Call to Action to Safeguard Environmental, Animal, and Human Health
[4] The emergence of Hendra virus from flying foxes (Pteropus spp.)
[5] Climate change increases cross-species viral transmission risk

Further, even though assisting foreign governments is not in the terms of reference of this Inquiry, such international policies protect Australians. The Inquiry should consider recommendations that leverage Australian international leadership to pursue global pandemic prevention that keeps Australians safe from external threats.

Capacity building in the Asia-Pacific region can be a key contribution to global and national health. At least 4 out of 9 pandemics that have occurred since 1900 originated from Asia, due to high human and animal population density[6]. Good work is already being done by the Indo-Pacific Centre for Health Security[7]. The Inquiry should consider making recommendations on how this work could be expanded and focused on pandemic prevention.

We can also build upon our record of international leadership. Australia is a member of the International Experts Group of Biosafety and Biosecurity Regulators. Australia also advocates for chemical and biological weapons security and non-proliferation, including through the formation of the Australia Group[8]. We could help keep Australians safe by:

- Acting on the recommendation of Global Health Security Index's 2021 report[9] by regularly reporting to the World Organisation for Animal Health on incidences of human cases of zoonotic disease.
- Recommending that the Foreign Minister includes in trade agreements relating to animals and animal products an obligation that requires the other trading partner to meet or exceed Australian standards and practices for preventing zoonoses. Through this mechanism, Australia could adopt best practices domestically and influence international practices.

Zoonoses have been the leading cause of pandemics, and the threat they pose is on the rise. Despite this, Gopal et al. estimate that dangerous pathogens leaking from labs have likely surpassed zoonoses as the key risk[10]. Even more worryingly, they argue that maliciously engineered pandemics could become the overriding risk unless action is taken.

Engineered pandemics have become a critical public health concern due to rapid progress in biotechnology and the risk of "dual-use" of AI products (i.e. when AI intended to perform useful tasks is utilised for malicious purposes). Specifically, AI is likely to enhance biotechnology and the ability of terrorists to harm Australians[11].

The US is taking dual-use risks seriously. On 25 July 2023, the US Senate Judiciary Subcommittee on Privacy, Technology and the Law took evidence about the potential risks of AI from [redacted]

[6] A visual history of pandemics
[7] Indo-Pacific Centre for Health Security
[8] The Australia Group
[9] Advancing Collective Action and Accountability Amid Global Crisis
[10] Securing Civilisation Against Catastrophic Pandemics
[11] AI suggested 40,000 new possible chemical weapons in just six hours - The Verge; Dual use of artificial-intelligence-powered drug discovery | Nature Machine Intelligence

[redacted] Committee Chair, Senator [redacted] began the hearing by highlighting these "dual-use" risks:

> *The future is not science fiction or fantasy — it's not even the future, it's here and now. And a number of you [Amodei, Bengio and Russell] have put the timeline at 2 years before we see some of the most severe biological dangers. It may be shorter because the pace of development is not only stunningly fast, it is also accelerating at a stunning pace.*

[redacted]

[redacted]

In response to these hearings, on 30 October 2023, President Biden made an executive order that does two main things[13]. First, it put a timeline on US agencies to develop a framework to ensure the proper screening of synthetic DNA. With or without the additional risks of AI, synthetic DNA is likely the essential input that any malicious or negligent actor would need to engineer a pandemic. Second, it put a range of requirements on AI labs designed to ensure future AI models don't have these "dual-use risks" that could contribute to a future pandemic.

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.

Sincerely,
Scott Smith

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[12] Recent Senate Hearing Discussing AI X-Risk | Medium

[13] Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence