(Individual) submission to the COVID-19 Response Inquiry

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Background

I am a internationally recognised authority on infectious disease dynamics and pandemic planning and response, and sit on numerous WHO pandemic planning and response, and viral respiratory surveillance working groups. During the COVID-19 pandemic, I sat on Australia's highest level health committee, the Australian Health Protection Principal Committee as one of three invited experts.

Ongoing at time of submission, I co-lead with ██████████████████████████████ a team that has delivered >200 high-impact 'situational assessment' reports to the Commonwealth and jurisdictional governments during COVID-19, directly shaping national and jurisdictional decisions. At the time of submission, their detailed content is not public, although the content is described in Australia's National Surveillance Plan for COVID-19 (various versions) and limited material has been made public through the release of technical reports and a number of peer-reviewed publications.

In addition to this work, in January–April 2020 with ██████████████████████████ we briefed the National Security Committee and National Cabinet on response options to COVID-19 including, but not limited to, international border closures, testing policy, isolation and quarantine, social distancing policies, and 'lockdown' strategies. In 2021 we co-led a national consortium delivering scientific advice on vaccination prioritisation and threshold coverage levels to support Australia's National Reopening Plan for COVID-19. Multiple reports were delivered to PM&C, Health, and National Cabinet, and have been made public via the Doherty Institute's website.

Summary

In this personal submission, I make a number of observations on how data, surveillance, modelling and analytics supported the Australian COVID-19 response, and where I believe there is scope for improvement and/or risks for future capability. These views do not necessarily represent those of my colleagues, nor my employer (University of Melbourne). My submission focuses primarily on how *data, epidemic analytics and scientific evidence* contributed to topics covered by the inquiries Terms of Reference points on: governance; key health response measures; international policies; and mechanisms to better target future responses.

Scenario modelling to support strategic response

Australia has world-leading capabilities in infectious diseases data analytics and modelling to support pandemic planning and response. These capabilities were drawn upon to great effect in the first few months of the pandemic (January–April 2020), when AHPPC recruited me, ████████████████████████████ Cheng to attend AHPPC as expert advisers (we retained these roles until approximately mid 2022).

Rapid analyses of the emerging data from China, sourced through my and ████████ international networks and membership of a rapidly convened WHO (Geneva) global working group (from 16th January 2020), supported early advice to the Commonwealth on the need for urgent action, and critically, the scientific evidence to support the view that early action could dramatically ameliorate the anticipated health and societal impacts of the pandemic. Public facing evidence for these observations is available in press conferences delivered by the Prime Minister and CMO in March 2020, and an associated peer-reviewed study (Moss et al, EID 26(12): 2844 2020).

Then in 2021, a national consortium convened by ████████ and McCaw delivered what has become known as the 'Doherty Modelling' to government to help shape the National Reopening Plan (put in place prior to the emergence of the Omicron variant(s) of SARS-CoV-2).

Despite strengths of this work and its positive and influential role in decision making, there are a number of concerns/weaknesses and associated recommendations.

Concern 1: Scientific research was not made available to the public in a timely manner, and release was subject to government (and perhaps political) oversight. This strongly contrasts with practices in the UK and New Zealand (and elsewhere no doubt) where the scientific analyses were made public in a timely manner.

Recommendation 1: The scientific evidence delivered to government should be made public prior to or at the time of the public announcement of policy responses based on that scientific evidence. Note: I am not making a comment on, nor recommendation about whether deliberations on the nature of that evidence (at meetings such as AHPPC and National Cabinet) should be made public as they are distinct from the scientific research itself.

Concern 2: In 2021, the Commonwealth only resourced a single team (albeit a large national consortium which I co-led) to provide model-based advice on the National Reopening strategy. This contrasts with, for example, best practice from the UK, where a mechanism was in place (through SPI-M) for multiple independent teams to conduct analyses that were then fed into a system to identify consensus and/or highlight points of highest uncertainty, in order to best advise government. Given the enormous scientific uncertainty, high-stakes outcomes, and established precedent for multi-team contributions to advise government, our national approach to have in essence a single point-of-contact with modelling was (in principle) a serious limitation. Note: I do not believe any of the actual decisions made by the government of the day were adversely impacted, but the limitation, and so concern, nonetheless remains.

Recommendation 2: Australia establish a mechanism – including suitably expanded investment in core scientific capability and training – to ensure that in a future pandemic modelling-based advice is delivered through a multi-team approach. The establishment of "scenario hubs" in the US and Europe, and the funding to support them, presents one model for how this might work in Australia.

Situational assessment, epidemic analytics and surveillance

In parallel to the scenario-based research conducted periodically to support major strategic decisions, Australia also benefited from high-frequency (weekly) analyses of myriad surveillance data. These analyses were conducted by the team co-led by me and ████████████(ongoing at time of submission), and are documented in Australia's National Surveillance Plan for COVID-19 (versions from 2021 through 2023).

Concern 3: Reports – providing the most data-informed estimates of key quantities such as the effective reproduction number, Transmission Potential, behavioural trends, and case and hospital forecasts – were not made public (in any routine sense, noting a number of technical reports were released (see the IDDU CEB UoM website) over the course of the pandemic). In their absence, analyses and findings conducted based on publicly available data and often by people/teams without appropriate scientific expertise in epidemic analytics and modelling, were the primary public source of information on the status of the pandemic in Australia. As an expert in the area (with a high-profile media presence), and with detailed knowledge of the actual status of the pandemic, I was regularly unable to describe the status of the pandemic, nor fully counter misconceptions or misunderstandings of the status of the pandemic presented in the media.

Recommendation 3: Australia provide real-time public reporting of all metrics and indicators described in its National Surveillance plan(s). Note: additional interpretive advice provided by experts (either those who conducted the analyses or third parties) based on those metrics and indicators may not necessarily be made public.

Concern 4: Jurisdictions were and remain the primary holder of the critical surveillance data used to inform situational assessment, yet the Commonwealth funded and coordinated the analyses (noting that some jurisdictions also worked directly with epidemiological experts and teams to provide in-jurisdiction advice). Given the restrictions on data sharing between jurisdictions and the Commonwealth, this resulted in a degraded non-optimal data set being provided to the national situational assessment consortium.

Recommendation 4: Data sharing and governance protocols are reviewed to ensure the contracted analytical teams are provided with the most detailed and accurate data to support national and jurisdictional responses. Furthermore, more fine-grained (but privacy-protecting) data should be made public to support independent scientific analyses and to feed back to the global community for public good.

Concern 5: Surveillance data is collected for multiple purposes: both front-line 'immediate' or operational responses (e.g. case interviews are conducted to support quarantine and isolation requirements) and high-level 'strategic' responses (e.g. decisions on whether or not quarantine and isolation policies should be imposed (or relaxed), or whether or not 'lockdown' restrictions should be imposed (or relaxed)). However, traditionally, it is only the frontline/operational' response considerations that determine what data is and is not collected through surveillance systems. At multiple times during the pandemic this led to decisions being made to cease collection of critical data (based on (reasonable) changing operational requirements) at the very time that those exact same data were required to deliver requested strategic advice to (the same) government(s). The inter-dependencies were unappreciated (even when explained ahead of time to those responsible), and the consequences of decisions made at an operational level were often not understood. This is a globally recognised challenge, and WHO (Geneva) has convened a number of working groups to explore this, to which Australian experts (including me and Dr Freya Shearer) are taking a leading role).

Recommendation 5: Australian surveillance planning – noting its dual purpose to support both 'operational' and 'strategic' objectives – undergoes a deep root-and-branch review. This requires a dramatic change in mindset, and likely change in training pathways for public health professionals, public servants and epidemiologists responsible for designing, overseeing and maintaining surveillance systems.

Concern 6: Since the end of the pandemic, Australia's surveillance systems for viral respiratory infections have largely returned to a 'pre-pandemic' status, rather than adjusting to adopt strategies and advances made during COVID-19. Those public health officials and scientists most involved in designing Australia's COVID-19 surveillance systems have not been sufficiently engaged (if engaged at all) in the design of post-pandemic surveillance (through the ACDC planning or otherwise). The major (global and national) advances that were made during the COVID-19 response are at genuine risk of being lost in Australia. This is in contrast to elsewhere. For example the US CDC has invested >$200M in a major forecasting hub' to take forward advances from COVID-19 data analytics and forecasting into routine viral respiratory surveillance (influenza, RSV, SARS-CoV-2), supporting routine health surveillance and ensuring preparedness for the (inevitable) next pandemic. ECDC launched a similar initiative in November 2023. And the WHO have convened a number of international working groups to review ongoing viral respiratory surveillance systems and functioning.

Recommendation 6: Australian government(s) directly engage with national experts in epidemic analytics and surveillance to ensure post-pandemic systems are fit-for-purpose and have adopted state-of-the-art approaches that have proven to be of value (and be efficient) during COVID-19.

A final note on the role of the mathematical sciences, and addressing a major misconception

Artificial intelligence and machine learning were not a major factor in the national (or global) response to COVID-19 (but do have their place of course). While modelling and data analytics played a major role in the COVID-19 response (as described above), the core disciplines that supported this were: non-linear dynamical systems analysis (that is, "mathematical modelling") and state-of-the-art biostatistical and epidemiological analyses. Artificial intelligence (AI) and techniques such as machine learning played only a minor (but still valuable) role. This is of no surprise to those with expertise in epidemiology and the mathematical sciences as AI, as impactful as it is in general society, is not (yet?) well suited to the challenges faced by governments when making strategic decisions on how to respond to a pandemic (because we are often dealing with unknowns and one-off events, and so the large volumes of data from which AI techniques primarily deliver their value do not exist). Any future expansion of scientific capability should reflect this.