Submission re new ACMA Powers

From: [redacted]
To: Information Integrity <information.integrity@infrastructure.gov.au>
Date: Sun, 20 Aug 2023 21:26:35 +1000
Attachments: Study on Asympomatic Spread.pdf (1.1 MB); A_Literature_Review_and_Meta_Analysis_of_the_Effects_of_Lockdowns.pdf (2.1 MB); article used in landmark PCR case.pdf (2.22 MB); Hiding the Elephant.pdf (2.35 MB); Altman-Report-Final-Version-11-8-22.pdf (3.4 MB)

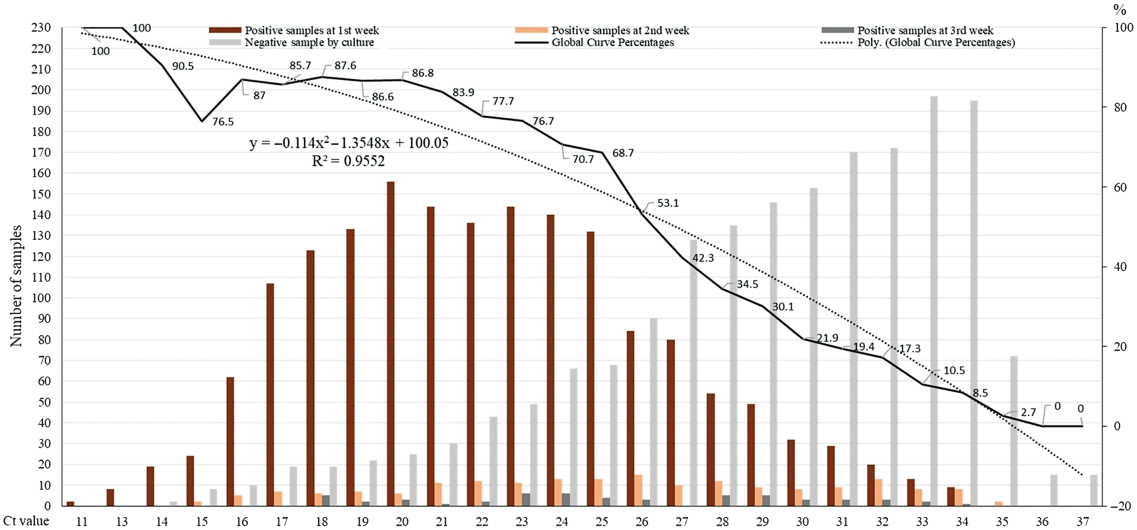
Lynda Crawford
[redacted]
Please feel free to publish my submission, but not my email or address. Thankyou.
To Whom It May Concern,
I feel very strongly that this legislation is a move in completely the wrong direction. Freedom of speech will be curtailed as a result, as it already has been over the last few years. I have been censored multiple times purely for sharing others medical opinions that differ to the mainstream narrative. I find this quite chilling!
Just the mere name of the bill is a red flag. Misinformation/disinformation have been heavily touted since the beginning of "The Pandemic" and become nearly as frequent as the term Antivaxxer which is used liberally to describe anyone who is looking at the science and asking questions. We absolutely must keep our children and general population safe from sinister agendas such as pedophilia, sexual abuse, drugs, bullying and hate speech. However, I doubt this bill will have much affect on these problems. I believe the main effect will be to censor any information that is not in line with the government, WEF or UN agenda. This could lead to the public only being exposed to the one narrative on issues such as the voice, climate change, covid, medical treatments, just to name a few. I feel that this is completely unacceptable and a violation of our basic human rights. We must be able to form ***our own*** opinions and make ***our own*** choices after assessing all the information.
How is it possible for a small committee of people to decide what is mis or disinformation? Well, I do not think it is. Not without bringing an end to science altogether! Science needs to be a fluid arena. A hypothesis is floated, then eventually proven or disproven and this can change when new information comes to light. There is already an incredible amount of censorship due to the way funding for research is offered by the pharma-industrial complex and handful of rich globalists. This bill will create even more censorship and will set a very dangerous precedent!!!
If you take time to read the attached articles, then you will see just a fraction of vital and important information many Australians were trying to share. If you find them interesting then you will find many others here More Than 400 Studies on the Failure of Compulsory Covid Interventions (Lockdowns, Restrictions, Closures) ⋆ Brownstone Institute
It was incredibly hard to get this information out to the general population whilst the media and our own government were speaking about us in a derogatory way, bullying us to make horrendous choices and censoring us senseless.
This legislation will not benefit the average citizen one little bit. It will only benefit big industry, big pharma, and government. I feel that this will be just the beginning of Totalitarianism in our beautiful Australia.
Please, I beg of you, do not apply any further regulations that will seek to censor the voice of the people any further. In my opinion it has already had catastrophic results!
Kind Regards,
Lynda Crawford

IDSA Infectious Diseases Society of America · hivma hiv medicine association · OXFORD

Correlation Between 3790 Quantitative Polymerase Chain Reaction–Positives Samples and Positive Cell Cultures, Including 1941 Severe Acute Respiratory Syndrome Coronavirus 2 Isolates

To the Editor—The outbreak of the coronavirus disease 2019 (COVID-19) pandemic due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was declared a pandemic on 12 March 2020 by the World Health Organization [1]. A major issue related to the outbreak has been to correlate viral RNA load obtained after reverse-transcription polymerase chain reaction (RT-PCR) and expressed as the cycle threshold (Ct) with contagiousness and therefore duration of eviction from contacts and discharge from specialized infectious disease wards. Several recent publications, based on more than 100 studies, have attempted to propose a cutoff Ct value and duration of eviction, with a consensus at approximately Ct >30 and at least 10 days, respectively [2–5]. However, in an article published in *Clinical Infectious Diseases*, Bullard et al reported that patients could not be contagious with Ct >25 as the virus is not detected in culture above this value [6]. This limit was then evoked in the French media during an interview with a member of the French Scientific Council Covid-19 as a possible value above which patients are no longer contagious [7].

At the beginning of the outbreak, we correlated Ct values obtained using our PCR technique based on amplification of the E gene and the results of the culture [8]. Since the beginning of the pandemic, we have performed 250 566 SARS-CoV-2 RT-PCR for 179 151 patients, of whom 13 161 (7.3%) tested positive. Up to the end of May, 3790 of these samples, reported as positive on nasopharyngeal samples, were inoculated and managed for culture as previously described [8]. Of these 3790 inoculated samples, 1941 SARS-CoV-2 isolates could be obtained after the first inoculation or up to 2 blind subcultures. The correlation between the scanner values and the positivity of the culture allows us to observe that the image obtained with 10 times more isolates than in our preliminary work (1941 vs 129) does not change significantly (Figure 1). It can be observed that at Ct = 25, up to 70% of patients remain positive in culture and that at Ct = 30 this value drops to 20%. At Ct = 35, the value we used to report a positive result for PCR, <3% of cultures are positive. Our Ct value of 35, initially based on the results



Ct value	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
Number of samples (N = 3790)	2	8	21	34	77	133	153	164	190	186	193	210	225	217	192	218	206	209	196	211	208	220	213	74	15	15
Total positive (n = 1941)	2	8	19	26	67	114	134	142	165	156	150	161	159	149	102	90	71	63	43	41	36	23	18	2	0	0
Week 1: number of positives (n = 1700)	2	8	19	24	62	107	123	133	156	144	136	144	140	132	84	80	54	49	32	29	20	13	9	0	0	0
(% by total positive)	(100)	(100)	(100)	(92.3)	(92.5)	(93.9)	(91.8)	(93.7)	(94.5)	(92.3)	(90.7)	(89.4)	(88.1)	(88.6)	(82.4)	(88.9)	(76.1)	(77.8)	(74.4)	(70.7)	(55.6)	(56.5)	(50.0)	(0)	(-)	(-)
Week 2: number of positives (n = 187)	0	0	0	2	5	7	6	7	6	11	12	11	13	13	15	10	12	9	8	9	13	8	8	2	0	0
(% by total positive)	(0)	(0)	(0)	(7.7)	(7.5)	(6.1)	(4.5)	(4.9)	(3.6)	(7.1)	(8.0)	(6.8)	(8.2)	(8.7)	(14.7)	(11.1)	(16.9)	(14.3)	(18.6)	(22.0)	(36.1)	(34.8)	(44.0)	(100)	(-)	(-)
Week 3: number of positives (n = 54)	0	0	0	0	0	0	5	2	3	1	2	6	6	4	3	0	5	5	3	3	3	2	1	0	0	0
(% by total positive)	(0)	(0)	(0)	(0)	(0)	(0)	(3.7)	(1.4)	(1.8)	(0.6)	(1.3)	(3.7)	(3.8)	(2.7)	(2.9)	(0)	(7.0)	(7.9)	(7.0)	(7.3)	(8.3)	(8.7)	(5.6)	(0)	(-)	(-)
Negative cultured (n = 1849)	0	0	2	8	10	19	19	22	25	30	43	49	66	68	90	128	135	146	153	170	172	197	195	72	15	15

Figure 1. Percentage of positive viral cultures of severe acute respiratory syndrome coronavirus 2 polymerase chain reaction–positive nasopharyngeal samples from coronavirus disease 2019 patients, according to Ct value (plain line). The dashed curve indicates the polynomial regression curve. Abbreviations: Ct, cycle threshold; Poly., polynomial.

obtained by RT-PCR on control negative samples in our laboratory and initial results of cultures [8], is validated by the results herein presented and is in correlation with what was proposed in Korea [9] and Taiwan [10]. We could observe that subcultures, especially the first one, allow an increasing percentage of viral isolation in samples with Ct values, confirming that these high Ct values are mostly correlated with low viral loads. From our cohort, we now need to try to understand and define the duration and frequency of live virus shedding in patients on a case-by-case basis in the rare cases when the PCR is positive beyond 10 days, often at a Ct >30. In any cases, these rare cases should not impact public health decisions.

Notes

Ethical approval. The protocol was approved by the University Hospital Institute Méditerranée Infection Ethical Committee. All patients provided informed consent in accordance with the Declaration of Helsinki.

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Post-lockdown SARS-CoV-2 nucleic acid screening in nearly ten million residents of Wuhan, China

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Stringent COVID-19 control measures were imposed in Wuhan between January 23 and April 8, 2020. Estimates of the prevalence of infection following the release of restrictions could inform post-lockdown pandemic management. Here, we describe a city-wide SARS-CoV-2 nucleic acid screening programme between May 14 and June 1, 2020 in Wuhan. All city residents aged six years or older were eligible and 9,899,828 (92.9%) participated. No new symptomatic cases and 300 asymptomatic cases (detection rate 0.303/10,000, 95% CI 0.270–0.339/10,000) were identified. There were no positive tests amongst 1,174 close contacts of asymptomatic cases. 107 of 34,424 previously recovered COVID-19 patients tested positive again (re-positive rate 0.31%, 95% CI 0.423–0.574%). The prevalence of SARS-CoV-2 infection in Wuhan was therefore very low five to eight weeks after the end of lockdown.

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The Coronavirus Disease 2019 (COVID-19) was first reported in December 2019, and was classified as a pandemic by the World Health Organization on March 11, 2020[1]. Following strict lockdown measures, the COVID-19 epidemic was generally under control in China, and the whole country has progressed into a post-lockdown phase. In this phase, countries face new problems and challenges, including how to accurately assess the post-lockdown risk of the COVID-19 epidemic, how to avoid new waves of COVID-19 outbreaks, and how to facilitate the resumption of economy and normal social life. As the city most severely affected by COVID-19 in China, Wuhan had been under lockdown measures from January 23 until April 8, 2020. During the first 2 months after city's reopening, there were only a few sporadic COVID-19 cases in Wuhan (six newly confirmed cases from April 8 to May 10, 2020[2]). However, there was still concern about the risk of COVID-19 in Wuhan, which seriously affected the resumption of industrial production and social services, and hampered the normal lives of residents. In order to ascertain the current status of the COVID-19 epidemic, the city government of Wuhan carried out a comprehensive citywide nucleic acid screening of SARS-CoV-2 infection from May 14, 2020 to June 1, 2020.

The citywide screening of SARS-CoV-2 infection in Wuhan is a mass screening programme in post-lockdown settings, and provided invaluable experiences or lessons with international relevance as more countries and cities around the world entering the post-lockdown phase. In this study, we report the organisation process, detailed technical methods used, and results of this citywide nucleic acid screening.

Results

There were 10,652,513 eligible people aged ≥6 years in Wuhan (94.1% of the total population). The nucleic acid screening was completed in 19 days (from May 14, 2020 to Jun 1, 2020), and tested a total of 9,899,828 persons from the 10,652,513 eligible people (participation rate, 92.9%). Of the 9899,828 participants, 9,865,404 had no previous diagnosis of COVID-19, and 34,424 were recovered COVID-19 patients.

The screening of the 9,865,404 participants without a history of COVID-19 found no newly confirmed COVID-19 cases, and identified 300 asymptomatic positive cases with a detection rate of 0.303 (95% CI 0.270–0.339)/10,000. The median age-stratified Ct-values of the asymptomatic cases were shown in Supplementary Table 1. Of the 300 asymptomatic positive cases, two cases came from one family and another two were from another family. There were no previously confirmed COVID-19 patients in these two families. A total of 1174 close contacts of the asymptomatic positive cases were traced, and they all tested negative for the COVID-19. There were 34,424 previously recovered COVID-19 cases who participated in the screening. Of the 34,424 participants with a history of COVID-19, 107 tested positive again, giving a repositive rate of 0.310% (95% CI 0.423–0.574%).

Virus cultures were negative for all asymptomatic positive and repositive cases, indicating no "viable virus" in positive cases detected in this study.

All asymptomatic positive cases, repositive cases and their close contacts were isolated for at least 2 weeks until the results of nucleic acid testing were negative. None of detected positive cases or their close contacts became symptomatic or newly confirmed with COVID-19 during the isolation period. In this screening programme, single and mixed testing was performed, respectively, for 76.7% and 23.3% of the collected samples. The asymptomatic positive rates were 0.321 (95% CI 0.282–0.364)/10,000 and 0.243 (95% CI 0.183–0.315)/10,000, respectively.

The 300 asymptomatic positive persons aged from 10 to 89 years, included 132 males (0.256/10,000) and 168 females (0.355/10,000). The asymptomatic positive rate was the lowest in children or adolescents aged 17 and below (0.124/10,000), and the highest among the elderly aged 60 years and above (0.442/10,000) (Table 1). The asymptomatic positive rate in females (0.355/10,000) was higher than that in males (0.256/10,000).

The asymptomatic positive cases were mainly domestic and unemployed residents (24.3%), retired older adults (21.3%), and public service workers (11.7%) (Fig. 1).

The asymptomatic positive rate in urban districts was on average 0.456/10,000, ranging from 0.317/10,000 in Hongshan to 0.807/10,000 in Wuchang district. A lower rate of asymptomatic positive cases was found in suburban districts (0.132/10,000), ranging from 0.047/10,000 in Xinzhou to 0.237/10,000 in Jiangan district (Fig. 2).

Among the 7280 residential communities in Wuhan, asymptomatic positive cases were identified in 265 (3.6%) communities (only one case detected in 246 communities), while no asymptomatic positive cases were found in other 96.4% communities.

Testing of antibody against SARS-CoV-2 virus was positive IgG (+) in 190 of the 300 asymptomatic cases, indicating that 63.3% (95% CI 57.6–68.8%) of asymptomatic positive cases were actually infected. The proportion of asymptomatic positive cases with both IgM (−) and IgG (−) was 36.7% (95% CI: 31.2–42.4%; $n = 110$), indicating the possibility of infection window or false positive results of the nucleic acid testing (Table 2).

Higher detection rates of asymptomatic infected persons were in Wuchang, Qingshan and Qiaokou districts, and the prevalence of previously confirmed COVID-19 cases were 68.243/10,000, 53.767/10,000, and 100.047/10,000, respectively, in the three districts. Figure 3 shows that districts with a high detection rate of asymptomatic positive persons generally had a high prevalence of confirmed COVID-19 cases ($r_s = 0.729$, $P = 0.002$).

Discussion

The citywide nucleic acid screening of SARS-CoV-2 infection in Wuhan recruited nearly 10 million people, and found no newly confirmed cases with COVID-19. The detection rate of asymptomatic positive cases was very low, and there was no evidence of transmission from asymptomatic positive persons to traced close contacts. There were no asymptomatic positive cases in 96.4% of the residential communities.

Previous studies have shown that asymptomatic individuals infected with SARS-CoV-2 virus were infectious[3], and might subsequently become symptomatic[4]. Compared with symptomatic patients, asymptomatic infected persons generally have low quantity of viral loads and a short duration of viral shedding, which decrease the transmission risk of SARS-CoV-2[5]. In the present study, virus culture was carried out on samples from asymptomatic positive cases, and found no viable SARS-CoV-2 virus. All close contacts of the asymptomatic positive cases tested negative, indicating that the asymptomatic positive cases detected in this study were unlikely to be infectious.

There was a low repositive rate in recovered COVID-19 patients in Wuhan. Results of virus culturing and contract tracing found no evidence that repositive cases in recovered COVID-19 patients were infectious, which is consistent with evidence from other sources. A study in Korea found no confirmed COVID-19 cases by monitoring 790 contacts of 285 repositive cases[6]. The official surveillance of recovered COVID-19 patients in China also revealed no evidence on the infectiousness of repositive cases[7]. Considering the strong force of infection of COVID-19[8–10], it is expected that the number of confirmed cases is associated with the risk of being infected in communities. We

Table 1 Characteristics of asymptomatic positive individuals.

	Total (%)	Asymptomatic positive persons (%)	Detection rate per 10,000 (95% CI)	*P* value
Total	9,899,828 (100.0)	300 (100.0)	0.303 (0.270–0.339)	
Sex				
Male	5,162,960 (52.2)	132 (44.0)	0.256 (0.214–0.303)	0.005
Female	4,736,868 (47.8)	168 (56.0)	0.355 (0.303–0.413	
Age (years old)				
≤17	969,014 (9.8)	12 (4.0)	0.124 (0.064–0.216)	<0.001
18–44	4,448,230 (44.9)	104 (34.7)	0.234 (0.191–0.283)	
45–59	2,492,943 (25.2)	96 (32.0)	0.385 (0.312–0.470)	
≥60	1,989,641 (20.1)	88 (29.3)	0.442 (0.355–0.545)	
Administrative Districts in Wuhan				
Wuchang	904,636 (9.1)	73 (24.3)	0.807 (0.633–1.015)	<0.001
Qingshan	414,312 (4.2)	23 (7.7)	0.555 (0.352–0.833)	
Qiaokou	583,440 (5.9)	32 (10.7)	0.548 (0.375–0.774)	
Hanyang	717,429 (7.2)	29 (9.7)	0.404 (0.271–0.581)	
Jianghan	524,224 (5.3)	19 (6.3)	0.362 (0.218–0.566)	
Hongshan	1,103,079 (11.1)	35 (11.7)	0.317 (0.221–0.441)	
East Lake High-tech Development Area	782,987 (7.9)	19 (6.3)	0.243 (0.146–0.379)	
Jiangan	800,440 (8.1)	19 (6.3)	0.237 (0.143–0.371)	
Caidian	503,595 (5.1)	11 (3.7)	0.218 (0.109–0.391)	
Jiangxia	671,248 (6.8)	14 (4.7)	0.209 (0.114–0.350)	
Huangpi	979,920 (9.9)	14 (4.7)	0.143 (0.078–0.240)	
Hannan	417,022 (4.2)	4 (1.3)	0.096 (0.026–0.246)	
Dongxihu	777,204 (7.9)	5 (1.7)	0.064 (0.021–0.150)	
Xinzhou	634,408 (6.4)	3 (1.0)	0.047 (0.010–0.138)	
East Lake Scenic Area of Wuhan	85,884 (0.9)	0 (0.0)	0.000 (0.000–0.430)	

χ^2 test was used to assess the association between the detection rate of asymptomatic cases increased and sex and age. Urban districts of Wuhan includes Wuchang, Qingshan, Qiaokou, Hanyang, Jiangan, Jianghan, and Hongshan; Suburban districts of Wuhan includes Hannan, Caidian, Dongxihu, Xinzhou, Jiangxia, Huangpi, East Lake High-tech Development Area, and East Lake Scenic Area of Wuhan.

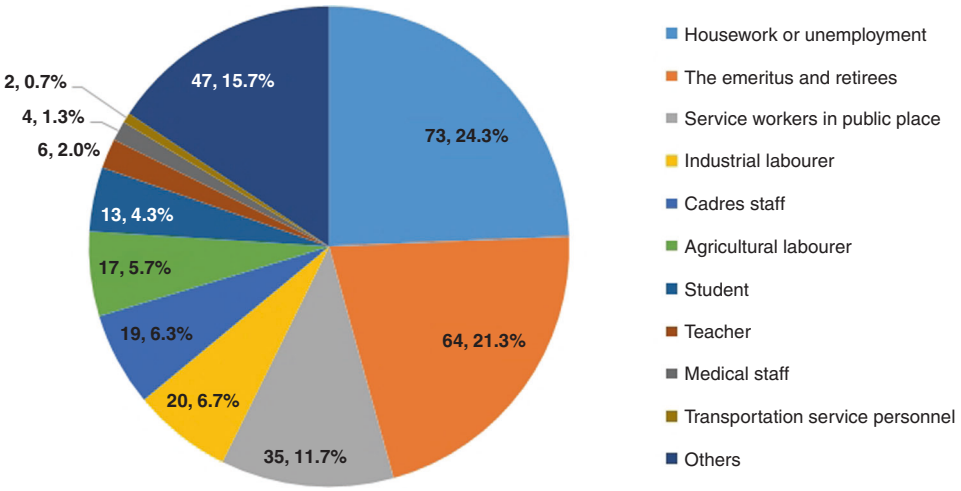

Fig. 1 The occupation distribution of asymptomatic positive cases (%). Note: Others included the self-employed, military personnel, and so on. (Source data are provided as s Source Data file.).

found that asymptomatic positive rates in different districts of Wuhan were correlated with the prevalence of previously confirmed cases. This is in line with the temporal and spatial evolution (especially the long-tailed characteristic) of infectious diseases[11].

Existing laboratory virus culture and genetic studies[9,10] showed that the virulence of SARS-CoV-2 virus may be weakening over time, and the newly infected persons were more likely to be asymptomatic and with a lower viral load than earlier infected cases. With the centralized isolation and treatment of all COVID-19 cases during the lockdown period in Wuhan, the risk of residents being infected in the community has been greatly reduced. When susceptible residents are exposed to a low dose of virus, they may tend to be asymptomatic as a result of their own immunity. Serological antibody testing in the current study found that at least 63% of asymptomatic positive cases were actually infected with SARS-CoV-2 virus. Nonetheless, it is too early to be complacent, because of the existence of asymptomatic positive cases and high level of susceptibility in residents in Wuhan. Public health measures for the prevention and control of COVID-19 epidemic, including wearing masks, keeping safe social distancing in Wuhan should be sustained. Especially, vulnerable populations with weakened immunity or co-morbidities, or both, should continue to be appropriately shielded.

Findings from this study show that COVID-19 was well controlled in Wuhan at the time of the screening programme. After two months since the screening programme (by August 9, 2020), there were no newly confirmed COVID-19 cases in Wuhan.

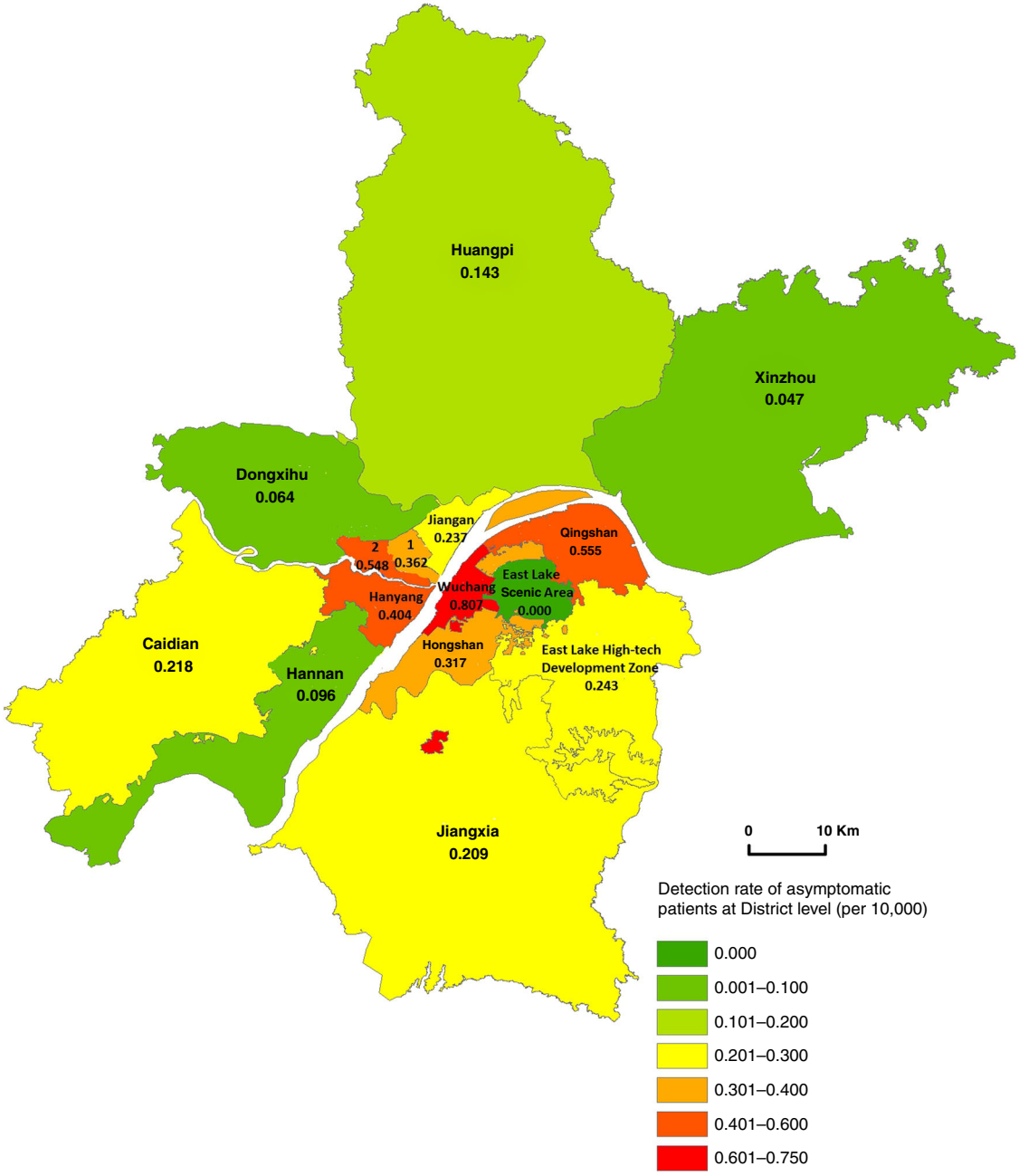

Fig. 2 The geographic distribution of the detection rate of asymptomatic positive cases. Note: 1 represents Jianghan district; 2 represents Qiaokou district. (Source data are provided as s Source Data file.).

Table 2 Results of the detection of antibody in 300 asymptomatic positive persons.

IgM Results	IgG	Asymptomatic positive persons	% (95% CI)
−	+	161	53.7 (47.8–59.4)
−	−	110	36.7 (31.2–42.4)
+	+	29	9.7 (6.6–13.6)
+	−	0	0.0 (0.0–1.2)

"−" indicates negative; "+" indicates positive.

Further testing of SARS-CoV-2 in samples collected from market environment settings in Wuhan were conducted, and found no positive results after checking a total of 52,312 samples from 1795 market setting during June 13 to July 2, 2020[12].

This study has several limitations that need to be discussed. First, this was a cross-sectional screening programme, and we are unable to assess the changes over time in asymptomatic positive and reoperative results. Second, although a positive result of nucleic acid testing reveals the existence of the viral RNAs, some false negative results were likely to have occurred, in particular due to the relatively low level of virus loads in asymptomatic infected individuals, inadequate collection of samples, and limited accuracy of the testing technology[13]. Although the screening programme provided no direct evidence on the sensitivity and specificity of the testing method used, a meta-analysis reported a

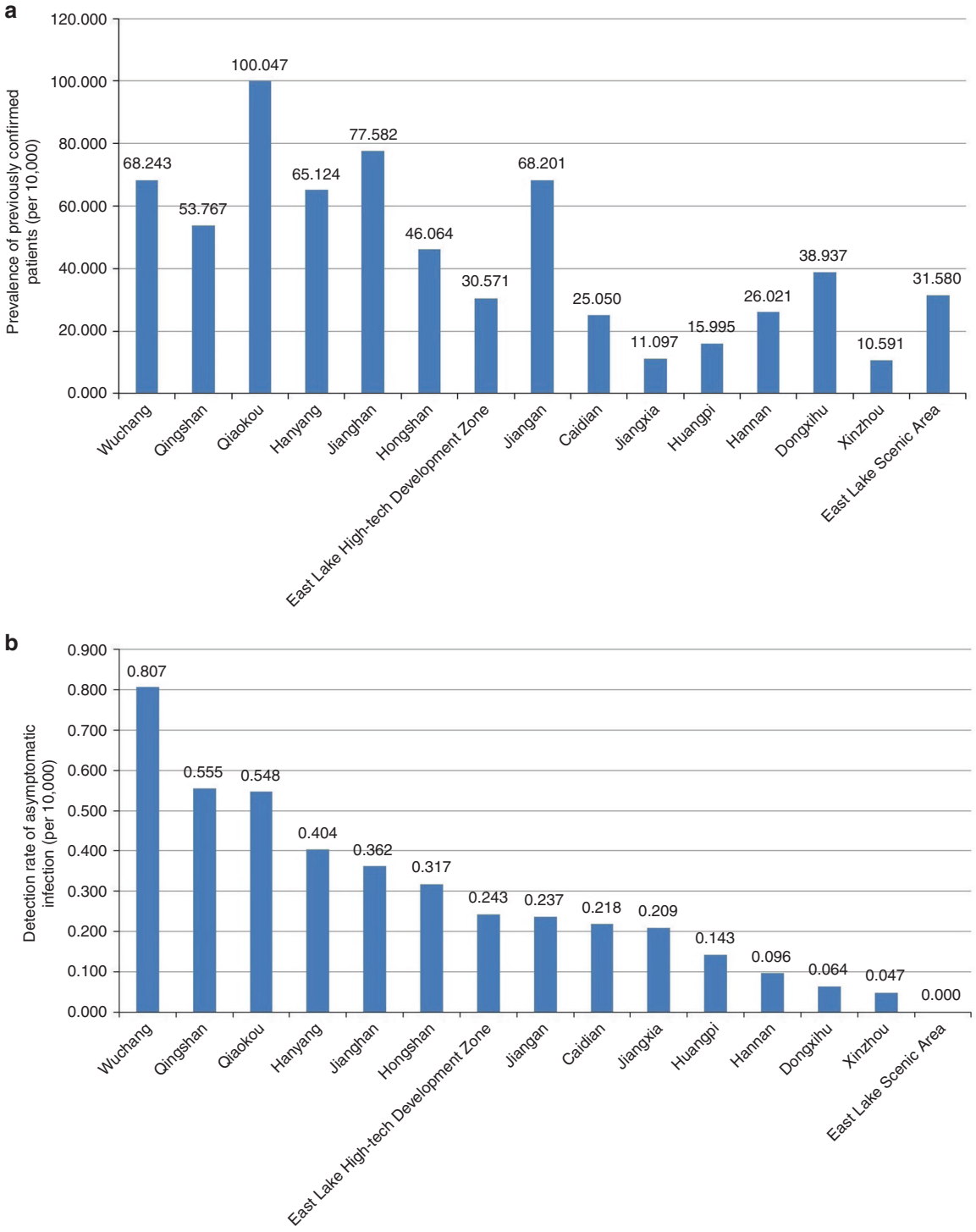

Fig. 3 The prevalence of previously confirmed patients and the detection rate of asymptomatic positive cases of COVID-19 in each district in Wuhan. **a** The prevalence of previously confirmed patients of COVID-19 in each district in Wuhan. **b** The detection rate of asymptomatic positive cases of COVID-19 in each district in Wuhan. (Source data are provided as s Source Data file.).

pooled sensitivity of 73% (95% CI 68–78%) for nasopharayngeal and throat swab testing of COVID-19[14]. Testing kits used in the screening programme were publicly purchased by the government and these kits have been widely used in China and other countries. Multiple measures were taken to possibly minimise false negative results in the screening programme. For example, standard training was provided to health works for sample collection to ensure the sample quality. The experiment procedures, including specimen collection, extraction, PCR, were according to official guidelines (Supplementary Note 1). For the real-time RT-PCR assay, two target genes were simultaneously tested. Even so, false negative results remained possible, particularly in any mass screening programmes. However, even if test sensitivity was as low as 50%, then the actual prevalence would be twice as high as reported in this study, but would still be very low. Around 7.1% of eligible residents did not participate in the citywide nucleic acid screening and the screening programme did not collect detailed data on reasons for nonparticipation, which is a limitation of this

study. Although there were no official statistics, a large number of migrant workers and university students left Wuhan before the lockdown, joining their families in other cities or provinces for traditional Chinese New Year. Therefore, it is likely that most nonparticipants were not in Wuhan at the time of the screening. The main objective of the screening programme was to assess the risk of COVID-19 epidemic in residents who were actually living in the post-lockdown Wuhan. Therefore, the estimated positive rates are unlikely to be materially influenced by nonparticipation of residents who were not in Wuhan or some residents who did not participate in the screening for other reasons. Moreover, people who left Wuhan were the target population for monitoring in other provinces and cities and were required to take nucleic acid testing. Although there was no official statistics showing the positive rate of nucleic acid testing in this population, there was no report that shown a higher positive rate of nucleic acid testing than our findings.

In summary, the detection rate of asymptomatic positive cases in the post-lockdown Wuhan was very low (0.303/10,000), and there was no evidence that the identified asymptomatic positive cases were infectious. These findings enabled decision makers to adjust prevention and control strategies in the post-lockdown period. Further studies are required to fully evaluate the impacts and cost-effectiveness of the citywide screening of SARS-CoV-2 infections on population's health, health behaviours, economy, and society.

Methods

Study population and ethical approvals. Wuhan has about 11 million residents in total, with seven urban and eight suburban districts. Residents are living in 7280 residential communities (or residential enclosures, "xiao-qu" in Chinese), and each residential community could be physically isolated from other communities for preventing transmission of COVID-19.

The screening programme recruited residents (including recovered COVID-19 patients) currently living in Wuhan who were aged ≥6 years (5,162,960 males, 52.2%). All participants provided written or verbal informed consent after reading a statement that explained the purpose of the testing. For participants who aged 6–17 years old, consent was obtained from their parents or guardians. The study protocol for an evaluation of the programme based on anonymized screening data was approved by the Ethics Committee of the Tongji Medical College Institutional Review Board, Huazhong University of Science and Technology, Wuhan, China (No. IROG0003571).

Organizational guarantee and community mobilization. A citywide nucleic acid screening group was formed, with specialized task teams contributing to comprehensive coordination, technical guidance, quality control, participation invitation, information management, communication, and supervision of the screening. The city government invested 900 million yuan (RMB) in the testing programme. From 14 May to 1 June 2020, in the peak time, up to 2907 sample collection sites were functioning at the same time in Wuhan. Each sample collection site had an assigned sample collection group, including several health professionals (staffed according to the number of communities' residents), 2–4 community managers, 1–2 police officers, and 1–2 inspectors. The sampling sites were set up based on the number and accessibility of local residents. Local community workers were responsible for a safe and orderly sampling process to minimise the waiting time. In addition, mobile sampling teams were formed by primary health care professionals and volunteers to conduct door-to-door sampling for residents who had physical difficulties or were unable to walk.

About 50,000 health professionals (mainly doctors and nurses from community health centers) and more than 280,000 person-times of community workers and volunteers contributed to sample collection, transport of equipment and samples collected, arrangement of participation process, and maintaining order of sampling sites. Public information communication and participant invitation were implemented through mass media, mobile messages, WeChat groups, and residential community broadcasts, so as to increase residents' awareness and the participation.

Acquisition, preservation, and transport of samples. All sampling personnel received standard training for the collection of oropharyngeal swab samples. To minimise the risk of cross-infection, the sampling process strictly followed a disinfection process and environmental ventilation were ensured. The collected samples were stored in a virus preservation solution or immersed in isotonic saline, tissue culture solution, or phosphate buffer (Supplementary note 1). Then, all samples were sent to testing institutions within 4 h using delivery boxes for biological samples refrigerated with dry ice to guarantee the stability of nucleic acid samples.

Technical methods for laboratory testing of collected samples. A total of 63 nucleic acid testing laboratories, 1451 laboratory workers and 701 testing equipment were involved in the nucleic acid testing. Received samples were stored at 4 °C and tested within 24 h of collection. Any samples that could not be tested within 24 h were stored at −70 °C or below (Supplementary note 1). In addition to "single testing" (i.e., separate testing of a single sample), "mixed testing" was also performed for 23% of the collected samples to increase efficiency, in which five samples were mixed in equal amounts, and tested in the same test tube. If a mixed testing was positive for COVID-19, all individual samples were separately retested within 24 h[15].

Details regarding technical methods for sequencing and virus culture were provided in Supplementary note 1. Real-time reverse transcriptase-polymerase chain reaction (RT-PCR) assay method was used for the nucleic acid testing. We simultaneously amplified and tested the two target genes: open reading frame 1ab (ORF1ab) and nucleocapsid protein (N) (Supplementary Note 1). A cycle threshold value (Ct-value) less than 37 was defined as a positive result, and no Ct-value or a Ct-value of 40 or more was defined as a negative result. For Ct-values ranging from 37 to 40, the sample was retested. If the retest result remained less than 40 and the amplification curve had obvious peak, the sample was classified as positive; otherwise, it was reported as being negative. These diagnostic criteria were based on China's official recommendations[16].

For asymptomatic positive cases, virus culture was carried out in biosafety level-3 laboratories. The colloidal gold antibody test was also performed for asymptomatic positive cases (Supplementary note 1). All testing results were double entered into a specifically designed database, and managed by the Big Data and Investigation Group of the COVID-19 Prevention and Control Centre in Wuhan, which was established to collect and manage data relevant to the COVID-19 epidemic.

Participant data collection and management. Before sample collection, residents electronically (using a specifically designed smartphone application) self-uploaded their personal information, including ID number, name, sex, age, and place of residence. Then, the electronic machine system generated a unique personal barcode and stuck it on the sample tube to ensure the match between the sample and the participant. Then trained staff interviewed each individual regarding the history of COVID-19 and previous nucleic acid testing. There was a database of confirmed COVID-19 cases in Wuhan, which can be used to validate the self-reported previous COVID-19 infection. All information was entered into a central database. The testing results were continually uploaded to the central database by testing institutions. Contact tracing investigations were conducted on participants who tested positive for SARS-CoV-2, to track and manage their close contacts. The pre-existing unique identification code for each resident was used as the programme's identification number, to ensure information accuracy during the whole process of screening, from sampling, nucleic acid testing, result reporting, the isolation of detected positive cases, and tracing of close contacts of positive cases. All screening information was kept strictly confidential and was not allowed to be disclosed or used for other purposes other than clinical and public health management. Personal information of asymptomatic positive cases was only disclosed to designated medical institutions and community health centres for the purpose of medical isolation and identification of close contacts. Researcher was blind to the study hypothesis during data collection.

Biological security guarantee. Nucleic acid testing was performed in biosafety level-2 (BSL-2) laboratories, and virus culture was conducted in biosafety level-3 laboratories. Sampling and testing personnel adopted the personal protective measures according to the standard of biosafety level-3 laboratories. Participating laboratories implemented control measures to guarantee biological safety in accordance with relevant regulations[17].

Result query and feedback. Two to three days after sample collection, participants could inquire about their test results using WeChat or Alipay application by their unique ID numbers. The results included text descriptions of nucleic acid testing and coloured health codes. A green coloured health code refers to a negative result, and a red coloured health code indicates a positive result.

Definition and management of identified confirmed cases and close contacts. In this study, all confirmed COVID-19 cases were diagnosed by designated medical institutions according to National Guidelines for the Prevention and Control of COVID-19 (Supplementary Note 2). Asymptomatic positive cases referred to individuals who had a positive result during screening, and they had neither a history of COVID-19 diagnosis, nor any clinical symptoms at the time of the nucleic acid testing. Close contacts were individuals who closely contacted with an asymptomatic positive person since 2 days before the nucleic acid sampling[16]. Repositive cases refer to individuals who recovered from previously confirmed COVID-19 disease and had a positive testing again in the screening programme. All repositive cases, asymptomatic positive persons, and their close contacts were

isolated for at least 2 weeks in designated hotels managed by primary health care professionals, and they were released from isolation only if two consecutive nucleic acid tests were negative.

Statistical analysis. Detection rate of asymptomatic positive or repositive cases was calculated by dividing the number of individuals with a positive result of nucleic acid testing by the number of participants tested. Because of extremely low detection rates, we calculated 95% confidence intervals of estimated proportions using Pearson–Klopper exact method, implemented through R package "binom" version 1.1-1[18]. SPSS version 22.0 was used for other statistical analyses. We analyzed the distribution of asymptomatic positive cases and assessed the Spearman correlation between the asymptomatic positive rate and the prevalence of previously confirmed COVID-19 cases in different districts of Wuhan. Differences in asymptomatic positive rates by sex and age groups were assessed using the χ^2 test. ArcGIS 10.0 was used to draw a geographic distribution map of asymptomatic positive cases. A value of $P < 0.05$ (two-tailed) was considered statistically significant.

Reporting summary. Further information on research design is available in the Nature Research Reporting Summary linked to this article.

Data availability

Detailed data directly used to generate each figure or table of this study are available within the article, Supplementary Information and source data are provided with this paper.

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Author contributions

S.Y.C., C.W., X.X.Y., and Z.X.L. conceived the study. C.W., Y.C.H., T.T.W., K.L., H.B.X., and X.S. participated in the acquisition of data. S.B.W. and J.G. were responsible for the on-site specimen collection, laboratory testing quality evaluation, and control. Y.C.H., T.T.W., and L.Q.L. analyzed the data. H.J., Y.H.G., and F.J.S. gave advice on methodology. Q.F.T. and C.Z.L. investigated the responses to the citywide nucleic acid testing among residents lived in outside of Wuhan city. S.Y.C., Y.G., C.W., and X.X.Y. drafted the manuscript, Y.G., M.B., and F.J.S. revised the manuscript, and M.B., C.Z.L., and F.J.S. critically commented and edited the manuscript. All authors read and approved the final manuscript. Z.X.L. is the guarantor of this study.

Competing interests

The authors declare no competing interests.

Additional information

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Studies in Applied Economics

A LITERATURE REVIEW AND META-ANALYSIS OF THE EFFECTS OF LOCKDOWNS ON COVID-19 MORTALITY

Jonas Herby, Lars Jonung, and Steve H. Hanke

Johns Hopkins Institute for Applied Economics,
Global Health, and the Study of Business Enterprise

A Literature Review and Meta-Analysis of the Effects of Lockdowns on COVID-19 Mortality

By Jonas Herby, Lars Jonung, and Steve H. Hanke

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The *Studies in Applied Economics* series is under the general direction of Prof. Steve H. Hanke, Founder and Co-Director of The Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise (hanke@jhu.edu). The views expressed in each working paper are those of the authors and not necessarily those of the institutions that the authors are affiliated with.

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Abstract

This systematic review and meta-analysis are designed to determine whether there is empirical evidence to support the belief that "lockdowns" reduce COVID-19 mortality. Lockdowns are defined as the imposition of at least one compulsory, non-pharmaceutical intervention (NPI). NPIs are any government mandate that directly restrict peoples' possibilities, such as policies that limit internal movement, close schools and businesses, and ban international travel. This study employed a systematic search and screening procedure in which 18,590 studies are identified that could potentially address the belief posed. After three levels of screening, 34 studies ultimately qualified. Of those 34 eligible studies, 24 qualified for inclusion in the meta-analysis. They were separated into three groups: lockdown stringency index studies, shelter-in-place-order (SIPO) studies, and specific NPI studies. An analysis of each of these three groups support the conclusion that lockdowns have had little to no effect on COVID-19 mortality. More specifically, stringency index studies find that lockdowns in Europe and the United States only reduced COVID-19 mortality by 0.2% on average. SIPOs were also ineffective, only reducing COVID-19 mortality by 2.9% on average. Specific NPI studies also find no broad-based evidence of noticeable effects on COVID-19 mortality.

While this meta-analysis concludes that lockdowns have had little to no public health effects, they have imposed enormous economic and social costs where they have been adopted. In consequence, lockdown policies are ill-founded and should be rejected as a pandemic policy instrument.

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Key Words: COVID-19, lockdown, non-pharmaceutical interventions, mortality, systematic review, meta-analysis

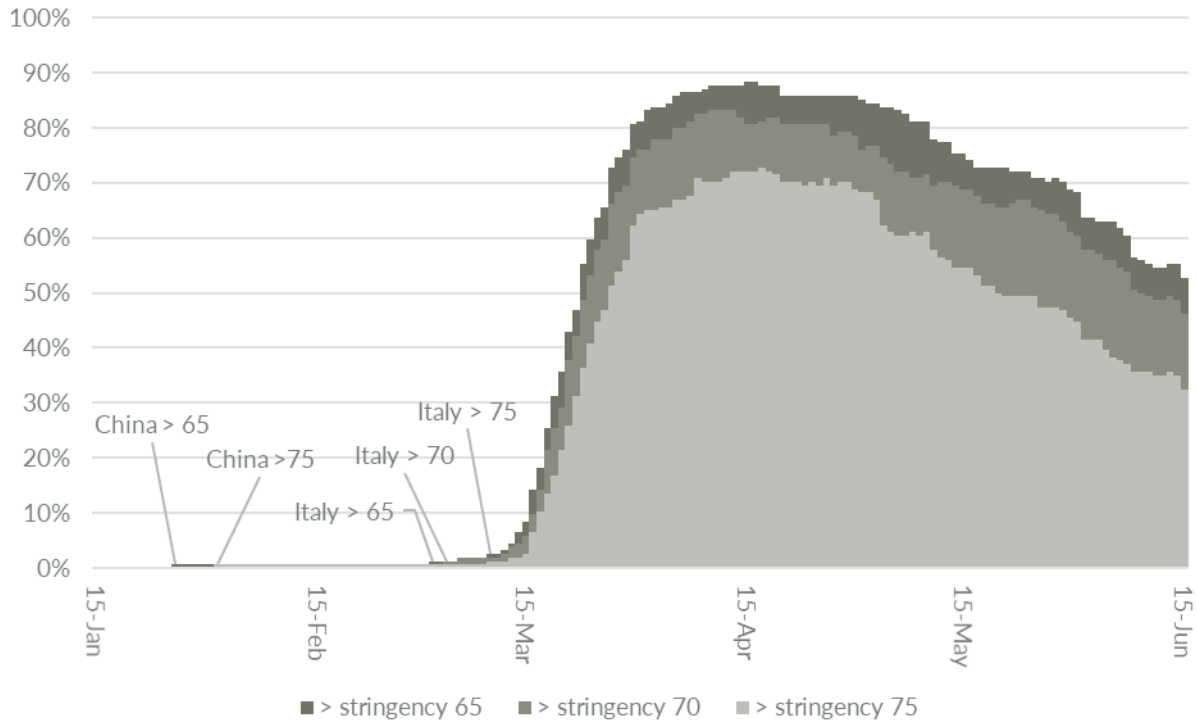
JEL Classification: I18; I38; D19

1 Introduction

The global policy reaction to the COVID-19 pandemic is evident. Compulsory non-pharmaceutical interventions (NPIs), commonly known as "lockdowns" – policies that restrict internal movement, close schools and businesses, and ban international travel – have been mandated in one form or another in almost every country.

The first NPIs were implemented in China. From there, the pandemic and NPIs spread first to Italy and later to virtually all other countries, see Figure 1. Of the 186 countries covered by the Oxford COVID-19 Government Response Tracker (OxCGRT), only Comoros, an island country in the Indian Ocean, did not impose at least one NPI before the end of March 2020.

Figure 1: Share of countries with OxCGRT stringency index above thresholds, January - June 2020



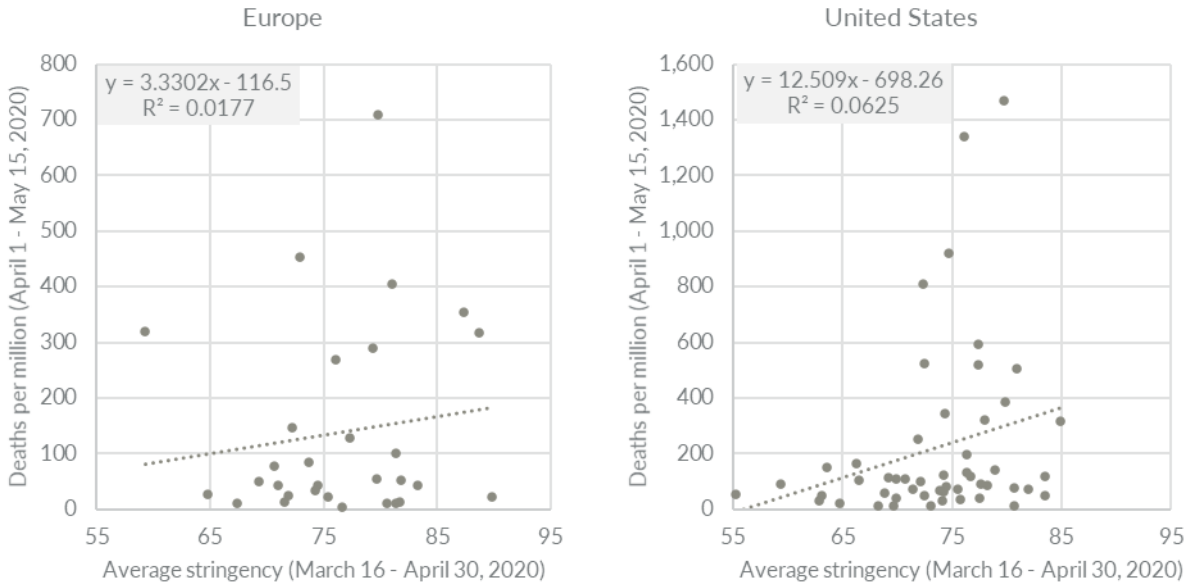
Comment: The figure shows the share of countries, where the OxCGRT stringency index on a given date surpassed index 65, 70 and 75 respectively. Only countries with more than one million citizens are included (153 countries in total). The OxCGRT stringency index records the strictness of NPI policies that restrict people's behavior. It is calculated using all ordinal containment and closure policy indicators (i.e., the degree of school and business closures, etc.), plus an indicator recording public information campaigns.
Source: Our World in Data.

Early epidemiological studies predicted large effects of NPIs. An often cited model simulation study by researchers at the Imperial College London (Ferguson et al. (2020)) predicted that a

suppression strategy based on a lockdown would reduce COVID-19 mortality by up to 98%.[1] These predictions were questioned by many scholars. Our early interest in the subject was spurred by two studies. First, Atkeson et al. (2020) showed that "across all countries and U.S. states that we study, the growth rates of daily deaths from COVID-19 fell from a wide range of initially high levels to levels close to zero within 20-30 days after each region experienced 25 cumulative deaths." Second, Sebhatu et al. (2020) showed that "government policies are strongly driven by the policies initiated in other countries," and less by the specific COVID-19-situation of the country.

A third factor that motivated our research was the fact that there was no clear negative correlation between the degree of lockdown and fatalities in the spring of 2020 (see Figure 2). Given the large effects predicted by simulation studies such as Ferguson et al. (2020), we would have expected to at least observe a simple negative correlation between COVID-19 mortality and the degree to which lockdowns were imposed.[2]

Figure 2: Correlation between stringency index and COVID-19 mortality in European countries and U.S. states during the first wave in 2020



Source: Our World in Data

[1] With R0 = 2.4 and trigger on 60, the number of COVID-19-deaths in Great Britain could be reduced to 8,700 deaths from 510,000 deaths (-98%) with a policy consisting of case isolation + home quarantine + social distancing + school/university closure, cf. Table 4 in Ferguson et al. (2020). R0 (the basic reproduction rate) is the expected number of cases directly generated by one case in a population where all individuals are susceptible to infection.

[2] In addition, the interest in this issue was sparked by the work Jonung did on the expected economic effects of the SARS pandemic in Europe in 2006 (Jonung and Röger, 2006). In this model-based study calibrated from Spanish flu data, Jonung and Röger concluded that the economic effects of a severe pandemic would be rather limited—a sharp contrast to the huge economic effects associated with lockdowns during the COVID-19 pandemic.

Today, it remains an open question as to whether lockdowns have had a large, significant effect on COVID-19 mortality. We address this question by evaluating the current academic literature on the relationship between lockdowns and COVID-19 mortality rates.[3] We use "NPI" to describe *any government mandate which directly restrict peoples' possibilities*. Our definition does *not* include governmental recommendations, governmental information campaigns, access to mass testing, voluntary social distancing, etc., but *do* include mandated interventions such as closing schools or businesses, mandated face masks etc. We define *lockdown* as any policy consisting of at least one NPI as described above.[4]

Compared to other reviews such as Herby (2021) and Allen (2021), the main difference in this meta-analysis is that we carry out a systematic and comprehensive search strategy to identify all papers potentially relevant to answer the question we pose. We identify 34 eligible empirical studies that estimate the effect of mandatory lockdowns on COVID-19 mortality using a counterfactual difference-in-difference approach. We present our results in such a way that they can be systematically assessed, replicated, and used to derive overall meta-conclusions.[5]

2 Identification process: Search strategy and eligibility criteria

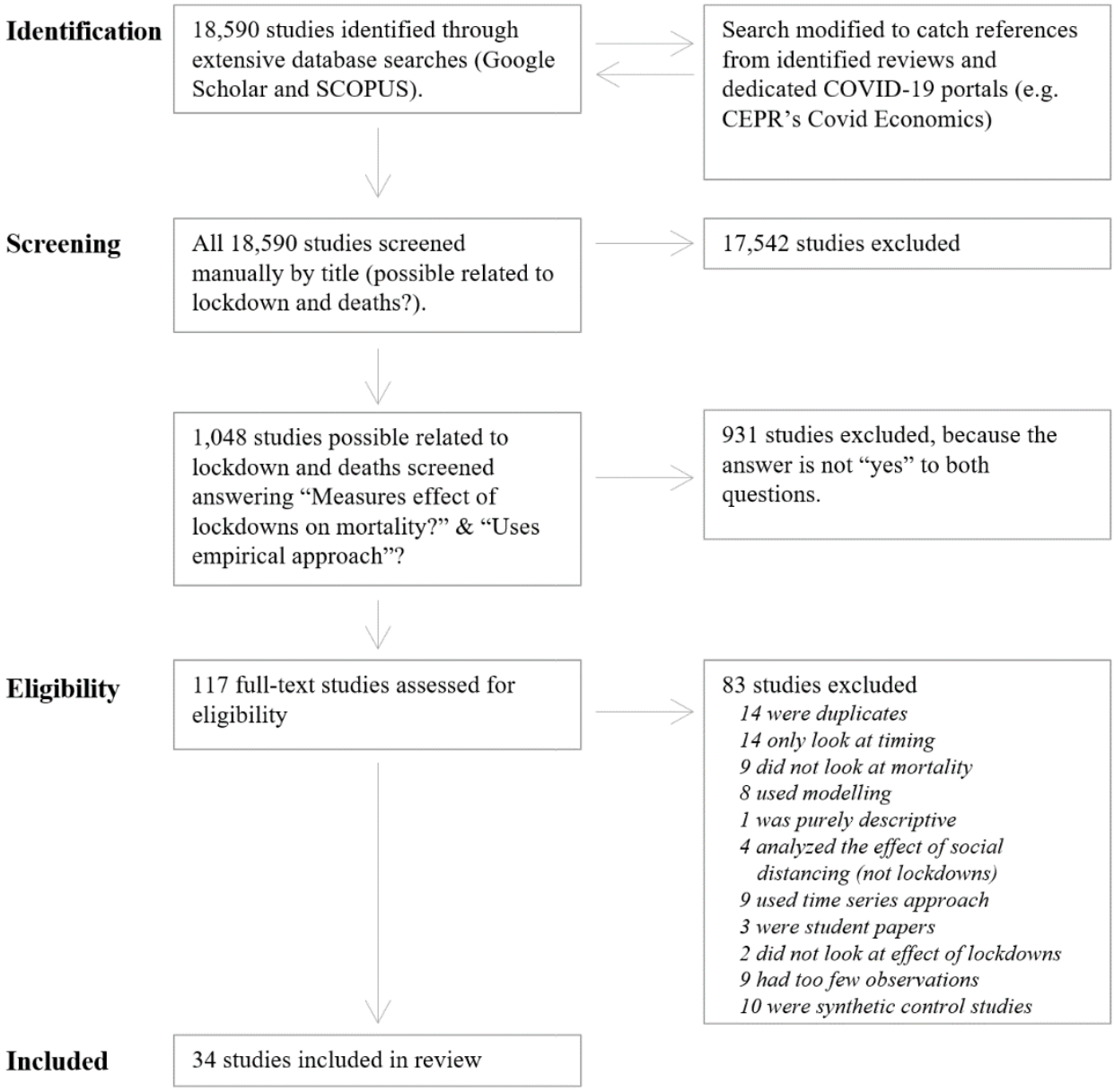
Figure 3 shows an overview of our identification process using a flow diagram designed according to PRISMA guidelines (Moher et al. (2009). Of 18,590 studies identified during our database searches, 1,048 remained after a title-based screening. Then, 931 studies were excluded, because they either did not measure the effect of lockdowns on mortality or did not use an empirical approach. This left 117 studies that were read and inspected. After a more thorough assessment, 83 of the 117 were excluded, leaving 34 studies eligible for our meta-analysis. A table with all 83 studies excluded in the final step can be found in Appendix B, Table 8.

[3] We use "mortality" and "mortality rates" interchangeably to mean COVID-19 deaths per population.

[4] For example, we will say that Country A introduced the *non-pharmaceutical interventions* school closures and shelter-in-place-orders as part of the country's *lockdown.*

[5] An interesting question is, "What damage lockdowns do to the economy, personal freedom and rights, and public health in general?" Although this question is important, it requires a full cost-benefit study, which is beyond the scope of this study.

Figure 3: PRISMA flow diagram for the selection of studies.



Below we present our search strategy and eligibility criteria, which follow the PRISMA guidelines and are specified in detail in our protocol Herby et al. (2021).

2.1 Search strategy

The studies we reviewed were identified by scanning *Google Scholar* and *SCOPUS* for English-language studies. We used a wide range of search terms which are combinations of three search strings: a disease search string ("covid," "corona," "coronavirus," "sars-cov-2"), a government

response search string[6], and a methodology search string[7]. We identified papers based on 1,360 search terms. We also required mentions of "deaths," "death," and/or "mortality." The search terms were continuously updated (by adding relevant terms) to fit this criterion.[8]

We also included all papers published in *Covid Economics*. Our search was performed between July 1 and July 5, 2021 and resulted in 18,590 unique studies.[9] All studies identified using SCOPUS and Covid Economics were also found using Google Scholar. This made us comfortable that including other sources such as VOXeu and SSRN would not change the result. Indeed, many papers found using Google Scholar were from these sources.

All 18,590 studies were first screened based on the title. Studies clearly not related to our research question were deemed irrelevant.[10]

After screening based on the title, 1,048 papers remained. These papers were manually screened by answering two questions:

1. Does the study measure the effect of lockdowns on mortality?
2. Does the study use an empirical *ex post* difference-in-difference approach (see eligibility criteria below)?

Studies to which we could not answer "yes" to both questions were excluded. When in doubt, we made the assessment based on reading the full paper, and in some cases, we consulted with colleagues.[11]

After the manual screening, 117 studies were retrieved for a full, detailed review. These studies were carefully examined, and metadata and empirical results were stored in an Excel

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[6] The government response search string used was: "non-pharmaceutical," "nonpharmaceutical," "NPI," "NPIs," "lockdown," "social distancing orders," "statewide interventions," "distancing interventions," "circuit breaker," "containment measures," "contact restrictions," "social distancing measures," "public health policies," "mobility restrictions," "covid-19 policies," "corona policies," "policy measures."

[7] The methodology search string used was: ("fixed effects," "panel data," "difference-in-difference," "diff-in-diff," "synthetic control," "counterfactual" , "counter factual," "cross country," "cross state," "cross county," "cross region," "cross regional," "cross municipality," "country level," "state level," "county level," "region level," "regional level," "municipality level," "event study."

[8] If a potentially relevant paper from one of the 13 reviews (see eligibility criteria) did not show up in our search, we added relevant words to our search strings and ran the search again. The 13 reviews were: Allen (2021); Brodeur et al. (2021); Gupta et al. (2020); Herby (2021); Johanna et al. (2020); Nussbaumer-Streit et al. (2020); Patel et al. (2020); Perra (2020); Poeschl and Larsen (2021); Pozo-Martin et al. (2020); Rezapour et al. (2021); Robinson (2021); Zhang et al. (2021).

[9] SCOPUS was continuously monitored between July 5th and publication using a search agent. Although the search agent returned several hits during this period, only one of them, An et al. (2021), was eligible according to our eligibility criteria. The study is not included in our review, but the conclusions are in line with our conclusions, as An et al. (2021) conclude that "The analysis shows that the mask mandate is consistently associated with lower infection rates in the short term, and its early adoption boosts the long-term efficacy. By contrast, the other five policy instruments— domestic lockdowns, international travel bans, mass gathering bans, and restaurant and school closures—show weaker efficacy."

[10] This included studies with titles such as "COVID-19 outbreak and air pollution in Iran: A panel VAR analysis" and "Dynamic Structural Impact of the COVID-19 Outbreak on the Stock Market and the Exchange Rate: A Cross-country Analysis Among BRICS Nations."

[11] Professor Christian Bjørnskov of University of Aarhus was particularly helpful in this process.

spreadsheet. All studies were assessed by at least two researchers. During this process, another 64 papers were excluded because they did not meet our eligibility criteria. Furthermore, nine studies with too little jurisdictional variance (< 10 observations) were excluded,[12] and 10 synthetic control studies were excluded.[13] A table with all 83 studies excluded in the final step can be found in Appendix B, Table 8. Below we explain why these studies are excluded.

2.2 Eligibility criteria

Focus on mortality and lockdowns

We only include studies that attempt to establish a relationship (or lack thereof) between lockdown policies and COVID-19 mortality or excess mortality. We exclude studies that use cases, hospitalizations, or other measures.[14]

Counterfactual difference-in-difference approach

We distinguish between two methods used to establish a relationship (or lack thereof) between mortality rates and lockdown policies. The first uses registered cross-sectional mortality data. These are *ex post* studies. The second method uses simulated data on mortality and infection rates.[15] These are *ex ante* studies.

We include all studies using a counterfactual difference-in-difference approach from the former group but disregard all *ex ante* studies, as the results from these studies are determined by model assumptions and calibrations.

Our limitation to studies using a "counterfactual difference-in-difference approach" means that we exclude all studies where the counterfactual is based on forecasting (such as a SIR-model) rather than derived from a difference-in-difference approach. This excludes studies like Duchemin et al. (2020) and Matzinger and Skinner (2020). We also exclude all studies based on interrupted time series designs that simply compare the situation before and after lockdown, as

[12] The excluded studies with too few observations were: Alemán et al. (2020), Berardi et al. (2020), Conyon et al. (2020a), Coccia (2021), Gordon et al. (2020), Juranek and Zoutman (2021), Kapoor and Ravi (2020), Umer and Khan (2020), and Wu and Wu (2020).

[13] The excluded synthetic control studies were: Conyon and Thomsen (2021), Dave et al. (2020), Ghosh et al. (2020), Born et al. (2021), Reinbold (2021), Cho (2020), Friedson et al. (2021), Neidhöfer and Neidhöfer (2020), Cerqueti et al. (2021), and Mader and Rüttenauer (2021).

[14] Analyses based on cases may pose major problems, as testing strategies for COVID-19 infections vary enormously across countries (and even over time within a given country). In consequence, cross-country comparisons of cases are, at best, problematic. Although these problems exist with death tolls as well, they are far more limited. Also, while cases and death tolls are correlated, there may be adverse effects of lockdowns that are not captured by the number of cases. For example, an infected person who is isolated at home with family under a SIPO may infect family members with a higher viral load causing more severe illness. So even if a SIPO reduces the number of cases, it may theoretically increase the number of COVID-19-deaths. Adverse effects like this may explain why studies like Chernozhukov et al. (2021) finds that SIPO reduces the number of cases but have no significant effect on the number of COVID-19-deaths. Finally, mortality is hierarchically the most important outcome, cf. GRADEpro (2013)

[15] These simulations are often made in variants of the SIR-model, which can simulate the progress of a pandemic in a population consisting of people in different states (Susceptible, Infectious, or Recovered) with equations describing the process between these states.

the effect of lockdowns in these studies might contain time-dependent shifts, such as seasonality. This excludes studies like Bakolis et al. (2021) and Siedner et al. (2020).

Given our criteria, we exclude the much-cited paper by Flaxman et al. (2020), which claimed that lockdowns saved three million lives in Europe. Flaxman et al. assume that the pandemic would follow an epidemiological curve unless countries locked down. However, this assumption means that the only interpretation possible for the empirical results is that lockdowns are the only thing that matters, even if other factors like season, behavior etc. caused the observed change in the reproduction rate, Rt. Flaxman et al. are aware of this and state that "our parametric form of R_t assumes that changes in Rt are an immediate response to interventions rather than gradual changes in behavior." Flaxman et al. illustrate how problematic it is to force data to fit a certain model if you want to infer the effect of lockdowns on COVID-19 mortality.[16]

The counterfactual difference-in-difference studies in this review generally exploit variation across countries, U.S. states, or other geographical jurisdictions to infer the effect of lockdowns on COVID-19 fatalities. Preferably, the effect of lockdowns should be tested using randomized control trials, natural experiments, or the like. However, there are very few studies of this type.[17]

Synthetic control studies

The synthetic control method is a statistical method used to evaluate the effect of an intervention in comparative case studies. It involves the construction of a synthetic control which functions as the counter factual and is constructed as an (optimal) weighted combination of a pool of donors. For example, Born et al. (2021) create a synthetic control for Sweden which consists of 30.0% Denmark, 25.3% Finland, 25.8% Netherlands, 15.0% Norway, and 3.9% Sweden. The effect of the intervention is derived by comparing the actual developments to those contained in the synthetic control.

We exclude synthetic control studies because of their inherent empirical problems as discussed by Bjørnskov (2021b). He finds that the synthetic control version of Sweden in Born et al. (2021) deviates substantially from "actual Sweden," when looking at the period before mid-March 2020, when Sweden decided not to lock down. Bjørnskov estimates that *actual Sweden* experienced

[16] Several scholars have criticized Flaxman et al. (2020), e.g. see Homburg and Kuhbandner (2020), Lewis (2020), and Lemoine (2020).

[17] Kepp and Bjørnskov (2021) is one such study. They use evidence from a quasi-natural experiment in the Danish region of Northern Jutland. After the discovery of mutations of Sars-CoV-2 in mink – a major Danish export – seven of the 11 municipalities of the region went into extreme lockdown in early November, while the four other municipalities retained the moderate restrictions of the remaining country. Their analysis shows that while infection levels decreased, they did so before lockdown was in effect, and infection numbers also decreased in neighbor municipalities without mandates. They conclude that efficient infection surveillance and voluntary compliance make full lockdowns unnecessary, at least in some circumstances. Kepp and Bjørnskov (2021) is not included in our review, because they focus on cases and not COVID-19 mortality. Dave et al. (2020) is another such study. They see the Wisconsin Supreme Court abolishment of Wisconsin's "Safer at Home" order (a SIPO) as a natural experiment and find that "the repeal of the state SIPO impacted social distancing, COVID-19 cases, or COVID-19-related mortality during the fortnight following enactment." Dave et al. (2020) is not included in our review, because they use a synthetic control method.

approximately 500 fewer deaths the first 11 weeks of 2020 and 4,500 fewer deaths in 2019 compared to *synthetic Sweden*.

This problem is inherent in all synthetic control studies of COVID-19, Bjørnskov argues, because the synthetic control should be fitted based on a long period of time before the intervention or the event one is studying the consequences of – i.e., the lockdown Abadie (2021). However, this is not possible for the coronavirus pandemic, as there clearly *is* no long period with coronavirus before the lockdown. Hence, the synthetic control study approach is *by design* not appropriate for studying the effect of lockdowns.

Jurisdictional variance - few observations

We exclude all interrupted time series studies which simply compare mortality rates before and after lockdowns. Simply comparing data from before and after the imposition of lockdowns could be the result of time-dependent variations, such as seasonal effects. For the same reason, we also exclude studies with little jurisdictional variance.[18] For example, we exclude Conyon et al. (2020b) who "exploit policy variation between Denmark and Norway on the one hand and Sweden on the other" and, thus, only have one jurisdictional area in the control group. Although this *is* a difference-in-difference approach, there is a non-negligible risk that differences are caused by much more than just differences in lockdowns. Another example is Wu and Wu (2020), who use all U.S. states, but pool groups of states so they end with basically three observations. None of the excluded studies cover more than 10 jurisdictional areas.[19] One study is a special case of the jurisdictional variance criteria (Auger et al. (2020). Those researchers analyze the effect of school closures in U.S. states and find that those closures reduce mortality by 35%. However, all 50 states closed schools between March 13, 2020, and March 23, 2020, which means that all difference-in-difference is based on maximum 10 days. Given the long lag between infection and death, there is a risk that Auger et al.'s approach is an interrupted time series analysis where they compare United States before and after school closures, rather than a true difference-in-difference approach. However, we choose to include this study, as it is eligible under our protocol Herby et al. (2021).

Publication status and date

We include all *ex post* studies regardless of publication status and date. That is, we cover both working papers and papers published in journals. We include the early papers because the knowledge of the COVID-19-pandemic grew rapidly in the beginning, making later papers able to stand on the shoulders of previous work. Also, in the early days of COVID-19, speed was

[18] A jurisdictional area can be countries, U.S. states, or counties. With "jurisdictional variance" we refer to variation in mandates across jurisdictional areas.

[19] All studies excluded on this criterion are listed in footnote 12.

crucial which may have affected the quality of the papers. Including them makes it possible to compare the results of early studies to studies carried out at a later stage.[20]

The role of optimal timing

We exclude papers which analyze the effect of early lockdowns in contrast to later lockdowns. There's no doubt that being prepared for a pandemic and knowing when it arrives at your doorstep is vital. However, at least two problems arise with respect to evaluating the effect of well-timed lockdowns.

First, when COVID-19 hit Europe and the United States, it was virtually impossible to determine the right timing. The World Health Organization declared the outbreak a pandemic on March 11, 2020, but at that date, Italy had already registered 13.7 COVID-19 deaths per million. On March 29, 2020, 18 days after the WHO declared the outbreak a pandemic and the earliest a lockdown response to the WHO's announcement could potentially have an effect, the mortality rate in Italy was a staggering 178 COVID-19 deaths per million with an additional 13 per million dying each day.[21]

Secondly, it is extremely difficult to differentiate between the effect of public awareness and the effect of lockdowns when looking at timing because people and politicians are likely to react to the same information. As Figure 4 illustrates, all European countries and U.S. states that were hit hard and early by COVID-19 experienced high mortality rates, whereas all countries hit relatively late experienced low mortality rates. Björk et al. (2021) illustrate the difficulties in analyzing the effect of timing. They find that a 10-stringency-points-stricter lockdown would reduce COVID-19 mortality by a total of 200 deaths per million[22] if done in week 11, 2020, but would only have approximately 1/3 of the effect if implemented one week earlier or later and no effect if implemented three weeks earlier or later. One interpretation of this result is that lockdowns do not work if people either find them unnecessary and fail to obey the mandates or if people voluntarily lock themselves down. This is the argument Allen (2021) uses for the ineffectiveness of the lockdowns he identifies. If this interpretation is true, what Björk et al. (2021) find is that information and signaling is far more important than the strictness of the lockdown. There may be other interpretations, but the point is that studies focusing on timing cannot differentiate between these interpretations. However, if lockdowns have a notable effect, we should see this effect regardless of the timing, and we should identify this effect more correctly by excluding studies that exclusively analyze timing.

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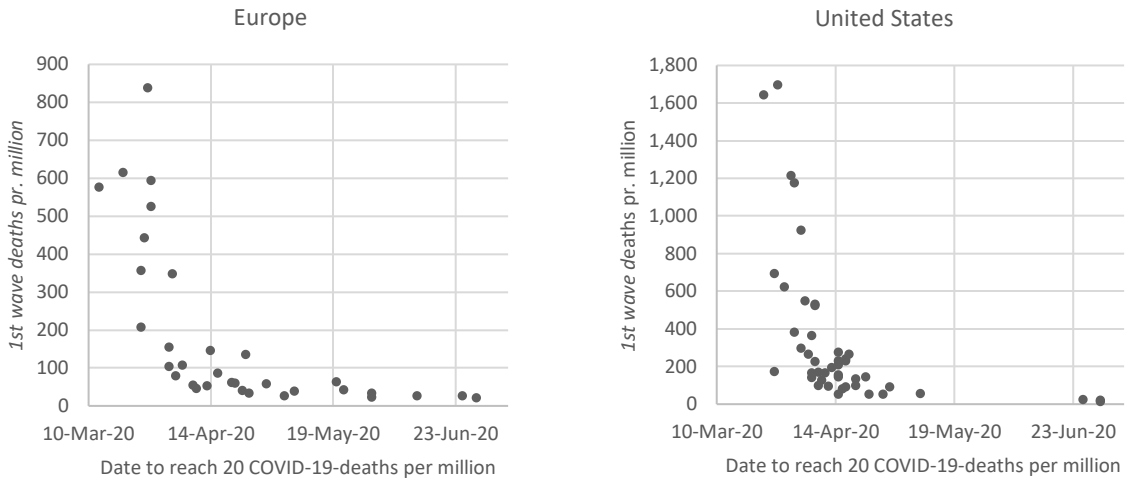
[20] We also intended to exclude studies which were primarily based on data from 2021 (as these studies would be heavily affected by vaccines) and studies that did not cover at least one EU-country, the United States, one U.S. U.S. state or Latin America, and where at least one country/state was not an island. However, we did not find any such studies.

[21] There's approximately a two-to-four-week gap between infection and deaths. See footnote 29.

[22] They estimate that 10-point higher stringency will reduce excess mortality by 20 "per week and million" in the 10 weeks from week 14 to week 23.

Figure 4: **Taken by surprise. The importance of having time to prepare**



Comment: The figure shows the relationship between early pandemic strength and total 1st wave of COVID-19 death toll. On the X-axis is "Days to reach 20 COVID-19-deaths per million (measured from February 15, 2020)." The Y-axis shows mortality (deaths per million) by June 30, 2020.
Source: Reported COVID-19 deaths and OxCGRT stringency for European countries and U.S. states with more than one million citizens. Data from Our World in Data.

We are aware of one meta-analysis by Stephens et al. (2020), which looks into the importance of timing. The authors find 22 studies that look at policy and timing with respect to mortality rates, however, only four were multi-country, multi-policy studies, which could possibly account for the problems described above. Stephens et al. conclude that "the timing of policy interventions across countries relative to the first Wuhan case, first national disease case, or first national death, is not found to be correlated with mortality." (See Appendix A for further discussion of the role of timing.)

3 The empirical evidence

In this section we present the empirical evidence found through our identification process. We describe the studies and their results, but also comment on the methodology and possible identification problems or biases.

3.1 Preliminary considerations

Before we turn to the eligible studies, we present some considerations that we adopted when interpreting the empirical evidence.

Empirical interpretation

While the policy conclusions contained in some studies are based on statistically significant results, many of these conclusions are ill-founded due to the tiny impact associated with said statistically significant results. For example, Ashraf (2020) states that "social distancing

measures has proved effective in controlling the spread of [a] highly contagious virus." However, their estimates show that the average lockdown in Europe and the U.S only reduced COVID-19 mortality by 2.4%.[23] Another example is Chisadza et al. (2021). The authors argue that "less stringent interventions increase the number of deaths, whereas more severe responses to the pandemic can lower fatalities." Their conclusion is based on a negative estimate for the squared term of *stringency* which results in a total negative effect on mortality rates (i.e. fewer deaths) for stringency values larger than 124. However, the stringency index is limited to values between 0 and 100 by design, so the conclusion is clearly incorrect. To avoid any such biases, we base our interpretations solely on the empirical estimates and not on the authors' own interpretation of their results.

Handling multiple models, specifications, and uncertainties

Several studies adopt a number of models to understand the effect of lockdowns. For example, Bjørnskov (2021a) estimates the effect after one, two, three, and four weeks of lockdowns. For these studies, we select the longest time horizon analyzed to obtain the estimate closest to the long-term effect of lockdowns.

Several studies also use multiple specifications including and excluding potentially relevant variables. For these studies, we choose the model which the authors regard as their main specification. Finally, some studies have multiple models which the authors regard as equally important. One interesting example is Chernozhukov et al. (2021), who estimate two models with and without national case numbers as a variable. They show that including this variable in their model alters the results substantially. The explanation could be that people responded to national conditions. For these studies, we present both estimates in Table 1, but – following Doucouliagos and Paldam (2008) – we use an average of the estimates in our meta-analysis in order to not give more weight to a study with multiple models relative to studies with just one principal model.

For studies looking at different classes of countries (e.g. rich and poor), we report both estimates in Table 1 but use the estimate for rich Western countries in our meta-analysis, where we derive common estimates for Europe and the United States.

Effects are measured "relative to Sweden in the spring of 2020"

Virtually all countries in the world implemented mandated NPIs in response to the COVID-19 pandemic. Hence, most estimates are relative to "doing the least," which in many Western countries means relative to doing as Sweden has done, especially during the first wave, when Sweden, do to constitutional constraints, implemented very few restrictions compared to other western countries (Jonung and Hanke 2020). However, some studies *do* compare the effect of doing something to the effect of doing absolutely nothing (e.g. Bonardi et al. (2020)).

The consequence is that some estimates are relative to "doing the least" while others are relative to "doing nothing." This may lead to biases if "doing the least" works as a signal (or warning)

[23] We describe how we arrive at the 2.4% in Section 4.

which alters the behavior of the public. For example, Gupta et al. (2020) find a large effect of emergency declarations, which they argue "are best viewed as an information instrument that signals to the population that the public health situation is serious and they act accordingly," on social distancing but not of other policies such as SIPOs (shelter-in-place orders). Thus, if we compare a country issuing a SIPO to a country doing nothing, we may overestimate the effect of a SIPO, because it is the sum of the signal *and* the SIPO. Instead, we should compare the country issuing the SIPO to a country "doing the least" to estimate the *marginal* effect of the SIPO.

To take an example, Bonardi et al. (2020) find relatively large effects of doing *something* but no effect of doing *more*. They find no extra effect of stricter lockdowns relative to less strict lockdowns and state that "our results point to the fact that people might adjust their behaviors quite significantly as partial measures are implemented, which might be enough to stop the spread of the virus." Hence, whether the baseline is Sweden, which implemented a ban on large gatherings early in the pandemic, or the baseline is "doing nothing" can affect the magnitude of the estimated impacts. There is no obvious right way to resolve this issue, but since estimates in most studies are relative to doing less, we report results as compared to "doing less" when available. Hence, for Bonardi et al. we state that the effect of lockdowns is zero (compared to Sweden's "doing the least").

3.2 Overview of the findings of eligible studies

Table 1 covers the 34 studies eligible for our review.[24] Out of these 34 studies, 22 were peer-reviewed and 12 were working papers. The studies analyze lockdowns during the first wave. Most of the studies (29) use data collected before September 1st, 2020 and 10 use data collected before May 1st, 2020. Only one study uses data from 2021. All studies are cross-sectional, ranging across jurisdictions. Geographically, 14 studies cover countries worldwide, four cover European countries, 13 cover the United States, two cover Europe and the United States, and one covers regions in Italy. Seven studies analyze the effect of SIPOs, 10 analyze the effect of stricter lockdowns (measured by the OxCGRT stringency index), 16 studies analyze specific NIP's independently, and one study analyzes other measures (length of lockdown).

Several studies find no statistically significant effect of lockdowns on mortality. For example, this includes Bjørnskov (2021a) and Stockenhuber (2020) who find no significant effect of stricter lockdowns (higher OxCGRT stringency index), Sears et al. (2020) and Dave et al. (2021), who find no significant effect of SIPOs, and Chaudhry et al. (2020), Aparicio and Grossbard (2021) and Guo et al. (2021) who find no significant effect of any of the analyzed NIP's, including business closures, school closures and border closures.

Other studies find a significant negative relationship between lockdowns and mortality. Fowler et al. (2021 find that SIPOs reduce COVID-19 mortality by 35%, while Chernozhukov et al.

[24] The following information can be found for each study in Table 2.

(2021) find that employee mask mandates reduces mortality by 34% and closing businesses and bars reduces mortality by 29%.

Some studies find a significant positive relationship between lockdowns and mortality. This includes Chisadza et al. (2021), who find that stricter lockdowns (higher OxCGRT stringency index) increases COVID-19 mortality by 0.01 deaths/million per stringency point and Berry et al. (2021), who find that SIPOs increase COVID-19 mortality by 1% after 14 days.

Most studies use the number of official COVID-19 deaths as the dependent variable. Only one study, Bjørnskov (2021a), looks at total excess mortality which – although is not perfect – we perceive to be the best measure, as it overcomes the measurement problems related to properly reporting COVID-19 deaths.

Several studies explicitly claim that they estimate the actual causal relationship between lockdowns and COVID-19 mortality. Some studies use instrumental variables to justify the causality associated with their analysis, while others make causality probable using anecdotal evidence.[25] But, Sebhatu et al. (2020) show that government policies are strongly driven by the policies initiated in neighboring countries rather than by the severity of the pandemic in their own countries. In short, it is not the severity of the pandemic that drives the adoption of lockdowns, but rather the propensity to copy policies initiated by neighboring countries. The Sebhatu et al. conclusion throws into doubt the notion of a causal relationship between lockdowns and COVID-19 mortality.

Table 1: Summary of eligible studies

1. Study (Author & title)	2. Measure	3. Description	4. Results	5. Comments
Alderman and Harjoto (2020); "COVID-19: U.S. shelter-in-place orders and demographic characteristics linked to cases, mortality, and recovery rates"	COVID-19 mortality	Use State-level data from the COVID-19 Tracking Project data all U.S. states, and a multivariate regression analysis to empirically investigate the impacts of the duration of shelter-in-place orders on mortality.	Find that shelter-in-place orders are - for the average duration - associated with 1% (insignificant) fewer deaths per capita.	
Aparicio and Grossbard (2021); "Are Covid Fatalities in the U.S. Higher than in the EU, and If so, Why?"	COVID-19 mortality	Their main focus is to explain the gap in COVID-19-fatalities between Europe and the United States based on COVID-deaths and other data from 85 nations/states. They include status for "social events" (ban on public gatherings, cancellation of major events and conferences), school closures, shop closures "partial lockdowns" (e.g. night curfew) and "lockdowns" (all-day curfew) 100 days after the pandemic onset in a country/state. None of these interventions have a significant effect on COVID-19 mortality. They also find no	Find no effect of "social events" (ban on public gatherings, cancellation of major events and conferences), school closures, shop closures "partial lockdowns" (e.g. night curfew) and "lockdowns" (all-day curfew) 100 days after the pandemic onset.	In the abstract the authors states that "various types of social distance measures such as school closings and lockdowns, and how soon they were implemented, help explain the U.S./EUROPE gap in cumulative deaths measured 100 days after the pandemic's onset in a state or country" although their estimates are insignificant.

[25] E.g. Dave et al. (2021) states that "estimated case reductions accelerate over time, becoming largest after 20 days following enactment of a SIPO. These findings are consistent with a causal interpretation."

1. Study (Author & title)	2. Measure	3. Description	4. Results	5. Comments
		significant effect of early cancelling of social events, school closures, shop closures, partial lockdowns and full lockdowns.		
Ashraf (2020); "Socioeconomic conditions, government interventions and health outcomes during COVID-19"	COVID-19 mortality	Their main focus is on the effectiveness of policies targeted to diminish the effect of socioeconomic inequalities (economic support) on COVID-19-deaths. They use data from 80 countries worldwide and include the OxCGRT stringency as a control variable in their models. The paper finds a significant negative (fewer deaths) effect of stricter lockdowns. The effect of lockdowns is insignificant, when they include an interaction term between the socioeconomic conditions index and the economic support index in their model.	For each 1-unit increase in OxCGRT stringency index, the cumulative mortality changes by -0.326 deaths per million (fewer deaths). The estimate is -0.073 deaths per million but insignificant, when including an interaction term between the socioeconomic conditions index and the economic support index.	
Auger et al. (2020); "Association between statewide school closure and COVID-19 incidence and mortality in the U.S."	COVID-19 mortality	U.S. population-based observational study which uses interrupted time series analyses incorporating a lag period to allow for potential policy-associated changes to occur. To isolate the association of school closure with outcomes, state-level nonpharmaceutical interventions and attributes were included in negative binomial regression models. Models were used to derive the estimated absolute differences between schools that closed and schools that remained open. The main outcome of the study is COVID-19 daily incidence and mortality per 100000 residents.	State that they adjust for several factors (e..g percentage of state's population aged 15 years and 65 years, CDC's social vulnerability index, stay-at-home or shelter-in-place order, restaurant and bar closure, testing rate per 1000 residents etc.), but does not specify how and do not present estimates.	All 50 states closed schools between March 13, 2020, and March 23, 2020. Hence, all difference-in-difference is based on maximum 10 days, and given the long lag between infection and death, there is a risk that their approach is more an interrupted time series analysis, where they compare United States before and after school closures, rather than a true difference-in-difference approach. However, we choose to include the study in our review as it - objectively speaking - lives up to the eligibility criteria specified in our protocol.
Berry et al. (2021); "Evaluating the effects of shelter-in-place policies during the COVID-19 pandemic"	COVID-19 mortality	The authors use U.S. county data on COVID-19 deaths from Johns Hopkin and SIPO data from the University of Washington to estimate the effect of SIPO's. They find no detectable effects of SIPO on deaths. The authors stress that their findings should not be interpreted as evidence that social distancing behaviors are not effective. Many people had already changed their behaviors before the introduction of shelter-in-place orders, and shelter-in-place orders appear to have been ineffective precisely because they did not meaningfully alter social distancing behavior.	SIPO increases the number of deaths by 0,654 per million after 14 days (see Fig. 2)	The authors conclude that "We do not find detectable effects of these policies [SIPO] on disease spread or deaths." However, this statement does not correspond to their results. In figure 2 they show that the effect on deaths is significant after 14 days. Looks at the effect 14 days after SIPO's are implemented which is a short lag given that the time between infection and deaths is at least 2-3 weeks.
Bjørnskov (2021a); "Did Lockdown Work? An Economist's Cross-Country Comparison"	Excess mortality	Uses excess mortality and OxCGRT stringency from 24 European countries to estimate the effect of lockdown on the number of deaths one, two, three and four weeks later. Finds no effect (negative but insignificant) of (stricter) lockdowns. The author's specification using instrument variables yields similar results.	A stricter lockdown (OxCGRT stringency) does not have a significant effect on excess mortality.	Finds a positive (more deaths) effect after one and two weeks, which could indicate that other factors (omitted variables) affect the results.
Blanco et al. (2020); "Do Coronavirus Containment Measures Work? Worldwide Evidence"	COVID-19 mortality	Use data for deaths and NPIs from Hale et al. (2020) covering 158 countries between January and August 2020 to evaluate the effect of eight different NPIs (stay at home, bans on gatherings, bans on public	When using the naïve dummy variable approach, all parameters are statistically	Run the same model four times for each of the different NPIs (stay at home-orders, ban on meetings, ban on public events and mobility restrictions). These NPIs were often introduced almost simultaneously so there is a high risk of

1. Study (Author & title)	2. Measure	3. Description	4. Results	5. Comments
		events, closing schools, lockdowns of workplaces, interruption of public transportation services, and international border closures. They address the possible endogeneity of the NPIs by using instrumental variables.	insignificant. On the contrary, estimates using the instrumental variable approach indicate that NPIs are effective in reducing the growth rate in the daily number of deaths 14 days later.	multicollinearity with each run capturing the same underlying effect. Indeed, the size and standard errors of the estimates are worryingly similar. Looks at the effect 14 days after NPIs are implemented which is a fairly short lag given the time between infection and deaths is 2-3 weeks, cf. e.g. Flaxman et al. (2020), which according to Bjørnskov (2020) appears to be the minimum typical time from infection to death).
Bonardi et al. (2020); "Fast and local: How did lockdown policies affect the spread and severity of the covid-19"	Growth rates	Use NPI data scraped from news headlines from LexisNexis and death data from Johns Hopkins University up to April 1st 2020 in a panel structure with 184 countries. Controls for country fixed effects, day fixed effects and within-country evolution of the disease.	Find that certain interventions (SIPO, regional lockdown and partial lockdown) work (in developed countries), but that stricter interventions (SIPO) do not have a larger effect than less strict interventions (e.g. restrictions on gatherings). Find no effect of border closures.	Find a positive (more deaths) effect on day 1 after lockdown which may indicate that their results are driven by other factors (omitted variables). We rely on their publicly available version submitted to CEPR Covid Economics, but estimates on the effect of deaths can be found in Supplementary material, which is available in an updated version hosted on the Danish Broadcasting Corporation's webpage: https://www.dr.dk/static/documents/2021/03/04/managing_pandemics_e3911c11.pdf
Bongaerts et al. (2021); "Closed for business: The mortality impact of business closures during the Covid-19 pandemic"	COVID-19 mortality	Uses variation in exposure to closed sectors (e.g. tourism) in municipalities within Italy to estimate the effect of business closures. Assuming that municipalities with different exposures to closed sectors are not inherently different, they find that municipalities with higher exposure to closed sectors experienced subsequently lower mortality rates.	Business shutdown saved 9,439 Italian lives by April 13th 2020. This corresponds to a reduction of deaths by 32%, as there were 20,465 COVID-19-deaths in Italy by mid April 2020.	They (implicitly) assume that municipalities with different exposures to closed sectors are not inherently different. This assumption could be problematic, as more touristed municipalities can be very different from e.g. more industrialized municipalities.
Chaudhry et al. (2020); "A country level analysis measuring the impact of government actions, country preparedness and socioeconomic factors on COVID-19 mortality and related health outcomes"	COVID-19 mortality	Uses information on COVID-19 related national policies and health outcomes from the top 50 countries ranked by number of cases. Finds no significant effect of any NPI on the number of COVID-19-deaths.	Finds no significant effect on mortality of any of the analyzed interventions (partial border closure, complete border closure, partial lockdown (physical distancing measures only), complete lockdown (enhanced containment measures including suspension of all non-essential services), and curfews).	
Chernozhukov et al. (2021); "Causal impact of masks, policies, behavior on early covid-19 pandemic in the U.S."	Growth rates	Uses COVID-deaths from the New York Times and Johns Hopkins and data for U.S. States from Raifman et al. (2020) to estimate the effect of SIPO, closed nonessential businesses, closed K-12 schools, closed restaurants except takeout, closed movie theaters, and face mask mandates for employees in public facing businesses.	Finds that mandatory masks for employees and closing K-12 schools reduces deaths. SIPO and closing business (average of closed businesses, restaurants and movie theaters) has no statistically significant effect. The effect of school closures is highly sensitive to the	States that ”our regression specification for case and death growths is explicitly guided by a SIR model although our causal approach does not hinge on the validity of a SIR model.” We are uncertain if this means that data are managed to fit an SIR-model (and thus should fail our eligibility criteria).

1. Study (Author & title)	2. Measure	3. Description	4. Results	5. Comments
			inclusion of national case and death data.	
Chisadza et al. (2021); "Government Effectiveness and the COVID-19 Pandemic"	COVID-19 mortality	Uses COVID-19-deaths and OxCGRT stringency from 144 countries to estimate the effect of lockdown on the number of COVID-19-deaths. Find a significant positive (more deaths) non-linear association between government response indices and the number of deaths.	An increase by 1 on "stringency index" increases the number of deaths by 0.0130 per million. The sign of the squared term is negative, but the combined non-linear estimate is positive (increases deaths) and larger than the linear estimate for all values of the OxCGRT stringency index.	The author states that "less stringent interventions increase the number of deaths, whereas more severe responses to the pandemic can lower fatalities." However, according to their estimates this is not correct, as the combined non-linear estimate cannot be negative for relevant values of the OxCGRT stringency index (0 to 100).
Dave et al. (2021); "When Do Shelter-in-Place Orders Fight Covid-19 Best? Policy Heterogeneity Across States and Adoption Time"	COVID-19 mortality	Uses smartphone location tracking and state data on COVID-19 deaths and SIPO data (supplemented by their own searches) collected by the New York Times to estimate the effect of SIPO's. Finds that SIPO was associated with a 9%–10% increase in the rate at which state residents remained in their homes full-time, but overall they do not find an significant effect on mortality after 20+ days (see Figure 4). Indicate that the lacking significance may be due to long term estimates being identified of a few early adopting states.	Finds no overall significant effect of SIPO on deaths but does find a negative effect (fewer deaths) in early adopting states.	Find large effects of SIPO on deaths after 6-14 days in early adopting states (see Table 8), which is before an SIPO-related effect would be seen. This could indicate that other factors rather than SIPO's drive the results.
Dergiades et al. (2020); "Effectiveness of government policies in response to the COVID-19 outbreak"	COVID-19 mortality	Uses daily deaths from the European Centre for Disease Prevention and Control and OxCGRT stringency from 32 countries worldwide (including U.S.) to estimates the effect of lockdown on the number of deaths.	Finds that the greater the strength of government interventions at an early stage, the more effective these are in slowing down or reversing the growth rate of deaths.	Focus is on the effect of early stage NPIs and thus does not absolutely live up to our eligibility criteria. However, we include the study as it differentiates between lockdown strength at an early stage.
Fakir and Bharati (2021); "Pandemic catch-22: The role of mobility restrictions and institutional inequalities in halting the spread of COVID-19"	COVID-19 mortality	Uses data from 127 countries. combining high-frequency measures of mobility data from Google's daily mobility reports, country-date-level information on the stringency of restrictions in response to the pandemic from Oxford's Coronavirus Government Response Tracker (OxCGRT), and daily data on deaths attributed to COVID-19 from Our World In Data and the Johns Hopkins University. Instrument stringency using day-to-day changes in the stringency of the restrictions in the rest of the world.	Find large causal effects of stricter restrictions on the weekly growth rate of recorded deaths attributed to COVID-19. Show that more stringent interventions help more in richer, more educated, more democratic, and less corrupt countries with older, healthier populations and more effective governments.	Finds a larger effect on deaths after 0 days than after 14 and 21 days (Table 3). This is surprising given that it takes 2-3 weeks from infection to death, and it may indicate that their results are driven by other factors.
Fowler et al. (2021); "Stay-at-home orders associate with subsequent decreases in COVID-19 cases and fatalities in the United States"	COVID-19 mortality	Uses U.S. county data on COVID-19 deaths and SIPO data collected by the New York Times to estimate the effect of SIPO's using a two-way fixed-effects difference-in-differences model. Find a large and early (after few days) effect of SIPO on COVID-19 related deaths.	Stay-at-home orders are also associated with a 59.8 percent (18.3 to 80.2) average reduction in weekly fatalities after three weeks. These results suggest that stay-at-home orders	Finds the largest effect of SIPO on deaths after 10 days (see Figure 4), before a SIPO-related effect could possibly be seen as it takes 2-3 weeks from infection to death. This could indicate that other factors drive their results.

1. Study (Author & title)	2. Measure	3. Description	4. Results	5. Comments
			might have reduced confirmed cases by 390,000 (170,000 to 680,000) and fatalities by 41,000 (27,000 to 59,000) within the first three weeks in localities that implemented stay-at-home orders.	
Fuller et al. (2021); "Mitigation Policies and COVID-19–Associated Mortality — 37 European Countries, January 23–June 30, 2020"	COVID-19 mortality	Uses COVID-19-deaths and OxCGRT stringency in 37 European countries to estimate the effect of lockdown on the number of COVID-19-deaths. Find a significant negative (fewer deaths) effect of stricter lockdowns after mortality threshold is reached (the threshold is a daily rate of 0.02 new COVID-19 deaths per 100,000 population (based on a 7-day moving average))	For each 1-unit increase in OxCGRT stringency index, the cumulative mortality decreases by 0.55 deaths per 100,000.	
Gibson (2020); "Government mandated lockdowns do not reduce Covid-19 deaths: implications for evaluating the stringent New Zealand response"	COVID-19 mortality	Uses data for every county in the United States from March through June 1, 2020, to estimate the effect of SIPO (called "lockdown") on COVID-19 mortality. Policy data are acquired from American Red Cross reporting on emergency regulations. His control variables include county population and density, the elder share, the share in nursing homes, nine other demographic and economic characteristics and a set of regional fixed effects. Handles causality problems using instrument variables (IV).	Find no statistically significant effect of SIPO.	Gibson use the word "lockdown" as synonym for SIPO (writes "technically, government-ordered community quarantine")
Goldstein et al. (2021); "Lockdown Fatigue: The Diminishing Effects of Quarantines on the Spread of COVID-19 "	COVID-19 mortality	Uses panel data from 152 countries with data from the onset of the pandemic until December 31, 2020. Finds that lockdowns tend to reduce the number of COVID-19 related deaths, but also that this benign impact declines over time: after four months of strict lockdown, NPIs have a significantly weaker contribution in terms of their effect in reducing COVID-19 related fatalities.	Stricter lockdowns reduce deaths for the first 60 days, whereafter the cumulative effect begins to decrease. If reintroduced after 120, the effect of lockdowns is smaller in the short run, but after 90 days the effect is almost the same as during first lockdown (only app. 10% lower).	There is little documentation in the study (e.g. no tables with estimates).
Guo et al. (2021); "Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts"	COVID-19 mortality	Uses policy data from 1,470 executive orders from the state–government websites for all 50 states and Washington DC and COVID-19-deaths from Johns Hopkins University in a random-effect spatial error panel model to estimate the effect of nine NPIs (SIPO, strengthened SIPO, public school closure, all school closure, large-gathering ban of more than 10 people, any gathering ban, restaurant/bar limit to dining out only, nonessential business closure, and mandatory self-quarantine of travelers) on COVID-19 deaths.	Two mitigation strategies (all school closure and mandatory self-quarantine of travelers) showed positive (more deaths) impact on COVID-19-deaths per 10,000. Six mitigation strategies (SIPO, public school closure, large gathering bans (>10), any gathering ban, restaurant/bar limit to dining out only, and nonessential business	Only conclude on NPIs which reduce mortality. However, the conclusion is based on one-tailed tests, which means that all positive estimates (more deaths) are deemed insignificant. Thus, in their mortality-specification (Table 3, Proportion of Cumulative Deaths Over the Population), the estimate of all school closures (.204) and mandatory self-quarantine of travelers (0.363) is deemed insignificant based on schools CI [.029, .379] and quarantine CI [.193, .532]. We believe, these results should be interpreted as a significant increase in mortality, and that these results should have been part of their conclusion.

1. Study (Author & title)	2. Measure	3. Description	4. Results	5. Comments
			closure) did not show any impact (Table 3, "Proportion of Cumulative Deaths Over the Population).	
Hale et al. (2020); "Global assessment of the relationship between government response measures and COVID-19 deaths"	COVID-19 mortality	Uses the OxCGRT stringency and COVID-19-deaths from the European Centre for Disease Prevention and Control for 170 countries. Estimates both cross-sectional models in which countries are the unit of analysis, as well as longitudinal models on time-series panel data with country-day as the unit of analysis (including models that use both time and country fixed effects).	Finds that higher stringency in the past leads to a lower growth rate in the present, with each additional point of stringency corresponding to a 0.039%-point reduction in daily deaths growth rates six weeks later.	
Hunter et al. (2021); "Impact of non-pharmaceutical interventions against COVID-19 in Europe: A quasi-experimental non-equivalent group and time-series"	COVID-19 mortality	Uses death data from the European Centre for Disease Prevention and Control (ECDC) and NPI-data from the Institute of Health Metrics and Evaluation. Argues that they use a quasi-experimental approach to identify the effect of NPIs because no analyzed intervention was imposed by all European countries and interventions were put in place at different points in the development of the epidemics.	Finds that mass gathering restrictions and initial business closures (businesses such as entertainment venues, bars and restaurants) reduces the number of deaths, whereas closing educational facilities and issuing SIPO increases the number of deaths. Finds no effect of closing non-essential services and mandating/recommending masks (Table 3)	Finds an effect of closing educational facilities and non-essential services after 1-7 days before lockdown could possibly have an effect on the number of deaths. This may indicate that other factors are driving their results.
Langeland et al. (2021); "The Effect of State Level COVID-19 Stay-at-Home Orders on Death Rates"	COVID-19 mortality	Estimates the effect of state-level lockdowns on COVID-19 deaths using multiple quasi-Poisson regressions with lockdown time length as the explanatory variable. Does not specify how lockdown is defined and what their data sources are.	Finds no significant effect of SIPO on the number of deaths after 2-4, 4-6 and 6+ weeks.	They write that "6+ weeks of lockdown is the only setting where the odds of dying are statistically higher than in the no lockdown case." However, all estimates are insignificant in Table C. Looks as if lockdown duration may cause a causality problem, because politicians may be less likely to ease restrictions when there are many cases/deaths.
Leffler et al. (2020); "Association of country-wide coronavirus mortality with demographics, testing, lockdowns, and public wearing of masks"	COVID-19 mortality	Use COVID-19 deaths from Worldometer and info about NPIs (mask/mask recommendations, international travel restrictions and lockdowns (defined as any closure of schools or workplaces, limits on public gatherings or internal movement, or stay-at-home orders) from Hale et al. (2020) for 200 countries to estimate the effect of the duration of NPIs on the number of deaths.	Finds that masking (mask recommendations) reduces mortality. For each week that masks were recommended the increase in per-capita mortality was 8.1% (compared to 55.7% increase when masks were not recommended). Finds no significant effect of the number of weeks with internal lockdowns and international travel restrictions (Table 2).	Their "mask recommendation" category includes some countries, where masks were mandated (see Supplemental Table A1) and may (partially) capture the effect of mask mandates. Looks at duration which may cause a causality problem, because politicians may be less likely to ease restrictions when there are many cases/deaths.
Mccafferty and Ashley (2021); "Covid-19 Social Distancing Interventions by Statutory Mandate and Their Observational	Other	Use data from 27 U.S. states and 12 European countries to analyze the effect of NPIs on peak morality rate using general linear mixed effects modelling.	Finds that no mandate (school closures, prohibition on mass gatherings, business closures, stay at home	

1. Study (Author & title)	2. Measure	3. Description	4. Results	5. Comments
Correlation to Mortality in the United States and Europe"			orders, severe travel restrictions, and closure of non-essential businesses) was effective in reducing the peak COVID-19 mortality rate.	
Pan et al. (2020); "Covid-19: Effectiveness of non-pharmaceutical interventions in the united states before phased removal of social distancing protections varies by region"	COVID-19 mortality	Uses county-level data for all U.S. states. Mortality is obtained from Johns Hopkins, while policy data are obtained from official governmental websites. Categorizes 12 policies into 4 levels of disease control; Level 1 (low) - State of Emergency; Level 2 (moderate) - school closures, restricting access (visits) to nursing homes, or closing restaurants and bars; Level 3 (high) - non-essential business closures, suspending non-violent arrests, suspending elective medical procedures, suspending evictions, or restricting mass gatherings of at least 10 people; and Level 4 (aggressive) - sheltering in place / stay-at-home, public mask requirements, or travel restrictions. Use stepped-wedge cluster randomized trial (SW-CRT) for clustering and negative binomial mixed model regression.	Concludes that only (duration of, see comment in next column) level 4 restrictions are associated with reduced risk of death, with an average 15% decline in the COVID-19 death rate per day. Implementation of level 3 and level 2 restrictions increased death rates in 6 of 6 regions, while longer duration increased death rates in 5 of 6 regions.	They focus on the negative estimate of duration of Level 4. However, their implementation estimate is large and positive, and the combined effect of implementation and duration is unclear.
Pincombe et al. (2021); "The effectiveness of national-level containment and closure policies across income levels during the COVID-19 pandemic: an analysis of 113 countries"	COVID-19 mortality	Uses daily data for 113 countries on cumulative COVID-19 death counts over 130 days between February 15, 2020, and June 23, 2020, to examine changes in mortality growth rates across the World Bank's income group classifications following shelter-in-place recommendations or orders (they use one variable covering both recommendations and orders).	Finds that shelter-in-place recommendations/orders reduces mortality growth rates in high income countries (although insignificant) but increases growth rates in countries in other income groups.	
Sears et al. (2020); "Are we #stayinghome to Flatten the Curve?"	COVID-19 mortality	Uses cellular location data from all 50 states and the District of Columbia to investigate mobility patterns during the pandemic across states and time. Adding COVID-19 death tolls and the timing of SIPO for each state they estimate the effect of stay-at-home policies on COVID-19 mortality.	Find that SIPOs lower deaths by 0.13- 0.17 per 100,000 residents, equivalent to death rates 29-35% lower than in the absence of policies. However, these estimates are insignificant at a 95% confidence interval (see Table 4). The study also finds reductions in activity levels prior to mandates. Human encounter rate fell by 63 percentage points and nonessential visits by 39 percentage points relative to pre-COVID-19 levels, prior to any state implementing a statewide mandate	In the abstract the authors state that death rates would be 42-54% lower than in the absence of policies. However, this includes averted deaths due to pre-mandate social distancing behavior (p. 6). The effect of SIPO is a reduction in deaths by 29%-35% compared to a situation without SIPO but with pre-mandate social distancing. These estimates are insignificant at a 95% confidence interval.

1. Study (Author & title)	2. Measure	3. Description	4. Results	5. Comments
Shiva and Molana (2021); "The Luxury of Lockdown"	COVID-19 mortality	Uses COVID-19-deaths and OxCGRT stringency from 169 countries to estimate the effect of lockdown on the number of deaths 1-8 weeks later. Finds that stricter lockdowns reduce COVID-19-deaths 4 weeks later (but insignificant 8 weeks later) and have the greatest effect in high income countries. Finds no effect of workplace closures in low-income countries.	A stricter lockdown (1 stringency point) reduces deaths by 0,1% after 4 weeks. After 8 weeks the effect is insignificant.	
Spiegel and Tookes (2021); "Business restrictions and Covid-19 fatalities"	COVID-19 mortality	Use data for every county in the United States from March through December 2020 to estimate the effect of various NPIs on the COVID-19-deaths growth rate. Derives causality by 1) assuming that state regulators primarily focus on the state's most populous counties, so state regulation in smaller counties can be viewed as a quasi randomized experiment, and 2) conducting county pair analysis, where similar counties in different states (and subject to different state policies) are compared.	Finds that some interventions (e.g. mask mandates, restaurant and bar closures, gym closures, and high-risk business closures) reduces mortality growth, while other interventions (closures of low- to medium-risk businesses and personal care/spa services) did not have an effect and may even have increased the number of deaths.	In total they analyze the lockdown effect of 21 variables. 14 of 21 estimates are significant, and of these 6 are negative (reduces deaths) while 8 are positive (increases deaths). Some results are far from intuitive. E.g. mask recommendations increases deaths by 48% while mask mandates reduces deaths by 12%, and closing restaurants and bars reduces deaths by 50%, while closing bars but not restaurants only reduces deaths by 5%.
Stockenhuber (2020); "Did We Respond Quickly Enough? How Policy-Implementation Speed in Response to COVID-19 Affects the Number of Fatal Cases in Europe"	COVID-19 mortality	Uses data for the number of COVID-19 infections and deaths and policy information for 24 countries from OxCGRT to estimate the effect of stricter lockdowns on the number of deaths using principal component analysis and a generalized linear mixed model.	Finds no significant effect of stricter lockdowns on the number of fatalities (Table 4).	Groups data on lockdown strictness into four groups and lose significant information and variation.
Stokes et al. (2020); "The relative effects of non-pharmaceutical interventions on early Covid-19 mortality: natural experiment in 130 countries"	COVID-19 mortality	Uses daily Covid-19 deaths for 130 countries from the European Centre for Disease Prevention and Control (ECDC) and daily policy data from the Oxford COVID-19 Government Response Tracker (OxCGRT). Looks at all levels of restrictions for each of the nine sub-categories of the OxCGRT stringency index (school, work, events, gatherings, transport, SIPO, internal movement, travel).	Of the nine sub-categories in the OxCGRT stringency index, only travel restrictions are consistently significant (with level 2 "Quarantine arrivals from high-risk regions" having the largest effect, and the strictest level 4 "Total border closure" having the smallest effect). Restrictions on very large gatherings (>1,000) has a large significant negative (fewer deaths) effect, while the effect of stricter restrictions on gatherings are insignificant. Authors recommend that the closing of schools (level 1) has a very large (in absolute terms it's twice the effect of border quarantines) positive	Their results are counter intuitive and somewhat inconclusive. Why does limiting very large gatherings (>1,000) work, while stricter limits do not? Why do recommending school closures cause more deaths? Why is the effect of border closures before 1st death insignificant, while the effect of closing borders after 1st death is significant (and large)? And why does quarantining arrivals from high-risk regions work better than total border closures? With 23 estimated parameters in total these counter intuitive and inconclusive results could be caused by multiple test bias (we correct for this in the meta-analysis), but may also be caused by other factors such as omitted variable bias.

1. Study (Author & title)	2. Measure	3. Description	4. Results	5. Comments
			effect (more deaths) while stricter interventions on schools have no significant effect. Required cancelling of public events also has a significant positive (more deaths) effect. We focus on their 14-38 days results, as they catch the longest time frame (their 0-24 day model returns mostly insignificant results).	
Toya and Skidmore (2020); "A Cross-Country Analysis of the Determinants of Covid-19 Fatalities"	COVID-19 mortality	Uses COVID-19-deaths and lockdown info from various sources from 159 countries in a cross-country event study. Controls for country specifics by including socio-economic, political, geographic, and policy information. Finds little evidence for the efficacy of NPIs.	Complete travel restrictions prior to April 2020 reduced deaths by -0.226 per 100.000 by April 1st 2021, while mandatory national lockdown prior to April 2020 increased deaths by 0.166 by April 1st 2021. Recommended local lockdowns reduced deaths but results are based on one observation. Partial travel restrictions, mandatory local lockdowns and recommended national lockdowns did not have a significant effect on deaths.	The study looks at the lockdown status prior to April 2020 and the effect on deaths the following year (until April 1st 2021). The authors state this is to reduce concerns about endogeneity but do not explain why the lockdowns in the spring of 2020 are a good instrument for lockdowns during later waves are.
Tsai et al. (2021); "Coronavirus Disease 2019 (COVID-19) Transmission in the United States Before Versus After Relaxation of Statewide Social Distancing Measures"	Reproduction rate, Rt	Uses data for NPIs that were implemented and/or relaxed in U.S. states between 10 March and 15 July 2020. Using segmented linear regression, they estimate the extent to which relaxation of social distancing affected epidemic control, as indicated by the time-varying, state-specific effective reproduction number (Rt). Rt is based on death tolls.	Finds that in the 8 weeks prior to relaxing NPIs, Rt was declining, while after relaxation Rt started to increase.	Their Figure 1 shows that Rt on average increases app. 10 days before relaxation, which could indicate that other factors (omitted variables) affect the results.

Note: All comments on the significance of estimates are based on a 5% significance level unless otherwise stated.

It is difficult to make a conclusion based on the overview in Table 1. Is -0.073 to -0.326 deaths/million per stringency point, as estimated by Ashraf (2020), a large or a small effect relative to. the 98% reduction in mortality predicted by the study published by the Imperial College London (Ferguson et al. (2020). This is the subject for our meta-analysis in the next section. Here, it turns out that -0.073 to -0.326 deaths/million per stringency point is a relatively modest effect and only corresponds to a 2.4% reduction in COVID-19 mortality on average in the U.S. and Europe.

4 Meta-analysis: The impact of lockdowns on COVID-19 mortality

We now turn to the meta-analysis, where we focus on the impact of lockdowns on COVID-19 mortality.

In the meta-analysis, we include 24 studies in which we can derive the relative effect of lockdowns on COVID-19 mortality, where mortality is measured as COVID-19-related deaths per million. In practice, this means that the studies we included estimate the effect of lockdowns on mortality or the effect of lockdowns on mortality growth rates, while using a counterfactual estimate.[26]

Our focus is on the effect of compulsory non-pharmaceutical interventions (NPI), policies that restrict internal movement, close schools and businesses, and ban international travel, among others. We do not look at the effect of voluntary behavioral changes (e.g. voluntary mask wearing), the effect of recommendations (e.g. recommended mask wearing), or governmental services (voluntary mass testing and public information campaigns), but only on mandated NPIs.

The studies we examine are placed in three categories. Seven studies analyze the effect of stricter lockdowns based on the OxCGRT stringency indices, 13 studies analyze the effect of SIPOs (6 studies only analyze SIPOs, while seven analyze SIPOs among other interventions), and 11 studies analyze the effect of specific NPIs independently (lockdown vs. no lockdown).[27] Each of these categories is handled so that comparable estimates can be made across categories. Below, we present the results for each category and show the overall results, as well as those based on various quality dimensions.

Quality dimensions

We include quality dimensions because there are reasons to believe that can affect a study's conclusion. Below we describe the dimensions, as well as our reasons to believe that they are necessary to fully understand the empirical evidence.

- *Peer-reviewed vs. working papers*: We distinguish between peer-reviewed studies and working papers as we consider peer-reviewed studies generally being of higher quality than working papers.[28]

- *Long vs. short time period*: We distinguish between studies based on long time periods (with data series ending *after* May 31, 2020) and short time periods (data series ending at or before May 31, 2020), because the first wave did not fully end before late June in the U.S. and Europe. Thus, studies relying on short data periods lack the last part of the first wave and may yield biased results if lockdowns only "flatten the curve" and do not prevent deaths.

[26] As a minimum requirement, one needs to know the effect on the top of the curve.
[27] The total is larger than 21 because the 11 SIPO studies include seven studies which look at multiple measures.
[28] Vetted papers from CEPR Covid Economics are considered as working papers in this regard.

- *No early effect on mortality*: On average, it takes approximately three weeks from infection to death.[29] However, several studies find effects of lockdown on mortality almost immediately. Fowler et al. (2021) find a significant effect of SIPOs on mortality after just four days and the largest effect after 10 days. An early effect may indicate that other factors (omitted variables) drive the results, and, thus, we distinguish between studies which find an effect on mortality sooner than 14 days after lockdown and those that do not.[30] Note that many studies do not look at the short term and thus fall into the latter category by default.

- *Social sciences vs. other sciences*: While it is true that epidemiologists and researchers in natural sciences should, in principle, know much more about COVID-19 and how it spreads than social scientists, social scientists are, in principle, experts in evaluating the effect of various policy interventions. Thus, we distinguish between studies published by scholars in social sciences and by scholars from other fields of research. We perceive the former as being better suited for examining the effects of lockdowns on mortality. For each study, we have registered the research field for the corresponding author's associated institute (e.g., for a scholar from "Institute of economics" research field is registered as "Economics"). Where no corresponding author was available, the first author has been used. Afterwards, all research fields have been classified as either from the "Social Science" or "Other.""[31]

We also considered including a quality dimension to distinguish between studies based on excess mortality and studies based on COVID-19 mortality, as we believe that excess mortality is potentially a better measure for two reasons. First, data on total deaths in a country is far more precise than data on COVID-19 related deaths, which may be both underreported (due to lack of tests) or overreported (because some people die *with* – but not *because of* – COVID-19). Secondly, a major purpose of lockdowns is to save lives. To the extend lockdowns shift deaths *from* COVID-19 *to* other causes (e.g. suicide), estimates based on COVID-19 mortality will overestimate the effect of lockdowns. Likewise, if lockdowns save lives in other ways (e.g. fewer traffic accidents) lockdowns' effect on mortality will be underestimated. However, as only one

[29] Leffler et al. (2020) writes, "On average, the time from infection with the coronavirus to onset of symptoms is 5.1 days, and the time from symptom onset to death is on average 17.8 days. Therefore, the time from infection to death is expected to be 23 days." Meanwhile, Stokes et al. (2020) writes that "evidence suggests a mean lag between virus transmission and symptom onset of 6 days, and a further mean lag of 18 days between onset of symptoms and death."

[30] Some of the authors are aware of this problem. E.g. Bjørnskov (2021a) writes "when the lag length extends to three or fourth weeks, that is, the length that is reasonable from the perspective of the virology of Sars-CoV-2, the estimates become very small and insignificant" and "these results confirm the overall pattern by being negative and significant when lagged one or two weeks (the period when they cannot have worked) but turning positive and insignificant when lagged four weeks."

[31] Research fields classified as social sciences were economics, public health, management, political science, government, international development, and public policy, while research fields not classified as social sciences were ophthalmology, environment, medicine, evolutionary biology and environment, human toxicology, epidemiology, and anesthesiology.

of the 34 studies (Bjørnskov (2021a)) is based on excess mortality, we are unfortunately forced to disregard this quality dimension.

Meta-data used for our quality dimensions as well as other relevant information are shown in Table 2.

Table 2: Metadata for the studies included in the meta-analysis

1. Study (Author & title)	2. Included in meta-analysis	3. Publication status	4. End of data period	5. Earliest effect	6. Field of research	7. Lockdown measure	8. Geographical coverage
Alderman and Harjoto (2020); "COVID-19: U.S. shelter-in-place orders and demographic characteristics linked to cases, mortality, and recovery rates"	Yes	Peer-review	11-Jun-20	n/a	Economics (Social science)	SIPO	United States
Aparicio and Grossbard (2021); "Are Covid Fatalities in the U.S. Higher than in the EU, and If so, Why?"	Yes	Peer-review	22-Jul-20	n/a	Economics (Social science)	Specific NPIs	Europe and United States
Ashraf (2020); "Socioeconomic conditions, government interventions and health outcomes during COVID-19"	Yes	WP	20-May-20	n/a	Economics (Social science)	Stringency	World
Auger et al. (2020); "Association between statewide school closure and COVID-19 incidence and mortality in the U.S."	Yes	Peer-review	07-May-20	>21 days	Medicine (Other)	Specific NPIs	United States
Berry et al. (2021); "Evaluating the effects of shelter-in-place policies during the COVID-19 pandemic"	Yes	Peer-review	30-May-20	8-14 days	Public policy (Social science)	SIPO	United States
Bjørnskov (2021a); "Did Lockdown Work? An Economist's Cross-Country Comparison"	Yes	Peer-review	30-Jun-20	<8 days	Economics (Social science)	Stringency	Europe
Blanco et al. (2020); "Do Coronavirus Containment Measures Work? Worldwide Evidence"	No	WP	31-Aug-20	8-14 days	Economics (Social science)	Specific NPIs	World
Bonardi et al. (2020); "Fast and local: How did lockdown policies affect the spread and severity of the covid-19"	Yes	WP	13-Apr-20	<8 days	Economics (Social science)	Specific NPIs	World
Bongaerts et al. (2021); "Closed for business: The mortality impact of business closures during the Covid-19 pandemic"	Yes	Peer-review	13-Apr-20	8-14 days	Management (Social science)	Specific NPIs	One country
Chaudhry et al. (2020); "A country level analysis measuring the impact of government actions, country preparedness and socioeconomic factors on COVID-19 mortality and related health outcomes"	Yes	Peer-review	01-Apr-20	n/a	Anesthesiology (Other)	Specific NPIs	World
Chernozhukov et al. (2021); "Causal impact of masks, policies, behavior on early covid-19 pandemic in the U.S."	Yes	Peer-review	03-Aun-20	n/a	Economics (Social science)	Specific NPIs	United States
Chisadza et al. (2021); "Government Effectiveness and the COVID-19 Pandemic"	Yes	Peer-review	01-Sep-20	n/a	Economics (Social science)	Stringency	World
Dave et al. (2021); "When Do Shelter-in-Place Orders Fight Covid-19 Best? Policy Heterogeneity Across States and Adoption Time"	Yes	Peer-review	20-Apr-20	Finds no effect	Economics (Social science)	SIPO	United States
Dergiades et al. (2020); "Effectiveness of government policies in response to the COVID-19 outbreak"	No	WP	30-Apr-20	n/a	Management (Social science)	Stringency	World
Fakir and Bharati (2021); "Pandemic catch-22: The role of mobility restrictions and institutional inequalities in halting the spread of COVID-19"	No	Peer-review	30-Jul-20	<8 days	Economics (Social science)	Stringency	World

1. Study (Author & title)	2. Included in meta-analysis	3. Publication status	4. End of data period	5. Earliest effect	6. Field of research	7. Lockdown measure	8. Geographical coverage
Fowler et al. (2021); "Stay-at-home orders associate with subsequent decreases in COVID-19 cases and fatalities in the United States"	Yes	Peer-review	07-May-20	<8 days	Public Health (Social science)	SIPO	United States
Fuller et al. (2021); "Mitigation Policies and COVID-19–Associated Mortality — 37 European Countries, January 23–June 30, 2020"	Yes	WP	30-Jun-20	n/a	Epidemiology (Other)	Stringency	Europe
Gibson (2020); "Government mandated lockdowns do not reduce Covid-19 deaths: implications for evaluating the stringent New Zealand response"	Yes	Peer-review	01-Jun-20	Finds no effect	Economics (Social science)	SIPO	United States
Goldstein et al. (2021); "Lockdown Fatigue: The Diminishing Effects of Quarantines on the Spread of COVID-19 "	Yes	WP	31-Dec-20	<8 days	International Development (Social science)	Stringency	World
Guo et al. (2021); "Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts"	Yes	Peer-review	07-Apr-20	n/a	Social work (Social science)	Specific NPIs	United States
Hale et al. (2020); "Global assessment of the relationship between government response measures and COVID-19 deaths"	No	WP	27-May-20	n/a	Government (Social science)	Stringency	World
Hunter et al. (2021); "Impact of non-pharmaceutical interventions against COVID-19 in Europe: A quasi-experimental non-equivalent group and time-series"	No	Peer-review	24-Apr-20	<8 days	Medicine (Other)	Specific NPIs	Europe
Langeland et al. (2021); "The Effect of State Level COVID-19 Stay-at-Home Orders on Death Rates"	No	WP	Not specified	Finds no effect	Political Science (Social science)	Other	United States
Leffler et al. (2020); "Association of country-wide coronavirus mortality with demographics, testing, lockdowns, and public wearing of masks"	Yes	Peer-review	09-May-20	n/a	Ophthalmology (Other)	Specific NPIs	World
Mccafferty and Ashley (2021); "Covid-19 Social Distancing Interventions by Statutory Mandate and Their Observational Correlation to Mortality in the United States and Europe"	No	Peer-review	12-Apr-20	Finds no effect	Ophthalmology (Other)	Specific NPIs	Europe and United States
Pan et al. (2020); "Covid-19: Effectiveness of non-pharmaceutical interventions in the united states before phased removal of social distancing protections varies by region"	No	WP	29-May-20	n/a	Environment (Other)	Specific NPIs	United States
Pincombe et al. (2021); "The effectiveness of national-level containment and closure policies across income levels during the COVID-19 pandemic: an analysis of 113 countries"	No	Peer-review	23-Jun-20	n/a	Health Science (Social science)	SIPO	World
Sears et al. (2020); "Are we #stayinghome to Flatten the Curve?"	Yes	WP	29-Apr-20	Finds no effect	Economics (Social science)	SIPO	United States
Shiva and Molana (2021); "The Luxury of Lockdown"	Yes	Peer-review	08-Jun-20	15-21 days	Government (Social science)	Stringency	World
Spiegel and Tookes (2021); "Business restrictions and Covid-19 fatalities"	Yes	Peer-review	31-Dec-20	<8 days	Management (Social science)	Specific NPIs	United States
Stockenhuber (2020); "Did We Respond Quickly Enough? How Policy-Implementation Speed in Response to COVID-19 Affects the Number of Fatal Cases in Europe"	Yes	Peer-review	12-Jul-20	n/a	Evolutionary Biology and Environment (Other)	Stringency	Europe
Stokes et al. (2020); "The relative effects of non-pharmaceutical interventions on early	Yes	WP	01-Jun-20	n/a	Economics (Social science)	Specific NPIs	World

1. Study (Author & title)	2. Included in meta-analysis	3. Publication status	4. End of data period	5. Earliest effect	6. Field of research	7. Lockdown measure	8. Geographical coverage
Covid-19 mortality: natural experiment in 130 countries"							
Toya and Skidmore (2020); "A Cross-Country Analysis of the Determinants of Covid-19 Fatalities"	Yes	WP	01-Apr-21	n/a	Economics (Social science)	Specific NPIs	World
Tsai et al. (2021); "Coronavirus Disease 2019 (COVID-19) Transmission in the United States Before Versus After Relaxation of Statewide Social Distancing Measures"	No	Peer-review	15-Jul-20	<8 days	Psychiatry (Social science)	Specific NPIs	United States

Note: Research fields classified as social sciences were economics, public health, health science, management, political science, government, international development, and public policy, while research fields not classified as social sciences were ophthalmology, environment, medicine, evolutionary biology and environment, human toxicology, epidemiology and anesthesiology.

Interpreting and weighting estimates

The estimates used in the meta-analysis are not always readily available in the studies shown in Table 2. In Appendix B Table 9, we describe for each paper how we interpret the estimates and how they are converted to a common estimate (the relative effect of lockdowns on COVID-19 mortality) which is comparable across all studies.

Following Paldam (2015) and Stanley and Doucouliagos (2010), we also convert standard errors[32] and use the precision of each estimate (defined as 1/SE) to calculate the precision-weighted average of all estimates and present funnel plots. The precision-weighted average is our primary indicator of the efficacy of lockdowns, but we also report arithmetic averages and medians in the meta-analysis.

In the following sections, we present the meta-analysis for each of the three groups of studies (stringency index-studies, SIPO-studies, and studies analyzing specific NPIs).

4.1 Stringency index studies

Seven eligible studies examine the link between lockdown stringency and COVID-19 mortality. The results from these studies, converted to common estimates, are presented in Table 3 below. All studies are based on the COVID-19 Government Response Tracker's (OxCGRT) stringency index of Oxford University's Blavatnik School of Government (Hale et al. (2020)).

The OxCGRT stringency index neither measures the expected effectiveness of the lockdowns nor the expected costs. Instead, it describes the stringency based on nine equally weighted parameters.[33] Many countries followed similar patterns and almost all countries closed schools,

[32] Standard errors are converted such that the t-value, calculated based on common estimates and standard errors, is unchanged. When confidence intervals are reported rather than standard errors, we calculate standard errors using t-distribution with ∞ degrees of freedom (i.e. 1.96 for 95% confidence interval).

[33] The nine parameters are "C1 School closing," "C2 Workplace closing," "C3 Cancel public events," "C4 Restrictions on gatherings," "C5 Close public transport," "C6 Stay at home requirements," "C7 Restrictions on internal movement," "C8 International travel controls" and "H1 Public information campaigns." The latter, "H1

while only a few countries issued SIPOs without closing businesses. Hence, it is reasonable to perceive the stringency index as continuous, although not necessarily linear. The index includes recommendations (e.g. "workplace closing" is 1 if the government recommends closing (or work from home), cf. Hale et al. (2021)), but the effect of including recommendations in the index is primarily to shift the index parallelly upward and should not alter the results relative to our focus on mandated NPIs. It is important to note that the index is not perfect. As pointed out by Book (2020), it is certainly possibly to identify errors and omissions in the index. However, the index is objective and unbiased and as such, useful for cross-sectional analysis with several observations, even if not suitable for comparing the overall strictness of lockdowns in two countries.

Since the studies examined use different units of estimates, we have created common estimates for Europe and United States to make them comparable. The common estimates show the effect of the average lockdown in Europe and United States (with average stringencies of 76 and 74, respectively, between March 16th and April 15th, 2020, compared to a policy based solely on recommendations (stringency 44)). For example, Ashraf (2020) estimates that the effect of stricter lockdowns is -0.073 to -0.326 deaths/million per stringency point. We use the average of these two estimates (-0.200) in the meta-analysis (see Table 9 in Appendix B for a description for all studies). The average lockdown in Europe between March 16th and April 15th, 2020, was 32 points stricter than a policy solely based on recommendations (76 vs. 44). In United States, it was 30 points. Hence, the total effect of the lockdowns compared to the recommendation policy was -6.37 deaths/million in Europe (32 x -0.200) and -5.91 deaths/million in United States. With populations of 748 million and 333 million, respectively the total effect as estimated by Ashraf (2020) is 4,766 averted COVID-19 deaths in Europe and 1,969 averted COVID-19 deaths in United States. By the end of the study period in Ashraf (2020), which is May 20, 2020, 164,600 people in Europe and 97,081 people in the United States had died of COVID-19. Hence, the 4,766 averted COVID-19 deaths in Europe and the 1,969 averted COVID-19 deaths in the United States corresponds to 2.8% and 2.0% of all COVID-19 deaths, respectively, with an arithmetic average of 2.4%. Our common estimate is thus -2.4%, cf. Table 3. So, this means that Ashraf (2020) estimates that without lockdowns, COVID-19 deaths in Europe would have been 169,366 and COVID-19 deaths in the U.S. would have been 99,050. Our approach is not unproblematic. First of all, the level of stringency varies over time for all countries. We use the stringency between March 16th and April 15th, 2020 because this period covers the main part of the first wave which most of the studies analyze. Secondly, OxCGRT has changed the index over time and a 10-point difference today may not be exactly the same as a 10-point difference when the studies were finalized. However, we believe these problems are unlikely to significantly alter our results.

Public information campaigns," is not an intervention following our definition, as it is not a mandatory requirement. However, of 97 European countries and U.S. States in the OxCGRT database, only Andorra, Belarus, Bosnia and Herzegovina, Faeroe Islands, and Moldova – less than 1.6% of the population – did not get the maximum score by March 20, 2020, so the parameter simply shifts the index parallelly upward and should not have notable impact on the analyzes.

Table 3 demonstrates that the studies find that lockdowns, on average, have reduced COVID-19 mortality rates by 0.2% (precision-weighted). The results yield a median of -2.4% and an arithmetic average of -7.3%. Only one of the seven studies, Fuller et al. (2021), finds a significant *and* (relative to the effect predicted in studies like Ferguson et al. (2020)) substantial effect of lockdowns (-35%). The other six studies find much smaller effects. Hence, based on the stringency index studies, we find little to no evidence that mandated lockdowns in Europe and the United States had a noticeable effect on COVID-19 mortality rates. And, as will be discussed in the next paragraph, the fifth column of Table 3 displays the number of quality dimensions (out of 4) met by each study.

Table 3: Overview of common estimates from studies based on stringency indexes

Effect on COVID-19 mortality	**Estimate (Estimated Averted Deaths / Total Deaths)**	**Standard error**	**Weight (1/SE)**	**Quality dimensions**
Bjørnskov (2021)	-0.3%	0.8%	119	3
Shiva and Molana (2021)	-4.1%	0.4%	248	4
Stockenhuber (2020)*	0.0%	n/a	n/a	3
Chisadza et al. (2021)	0.1%	0.0%	7,390	4
Goldstein et al. (2021)	-9.0%	3.8%	26	2
Fuller et al. (2021)	-35.3%	9.1%	11	2
Ashraf (2020)	-2.4%	0.4%	256	2
Precision-weighted average (arithmetic average / median)	**-0.2% (-7.3%/-2.4%)**			

Note: The table shows the estimates for each study converted to a common estimate, i.e. the implied effect on COVID-19 mortality in Europe and United States. A negative number corresponds to fewer deaths, so -5% means 5% lover COVID-19 mortality. For studies which report estimates in deaths per million, the common estimate is calculated as: (COVID-19 mortality with "common area's" policy) / (COVID-19 mortality with recommendation policy) -1, where (COVID-19 mortality with recommendation policy) is calculated as ((COVID-19 mortality with "common area's" policy) - Estimate x Difference in stringency x population). Stringencies in Europe and United States are equal to the average stringency from March 16th to April 15th 2020 (76 and 74 respectively) and the stringency for the policy based solely on recommendations is 44 following Hale et al. (2020). For the conversion of other studies see Table 9 in appendix B.

** It is not possible to calculate a common estimate for Stockenhuber (2020). When calculating arithmetic average / median, the study is included as 0%, because estimates are insignificant and signs of estimates are mixed (higher strictness can cause both lower and higher COVID-19 mortality).*

We now turn to the quality dimensions. Table 4 presents the results differentiated by the four quality dimensions. Two studies, Shiva and Molana (2021) and Chisadza et al. (2021), meet all quality dimensions. The precision-weighted average for these studies is 0.0%, meaning that lockdowns had no effect on COVID-19 mortality. Two studies live up to 3 of 4 quality dimensions (Bjørnskov (2021a) and Stockenhuber (2020)). The precision-weighted average for these studies is -0.3%, meaning that lockdowns reduced COVID-19 mortality by 0.3%. Three studies lack at least two quality dimensions.[34] These studies find that lockdowns reduce COVID-19 mortality by 4.2%. To sum up, we find that the studies that meet at least 3 of 4 quality measures find that lockdowns have little to no effect on COVID-19 mortality, while studies that

[34] In fact, the working papers by P. Goldstein et al. (2021), Fuller et al. (2021) and Ashraf (2020) all lack exactly two quality parameters.

meet 2 of 4 quality measures find a small effect on COVID-19 mortality. These results are far from those estimated with the use of epidemiological models, such as the Imperial College London (Ferguson et al. (2020).

Table 4: Overview of common estimates split on quality dimensions for studies based on stringency indexes

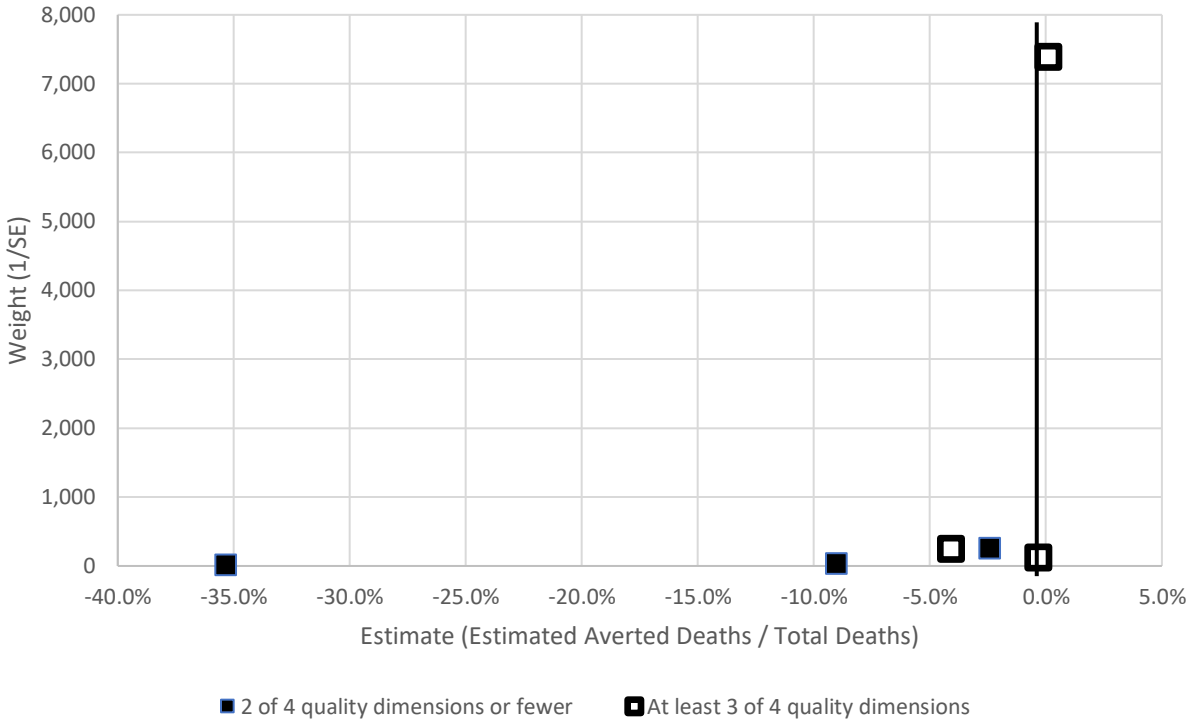
Values show effect on COVID-19 mortality	Precision-weighted average*	Arithmetic average	Median
Peer-reviewed vs. working papers			
Peer-reviewed [4]	0.0%	-1.1%	-0.2%
Working paper [3]	-4.2%	-15.6%	-9.0%
Long vs. short time period			
Data series ends after 31 May 2020 [6]	-0.1%	-8.1%	-0.2%
Data series ends before 31 May 2020 [1]	-2.4%	-2.4%	-9.0%
No early effect on mortality			
Does not find an effect within the first 14 days (including n/a) [5]	-0.2%	-8.3%	-2.4%
Finds effect within the first 14 days [2]	-1.9%	-4.7%	-4.7%
Social sciences vs. other sciences			
Social sciences [5]	-0.1%	-3.1%	-2.4%
Other sciences [2]	-35.3%	-17.7%	-17.7%
4 of 4 quality dimensions [2]	**0.0%**	**-2.0%**	**-2.0%**
3 of 4 quality dimensions [2]	**-0.3%**	**-0.2%**	**-0.2%**
2 of 4 quality dimensions or fewer [3]	**-4.2%**	**-15.6%**	**-9.0%**

*Note: The table shows the common estimate as described in Table 3 for each quality dimension. The number of studies in each category is in square brackets. * The precision-weighted average does not include studies where no common standard error is available, cf. Table 3.*

Figure 5 shows a funnel plot for the studies in Table 3, except Stockenhuber (2020), where common estimate standard errors cannot be derived. Chisadza et al. (2021) has a far higher precision than the other studies (1/SE is 7,398 and the estimate is 0.1%)[35], and there are indications that the estimate from Fuller et al. (2021) (the bottom left) is an imprecise outlier.[36] Figure 5 The plot also shows that the studies with at least 3 of 4 quality dimensions are centered around zero and generally have higher precision than other studies.

[35] Excluding Chisadza et al. (2021) from the precision-weighted average changes the average to -3.5%.
[36] Excluding Fuller et al. (2021) from the precision-weighted average only marginally changes the average because the precision is very low.

Figure 5: Funnel plot for estimates from studies based on stringency indexes



Note: The figure displays all estimates and the precision of the estimate defined as one over the standard error. Studies where standard errors are not available are not included. Studies which live up to at least 3 of 4 quality dimensions are marked with white, while studies which lives up to 2 of 3 quality dimensions or less are marked with black. The vertical line illustrates the precision-weighted average.

Overall conclusion on stringency index studies

Compared to a policy based solely on recommendations, we find little evidence that lockdowns had a noticeable impact on COVID-19 mortality Only one study, Fuller et al. (2021), finds a substantial effect, while the rest of the studies find little to no effect. Indeed, according to stringency index studies, lockdowns in Europe and the United States reduced only COVID-19 mortality by 0.2% on average.

In the following section we will look at the effect of SIPOs. The section follows the same structure as this section.

4.2 Shelter-in-place order (SIPO) studies

We have identified 13 eligible studies which estimate the effect of Shelter-In-Place Orders (SIPOs) on COVID-19 mortality, cf. Table 5. Seven of these studies look at multiple NPIs of which a SIPO is just one, while six studies estimate the effect of a SIPO vs. no SIPO in the United States. According to the containment and closure policy indicators from OxCGRT, 41 states in the U.S. issued SIPOs in the spring of 2020. But usually, these were introduced after implementing other NPIs such as school closures or workplace closures. On average, SIPOs

were issued 7½ days after *both* schools and workplaces closed, and 12 days after the first of the two closed. Only one state, Tennessee, issued a SIPO before schools and workplaces closed. The 10 states that did not issue SIPOs all closed schools. Moreover, of those 10 states, three closed some non-essential businesses, while the remaining 7 closed all non-essential businesses. Because of this, we perceive estimates for SIPOs based on U.S.-data as the marginal effect of SIPOs on top of other restrictions, although we acknowledge that the estimates may capture the effects of other NPI measures as well.

The results of eligible studies based on SIPOs are presented in Table 5. The table demonstrates that the studies generally find that SIPOs have reduced COVID-19 mortality by 2.9% (on a precision-weighted average). There is an apparent difference between studies in which a SIPO is one of multiple NPIs, and studies in which a SIPO is the only examined intervention. The former group generally finds that SIPOs *increase* COVID-19 mortality *marginally*, whereas the latter finds that SIPOs *decrease* COVID-19 mortality. As we will see below, this difference could be explained by differences in the quality dimensions, and especially the time period covered by each study.

Table 5: Overview of estimates from studies based on SIPOs

Values show effect on COVID-19 mortality	**Estimate (Estimated Averted Deaths / Total Deaths)**	**Standard error**	**Weight (1/SE)**	**Quality dimensions**
Studies where SIPO is one of several examined interventions and not (as) likely to capture the effect of other interventions				
Chernozhukov et al. (2021)	-17.7%	14.3%	7	4
Chaudhry et al. (2020) *	0.0%	n/a	n/a	2
Aparicio and Grossbard (2021)	2.6%	2.8%	35	4
Stokes et al. (2020)	0.8%	11.1%	9	3
Spiegel and Tookes (2021)	13.1%	6.6%	15	3
Bonardi et al. (2020)	0.0%	n/a	n/a	1
Guo et al. (2021)	4.6%	14.8%	4	3
Average (median) where SIPO is one of several variables	2.8% (0.5%/0.8%)			
Studies where SIPO is the only examined intervention and may capture the effect of other interventions				
Sears et al. (2020)	-32.2%	17.6%	6	2
Alderman and Harjoto (2020)	-1.0%	0.6%	169	4
Berry et al. (2020)	1.1%	n/a	n/a	2
Fowler et al. (2021)	-35.0%	7.0%	14	2
Gibson (2020)	-6.0%	24.3%	4	4
Dave et al. (2020)	-40.8%	36.1%	3	3
Average (median) where SIPO is the only variable	-5.1% (-19.0%/-19.1%)			
Precision-weighted average (arithmetic average / median) for all studies	**-2.9% (-8.5%/0.0%)**			

*Note: * Chaudhry et al. (2020) does not provide an estimate but states that SIPO is insignificant. We use 0% when calculating the arithmetic average and median. Chaudhry et al. (2020) and Berry et al. (2021) do not affect the precision-weighted average, as we do not know the standard errors.*

Table 6 presents the results differentiated by quality dimensions. Four studies (Chernozhukov et al. (2021), Aparicio and Grossbard (2021), Alderman and Harjoto (2020) and Gibson (2020))

meet all quality dimensions but find vastly different effects of SIPOs on COVID-19 mortality. The precision weighted average of the four studies is -1.0%. Four studies meet 3 of 4 quality dimensions. They overall find that SIPOs *increase* COVID-19 mortality, as the precision-weighted average is positive (3.7%). The five studies that meet 2 of 4 quality dimensions or fewer[37] find a substantial reduction in COVID-19-mortality (-34.2%). This substantial reduction seems to be driven by relatively short data series. The latest data point for the three studies which find large effects of lockdowns (Sears et al. (2020), Fowler et al. (2021), and Dave et al. (2021)) are April 29, May 7, and April 20, respectively. This may indicate that SIPOs can delay deaths but not eliminate them completely. Disregarding these studies with short data series, the precision-weighted average is -0.1%.

Table 6: Quality dimensions for studies based on SIPOs

Values show effect on COVID-19 mortality	Precision-weighted average*	Arithmetic average	Median
Peer-reviewed vs. working papers			
Peer-review [10]	-2.4%	-7.9%	-0.5%
Working paper [3]	-12.0%	-10.5%	0.0%
Long vs. short time period			
Data serie ends after 31 May 2020 [6]	-0.1%	-1.4%	-0.1%
Data serie ends before 31 May 2020 [7]	-25.9%	-14.6%	0.0%
No early effect on mortality			
Finds effect within the first 14 days [9]	-2.0%	-10.0%	-1.0%
Does not find an effect within the first 14 days (including n/a) [4]	-10.3%	-5.2%	0.0%
Social sciences vs. other sciences			
Social sciences [12]	-2.9%	-9.2%	-0.5%
Other sciences [1]	n/a	0.0%	0.0%
4 of 4 quality dimensions [4]	-1.0%	-5.5%	-3.5%
3 of 4 quality dimensions [4]	3.7%	-5.6%	2.7%
2 of 4 quality dimensions or fewer [5]	-34.2%	-13.2%	0.0%

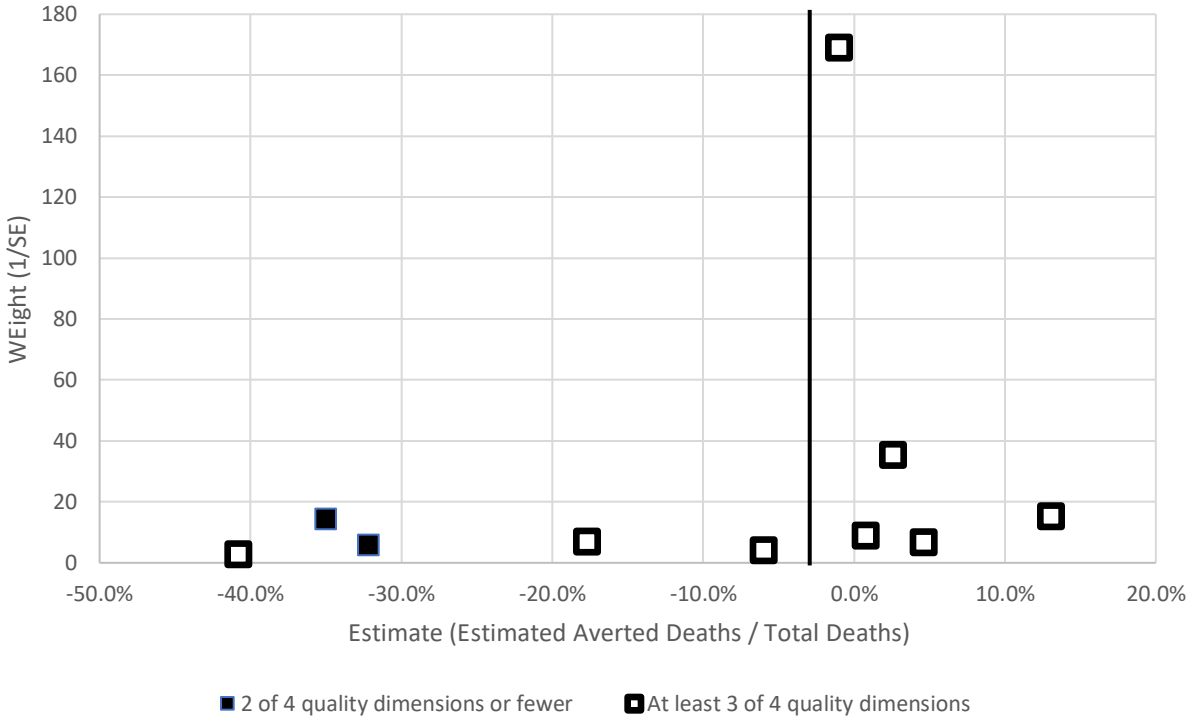
*Note: The table shows the common estimate as described in Table 5 for each quality dimension. The number of studies in each category is in square brackets. * The precision-weighted average does not include studies where no common standard error is available, cf. Table 5.*

Figure 6 shows a funnel plot for the studies in Table 5, except Chaudhry et al. (2020) and Berry et al. (2021), where common standard errors cannot be derived. Sears et al. (2020) stands out with a precision far higher than those of the other studies. But generally, the precisions of the studies are low and the estimates are placed on both sides of the zero-line with some 'tail' to the

[37] Bonardi et al. (2020) only meet one quality dimension (social science).

left.[38] Figure 5 also shows that four of eight studies with at least 3 of 4 quality dimensions find that SIPOs *increase* COVID-19 mortality by 0.8% to 13.1%.

Figure 6: Funnel plot for estimates from SIPO studies



Note: The figure displays all estimates and the precision of the estimate defined as one over the standard error. Studies where standard errors are not available are not included. Studies which live up to at least 3 of 4 quality dimensions are marked with white, while studies which lives up to 2 of 4 quality dimensions or less are marked with black. The vertical line illustrates the precision-weighted average.

Overall conclusion on SIPO studies

We find no clear evidence that SIPOs had a noticeable impact on COVID-19 mortality. Some studies find a large negative relationship between lockdowns and COVID-19 mortality, but this seems to be caused by short data series which does not cover a full COVID-19 'wave'. Several studies find a small positive relationship between lockdowns and COVID-19 mortality. Although this appears to be counterintuitive, it could be the result of an (asymptomatic) infected person being isolated at home under a SIPO can infect family members with a higher viral load causing more severe illness.[39] The overall effect measured by the precision-weighted average is -2.9%. The result is in line with Nuzzo et al. (2019), who state that "In the context of a high-impact

[38] This could indicate some publication bias, but the evidence is weak and with only 13 estimates, this cannot be formally tested

[39] E.g. see Guallar et al. (2020), who concludes, "Our data support that a greater viral inoculum at the time of SARS-CoV-2 exposure might determine a higher risk of severe COVID-19."

respiratory pathogen, quarantine may be the least likely NPI to be effective in controlling the spread due to high transmissibility" and World Health Organization Writing Group (2006), who conclude that "forced isolation and quarantine are ineffective and impractical."[40]

In the following section, we will look at the effect found in studies analyzing specific NPIs.

4.3 Studies of specific NPIs

A total of 11 eligible studies look at (multiple) specific NPIs independently or simply lockdown vs. no lockdown.[41] The definition of the specific NPIs varies from study to study and are somewhat difficult to compare. The variety in the definitions can be seen in the analysis of non-essential business closures and bar/restaurant closures. Chernozhukov et al. (2021) focus on a combined parameter (the average of business closure and bar/restaurant closure in each state), Aparicio and Grossbard (2021) look at business closure but not bar/restaurant closure, Spiegel and Tookes (2021) examine bar/restaurant closure but not business closure, and Guo et al. (2021) look at both business closures and bar/restaurant closures independently.

Some studies include several NPIs (e.g. Stokes et al. (2020) and Spiegel and Tookes (2021)), while others cover very few. Bongaerts et al. (2021) only study business closures, and Leffler et al. (2020) look at internal lockdown and international travel restrictions). Few NPIs in a model are potentially a problem because they can capture the effect of excluded NPIs. On the other hand, several NPIs in a model increase the risk of multiple test bias.

The differences in the choice of NPIs and in the number of NPIs make it challenging to create an overview of the results. In Table 7, we have merged the results in six overall categories but note that the estimates may not be fully comparable across studies. In particular, the lockdown-measure varies from study to study and in some cases is poorly defined by the authors. Also, there are only a few estimates within some of the categories. For instance, the estimate of the effect of facemasks is based on only two studies.

Table 7 illustrates that generally there is no evidence of a noticeable relationship between the most-used NPIs and COVID-19. Overall, lockdowns and limiting gatherings seem to increase COVID-19 mortality, although the effect is modest (0.6% and 1.6%, respectively) and border closures has little to no effect on COVID-19 mortality, with a precision-weighted average of -0.1% (removing the imprecise outlier from Guo et al. (2021) changes the precision-weighted average to -0.2%). We find a small effect of school closure (-4.4%), but this estimate is mainly driven by Auger et al. (2020), who – as noted earlier – use an "interrupted time series study"

[40] Both Nuzzo et al. (2019) and World Health Organization Writing Group (2006) focus on quarantining infected persons. However, if quarantining infected persons is not effective, it should be no surprise that quarantining uninfected persons could be ineffective too.

[41] Note that we – according to our search strategy – did not search on specific measures such as "school closures" but on words describing the overall political approach to the COVID-19 pandemic such as "non-pharmaceutical," "NPIs," "lockdown" etc.

approach and may capture other effects such as seasonal and behavioral effects. The absence of a notable effect of school closures is in line with Irfan et al. (2021), who – based on a systematic review and meta-analysis of 90 published or preprint studies of transmission in children – concluded that "risks of infection among children in educational-settings was lower than in communities. Evidence from school-based studies demonstrate it is largely safe for young children (<10 years of age) to be at schools; however, older children (between 10 and 19 years of age) might facilitate transmission." UNICEF (2021) and ECDC (2020) reach similar conclusions.[42]

Mandating facemasks – an intervention that was not widely used in the spring of 2020, and in many countries was even discouraged – seems to have a large effect (-21.2%), but this conclusion is based on only two studies.[43] Again, our categorization may play a role, as the larger mask-estimate from Chernozhukov et al. (2021) is in fact "employee facemasks," not a general mask mandate. Our findings are somewhat in contrast to the result found in a review by Liu et al. (2021), who conclude that "fourteen of sixteen identified randomized controlled trials comparing face masks to no mask controls failed to find statistically significant benefit in the intent-to-treat populations." Similarly, a pre-COVID Cochrane review concludes, "There is low certainty evidence from nine trials (3507 participants) that wearing a mask may make little or no difference to the outcome of influenza-like illness (ILI) compared to not wearing a mask (risk ratio (RR) 0.99, 95% confidence interval (CI) 0.82 to 1.18). There is moderate certainty evidence that wearing a mask probably makes little or no difference to the outcome of laboratory-confirmed influenza compared to not wearing a mask (RR 0.91, 95% CI 0.66 to 1.26; 6 trials; 3005 participants)" (Jefferson et al. (2020)).[44] However, it should be noted that even if no effect is found in controlled settings, this does not necessarily imply that mandated face masks does not reduce mortality, as other factors may play a role (e.g. wearing a mask may function as a tax on socializing if people are bothered by wearing a face masks when they are socializing).

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[42] UNICEF (2021) concludes, "The preliminary findings thus far suggest that in-person schooling – especially when coupled with preventive and control measures – had lower secondary COVID-19 transmission rates compared to other settings and do not seem to have significantly contributed to the overall community transmission risks." Whereas, ECDC (2020) conclude, "School closures can contribute to a reduction in SARS-CoV-2 transmission, but by themselves are insufficient to prevent community transmission of COVID-19 in the absence of other nonpharmaceutical interventions (NPIs) such as restrictions on mass gathering," and states, "There is a general consensus that the decision to close schools to control the COVID-19 pandemic should be used as a last resort. The negative physical, mental health and educational impact of proactive school closures on children, as well as the economic impact on society more broadly, would likely outweigh the benefits."

[43] Note again, that we – according to our search strategy – did not search on the specific measures such as "masks," "face masks," "surgical masks" but on words describing the overall political approach to the COVID-19 pandemic such as "non-pharmaceutical," "NPIs," "lockdown" etc. Thus, we do not include most of the studies in mask reviews such as Liu et al. (2021) and Jefferson et al. (2020).

[44] Lipp and Edwards (2014) also find no evidence of an effect and – looking at disposable surgical face masks for preventing surgical wound infection in clean surgery – conclude, "Three trials were included, involving a total of 2113 participants. There was no statistically significant difference in infection rates between the masked and unmasked group in any of the trials." Meanwhile, Li et al. (2021) – based on six case-control studies – conclude, "In general, wearing a mask was associated with a significantly reduced risk of COVID-19 infection (OR = 0.38, 95% CI: 0.21-0.69, I^2 = 54.1%).

Only business closure consistently shows evidence of a negative relationship with COVID-19 mortality, but the variation in the estimated effect is large. Three studies find little to no effect, and three find large effects. Two of the larger effects are related to closing bars and restaurants. The "close business" category in Chernozhukov et al. (2021) is an average of closed businesses, restaurants, and movie theaters, while that same category is "closing restaurants and bars" in Spiegel and Tookes (2021). The last study finding a large effect is Bongaerts et al. (2021), the only eligible single-country study.[45]

As a final observation on Table 7, studies with fewer quality dimensions seem to find larger effects, but the pattern is not systematic.[46]

Table 7: Overview of estimates from studies of specific NPIs

	Lockdown (complete/ partial)	Facemasks/ Employee face masks	Business closure (/bars & restaurants)	Border closure (/quarantine)	School closures	Limiting gatherings	Quality dimensions
Chernozhukov et al. (2021)		-34.0%	-28.6%				4
Bongaerts et al. (2021)			-31.6%				2
Chaudhry et al. (2020)*	0.0%			0.0%			2
Toya & Skidmore (2021)	0.5%			-0.1%			3
Aparicio & Grossbard (2021)			-1.3%		0.5%	0.8%	4
Auger et al. (2020)					-58.0%		2
Leffler et al. (2020)	1.7%			-15.6%			2
Stokes et al. (2020)			0.3%	-24.6%	-0.1%	-6.3%	3
Spiegel & Tookes (2021)		-13.5%	-50.2%			11.8%	3
Bonardi et al. (2020) *	0.0%			0.0%			1
Guo et al. (2021)			-0.4%	36.3%	-0.2%	5.7%	3
Precision-weighted average	**0.6%**	**-21.2%**	**-10.6%**	**-0.1%**	**-4.4%**	**1.6%**	
Arithmetic average	**0.6%**	**-23.8%**	**-18.6%**	**-0.7%**	**-14.4%**	**3.0%**	
Median	**0.3%**	**-23.8%**	**-14.9%**	**0.0%**	**-0.1%**	**3.2%**	
4 of 4 quality dimensions	**n/a [0]**	**-34.0% [1]**	**-2.9% [2]**	**n/a [0]**	**0.5% [1]**	**0.8% [1]**	
3 of 4 quality dimensions	**0.5% [1]**	**-13.5% [1]**	**-21.5% [3]**	**0.0% [3]**	**-0.1% [2]**	**5.6% [3]**	
2 of 4 quality dimensions or fewer	**1.7% [2]**	**n/a [1]**	**-31.6% [2]**	**-15.6% [2]**	**-58.0% [1]**	**n/a [1]**	

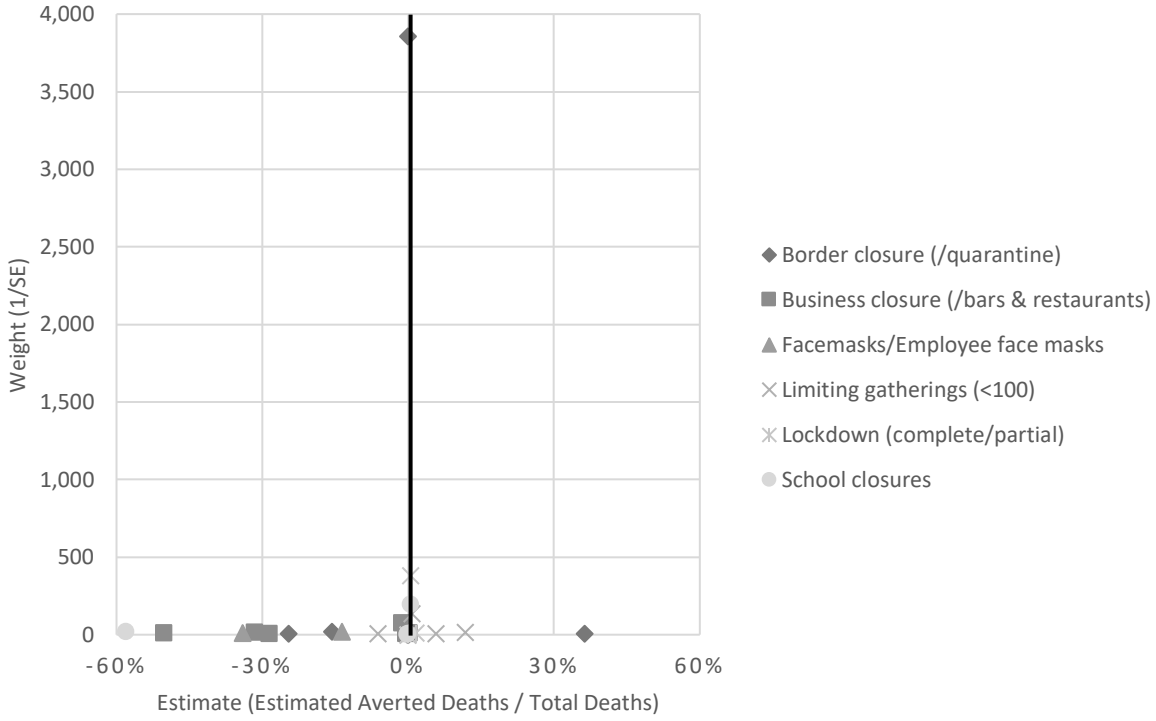
*Note: * It is not possible to derive common estimates and standard errors from Chaudhry et al. (2020) and Bonardi et al. (2020). Chaudhry et al. (2020) states that the effect of the various NPIs is insignificant without listing the estimates and standard errors. Bonardi et al. (2020) states that partial or regional lockdowns are as effective as stricter NPIs but does not provide information to calculate common estimates. Instead, we assume the estimate is 0% when calculating arithmetic average and median, while the estimates are excluded from the calculation of precision-weighted averages because there are no standard errors.*

[45] Bongaerts et al. (2021) (implicitly) assume that municipalities with different exposures to closed sectors are not inherently different, which may be a relatively strong assumption and could potentially drive their results.

[46] We saw with SIPOs that studies based on short data series tended to find larger effects than studies based on short data series. This is also somewhat true for studies examining multiple specific measures. If we focus on studies with long data series (>May 31st, 2020), the precision-weighted estimates are as follows (average for all studies in parentheses for easy comparison): Lockdown (complete/partial): 0.5% (0.6%), Facemasks/Employee face masks: -21.2% (-21.2%), Business closures (/bars & restaurants): -8.1% (-10.6%), Border closures (/quarantine): -0.1% (-0.1%), School closures: 0.5% (-4.4%), Limiting gatherings: 1.4% (1.6%).

Figure 7 shows a funnel plot for all estimates in Table 7, except Chaudhry et al. (2020) and Bonardi et al. (2020), where common standard errors cannot be derived. Two estimates from Toya and Skidmore (2020) stands out with a precision far higher than those of other studies, and estimates are placed with some 'tail' to the left, which could indicate some publication bias, i.e. reluctance to publish results that show large positive (more deaths) effects of lockdowns. The most precise estimates are gathered around 0%, while less precise studies are spread out between -58% and 36%. The precision-weighted average of all estimates across all NPIs is -0.6%.

Figure 7: Funnel plot for estimates from studies of specific NPIs



Note: The figure displays all estimates except two (se text in figure) of specific NPIs and the precision of the estimate defined as one over the standard error. Studies where standard errors are not available are not included.

Overall conclusion on specific NPIs

Because of the heterogeneity in NPIs across studies, it is difficult to draw strong conclusions based on the studies of multiple specific measures. We find no evidence that lockdowns, school closures, border closures, and limiting gatherings have had a noticeable effect on COVID-19 mortality. There is some evidence that business closures reduce COVID-19 mortality, but the variation in estimates is large and the effect seems related to closing bars. There may be an effect of mask mandates, but just two studies look at this, one of which one only looks at the effect of employee mask mandates.

5 Concluding observations

Public health experts and politicians have – based on forecasts in epidemiological studies such as that of Imperial College London (Ferguson et al. (2020) – embraced compulsory lockdowns as an effective method for arresting the pandemic. But, have these lockdown policies been effective in curbing COVID-19 mortality? This is the main question answered by our meta-analysis.

Adopting a systematic search and title-based screening, we identified 1,048 studies published by July 1st, 2020, which potentially look at the effect of lockdowns on mortality rates. To answer our question, we focused on studies that examine the actual impact of lockdowns on COVID-19 mortality rates based on registered cross-sectional mortality data and a counterfactual difference-in-difference approach. Out of the 1,048 studies, 34 met our eligibility criteria.

Conclusions

Overall, our meta-analysis fails to confirm that lockdowns have had a large, significant effect on mortality rates. Studies examining the relationship between lockdown strictness (based on the OxCGRT stringency index) find that the average lockdown in Europe and the United States only reduced COVID-19 mortality by 0.2% compared to a COVID-19 policy based solely on recommendations. Shelter-in-place orders (SIPOs) were also ineffective. They only reduced COVID-19 mortality by 2.9%.

Studies looking at specific NPIs (lockdown vs. no lockdown, facemasks, closing non-essential businesses, border closures, school closures, and limiting gatherings) also find no broad-based evidence of noticeable effects on COVID-19 mortality. However, closing non-essential businesses seems to have had some effect (reducing COVID-19 mortality by 10.6%), which is likely to be related to the closure of bars. Also, masks may reduce COVID-19 mortality, but there is only one study that examines universal mask mandates. The effect of border closures, school closures and limiting gatherings on COVID-19 mortality yields precision-weighted estimates of -0.1%, -4.4%, and 1.6%, respectively. Lockdowns (compared to no lockdowns) also do not reduce COVID-19 mortality.

Discussion

Overall, we conclude that lockdowns are not an effective way of reducing mortality rates during a pandemic, at least not during the first wave of the COVID-19 pandemic. Our results are in line with the World Health Organization Writing Group (2006), who state, "Reports from the 1918 influenza pandemic indicate that social-distancing measures did not stop or appear to dramatically reduce transmission […] In Edmonton, Canada, isolation and quarantine were instituted; public meetings were banned; schools, churches, colleges, theaters, and other public gathering places were closed; and business hours were restricted without obvious impact on the epidemic." Our findings are also in line with Allen's (2021) conclusion: "The most recent research has shown that lockdowns have had, at best, a marginal effect on the number of Covid-19 deaths." Poeschl and Larsen (2021) conclude that "interventions are generally effective in

mitigating COVID-19 spread". But, 9 of the 43 (21%) results they review find "no or uncertain association" between lockdowns and the spread of COVID-19, suggesting that evidence from that own study contradicts their conclusion.

The findings contained in Johanna et al. (2020) are in contrast to our own. They conclude that "for lockdown, ten studies consistently showed that it successfully reduced the incidence, onward transmission, and mortality rate of COVID-19." The driver of the difference is three-fold. First, Johanna et al. include modelling studies (10 out of a total of 14 studies), which we have explicitly excluded. Second, they included interrupted time series studies (3 of 14 studies), which we also exclude. Third, the only study using a difference-in-difference approach (as we have done) is based on data collected before May 1st, 2020. We should mention that our results indicate that early studies find relatively larger effects compared to later studies.

Our main conclusion invites a discussion of some issues. Our review does not point out *why* lockdowns did not have the effect promised by the epidemiological models of Imperial College London (Ferguson et al. (2020). We propose four factors that might explain the difference between our conclusion and the view embraced by some epidemiologists.

First, people respond to dangers outside their door. When a pandemic rages, people believe in social distancing regardless of what the government mandates. So, we believe that Allen (2021) is right, when he concludes, "The ineffectiveness [of lockdowns] stemmed from individual changes in behavior: either non-compliance or behavior that mimicked lockdowns." In economic terms, you can say that the demand for costly disease prevention efforts like social distancing and increased focus on hygiene is high when infection rates are high. Contrary, when infection rates are low, the demand is low and it may even be morally and economically rational not to comply with mandates like SIPOs, which are difficult to enforce. Herby (2021) reviews studies which distinguish between mandatory and voluntary behavioral changes. He finds that – on average – voluntary behavioral changes are 10 times as important as mandatory behavioral changes in combating COVID-19. If people voluntarily adjust their behavior to the risk of the pandemic, closing down non-essential businesses may simply reallocate consumer visits away from "nonessential" to "essential" businesses, as shown by Goolsbee and Syverson (2021), with limited impact on the total number of contacts.[47] This may also explain why epidemiological model simulations such as Ferguson et al. (2020) – which do not model behavior endogenously – fail to forecast the effect of lockdowns.

Second, mandates only regulate a fraction of our potential contagious contacts and can hardly regulate nor enforce handwashing, coughing etiquette, distancing in supermarkets, etc. Countries like Denmark, Finland, and Norway that realized success in keeping COVID-19 mortality rates relatively low allowed people to go to work, use public transport, and meet privately at home during the first lockdown. In these countries, there were ample opportunities to legally meet with others.

[47] In economic terms, lockdowns are substitutes for – not complements to – voluntary behavioral changes.

Third, even if lockdowns are successful in initially reducing the spread of COVID-19, the behavioral response may counteract the effect completely, as people respond to the lower risk by changing behavior. As Atkeson (2021) points out, the economic intuition is straightforward. If closing bars and restaurants causes the prevalence of the disease to fall toward zero, the demand for costly disease prevention efforts like social distancing and increased focus on hygiene also falls towards zero, and the disease will return.[48]

Fourth, unintended consequences may play a larger role than recognized. We already pointed to the possible unintended consequence of SIPOs, which may isolate an infected person at home with his/her family where he/she risks infecting family members with a higher viral load, causing more severe illness. But often, lockdowns have limited peoples' access to safe (outdoor) places such as beaches, parks, and zoos, or included outdoor mask mandates or strict outdoor gathering restrictions, pushing people to meet at less safe (indoor) places. Indeed, we do find some evidence that limiting gatherings was counterproductive and increased COVID-19 mortality.

One objection to our conclusions may be that we do not look at the role of timing. If timing is very important, differences in timing may empirically overrule any differences in lockdowns. We note that this objection is not necessarily in contrast to our results. If timing is very important relative to strictness, this suggests that well-timed, but very mild, lockdowns should work as well as, or better than, less well-timed but strict lockdowns. This is not in contrast to our conclusion, as the studies we reviewed analyze the effect of lockdowns compared but to doing very little (see Section 3.1 for further discussion). However, there is little solid evidence supporting the timing thesis, because it is inherently difficult to analyze (see Section 2.2 for further discussion). Also, even if it can be empirically stated that a well-timed lockdown is effective in combating a pandemic, it is doubtful that this information will ever be useful from a policy perspective.

But, what explains the differences between countries, if not differences in lockdown policies? Differences in population age and health, quality of the health sector, and the like are obvious factors. But several studies point at less obvious factors, such as culture, communication, and coincidences. For example, Frey et al. (2020) show that for the same policy stringency, countries with more obedient and collectivist cultural traits experienced larger declines in geographic mobility relative to their more individualistic counterpart. Data from Germany Laliotis and Minos (2020) shows that the spread of COVID-19 and the resulting deaths in predominantly Catholic regions with stronger social and family ties were much higher compared to non-Catholic ones at the local NUTS 3 level.[49]

Government communication may also have played a large role. Compared to its Scandinavian neighbors, the communication from Swedish health authorities was far more subdued and embraced the idea of public health vs. economic trade-offs. This may explain why Helsingen et

[48] This kind of behavior response may also explain why Subramanian and Kumar (2021) find that increases in COVID-19 cases are unrelated to levels of vaccination across 68 countries and 2947 counties in the United States. When people are vaccinated and protected against severe disease, they have less reason to be careful.

[49] The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory of the EU and the UK. There are 1215 regions at the NUTS 3-level.

al. (2020), found, based on questionnaire data collected from mid-March to mid-April, 2020, that even though the daily COVID-19 mortality rate was more than four times higher in Sweden than in Norway, Swedes were less likely than Norwegians to not meet with friends (55% vs. 87%), avoid public transportation (72% vs. 82%), and stay home during spare time (71% vs. 87%). That is, despite a more severe pandemic, Swedes were less affected in their daily activities (legal in both countries) than Norwegians.

Many other factors may be relevant, and we should not underestimate the importance of coincidences. An interesting example illustrating this point is found in Arnarson (2021) and Björk et al. (2021), who show that areas where the winter holiday was relatively late (in week 9 or 10 rather than week 6, 7 or 8) were hit especially hard by COVID-19 during the first wave because the virus outbreak in the Alps could spread to those areas with ski tourists. Arnarson (2021) shows that the effect persists in later waves. Had the winter holiday in Sweden been in week 7 or week 8 as in Denmark, the Swedish COVID-19 situation could have turned out very differently.[50]

Policy implications

In the early stages of a pandemic, before the arrival of vaccines and new treatments, a society can respond in two ways: mandated behavioral changes or voluntary behavioral changes. Our study fails to demonstrate significant positive effects of mandated behavioral changes (lockdowns). This should draw our focus to the role of voluntary behavioral changes. Here, more research is needed to determine how voluntary behavioral changes can be supported. But it should be clear that one important role for government authorities is to provide information so that citizens can voluntarily respond to the pandemic in a way that mitigates their exposure.

Finally, allow us to broaden our perspective after presenting our meta-analysis that focuses on the following question: "What does the evidence tell us about the effects of lockdowns on mortality?" We provide a firm answer to this question: The evidence fails to confirm that lockdowns have a significant effect in reducing COVID-19 mortality. The effect is little to none.

The use of lockdowns is a unique feature of the COVID-19 pandemic. Lockdowns have not been used to such a large extent during any of the pandemics of the past century. However, lockdowns during the initial phase of the COVID-19 pandemic have had devastating effects. They have contributed to reducing economic activity, raising unemployment, reducing schooling, causing political unrest, contributing to domestic violence, and undermining liberal democracy. These costs to society must be compared to the benefits of lockdowns, which our meta-analysis has shown are marginal at best. Such a standard benefit-cost calculation leads to a strong conclusion: lockdowns should be rejected out of hand as a pandemic policy instrument.

[50] Another case of coincidence is illustrated by Shenoy et al. (2022), who find that areas that experienced rainfall early in the pandemic realized fewer deaths because the rainfall induced social distancing.

6 Appendix A. The role of timing

Some of the included papers study the importance of the timing of lockdowns, while several other papers only looking at timing of (but not on the inherent effect of) lockdowns have been excluded from the literature list in this review. There's no doubt that being prepared for a pandemic and knowing when it arrives at your doorstep is vital. However, two problems arise with respect to imposing early lockdowns.

First of all, it was virtually impossible to determine the right timing when COVID-19 hit Europe and the United States. The World Health Organization declared the outbreak of a pandemic on 11 March 2020, but at that date Italy had already registered 13.7 COVID-19-deaths per million (all infected before approximately 22 February, because of the roughly 18 day gap between infection and death, c.f. e.g.. Bjørnskov (2021a)). On 29 March 2020, 18 days after WHO declared the outbreak a pandemic and the earliest a lockdown response to WHO's announcement could have an effect, the death toll in Italy was a staggering 178 COVID-19-deaths per million with an additionally 13 per million dying each day.

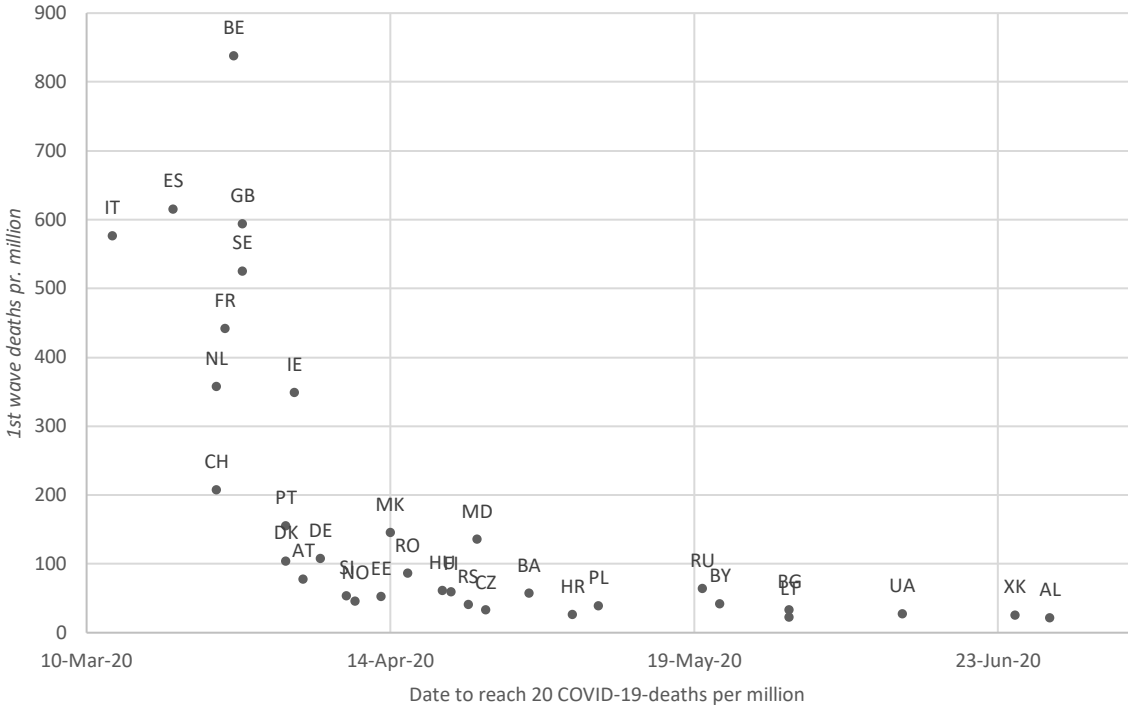
There are reasons to believe that many countries and regions were hit particularly hard during the first wave of COVID, because they had no clue about how bad it really was. This point is illustrated in Figure 8 (and Figure 9), which show that countries (and states), which were hit hard and early, experienced large death tolls compared to countries where the pandemic had a slower start. Björk et al. (2021) and Arnarson (2021) show that areas with a winter holiday in week 10 and – especially – week 9 were hit hard, because they imported cases from the Alps *before* they knew the pandemic was wide spread at the ski resorts. Hence, while acting early by warning citizens and closing business may be an effective strategy; this was not a feasible strategy for most countries in the spring of 2020.

The second problem is that it is extremely difficult to differentiate between the effect of public awareness and the effect of lockdowns. If people and politicians react to the same information, for example deaths in geographical neighboring countries (many EU-countries reacted to deaths in Italy) or in another part of the same country, the effect of lockdowns cannot easily be separated from the effect of voluntary social distancing or, use of hand sanitizers. Hence, we find it problematic to use national lockdowns and differences in the progress of the pandemic in different regions to say anything about the effect of early lockdowns on the pandemic, as the estimated effect might just as well come from voluntary behavior changes, when people in Southern Italy react to the situation in Northern Italy.

We have seen no studies which we believe credibly separate the effect of early lockdown from the effect of early voluntary behavior changes. Instead, the estimates in these studies capture the effects of lockdowns *and* voluntary behavior changes. As Herby (2021) illustrates, voluntary behavior changes are essential to a society's response to an pandemic and can account for up to 90% of societies' total response to the pandemic.

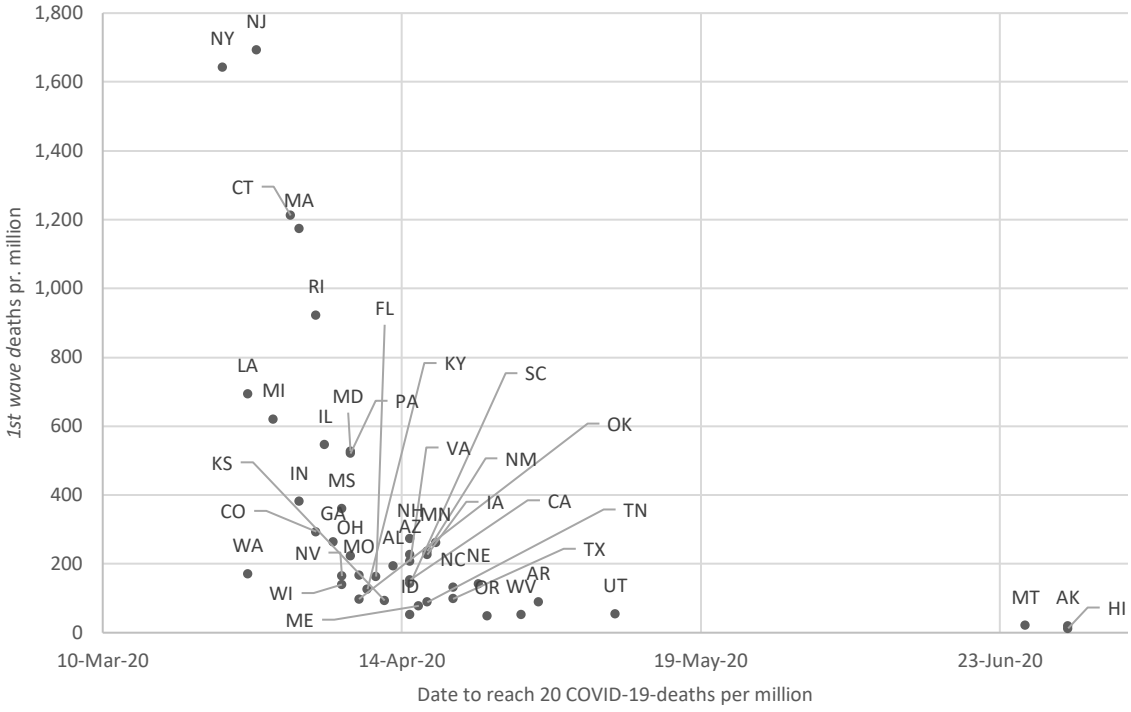
Including these studies will greatly overestimate the effect of lockdowns, and, hence, we chose not to include studies focusing on timing of lockdowns in our review.

Figure 8: Taken by surprise. The importance of having time to prepare in Europe



Description: European countries with more than one million citizens.
Source: Our World in Data

Figure 9: Taken by surprise. The importance of having time to prepare in U.S. states



Description: U.S. states with more than one million citizens.
Source: Our World in Data

7 Appendix B. Supplementary information

7.1 Excluded studies

Below is a list will the studies excluded during the eligibility phase of our identification process and a short description of our basis for excluding the study.

Table 8: Studies excluded during the eligibility phase of our identification process

1. Study (Author & title)	2. Reason for exclusion
Alemán et al. (2020); "Evaluating the effectiveness of policies against a pandemic"	Too few observations
Alshammari et al. (2021); "Are countries' precautionary actions against COVID-19 effective? An assessment study of 175 countries worldwide"	Is purely descriptive
Amuedo-Dorantes et al. (2020); "Timing is Everything when Fighting a Pandemic: COVID-19 Mortality in Spain"	Duplicate
Amuedo-Dorantes et al. (2021); "Early adoption of non-pharmaceutical interventions and COVID-19 mortality"	Only looks at timing
Amuedo-Dorantes, Kaushal and Muchow (2020); "Is the Cure Worse than the Disease? County-Level Evidence from the COVID-19 Pandemic in the United States"	Duplicate
Amuedo-Dorantes, Kaushal and Muchow (2021); "Timing of social distancing policies and COVID-19 mortality: county-level evidence from the U.S."	Only looks at timing
Arruda et al. (2021); "ASSESSING THE IMPACT OF SOCIAL DISTANCING ON COVID-19 CASES AND DEATHS IN BRAZIL: AN INSTRUMENTED DIFFERENCE-IN-	Social distancing (not
Bakolis et al. (2021); "Changes in daily mental health service use and mortality at the commencement and lifting of COVID-19 'lockdown' policy in 10 UK sites: a regression	Uses a time series approach
Bardey, Fernández and Gravel (2021); "Coronavirus and social distancing: do non-pharmaceutical-interventions work (at least) in the short run?"	Only looks at timing
Berardi et. Al. (2020); "The COVID-19 pandemic in Italy: policy and technology impact on health and non-health outcomes"	Too few observations
Bhalla (2020); "Lockdowns and Closures vs COVID–19: COVID Wins"	Uses modelling
Björk et al. (2021); "Impact of winter holiday and government responses on mortality in Europe during the first wave of the COVID-19 pandemic"	Only looks at timing
Bongaerts, Mazzola and Wagner (2020); "Closed for business"	Duplicate
Born, Dietrich and Müller (2021); "The lockdown effect: A counterfactual for Sweden"	Synthetic control study
Born, Dietrich and Müller (2021); "The lockdown effect: A counterfactual for Sweden"	Duplicate
Bushman et al. (2020); "Effectiveness and compliance to social distancing during COVID-19"	Social distancing (not
Castaneda and Saygili (2020); "The effect of shelter-in-place orders on social distancing and the spread of the COVID-19 pandemic: a study of Texas"	Uses a time series approach
Cerqueti et al. (2021); "The sooner the better: lives saved by the lockdown during the COVID-19 outbreak. The case of Italy"	Synthetic control study
Chernozhukov, Kasahara and Schrimpf (2021); "Mask mandates and other lockdown policies reduced the spread of COVID-19 in the U.S."	Duplicate
Chin et al. (2020); "Effects of non-pharmaceutical interventions on COVID-19: A Tale of Three Models"	Uses modelling
Cho (2020); "Quantifying the impact of nonpharmaceutical interventions during the COVID-19 outbreak: The case of Sweden"	Synthetic control study
Coccia (2020); "The effect of lockdown on public health and economic system: findings from first wave of the COVID-19 pandemic for designing effective strategies to cope	Only looks at timing
Coccia (2021); "Different effects of lockdown on public health and economy of countries: Results from first wave of the COVID-19 pandemic"	Too few observations
Conyon and Thomsen (2021); "COVID-19 in Scandinavia"	Synthetic control study
Conyon et al. (2020); "Lockdowns and COVID-19 deaths in Scandinavia"	Too few observations
Dave et al. (2020); "Did the Wisconsin Supreme Court restart a COVID-19 epidemic? Evidence from a natural experiment"	Synthetic control study
Delis, Iosifidi and Tasiou (2021); "Efficiency of government policy during the COVID-19 pandemic"	Do not look at mortality
Dreher et al. (2021); "Policy interventions, social distancing, and SARS-CoV-2 transmission in the United States: a retrospective state-level analysis"	Do not look at mortality
Duchemin, Veber and Boussau (2020); "Bayesian investigation of SARS-CoV-2-related mortality in France"	Uses modelling
Fair et. Al. (2021); "Estimating COVID-19 cases and deaths prevented by non-pharmaceutical interventions in 2020-2021, and the impact of individual actions: a retrospective	Uses modelling
Filias (2020); "The impact of government policies effectiveness on the officially reported deaths attributed to covid-19."	Student paper
Fowler et al. (2021); "Stay-at-home orders associate with subsequent decreases in COVID-19 cases and fatalities in the United States"	Duplicate
Friedson et al. (2020); "Did California's shelter-in-place order work? Early coronavirus-related public health effects"	Duplicate
Friedson et al. (2020); "Shelter-in-place orders and public health: evidence from California during the COVID-19 pandemic"	Synthetic control study
Fuss, Weizman and Tan (2020); "COVID19 pandemic: how effective are interventive control measures and is a complete lockdown justified? A comparison of countries and	Do not look at mortality
Ghosh, Ghosh and Narymanchi (2020); "A Study on The Effectiveness of Lock-down Measures to Control The Spread of COVID-19"	Synthetic control study
Glogowsky et al. (2021); "How Effective Are Social Distancing Policies? Evidence on the Fight Against COVID-19"	Only looks at timing
Glogowsky, Hansen and Schächtele (2020); "How effective are social distancing policies? Evidence on the fight against COVID-19 from Germany"	Duplicate
Glogowsky, Hansen and Schächtele (2020); "How Effective Are Social Distancing Policies? Evidence on the Fight Against COVID-19 from Germany"	Duplicate
Gordon, Grafton and Steinshamn (2021); "Cross-country effects and policy responses to COVID-19 in 2020: The Nordic countries"	Do not look at mortality
Gordon, Grafton and Steinshamn (2021); "Statistical Analyses of the Public Health and Economic Performance of Nordic Countries in Response to the COVID-19 Pandemic"	Too few observations
Guo et al. (2020); "Social distancing interventions in the United States: An exploratory investigation of determinants and impacts"	Duplicate
Huber and Langen (2020); "The impact of response measures on COVID-19-related hospitalization and death rates in Germany and Switzerland"	Duplicate
Huber and Langen (2020); "Timing matters: the impact of response measures on COVID-19-related hospitalization and death rates in Germany and Switzerland"	Only looks at timing
Jain et al. (2020); "A comparative analysis of COVID-19 mortality rate across the globe: An extensive analysis of the associated factors"	Do not look at mortality
Juranek and Zoutman (2021); "The effect of non-pharmaceutical interventions on the demand for health care and mortality: evidence on COVID-19 in Scandinavia"	Too few observations
Kakpo and Nuhu (2020); "Effects of Social Distancing on COVID-19 Infections and Mortality in the U.S."	Social distancing (not
Kapoor and Ravi (2020); "Impact of national lockdown on COVID-19 deaths in select European countries and the U.S. using a Changes-in-Changes model"	Too few observations
Khatiwada and Chalise (2020); "Evaluating the efficiency of the Swedish government policies to control the spread of Covid-19."	Student paper
Korevaar et al. (2020); "Quantifying the impact of U.S. state non-pharmaceutical interventions on COVID-19 transmission"	Do not look at mortality
Kumar et. Al. (2020); "Prevention-Versus Promotion-Focus Regulatory Efforts on the Disease Incidence and Mortality of COVID-19: A Multinational Diffusion Study Using	Do not look at mortality
Le et al. (2020); "Impact of government-imposed social distancing measures on COVID-19 morbidity and mortality around the world"	Uses a time series approach
Liang et al. (2020); "Covid-19 mortality is negatively associated with test number and government effectiveness"	Not effect of lockdowns
Mader and Rütternauer (2021); "The effects of non-pharmaceutical interventions on COVID-19-related mortality: A generalized synthetic control approach across 169 countries"	Synthetic control study
Matzinger and Skinner (2020); "Strong impact of closing schools, closing bars and wearing masks during the Covid-19 pandemic: results from a simple and revealing analysis"	Uses modelling
Mccafferty and Ashley (2020); "Covid-19 Social Distancing Interventions by State Mandate and their Correlation to Mortality in the United States"	Duplicate
Medline et al. (2020); "Evaluating the impact of stay-at-home orders on the time to reach the peak burden of Covid-19 cases and deaths: does timing matter?"	Only looks at timing

1. Study (Author & title)	2. Reason for exclusion
Mu et al. (2020); "Effect of social distancing interventions on the spread of COVID-19 in the state of Vermont"	Uses modelling
Nakamura (2020); "The Impact of Rapid State Policy Response on Cumulative Deaths Caused by COVID-19"	Student paper
Neidhöfer and Neidhöfer (2020); "The effectiveness of school closures and other pre-lockdown COVID-19 mitigation strategies in Argentina, Italy, and South Korea"	Synthetic control study
Oliveira (2020); "Does' Staying at Home'Save Lives? An Estimation of the Impacts of Social Isolation in the Registered Cases and Deaths by COVID-19 in Brazil"	Social distancing (not
Palladina et al. (2020); "Effect of Implementation of the Lockdown on the Number of COVID-19 Deaths in Four European Countries"	Uses a time series approach
Palladina et al. (2020); "Effect of timing of implementation of the lockdown on the number of deaths for COVID-19 in four European countries"	Duplicate
Palladino et al. (2020); "Excess deaths and hospital admissions for COVID-19 due to a late implementation of the lockdown in Italy"	Uses a time series approach
Peixoto et al. (2020); "Rapid assessment of the impact of lockdown on the COVID-19 epidemic in Portugal"	Uses modelling
Piovani et. Al. (2021); "Effect of early application of social distancing interventions on COVID-19 mortality over the first pandemic wave: An analysis of longitudinal data from 37	Only looks at timing
Reinbold (2021); "Effect of fall 2020 K-12 instruction types on CoViD-19 cases, hospital admissions, and deaths in Illinois counties"	Synthetic control study
Renne, Roussellet and Schwenkler (2020); "Preventing COVID-19 Fatalities: State versus Federal Policies"	Uses modelling
Siedner et al. (2020); "Social distancing to slow the U.S. COVID-19 epidemic: Longitudinal pretest–posttest comparison group study"	Duplicate
Siedner et al. (2020); "Social distancing to slow the U.S. COVID-19 epidemic: Longitudinal pretest–posttest comparison group study"	Uses a time series approach
Silva, Filho and Fernandes (2020); "The effect of lockdown on the COVID-19 epidemic in Brazil: evidence from an interrupted time series design"	Uses a time series approach
Stamam et al. (2020); "IMPACT OF LOCKDOWN MEASURE ON COVID-19 INCIDENCE AND MORTALITY IN THE TOP 31 COUNTRIES OF THE WORLD."	Uses a time series approach
Steinegger et al. (2021); "Retrospective study of the first wave of COVID-19 in Spain: analysis of counterfactual scenarios"	Only looks at timing
Stephens et al. (2020); "Does the timing of government COVID-19 policy interventions matter? Policy analysis of an original database."	Only looks at timing
Supino et al. (2020); "The effects of containment measures in the Italian outbreak of COVID-19"	Uses a time series approach
Timelli and Girardi (2021); "Effect of timing of implementation of containment measures on Covid-19 epidemic. The case of the first wave in Italy"	Only looks at timing
Trivedi and Das (2020); "Effect of the timing of stay-at-home orders on COVID-19 infections in the United States of America"	Only looks at timing
Umer and Khan (2020); "Evaluating the Effectiveness of Regional Lockdown Policies in the Containment of Covid-19: Evidence from Pakistan"	Too few observations
VoPham et al. (2020); "Effect of social distancing on COVID-19 incidence and mortality in the U.S."	Do not look at mortality
Wu and Wu (2020); "Stay-at-home and face mask policies intentions inconsistent with incidence and fatality during U.S. COVID-19 pandemic"	Too few observations
Xu et al. (2020); "Associations of Stay-at-Home Order and Face-Masking Recommendation with Trends in Daily New Cases and Deaths of Laboratory-Confirmed COVID-19 in	Do not look at mortality
Yehya, Venkataramani and Harhay (2020); "Statewide Interventions and Coronavirus Disease 2019 Mortality in the United States: An Observational Study"	Only looks at timing
Ylli et al. (2020); "The lower COVID-19 related mortality and incidence rates in Eastern European countries are associated with delayed start of community circulation Alban	Not effect of lockdowns

7.2 Interpretation of estimates and conversion to common estimates

In Table 9, we describe for each study used in the meta-analysis how we interpret their results and convert the estimates to our common estimate. Standard errors are converted such that the t-value, calculated based on common estimates and standard errors, is unchanged. When confidence intervals are reported rather than standard errors, we calculate standard errors using t-distribution with ∞ degrees of freedom (i.e. 1.96 for 95% confidence interval).

Table 9: Notes on studies included in the meta-analysis

1. Study (Author & title)	2. Date Published	3. Journal	4. Comments regarding meta-analysis
Alderman and Harjoto (2020); "COVID-19: U.S. shelter-in-place orders and demographic characteristics linked to cases, mortality, and recovery rates"	26-Nov-20	Transforming Government: People, Process and Policy	We use the 1% effect noted by the authors in "We find that the natural log of the duration (in days) that the state instituted shelter-in-place reduces percentages of mortality by 0.0001%, or approximately 1% of the means of percentages of deaths per capita in our sample. The standard error is calculated on basis of the t-value in Table 3.
Aparicio and Grossbard (2021); "Are Covid Fatalities in the U.S. Higher than in the EU, and If so, Why?"	16-Jan-21	Review of Economics of the Household	We use estimates from Table 3, model 5. For each estimate the common estimate is calculated as (difference in COVID-19 mortality with NPI)/(difference in COVID-19 mortality without NPI)-1, where (difference in COVID-19 mortality with NPI) is 237.89 (Table 2 states that deaths per million is 406.99 in U.S. and 169.10 in Europe) and (difference in COVID-19 mortality without NPI) is estimated as exp(ln(difference in COVID-19 mortality with NPI)-estimate).
Ashraf (2020); "Socioeconomic conditions, government interventions and health outcomes during COVID-19"	1-Jul-20	ResearchGate	It is unclear whether they prefer the model with or without the interaction term. In the meta-analysis, we use an average of -0.326 (Table 3, without) and -0.073 (Table 6, with) deaths per million per stringency point (i.e. -0.200). The common estimate is the average effect in Europe and United States respectively calculated as (Actual COVID-19 mortality) / (COVID-19 mortality with recommendation policy) -1, where (COVID-19 mortality with recommendation policy) is calculated as ((Actual COVID-19 mortality) - Estimate x Difference in stringency x population). Stringencies in Europe and United States are equal to the average stringency from March 16th to April 15th 2020 (76 and 74 respectively) and the stringency for the policy based solely on recommendations is 44 following Hale et al. (2020).

1. Study (Author & title)	2. Date Published	3. Journal	4. Comments regarding meta-analysis
Auger et al. (2020); "Association between statewide school closure and COVID-19 incidence and mortality in the U.S."	1-Sep-20	JAMA	Estimate that school closure was associated with a 58% decline in COVID-19 mortality and that the effect was largest in states with low cumulative incidence of COVID-19 at the time of school closure. States with the lowest incidence of COVID-19 had a −72% relative change in incidence compared with −49% for those states with the highest cumulative incidence.
Berry et al. (2021); "Evaluating the effects of shelter-in-place policies during the COVID-19 pandemic"	24-Feb-21	PNAS	The estimated effect of SIPO's, an increase in deaths by 0,654 per million after 14 days (significant, cf. Fig. 2), is converted to a relative effect on a state basis based on data from OurWorldInData. For states which did implement SIPO, we calculate the number of deaths without SIPO as the number of official COVID-19 deaths 14 days after SIPO was implemented minus 0,654 extra deaths per million. For states which did not implement SIPO, we calculate the number of deaths with SIPO as the number of official COVID-19 deaths 14 days after March 31 2020 plus 0,654 extra deaths per million. We use March 31 2020 as this was the average date on which SIPO was implemented in the 40 states which did implement SIPO. Using this approximation, the effect of SIPO's in the U.S. is 1,1% more deaths after 14 days. Common standard errors are not available.
Bjørnskov (2021a); "Did Lockdown Work? An Economist's Cross-Country Comparison"	29-Mar-21	CESifo Economic Studies	We use estimates from Table 2 (four weeks). Common estimate is calculated as the average of the effect in Europe and United States, where the effect for each is calculated as (ln(policy stringency) - ln(recommendation stringency)) x estimate.
Blanco et al. (2020); "Do Coronavirus Containment Measures Work? Worldwide Evidence"	1-Dec-20	World Bank Group	The study is not included in the meta-analysis, as it looks at the effect of NPIs on growth rates and does not include an estimate of the effect on total mortality.
Bonardi et al. (2020); "Fast and local: How did lockdown policies affect the spread and severity of the covid-19"	8-Jun-20	0	Find that, world-wide, internal NPIs have prevented about 650,000 deaths (3.11 deaths were prevented for each death that occurred, i.e. 76% effect). However, this effect is for any lockdown including a Swedish lockdown. They do not find an extra effect of stricter lockdowns and state that "our results point to the fact that people might adjust their behaviors quite significantly as partial measures are implemented, which might be enough to stop the spread of the virus." Hence, whether the baseline is Sweden, which implemented a ban on large gatherings early in the pandemic, or the baseline is "doing nothing" can affect the magnitude of the estimated impacts. Since all Western countries did something and estimates in other reviewed studies are relative to doing less – and, hence not to doing nothing, we report the result from Bonardi et al. as compared to "doing less." Hence, for Bonardi et al. we use 0% as the common estimate in the meta-analysis for each NPI (SIPO, regional lockdown, partial lockdown, and border closure (stage 1, stage 2 and full) because all NPIs are insignificant (compared to Sweden's "doing the least"-lockdown).
Bongaerts et al. (2021); "Closed for business: The mortality impact of business closures during the Covid-19 pandemic"	14-May-21	PLOS ONE	Business shutdown saved 9,439 Italian lives by 13th 2020. This corresponds to 32%, as there were 20,465 COVID-19-deaths in Italy by mid April 2020.
Chaudhry et al. (2020); "A country level analysis measuring the impact of government actions, country preparedness and socioeconomic factors on COVID-19 mortality and related health outcomes"	1-Aug-20	EClinacal-Medicine	Finds no effect of partial border closure, complete border closure, partial lockdown (physical distancing measures only), complete lockdown (enhanced containment measures including suspension of all non-essential services), and curfews. In the meta-analysis we use a common estimate of 0%, as estimates and standard errors are not available.
Chernozhukov et al. (2021); "Causal impact of masks, policies, behavior on early covid-19 pandemic in the U.S."	1-Jan-21	Journal of Econometrics	The study looks at the effect of NPIs on growth rates but does include an estimate of the effect on total mortality at the end of the study period for employee face masks (-34%), business closure (-29%). and SIPO (-18%), but not for school closures (which we therefore exclude). In reporting the results of their counterfactual, they alter between "fewer deaths with NPI" and "more deaths without NPI." We have converted the latter to the former as estimate/(1+estimate) so "without business closures deaths would be about 40% higher" corresponds to "with business closures deaths would be about 29% lower."
Chisadza et al. (2021); "Government Effectiveness and the COVID-19 Pandemic"	10-Mar-21	MDPI	The common estimate is the average effect in Europe and United States respectively calculated as (Actual COVID-19 mortality) / (COVID-19 mortality with recommendation policy) -1, where (COVID-19 mortality with recommendation policy) is calculated as ((Actual COVID-19 mortality) - Estimate x Difference in stringency x population). Stringencies in Europe and United States are equal to the average stringency from March 16th to April 15th 2020 (76 and 74 respectively) and the stringency for the policy based solely on recommendations is 44 following Hale et al. (2020). In the meta-analysis we use the non-linear estimate, but the squared estimate yields similar results.
Dave et al. (2021); "When Do Shelter-in-Place Orders	3-Aug-20	Economic Inpuiry	The study looks at the effect of SIPO's on growth rates but does include an estimate of the effect on total mortality after 20+ days for model 1 and 2 in Table 7. Since model 3, 4 and 5 have estimates

1. Study (Author & title)	2. Date Published	3. Journal	4. Comments regarding meta-analysis
Fight Covid-19 Best? Policy Heterogeneity Across States and Adoption Time"			similar to model 2, we use an average of model 1 to 5, where the estimates of model 3 to 5 are calculated as (common estimate model 2) / (estimate model 2) x estimate model 3/4/5.
Dergiades et al. (2020); "Effectiveness of government policies in response to the COVID-19 outbreak"	28-Aug-20	SSRN	The study is not included in the meta-analysis, as it looks at the effect of NPIs on growth rates and does not include an estimate of the effect on total mortality.
Fakir and Bharati (2021); "Pandemic catch-22: The role of mobility restrictions and institutional inequalities in halting the spread of COVID-19"	28-Jun-21	PLOS ONE	The study is not included in the meta-analysis, as it looks at the effect of NPIs on growth rates and does not include an estimate of the effect on total mortality.
Fowler et al. (2021); "Stay-at-home orders associate with subsequent decreases in COVID-19 cases and fatalities in the United States"	10-Jun-21	PLOS ONE	The study looks at the effect of SIPO's on growth rates but does include an estimate of the effect on total mortality after three weeks (35% reduction in deaths) which is used in the meta-analysis.
Fuller et al. (2021); "Mitigation Policies and COVID-19–Associated Mortality — 37 European Countries, January 23–June 30, 2020"	15-Jan-21	Morbidity and Mortality Weekly Report	For each 1-unit increase in OxCGRT stringency index, the cumulative mortality decreases by 0.55 deaths per 100,000. The common estimate is the average effect in Europe and United States respectively calculated as (Actual COVID-19 mortality) / (COVID-19 mortality with recommendation policy) -1, where (COVID-19 mortality with recommendation policy) is calculated as ((Actual COVID-19 mortality) - Estimate x Difference in stringency x population). Stringencies in Europe and United States are equal to the average stringency from March 16th to April 15th 2020 (76 and 74 respectively) and the stringency for the policy based solely on recommendations is 44 following Hale et al. (2020).
Gibson (2020); "Government mandated lockdowns do not reduce Covid-19 deaths: implications for evaluating the stringent New Zealand response"	18-Aug-20	New Zealand Economic Papers	We use the two graphs to the left in figure 3, where we extract the data from the rightmost datapoint (I.e. % impact of county lockdowns on Covid-19 deaths by 1/06/2020). We then take the average of the estimates found in the two graphs, because it is unclear which estimate the author prefers.
Goldstein et al. (2021); "Lockdown Fatigue: The Diminishing Effects of Quarantines on the Spread of COVID-19 "	4-Feb-21	CID Faculty Working	We convert the effect in Figure 4 after 90 days (log difference -1.16 of a standard deviation change) to deaths per million per stringency following footnote 3 (the footnote says "weekly deaths," but we believe this should be "daily deaths"), so the effect is e^-1.16 − 1 = −0.69 decline in daily deaths per million per SD. We convert to total effect by multiplying with 90 days and "per point" by dividing with SD = 22.3 (corresponding to the SD for the 147 countries with data before March 19, 2020 - using all data yields similar results) yielding -2.77 deaths per million per stringency point. The common estimate is the average effect in Europe and United States respectively calculated as (Actual COVID-19 mortality) / (COVID-19 mortality with recommendation policy) -1, where (COVID-19 mortality with recommendation policy) is calculated as ((Actual COVID-19 mortality) - Estimate x Difference in stringency x population). Stringencies in Europe and United States are equal to the average stringency from March 16th to April 15th 2020 (76 and 74 respectively) and the stringency for the policy based solely on recommendations is 44 following Hale et al. (2020).
Guo et al. (2021); "Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts"	21-Sep-20	Research on Social Work Practice	We use estimates for "Proportion of Cumulative Deaths Over the Population" (per 10,000) in Table 3. We interpret this number as the change in cumulative deaths over the population in percent and is therefore the same as our common estimate.
Hale et al. (2020); "Global assessment of the relationship between government response measures and COVID-19 deaths"	6-Jul-20	medRxiv	The study is not included in the meta-analysis, as it looks at the effect of NPIs on growth rates and does not include an estimate of the effect on total mortality. They ascertain that "sustained over three months, this would correspond to a cumulative number of deaths 30% lower," however this is not a counterfactual estimate and three months goes beyond the period they have data for.
Hunter et al. (2021); "Impact of non-pharmaceutical interventions against COVID-19 in Europe: A quasi-experimental non-equivalent group and time-series"	15-Jul-21	Eurosurveillance	The study is not included in the meta-analysis, as they report the effect of NPIs in incident risk ratio which are not easily converted to relative effects.

1. Study (Author & title)	2. Date Published	3. Journal	4. Comments regarding meta-analysis
Langeland et al. (2021); "The Effect of State Level COVID-19 Stay-at-Home Orders on Death Rates"	5-Mar-21	Culture & Crisis Conference	The study is not included in the meta-analysis, as it looks at the effect of NPIs on odds-ratios and does not include an estimate of the effect on total mortality.
Leffler et al. (2020); "Association of country-wide coronavirus mortality with demographics, testing, lockdowns, and public wearing of masks"	26-Oct-20	ASTMH	Their "mask recommendation" includes some countries, where masks were mandated and may (partially) capture the effect of mask mandates. However, the authors' focus is on recommendation, so we do interpret their result as a voluntary effect - not an effect of mask mandate. Using estimates from Table 2 and assuming NPIs were implemented March 15 (8 weeks in total by end of study period), common estimates are calculated as 8^est-1.
Mccafferty and Ashley (2021); "Covid-19 Social Distancing Interventions by Statutory Mandate and Their Observational Correlation to Mortality in the United States and Europe"	27-Apr-21	Pragmatic and Observational Research	The study is not included in the meta-analysis, as it looks at the effect of NPIs on peak mortality and does not include an estimate of the effect on total mortality.
Pan et al. (2020); "Covid-19: Effectiveness of non-pharmaceutical interventions in the united states before phased removal of social distancing protections varies by region"	20-Aug-20	medRxiv	The study is not included in the meta-analysis, as the cluster the NPIs (e.g. SIPO, mask mandata amd travel restricions are clustered in Level 4).
Pincombe et al. (2021); "The effectiveness of national-level containment and closure policies across income levels during the COVID-19 pandemic: an analysis of 113 countries"	4-May-21	Health Policy and Planning	Policy implementations were assigned according to the first day that a country received a policy stringency rating above 0 in the OxCGRT stay-at-home measure. As the value 1 is a recommendation "recommend not leaving house," we cannot distinguish recommendations from mandates, and, thus, the study is not included in the meta-analysis.
Sears et al. (2020); "Are we #stayinghome to Flatten the Curve?"	6-Aug-20	medRxiv	Find that SIPOs lower mortality by 29-35%. We use the average (32%) as our common estimate. Common standard errors are calculated based on estimates and standard errors from (Table 4) assuming they are linearly related to estimates.
Shiva and Molana (2021); "The Luxury of Lockdown"	9-Apr-21	The European Journal of Develepment Research	The estimate with 8 weeks lag is insignificant, and preferable given our empirical strategy. However, they use the 4-week lag when elaborating the model to differentiate between high- and low-income countries, so the 4-week lag estimate for rich countries is used in our meta-analysis. Common estimate is calculated as the average of the effect in Europe and United States, where the effect for each is calculated as (policy stringency - recommendation stringency) x estimate.
Spiegel and Tookes (2021); "Business restrictions and Covid-19 fatalities"	18-Jun-21	The Review of Financial Studies	We use weighted average of estimates for Table 4, 6, and 9. Since authors state that they place more weight on the findings in Table 9, Table 9 weights by 50% while Table 4 and 6 weights by 25%. We estimate the effect on total mortality from effect on growth rates based on authors calculation showing that estimates of -0.049 and -0.060 reduces new deaths by 12.5% 15.3% respectively. We use the same relative factor on other estimates.
Stockenhuber (2020); "Did We Respond Quickly Enough? How Policy-Implementation Speed in Response to COVID-19 Affects the Number of Fatal Cases in Europe"	10-Nov-20	World Medical & Health Policy	When calculating arithmetic average / median, the study is included as 0%, because estimates in Table 6 are insignificant and signs of estimates are mixed (higher strictness can cause both fewer and more deaths). We don't calculate common standard errors.
Stokes et al. (2020); "The relative effects of non-pharmaceutical interventions on early Covid-19 mortality: natural experiment in 130 countries"	6-Oct-20	medRxiv	We use estimates from regression on strictness alone (Right panel in Table "Regression results, policy strictness. Baseline is "policy not introduced within policy analysis period" in "Additional file"). We use the average of 24 and 38 days from model 5. There are 23 relevant estimates in total (they analyze all levels within the eight NPI measures in the OxCGRT stringency index). We calculate the effect of each NPI (e.g. closing schools) as the average effect in all of U.S./Europe. This is done by calculating the effect for each state/country based on the maximum level for each measure between Mar 16 and Apr 15 (e.g. if all schools in a state/country are required to close (school closing level 3) the relevant estimate for that state/level is -0.031 (average of -0.464 and 0.402). We assume all NPIs are effective for 54 days (from March 15 to June 1 minus 24 days to reach full effect). Standard errors are converted to common standard errors following the same process (this approach is unique for Stokes, as our general approach is not possible).

1. Study (Author & title)	2. Date Published	3. Journal	4. Comments regarding meta-analysis
Toya and Skidmore (2020); "A Cross-Country Analysis of the Determinants of Covid-19 Fatalities"	1-Apr-20	CESifo Working Papers	It is unclear how they define "lockdown." They write that "many countries [...] imposed lockdowns of varying degrees, some imposing mandatory nationwide lockdowns, restricting economic and social activity deemed to be non-essential," and since all European countries and all states in the U.S. imposed restrictions on economic (closing unessential businesses) and/or social (limiting large gatherings) activity, we interpret this as all European countries and all U.S. states had mandatory nationwide lockdowns. The effect of recommended lockdowns is set to zero in the meta-analysis, as only one country was in this lockdown category (i.e. too few observations, cf. eligibility criteria). The estimate for complete travel closure is -0.226 COVID-deaths per 100,000. Hence, if all of Europe imposed complete travel closure, the total effect would be -0.266 * 748 million (population) * 10 (100,000/1,000,000) equal to 1,690 averted COVID-19 deaths. However, according to OxCGRT-data European countries only had complete travel bans (Level 4: "Ban on all regions or total border closure") in 11% of the time between March 16 and April 15, 2020. So the total effect is 1,690 * 11% = 194 averted deaths. During the first wave 188,000 deaths in Europe was related to COVID-19 (by June 30, 2020), so the total effect is approximated to -0.1% in Europe and, following the same logic, 0% in U.S., where no states closed their borders completely. We use the average, -0.05%, in the meta-analysis. The estimate for mandatory national lockdown is 0.166 (>0) COVID-deaths per 100,000. Since all European countries (and U.S. states) imposed lockdowns, the total effect is 1,241 (553) extra COVID-19 deaths corresponding to 0.7% (0.4%). We use the average of Europe and the U.S., 0.5%, in the meta-analysis. Calculations of the effect of "Mandatory national lockdown" follow the same logic, but we assume 100% of Europe and United States have had "Mandatory national lockdown."
Tsai et al. (2021); "Coronavirus Disease 2019 (COVID-19) Transmission in the United States Before Versus After Relaxation of Statewide Social Distancing Measures"	3-Oct-20	Oxford academic	The study is not included in the meta-analysis, as they report the effect of NPIs on Rt which are not easily converted to relative effects.

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ABSTRACT

Hiding the Elephant: The Tragedy of COVID Policy and Its Economist Apologists*

In 2020 and 2021, the world witnessed policies that caused enormous net damage to nearly every country. We demonstrate the usefulness of the new WELLBY currency in gauging the costs and benefits of COVID policies and review the contributions of Australian economists to the scholarly and public debates about these policies. Our analysis documents the value of what was destroyed, the weak resistance mounted by the Australian economics profession during this period, and the role played by many Australian economists as apologists for Australia's most catastrophic peacetime economic policy failure. We close with ideas for working towards a better future.

JEL Classification: I31, I38, A11

Keywords: COVID-19, economics profession, WELLBY, welfare, health policy, Australia

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Introduction[1][2]

What were the costs of the main policies tried in Australia and elsewhere in response to the emergence on the world stage of COVID-19 in early 2020, in comparison to both an optimistic and a pessimistic estimate of their benefits? What was the received wisdom from previous decades about such policies and their effects, and how can what transpired be judged? What role did Australian economists, whose duty in part is to channel "what is best for the nation", play in influencing the debate about optimal policy-setting? In this paper, we offer our answers to these questions, in an effort to commence an internal reckoning within the Australian economics fraternity regarding this period.

In the first part of the paper, we provide a summary of the arguments and statistics we and others using similar methodologies have been using to evaluate COVID policies. We calculate the costs and benefits of COVID policies around the world and with respect to Australia, placing these policy choices into historical context. In the second part of the paper, we report on the role played by Australian economists during this crisis moment in our country's history.

The public function of economists involves producing traditional scholarly works, such as journal articles and working papers, but also making public pronouncements about policy through the media. To assess Australian economists' contributions to the debate needs an analysis of both, which we provide in the second part of the paper.

Media contributions of economists help to inform the public of what economists think should be done, and they also influence what other economists think and are willing to say. As one of the editors of an Australian economics journal expressed it in an email:

> *There is an enormous groupthink taking place on the one hand, and on the other the dissenters do not dare speak out. There is a lot of self-censorship going on – everyone has seen how Gigi's been pilloried for taking a contrarian stance.*

Ortmann (2021) similarly opines (page 3) in his piece looking at these debates:

> *…a very vocal group of economists, marching in lock-step with an equally vocal group of public-health researchers and epidemiologists, claimed to have models that suggest that prioritizing public health lexicographically was the way to go (Hamilton et al. 2020; Quiggin & Holden 2021). Never mind the absurd logic underlying the claims of the no-trade-off economists (Swan 2020; Frijters 2020), it was their*

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[2] This paper combines the two invited keynote presentations of the two authors at the 2021 Australian Conference of Economists (ACE) in July, Perth. It has been prepared and revised for the special conference issue of the Economic Record.

aggressive posturing on social and other media that made many reasonable voices refrain from engaging in the public debate.

Self-censorship and pillorying are dysfunctional dynamics within any professional community. If left unaddressed, such dynamics marginalise free thought and critical thinking, downgrading the whole of economics to propaganda. These problems must be recognised and resolved for Australian economics to have a healthy future. To that end, in closing the second part of this paper we reflect on how the Australian economics fraternity can come to terms with its dubious role in this period and move forward together.

To conclude the paper, we briefly discuss our main policy suggestions for avoiding a repeat of the policy choices in this period. Our suggestions consist of institutional changes designed to divorce public authority from money. Changes in this spirit would not merely allow more free thinking and diversity into our policy-making machinery in times of crisis, but would also address several other underlying societal problems that were corroding Australian productivity and well-being long before COVID-19, such as corruption and inequality.

PART 1: Evaluation of COVID policies

We begin this section with a very quick stylised overview of what we have termed elsewhere the 'Great Covid Panic' (GCP) (Frijters et al. 2021), beginning with the emergence of a new coronavirus and the country-by-country mimicking of unprecedented policies of locking down whole populations to 'combat' that virus. Then we review some of the reported damage directly from lockdown policies, to give the reader a sense of the relative scale of damage caused by policy choices, versus damage caused by the virus.

Next, we introduce the WELLBY cost-benefit methodology that was developed to replace GDP and economic surplus as the main measures of value in cost-benefit analyses, arguing that the WELLBY is uniquely suited to capturing the many different types of effects of COVID policies in different life domains. We lay out the underpinning of that methodology and its current status in the world of policy making. We then apply the WELLBY methodology to an evaluation of the lockdown policies pursued, keeping our exposition as simple and transparent as possible. Our conclusion is that any reasonable approach unavoidably delivers the conclusion that the costs of the lockdown policies pursued during this period dwarf any plausible benefits by a huge factor. This conclusion is echoed in results produced by six independent groups in different Anglo-Saxon countries using the same methodology (De Neve et al. 2020, Ryan 2021, Lally 2021, Joffe 2021, Foster 2020c, Frijters and Krekel 2021, Frijters 2020b).

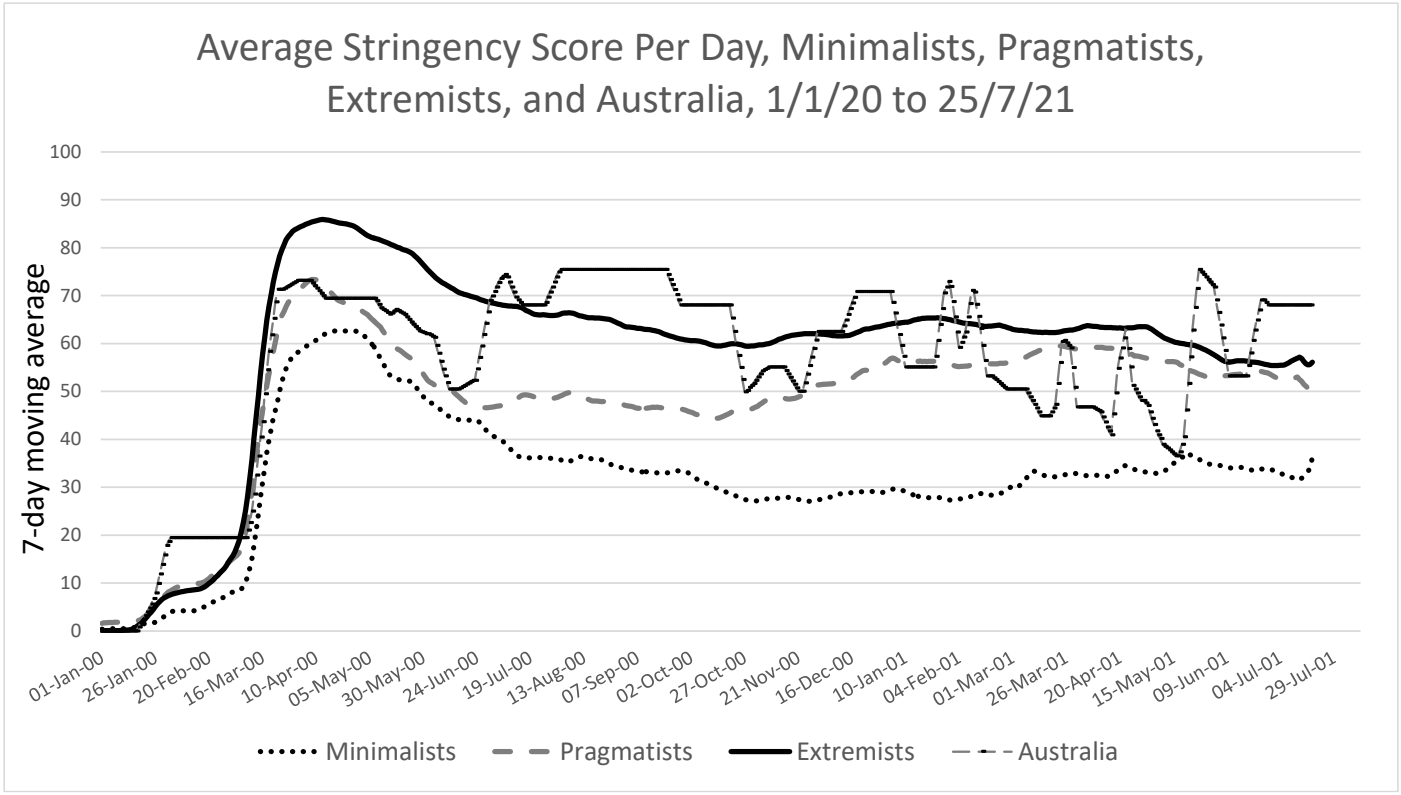
1 Timeline of the policies

In Frijters et al. (2021) we classify whole countries into one of three categories based on the 'stringency index' produced by researchers in the Blavatnik School of Government at the

University of Oxford.[3] This index aggregates information on nine government policies, one of which is about the presence of a COVID-cautioning public information campaign and the remaining eight of which are referred to as 'containment and closure' policies: specifically, school closures, workplace closures, cancellation of public events, restrictions on gatherings, closure of public transport, restrictions on internal travel (stay-at-home requirements and restrictions on internal movements), and restrictions on foreign travel. The lowest value possible of the Blavatnik stringency index is 0 and the highest is 100, allowing us to define as a "lockdown day" a day on which the index score was above a threshold, which we set at 70. Our three policy categories are "Minimalist", "Pragmatist", and "Extremist".[4] Extremists are countries with at least 60 days of lockdown during 2020; minimalists are countries with a stringency index score of less than 40 on average in 2020; and pragmatists are the rest. By this definition and data, the world as a whole had spent around 8 months in lockdowns through September 1st 2021, the whole of Scandinavia is made up of pragmatists, and all major Anglo-Saxon countries (> 10 million citizens) are extremists.

We first illustrate the timelines of policy implementation in these three groups, overlaying Australia's policy decisions to enable comparisons. Figure 1 shows the path of the stringency of measures implemented on average in the minimalist, pragmatist, and extremist countries from January 2020 through July 2021, together with Australia's policy path on a separate line. Like the rest of the Anglo-Saxon world, by our definition that is based on its Blavatnik policy stringency score pattern, Australia has been an extremist country.
FIGURE 1

[3] https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker
[4] In The Great Covid Panic, our 2021 book about the COVID era written for the layperson, we use the term "Covid Cult" to describe the group of countries referred to here as "Extremists". We intentionally chose the word "cult" in our book to convey the religious rather than scientific nature of these extreme policy choices in response to COVID-19.

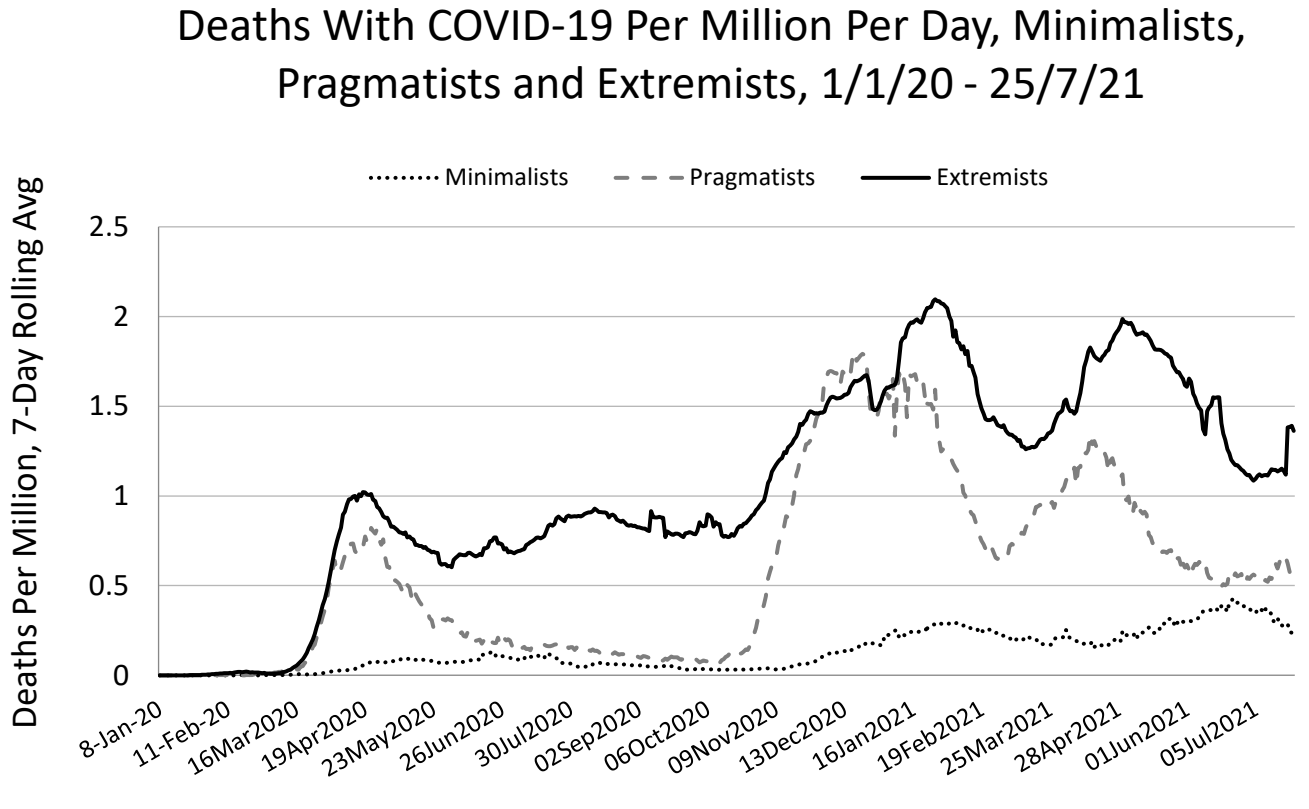


First comparing the policy trajectories of the three major groups of countries during this period, we see a sharp ramping up of restrictions in mid-March 2020 followed by a trifurcation, in which extremist counties attained in mid-April the highest peak stringency across the three groups and then eased off gradually, whereas minimalist countries' restrictions peaked slightly later and then lowered more quickly throughout the ensuing weeks. The policy settings of pragmatist countries peaked between the extremists and the minimalists in April 2020, fell markedly through June, and then hovered for the rest of the period between the average levels of stringency of the extremists and the minimalists. By approximately a year after restrictions began, extremists and pragmatists looked quite similar in terms of their levels of policy stringency, with minimalists remaining at markedly lower stringency levels than the other two groups.

Figure 1 shows that Australia was comparatively quick out of the starting blocks to implement restrictions, exceeding the extremist countries' average level of stringency in late January and early February 2020. In the period of peak restrictions for the average extremist country (March through May 2020), Australia's settings looked more like the average settings of pragmatist countries. Starting in July 2020, however – when Victoria tightened its already strong shelter-in-place directives and suspended international arrivals into Tullamarine airport – Australia's policy stringency rose above that of the average extremist country, and it stayed there for many weeks. The suspension of activities around the Christmas and end-of-year holiday period saw Australia's stringency score pop up again above the extremist average around the turn of the year. While in the autumn months of 2021 Australia started to look more like a pragmatist or even a minimalist country in terms of its policy settings, by mid-year 2021 its policy stringency was back up above the extremist average.

Stringent measures were supposedly instituted in order to prevent, or at least stall, COVID deaths. What, then, was the path of deaths with COVID-19 in each of these three groups of countries? To answer this question, we reproduce below as our Figure 2 what is Figure 1 in Frijters et al. (2021). The data on deaths is taken from the Oxford Blavatnik data, which in turn comes from governments themselves. These data are not uncontroversial, having been argued to be a gross over-estimate by some (e.g., Pasquariello and Stranges 2020) and an under-estimate by others (e.g., Chatterjee 2020).

FIGURE 2



Source: Blavatnik School of Government, University of Oxford, COVID-19 Government Response Tracker. Countries classified by authors.

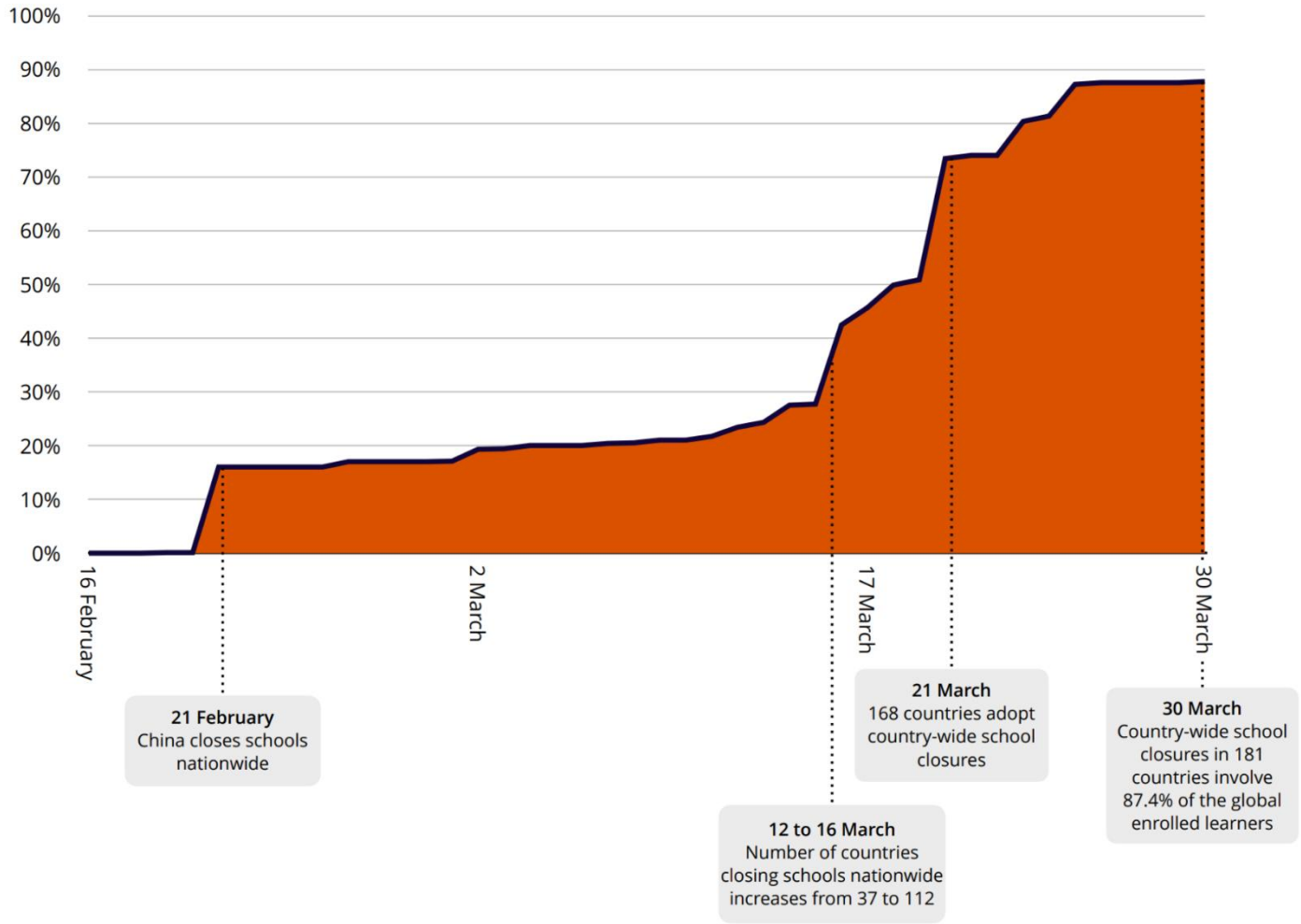
The most crucial fact to draw from Figure 2 is that none of the 20-odd countries in the minimalist and pragmatist groups experienced the "COVID Armageddon" (more than 0.5% of their population dying with COVID) predicted by many early in the period, and in fact these countries experienced only a fraction of the deaths per capita experienced in extremist countries, which sometimes were their neighbours (e.g., Denmark (pragmatist) and Germany (extremist)). Also striking is that over 90% of COVID deaths occurred many months after lockdowns, begging the question of whether the lockdowns prevented anything or whether, at best, they merely postponed waves of infection. At the very minimum, Figure 2 proves that the many predictions of inevitably huge numbers of COVID deaths following a failure to lock down, on which lockdown policies in extremist countries around the world were based, were plainly wrong.

1.1 School closures

One policy area of particular note, as it impacts so heavily upon the welfare of the young, is school closures. In April 2020, the same Blavatnik group that has tracked the stringency of lockdown measures around the world produced a report[5] whose Figure 1 we reproduce below as our Figure 3 to illustrate the scale of the decisions made early in the GCP by leaders around the world to pull children out of school.

FIGURE 3

Percentage of Students Affected by COVID School Closures, Global



In past generations, school closures may have been more disruptive than during the modern era, due to the modern availability of online learning as a substitute. However, even under the generous assumption that online learning is 90% as good as in-person learning in terms of building future productivity, Foster (2020a) estimates a wage loss to Australia's future workers – those people in the cohort of schoolchildren suffering from

[5] https://www.bsg.ox.ac.uk/sites/default/files/2020-04/Education-during-covid-19-crisis.pdf

COVID-era school closures – from the closures mandated only through mid-June 2020 of between A$50 and A$100 million. This figure is a lower bound. It ignores the social cost of the widened gap between well-off and poorly-off students that school closures have produced (see below). It excludes losses in the sphere of public returns to education (e.g., in terms of levels of violence or unemployment), all private losses that are not captured by wages (e.g., damage from lower mental health and bad habits), and all losses accruing after mid-June 2020. School closures surged again later in the GCP in many states.

A good review of the various negative effects of school closures, particularly for the most vulnerable children, is in the Norwegian case study by Thornsteinsen et al. (2021). The main takeaway is that children of well-organised and digitally skilled parents have seen few negative consequences, but that children of disadvantaged groups with relatively poor preparation have seen a lot of damage to their progress, sometimes even including regression in cognitive levels as a result of the lack of intellectual stimulus. We conclude that school closures can be seen as inequality increasing, and an investment in future social disruption. At time of writing, schools in Australia's most populous states are still subject to closures implemented earlier in 2021.

1.2 Border closures

Another notable policy arena is border closures. Australia is acutely affected by international border closures because of our economically important tourism and international education sectors, and more profoundly because of our status as a nation of immigrants. The latest data from the ABS, captured in June 2020,[6] report that more than 7 million of the people we think of as "Australians", as they are part of our population, are immigrants. Immigrants disproportionately represent the productive portion of the age distribution.

New immigration essentially came to an abrupt halt in the COVID era, meaning Australia has foregone about 120,000 skilled immigrant arrivals per year, and a similar number of students. These figures represent a large loss of free human capital and education exports. The international tourism sector has similarly seen its business reduce to almost nothing, with businesses having had to orient towards domestic tourism (Grozinger and Parsons 2020). Insolvencies during this period in Australia, which have been estimated to be the highest in the world,[7] will contain a large portion of small businesses with a tourism or hospitality component that will not reopen when borders finally do.

Whether Australia will regain its historically high international flows of people (migrants, students, tourists) is uncertain and depends on whether and how badly 'brand Australia' has now been tainted. Long, expensive quarantine requirements seem incompatible with large flows of people to Australia. Internal border restrictions similarly have disrupted the

[6] https://www.abs.gov.au/statistics/people/population/migration-australia/latest-release#:

[7] https://atradius.com.au/reports/economic-research-2021-a-turn-of-the-tide-in-insolvencies.html

normal operations of families and businesses within Australia. The previous Australian reputation for being welcoming has probably been affected by the country's COVID-era policies. The way in which temporary visa holders (including students) have been treated during the COVID era,[8] receiving very little government support and the distinct message that Australia wanted them to go home, also bodes ill for brand Australia.[9]

2 Expected and actual damage, in brief

Ex ante, what damage was expected to ensue from the unprecedent polices described above, and what damage did they actually cause?

To help the reader prepare for the answer to these questions, we start by offering four pieces of relevant information.

1. The Nuremberg code, drawn up to prevent a recurrence of the Nazi experiments, explicitly requires a mass medical experiment (such as a population-wide lockdown justified on the grounds of protecting public health) to be supported by reasonable evidence that the damage of the intended cure to population health is likely to be less than the benefit. Failure to have that evidence, and to implement the experiment anyway, is a crime against humanity.[10]
2. In March 2020, the Dutch Ministry of Economic Affairs (2020) estimated the health damage from lockdowns and associated disruptions to normal health services to be at least 3 times larger than the anticipated gains of lockdowns – evidence that the Dutch government buried for over a year. UK government actuaries estimated in April 2020 that up to 200,000 deaths would be caused by health service disruption during lockdowns (compared to 130,000 claimed eventual COVID deaths), evidence that did not come to light until December 2020 after Freedom of Information requests (Knapton 2020).
3. The standing advice prior to March 2020 on pandemic policies in Victoria, Australia, the UK, the US, and much of Europe was that lockdowns were not recommended, in part because they were estimated to be too costly and unsustainable (Sabhlok 2020, Kulldorff 2020). In their review of what to do once a new respiratory virus went pandemic, Inglesby et al. (2006) dismissed lockdowns as an unviable option.
4. If you take their estimated economic damage due to lockdowns and apply their high-end threshold that the value of a statistical life (VSL) is 9 million AUD, and then adjust for the remaining quality years of life expected of COVID victims, then in May 2020,

[8] https://www.sbs.com.au/language/english/nearly-600-000-temporary-visa-holders-left-australia-for-their-home-countries-in-2020

[9] https://www.eastasiaforum.org/2020/04/20/go-home-australian-migration-policies-will-reap-a-bitter-covid-19-economic-harvest/

[10] Some may object to the classification of population-wide lockdowns in response to COVID-19 as "medical experiments". Restrictions to normal life that would negatively impact individuals' health (both mental and physical) were mandated in the name of public health, without clear evidence that they would work. We contend on that basis that medical experimentation is exactly what went on here, regardless of what AAP fact-checkers may contend.

Holden and Preston (2020) already implicitly argued that Australian lockdowns were destroying at least 4 times more life years than they were saving.

2.1 How to judge policies and outcomes? Introducing the WELLBY

Life satisfaction is the answer to the question, "Overall, how satisfied are you with your life nowadays?" Such a question already appears in many social science surveys worldwide and captures in a simple measure the extent to which a person is happy, content, and thriving.

One WELLBY ("wellbeing year") is defined as one unit of life satisfaction on the 0-10 answer scale for this question, for one person, for one year. The aim of public policy pursuing human wellbeing as the objective is then the anticipated stream of subjective wellbeing of the population:

$$\sum_t (1-\rho^W)^t \sum_i SW_i * (LS_{it} - LS_0)$$

Time *t* is in whatever unit is most convenient (years, months), ρ^W is the pure social discount rate on the future, the individual counter *i* sums over the relevant population (which will change over time), SW_i is a positive weight that could differ over individuals, for instance because some are dual citizens, and LS_{it} is the life satisfaction of person *i* at time *t.* LS_0 is the zero-point of life satisfaction, denoting the level of life satisfaction equivalent to death, crucial for making trade-offs between the quality of life and the length of life. If the unit of time is in years, $(LS_{it} - LS_0)$ is the number of WELLBYs contributed by a living individual to societal subjective wellbeing. A unit of WELLBY is treated as equivalent across individuals, independent of the person (complete with his personal characteristics) who is experiencing a unit of wellbeing.

The WELLBY-based methodology is meant eventually to replace most existing standard economic cost-benefit analyses (CBAs) which are explained in Boardman et al. (2017). CBAs differ by country and government department, but all are oriented towards the measurement of economic surplus, value added, or GDP-like notions of value. Economic surplus is itself an unobserved 'psychic' good, meaning that it is not true that CBAs are restricted to counting market prices or observable outcomes. The bundle of things valued by economists in CBAs is quite broad, but all link in some way to prices and market demand and supply curves. It is uncontroversial to say that classic CBA is accepted as not directly measuring what matters to people, but instead aims to infer what matters from market prices, willingness-to-pay studies, or other inferences from choices.

Standard CBA practice has four key inherent problems. The first is that many of the most important things in life, like children or friendships, are not things people buy and sell and are inherently interpreted as non-monetary. As a result, changes to things like friendships or other warm relations that are not signalled in a marketplace are left out of CBA considerations. The second is that negative externalities, such as status externalities of

consumption, are not part of prices and are thus usually presumed not to exist in economic CBAs. The third is that the state is involved in the supply of many public goods that have clear benefits but no obvious market price, such as a clean environment or national art programmes. The fourth is that there are many areas where it is totally unreasonable to presume people know how beneficial this or that good is to them and hence that choice behaviour is informative, such as mental health and the services that improve mental health, which are classic 'experience goods' (Dulleck and Kershbaumer 2006). As a result, current policy that is informed by existing CBAs heavily underinvests in these blind spots (i.e., the environment, mental health, and social life (Frijters and Krekel 2021)).

The alternative WELLBY-based methodology was first published in Frijters et al. (2020) and has been adopted by the UK Treasury (2021) for policy evaluations and appraisal throughout UK institutions.[11] New Zealand has recently followed suit. It is also being advocated for other countries (e.g., Helliwell et al. 2021). A large handbook by Frijters and Krekel (2021) lays out many aspects of the methodology, which has by now been applied to evaluate lockdowns in the UK (De Neve et al. 2020), Ireland (Ryan 2021), New Zealand (Lally 2021), Canada (Joffe 2021), Australia (Foster 2020c), the world, and various countries in continental Europe (Frijters and Krekel 2021, Frijters 2020b).

Each of the dozen or so WELLBY-based cost-benefit analyses of COVID lockdowns has concluded that the costs of lockdowns are a vast multiple of their likely benefits, on a scale ranging from 4:1 to 1000:1. This is one reason why the most prominent wellbeing economists[12] in the UK have written pieces highly critical of lockdowns in the UK and elsewhere. Importantly, the vast wellbeing literature contained enough predictive information about the likely economic and mental health effects of lockdown policies that such judgments could be made right at the start of the COVID period (e.g., Frijters 2020c), which was also true for calculations based on physical health effects that were available to some governments as early as March and April 2020 (Dutch Ministry of Economics 2020, Knapton 2020). For example, Miles et al. (2020) claimed a 50:1 ratio of costs versus benefits of lockdowns in the UK, looking only at physical health.

Each aspect of the basic maximand shown above demands technical standards. Those advocated by Frijters and Krekel (2021) are to take 1.5% for ρ^W, a level of 2 for LS_0, and a level of 8 for the expected LS_{it} of a healthy person, meaning that a healthy person contributes to societal wellbeing 6 WELLBYs per year, which is then also the loss of a person experiencing one year fewer of healthy life.

[11] A key attraction of using the WELLBY is that the literature on the determinants of life satisfaction includes something like 200,000 studies going back since the 1930s, including many causal-design studies, such as recent ones drawing on large-scale lotteries (Lindqvist et al. 2020) and naturalisation policy changes in Germany (Dahl et al. 2021). This means that we already know a lot about what a government could do if it wants to increase its WELLBYs, and how to avoid WELLBY losses.

[12] These include Andrew Oswald, Andrew Clarke, Nick Powdthavee, Richard Layard, Gus O'Donnell, Jan De Neve, Christian Krekel, Nancy Hej, David Miles (though one might argue he is more a health economist), Paul Dolan, and Daniel Fujiwara.

A crucial value is how productive government expenditure is in generating a WELLBY. Frijters and Krekel (2021) convert the mainstream productivity estimates of the UK National Health Service into the estimate that around 4500 AUD of government expenditure produces one WELLBY. This differs from the willingness to pay for a WELLBY, for which the value lies between 10,000 AUD and 20,000 AUD (UK Treasury 2021).[13] This means that government expenditures generate a year of healthy life – i.e., six WELLBYs – with every 27,000 AUD (low) to 120,000 AUD (high). The threshold value used by the Pharmaceutical Benefit Scheme (PBS) in Australia above which a drug or medical intervention that saves one good year of life will be purchased is around 50,000 AUD (Wang et al. 2018). This number applies to buying medicines affecting millions of Australians.

A 1%-of-GDP increase in national debt would mean a reduction of 22 billion AUD in government expenditure when that debt is eventually paid back.[14] The above calculations indicate that this in turn will cost the repaying country between 183,000 and 815,000 WELLBYs, which equates to between 31,000 and 136,000 years of life spent with a life satisfaction of 8 out of 10. In the remainder of what follows, we will use the PBS-implied threshold number that 8333 AUD worth of government expenditure produces approximately one WELLBY,[15] translating to about 4 million AUD as the "price" to buy a whole life via government spending. In turn, this means that a 1% decrease in future government expenditure implies 2.64 million fewer future WELLBYs.[16] As we discuss below, both lower and higher estimates exist for the statistical value of life, while the 4 million AUD number is routinely used in practice in Australia when making health decisions for the whole population.[17]

2.1.1 Lockdown WELLBY calculations

The strategy of a WELLBY CBA for an intervention like a lockdown is best illustrated by Figure 4. It is essentially an envelope-theorem strategy whereby one tries to approximate the difference between two streams of wellbeing by what one knows of the estimated actual difference in the period of the intervention (from T=0 to T=1) and then 'solves' for values for the rest of time via an evaluation of how particular capital stocks, like the size of the population and government debt, have been affected by the shock.[18] Implementing it

[13] An analogous difference is seen in the distinction between the amount a government pays to save a life-year in normal times, and the amount that an individual person would pay to 'buy' an extra year of life for himself.

[14] This assumes that real interest rates and discount rates are the same, which is a standard assumption, so that the timing of the expense reduction is irrelevant.

[15] Six WELLBYs equate approximately to one QALY's worth of change via a one-year change in life satisfaction.

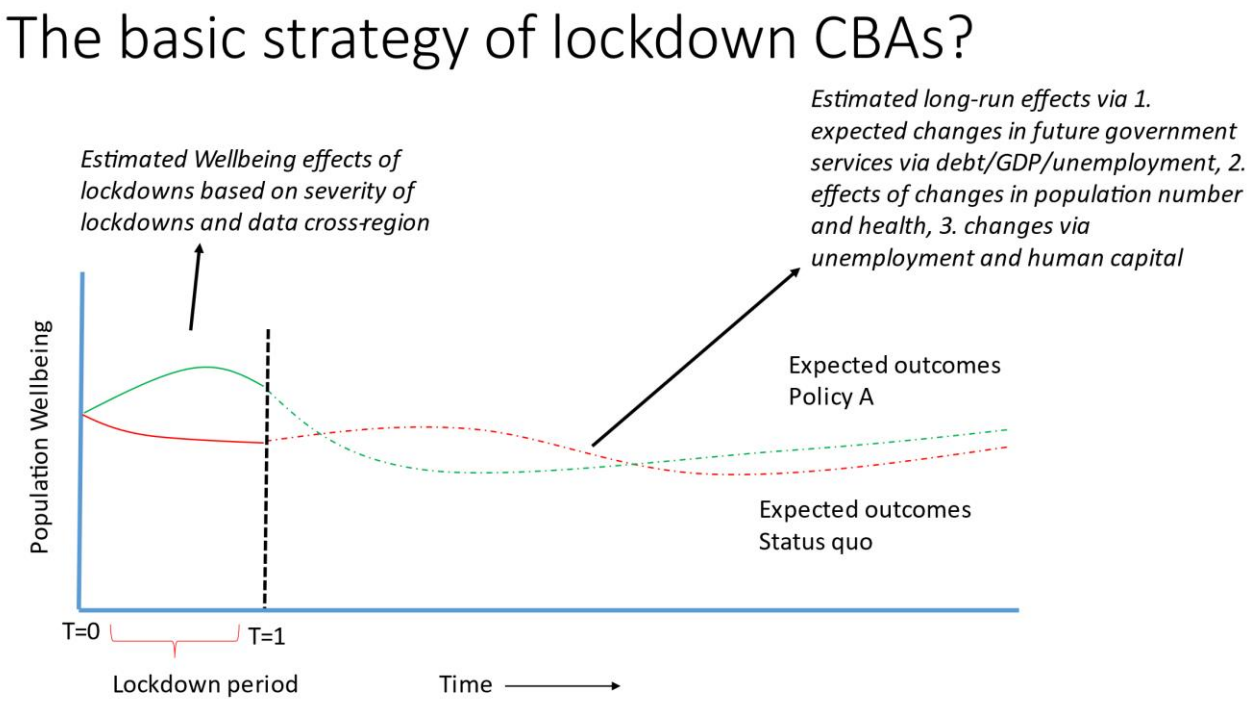
[16] The figure is the result of dividing the future expenditure reduction of 22 billion AUD by the amount of government expenditure needed to "buy" one WELLBY.

[17] One might argue that marginal health expenses are probably not all that cost-effective relative to mental health expenses and many education activities, or direct welfare (Frijters and Krekel, 2021). Still, presuming the marginal productivity of expenses in one large area of government (the PBS) is the same as those for the other major areas conforms to the economic logic of rational budget allocation within government.

[18] We use the term "envelope theorem" here very loosely to convey the idea of a first-order approximation of the difference in two streams of wellbeing by means of looking at changes in resources (capital stocks) valued by their derivative (wellbeing price).

thus requires the use of wellbeing prices for those capital stocks as well as elements in the estimated streams, like the wellbeing lost from a COVID death.

FIGURE 4



The basic implementation of a wellbeing cost-benefit analysis of COVID lockdowns has been to focus on the effects of lockdowns on economic and social life in Western countries, and to build in a clear bias towards concluding that lockdowns were worth it. The main deliberately biased assumption has been to presume that lockdowns avoid a loss of life equal to a generous estimate of the infection fatality rate of COVID-19 (like 0.2%, higher than the survey estimate by Ioannidis 2021), thereby taking the extreme assumption that lockdowns truly prevent all COVID deaths, which was not expected ex ante in March 2020 and became extremely dubious ex post for Europe and the Americas in particular (see Lally 2021). Indeed, an author writing for the Brownstone Institute – whose senior scientific director is Martin Kulldorff, one of the lead authors of the Great Barrington Declaration signed by over 80,000 scientists – compiled a list of 400 studies finding that lockdowns have had no noticeable positive effect on cases or deaths,[19] where the dominant research methodology is cross-country analysis or standard time-series analysis.

While we think it likely that some components of the Australian lockdown response, such as international border closures, have prevented earlier waves of COVID deaths, we do not regard that as clearly established because the whole region of the world where Australia is located (which includes China, Taiwan, Indonesia, and Vietnam) has recorded very low numbers of COVID deaths – on the order of 1/10th the toll seen in Europe and the Americas. This makes it possible that the region as a whole has high levels of pre-existing immunity

[19] https://brownstone.org/articles/more-than-400-studies-on-the-failure-of-compulsory-covid-interventions/

from other coronaviruses, and/or other characteristics conducive to low numbers of COVID deaths or relatively low transmission rates. Further investigation of the impact of these characteristics would be a scientific approach to the observation of low death counts in countries that share Australia's geographic region. The list of characteristics that might be involved includes climate, fauna, social habits, diet, sunlight exposure, and many others.[20]

In our various wellbeing CBAs from 2020-2021, we have taken two main possible counterfactuals. One is described by the trends and policies from before 2020, thus presuming a business-as-usual response (some lockdown advocates might call this a "let it rip" response) to the coronavirus. What one then has in mind is a public health response not much different to what is seen in response to yearly flu variations, which also often involve crowded hospitals and attempts at selective screening. The business-as-usual counterfactual simply entails following the pre-2020 plans and habits for what to do in case of a pandemic of the (mild) severity that occurred. Crucially, it presumes the absence of any government-maintained panic. The difficulty in judging the effects of actual policies is then in gauging what fraction of the results seen in Australia to ascribe to national policies, and what fraction to the changes seen in other countries that would have happened in Australia anyway, unconditional on policies. In gauging this we have by and large been guided by estimates from the mainstream. One is then still in the business of judging the totality of many different policies, without trying to evaluate every single policy on its own.

Another counterfactual we have sometimes constructed is to take the Swedish experience as a base case for the policies and outcomes other Western countries could have had relative to 2019 trends. Sweden did not spend a single day in lockdown. Most schools were open, no Swede was prevented from leaving the country, and no Swede needing to be socially close to others was prevented from doing so. Using Sweden as the counterfactual means presuming that the deviation in Sweden from Swedish trends pre-2020 would have been experienced by other countries, adjusted for population size, had they taken the same policy path that Sweden trod. More sophisticated counterfactuals are easy to construct, for example if one wants to allow for the possibility of regional idiosyncratic trends, or sectoral differences between countries. The reader will see later why the precise nature of the counterfactual does not matter for the bottom line: the costs of lockdown policies so vastly outweigh any reasonable estimate of their benefits that any small adjustment to the counterfactual scenario is irrelevant.

In various calculations aiming to evaluate lockdown policies, some authors have tried to include the values of large lists of things that might matter, such as pollution, crime, road deaths, suicides, "long COVID", unemployment, private incomes losses, disruptions in the developing world, and so on (Miles et al. 2020; de Neve et al. 2021; Joffe 2020). Yet, by

[20] Authors who have investigated such factors include Waterlow et al (2021), studying cross-immunity derived from prior exposure to other coronaviruses; Meyers et al (2021), studying the impact of nasal rinsing, a cultural practice more common in East Asian societies relative to other regions; and Souris et al (2021), studying the potential role of region-specific fauna in giving rise to prior deep immunity.

mid-2020 it had become clear that four key numbers capture the bulk of the costs versus benefits for a developed Western country like Australia. Here we focus only on those four.

The first key number is the plausible WELLBY benefits of lockdowns, based on estimates of COVID deaths averted and years of life saved per COVID death. On the number of COVID deaths averted, typically wellbeing authors have made some heroically generous-to-lockdown assumption, such as that lockdowns are immediately followed by a 100% effective vaccine which arrives too late in the counterfactual scenario. A high estimate is that 0.2% of the population's lives are saved, which for perspective is 140% of the lives actually lost due to COVID-19 in Sweden, much higher than any COVID death rate in the time zones near Oceania (e.g., Japan, China, Thailand), and higher than the meta-study estimate of the IFR of 0.15% by Ioannidis (2021, first published by the World Health Organisation). On the question of how many years of good health are lost per COVID death, the common finding in Europe and China has been that the average COVID death occurs at about age 80, in a person who has several underlying health problems. The first-flush approach some have taken is to say that the average 80-year-old has another 10 years to go, so that the loss of one average COVID victim equates to the loss of 10 years of healthy life (Ferreira et al. 2020). Yet, for someone aged 80, having existing health conditions is predictive of a lower residual life expectancy of only around 5 additional years (Frijters 2020b). One should furthermore realise that the quality of life is lower for those with severe health conditions, and that about half the COVID deaths were among the institutionalised elderly with particularly low life expectancies and bad health conditions. All of this means that 3 good years of life is a generous estimate of what is lost on average per COVID death (Frijters 2020b). In all, this would mean for Australia that a generous estimate of what lockdowns have averted via reduced COVID deaths is 155,000 good years of life,[21] or 930,000 WELLBYs.

The second crucial number is the loss of WELLBYs during lockdowns via reduced mental health, loneliness, worse physical health, idleness, loss of purpose, and so on. Different estimates now exist for different countries, such as a loss of around 0.5 in life satisfaction from UK-style lockdowns via social distancing measures (Fujiwara et al 2020). For Australia, the monthly ANU survey of around 3,000 Australians analysed by Biddle et al. (2020) has found a remarkably close correspondence between lockdowns in a state and life satisfaction that also corresponds to about 0.5 loss in life satisfaction for a Victoria-style lockdown. This means that for Australia as a whole, a 1-month lockdown means a loss of 1.1 million WELLBYs. A similar figure can be recovered by comparing Australia to Sweden, a country with not a single day of lockdown and that experienced a COVID wave.

The third crucial number is just how much national debt increases due to lockdowns themselves, as opposed to in response to the changes in the international economy. This is essentially a measure of future reductions in government expenditure, as explained above, which in turn is the channel through which lockdowns produce by far their biggest

[21] I.e., .2% of Australia's population, multiplied by 3.

economic effects on wellbeing. The expected additional rise in debt not only reflects debt directly incurred in the present period, but also the effect of changes in economic activity. In Australia, the debt-to-GDP ratio has already risen about 10% compared to previous trends and is expected to rise another 25% at least relative to pre-2020 (Reserve Bank of Australia 2021), largely as directly caused by policies such as subsidies for workers to stay home and expenditures on tests. In Sweden, by comparison, debt only rose 6% and the country already runs a balanced budget (Trading Economics 2022). In Australia, printing money to cover debt carries an inflation risk. One could thus argue that the Australian lockdown policies have already 'locked in' an additional 19%-of-GDP worth of government debt, judging by how many months of lockdowns so far the average Australian has endured. Yet, if we are again generous and only ascribe 50% of the Australian government debt increase to lockdown policies, then we should still conclude that an increase of at least 1%-of-GDP worth of government debt is caused per month of lockdowns, costing 2.64 million WELLBYs via reductions in future government expenditure.

The fourth crucial number, which was the basis of the early calculations in Miles et al. (2020) and the Dutch Ministry of Economic Affairs (2020), is just how many health problems are created in the future by mandated disruptions to normal health services. Estimates of this number vary and are controversial, as one might imagine, but a UK government report (Department of Health and Social Care et al. (2020)) concluded that the likely number in the UK was an additional loss of 100,000 preventable deaths via undiagnosed cancers and similar preventable problems. Those succumbing to these problems should be expected to have had far more than just 3 good years left to live, with 5 good years being a low estimate. Ascribing that loss to the 4 months of lockdowns in the UK noted in the report and converting to the Australian context implies a loss of about 276,000 WELLBYs per month of lockdowns in Australia from disruptions to health services. Additionally, IVF treatments have been disrupted in Australia because such treatments were considered inessential, which then carries another 370,000 WELLBYs lost per month via unborn planned children. It is a difficult philosophical question how much to count these actively prevented births, but if they are counted then the health cost disruption is easily double per month what conventional health estimates indicate.

Less crucial and more debatable categories of costs, in decreasing order of how large we think they are relative to the above, include: the eventual loss of trust in government and media from the violations of liberties and propaganda during this period; the missed free gift of the human capital coming into Australia via skilled migration; the damage of school disruptions in terms of children's social and emotional development and future tax receipts; the reduction in numbers of 'regular' children born (a big number in the US and UK); the loss of human capital among workers prevented from gaining experience; and the benefits of accelerated medical vaccine technology versus decelerated technology of other sorts. What is probably not affected at all or is very minor relative to the four numbers above are changes to suicides, long COVID, long-term unemployment, and pollution. See Frijters et al. (2021) for a lengthier discussion and references.

Where do these four key numbers leave us? They tell us that a loss equivalent to what would be lost in total from COVID-19, assuming a highly pessimistic 0.2% mortality rate, is suffered in 4 weeks of lockdowns via the direct mental health and other wellbeing costs of locking down the whole population; in 11 days of lockdowns via increased government debt that inevitably leads to reduced future government expenditure via the government budget constraint; and in 2 months of lockdowns via eventual losses from disrupted normal health services and IVF treatments. Every 7 days of lockdown thus leads to a wellbeing loss equivalent to the loss from COVID-19 (again assuming a 0.2% mortality rate) of 51,600 Australian COVID deaths. Melbourne suffered 29 weeks of lockdown between January 2020 and September 2021, making the 'cure' at least 29 times worse than the disease, and that is making the optimistic assumption that lockdown losses are now over for Melbourne.

In sum, as a rule of thumb, an Australian lockdown costs 30% of the time spent in it via both direct reductions in the wellbeing of life during them (about 8 of the 30%), future reductions in government expenditure (about 20 of the 30%) and other health costs that they produce (2 of the 30%). For every 10 days of lockdowns, it is as if one took away 3 days of life from everyone. Taking away 3 out 10 days from a whole population of 25.8 million adds up. The average human in the world has seen almost 34 weeks of lockdowns since January 2020, adding up to a staggering worldwide loss of human wellbeing.

The costs of lockdowns are simply in a different ballpark from their benefits if one considers the wellbeing of the population as the object of policy. Even if one quadruples the above estimates of benefits and divides the estimates of costs by a factor of four, one would still conclude that lockdowns are not worth it.

One can only arrive at a 'lockdowns were worth it' conclusion if one chooses a different policy objective (such as "the career interests of politicians") or ignores the big costs and makes unsupportable assumptions on the benefits. As one example of the latter, none of the three big-ticket cost items discussed above shows up in the pro-lockdown simulation cost-benefit model of Kompas et al. (2021), whose analysis was first publicly released in 2020.

Our calculations above have been stacked deliberately in favour of lockdowns' benefits and against ascribing negative effects to lockdowns. If one considers that lockdowns were initiated not to prevent COVID deaths but to 'flatten the curve' and hence deal with COVID cases over a longer period of time rather than prevent them from occurring (which was deemed impossible at the time), then one immediately realises that they were not anticipated to prevent a large number of deaths. Their supposed anticipated benefit depended on how effective hospital treatments were going to be relative to care at home, and whether a large proportion of those infected in the COVID wave that was indeed averted would otherwise show up in vain at hospitals. Given that hospitals could do little

for COVID patients (with ventilators a mixed blessing[22]), it is not clear that the proposal of flattening the curve had any reasonable argument going for it.

Further, the costs of lockdowns are far worse still when we consider the effects they have on poor countries who have not merely seen their trade disrupted, but have also been given a disastrous example to follow. Joffe (2020) documents in great detail the many health costs paid by poor countries and the website collateralglobal.org, an outgrowth of the Great Barrington Declaration, tracks them. Poor countries have seen non-COVID inoculation programs disrupted, food prices rise 30%, the number of extremely poor and at risk rise dramatically, a significant reduction in access to clean birth, and other large shocks. There has been no serious acknowledgement of this in Australia, but the poor world has been affected terribly by lockdowns.

Some comparison with the effects of peacetime downturns in Australian history is useful. From the numbers above, we can see that disruption to social life can be extremely detrimental via its effect on mental health, but that unproductive increases in government debt are the biggest-ticket item. The combination means that recessions are the main peacetime negative-wellbeing events. During the GFC in 2008-2010, the debt-to-GDP ratio rose 10-15% per year, similar to the rise in COVID times. The shock to mental health and wellbeing is also similar in large recessions (cf. Deaton's "Deaths of Despair") and in lockdowns. Yet, whereas lockdowns lead to debt that would not reasonably occur without lockdowns, debts incurred during 'normal' recessions prevent hardship among those unavoidably unemployed. Most importantly, recessions have been a feature of capitalist economies for centuries, without any indication of some way of preventing them from happening, so the suffering and debt they involve is not reasonably 'avoidable' by policy.

Our conclusion is that COVID lockdowns have been the worst policy disaster in Australian peacetime history.

PART TWO: The role of economists in influencing COVID policy

We now move to a summary of the general reactions of economists worldwide to the GCP, paying particular attention to what happened within the Australian economics community.

3 How did economists react to the unfolding catastrophe?

As the profession to which society turns for cool-headed, objective (if occasionally dismal) advice on how to maximise total social welfare, economics was the natural place to expect resistance to be mounted against the welfare-destroying policies of lockdowns. Did we deliver?

[22] https://www.statnews.com/2020/04/08/doctors-say-ventilators-overused-for-covid-19/

Some top economists, and particularly those inside state bureaucracies, definitely did. They produced cost-benefit analyses, ran scenarios on the effects of lockdown on the macroeconomy, and pointed out the losses from proposed policies. Sanjeev Sabhlok (Sabhlok 2020) documents at length the presence and activities of these dedicated insider economists in Australia and in the state of Victoria in particular, where he was one of these economists. Sabhlok resigned when, to his mind, he saw his government committing crimes against its own population and his employer would not allow him to speak this opinion. We have been in communication with many more professional economists in departments of the states and Commonwealth, charged with making, reviewing, and advising on resource allocation decisions on behalf of millions every day, who held similar views as Sabhlok but kept silent for fear of losing their jobs.

In February and March 2020, as governments around the world were captured in quick succession by the control-and-lock-down ideology, economists in the more refined worlds of academia, consulting, and think tanks were making their voices heard individually and through national opinion surveys regarding whether the path being charted was wise. In the majority of cases, the judgment was favourable.

In the United States, which some hold to be the global hub of elite economic thought, 44 academic economists from Ivy League universities and other top departments were asked in late March 2020 by the IGM Forum at the University of Chicago about their agreement with the following statement:[23]

> "Abandoning severe lockdowns at a time when the likelihood of a resurgence in infections remains high will lead to greater total economic damage than sustaining the lockdowns to eliminate the resurgence risk."

We note first that this is a leading question, as its wording alone invites the responder to agree, and assumes a connection between lockdowns and viral trajectory. Still, PhD-qualified economists working for world-class universities would presumably have the skills needed to resist implicit pressure towards having a particular opinion on a survey question directly related to their expertise. However, not a single American economist in the group went on record as disagreeing with the statement above. Only 14% of the 44 respondents responded "Uncertain", and 7% abstained.[24]

In Europe, the situation was slightly better. Asked by the same group running the American survey of academic economists about their agreement with the following statement, 75%

[23] https://www.igmchicago.org/surveys/policy-for-the-covid-19-crisis/

[24] Those who selected "Uncertain" were David Autor, Linan Einav, Pinelopi Goldberg, Jonathan Levin, Jose Scheinkman, and James Stock. Those who abstained were Abhijit Banerjee, Amy Finkelstein, and Caroline Hoxby.

of the surveyed "top economic experts" in Europe agreed or agreed strongly (4% disagreed) that:[25]

> "Severe lockdowns – including closing non-essential businesses and strict limitations on people's movement – are likely to be better for the economy in the medium term than less aggressive measures."

The strong agreement on public display may well have masked private doubts of some academics who were afraid for their friendships or their careers. Others have made the case that the image of consensus was not matched by actual broad agreement with the measures.[26] Yet in the face of so much outward agreement, the power of social signalling in driving people into a common pattern of choices (as studied in Bose et al. 2020 and by many others) must have been overwhelming during this period. The individual rewards for being the 'salmon swimming upstream' at such a moment are mainly internal, flowing from an alignment of action to pre-existing moral commitment. By contrast, the rewards for agreeing with the majority opinion are immediate and probably difficult to resist.

Some small groups did not follow the mainstream. One group of economists that took a sceptical view of lockdowns as the right policy response to COVID-19 from very early on were the UK's wellbeing economists, who as previously mentioned openly toed a highly sceptical line on lockdowns.[27] Given that the economics profession presents itself as a social science with a moral charter, i.e., to seek the outcomes that maximise total social welfare (see Hazlitt 1946) regardless of other considerations such as social approval, from the standpoint of professional integrity and morality all economists should have been willing to play the salmon. Reality proved different.

3.1 Australian economists' contributions to the COVID policy debate

Several COVID policy pieces were published in journals, working paper series, and official reports by Australian economists during this era. For space reasons we cannot provide an in-depth review of every scholarly contribution here. We instead select one exemplar article that illustrates the willingness of economist authors to follow the groupthink, and then report on the scholarly contributions about Australian COVID policy that are returned by a standard literature search that might be performed by a naïve student researching this period.

We already encountered the cost-benefit analysis of Kompas et al. (2021), a simulation model of the type used by many others. These authors were willing to assume a COVID IFR of 1.7% for adults, that lockdowns would be one-off final solutions to COVID risks, that total

[25] https://voxeu.org/article/european-economic-policy-covid-19-crisis-igm-forum-survey

[26] https://www.realclearmarkets.com/articles/2021/06/21/did_economists_really_favor_the_corona-lockdowns_782236.html

[27] This includes the 17 authors represented in De Neve et al. (2020), Brodeur et al. (2021), Oswald and Powdthavee (2020), Fujiwara et al. (2020), and Frijters and Krekel (2021).

economic recovery would occur within weeks, that there was no causal debt issue, and that mental health and physical health disruptions caused by lockdowns were irrelevant. We see these assumptions and argument as analogous to a concentration camp guard insisting that the camps extended the life of their inmates because surely more would have died had some not received camp rations. The camp analogy contains the same combination of pointing to something very small that supposedly has a benefit (camp rations, paralleling COVID prevention through social isolation and related measures) while not recognising the enormous and immediate damage of the whole enterprise (the destruction in the camps, paralleling the negative effects of lockdowns). As with concentration camps, the damage done by lockdowns was recognised and seen as obvious for decades prior, making it wondrous in both cases that adherents have been able to look away from the damage.

Even the initial 'flatten the curve' models used to justify lockdowns (Imperial College COVID-19 Response Team (2020)) were not as outlandish as this, because at least the authors of the 'flatten the curve' models admitted that they did not know what the costs and benefits were going to be, which is also an admission that they should not have been used as the justification for any policy, especially one as draconian as lockdowns.

How then should we view the journals that published studies like Kompas et al. (2021)? The omission of the huge negative effects and the unsupportable assumptions about the supposed beneficial effects of the policy examined do not count as science in our eyes, but as ex-post groupthink. For the health of science moving forward, our judgement is that such journals should disband.

However, this is not the only scholarly paper penned by an Australian economist about COVID policy. In Table 1 below, we list the scholarly works with Australia-based economists in the author line that are returned from a ProQuest search of journals, working paper series, and reports for contributions published between January 2020 and December 2021 containing "COVID" and "Australia" in the title, and "economic" somewhere in the text. Kompas et al. (2021) is naturally included in this list. We classify each contribution into one of the three categories used above to classify countries' responses to COVID-19 – minimalist, pragmatist, or extremist – based on a review of the stance the authors take towards the Australian Government's COVID policy decisions. Those economists who defended existing highly restrictive policies, or argued for more restrictions, were classified as extremists; those who advocated largely for a return to normal but perhaps with additional measures targeted to the vulnerable (essentially in conformity to pre-2020 policy approaches for a health threat of the magnitude of COVID-19) were classified as minimalists; and those who argued in favour of some of the policy prescriptions being taken that were not recommended pre-2020 for such situations, but against others, were classified as pragmatists. In some cases this stance was obvious, while in others, it was more nuanced or only expressed as a side-line of the paper.

Table 1:

Scholarly works by Australian economists commenting on the wisdom of COVID policies

Date	Author(s)	Affiliation	Classification	Medium	Citation	Link
2020	Kailing Shen, Bledi Taska	Australian National University, Burning Glass Technologies	Pragmatist	IZA Working paper	Shen, K., & Taska, B. (2020). Measuring the Impacts of COVID-19 on Job Postings in Australia Using a Reweighting-Estimation-Transformation Approach. *IZA Working Paper* 13640.	https://docs.iza.org/dp13640.pdf
2020	Chris Edmond, Richard Holden, Bruce Preston	University of Melbourne, University of New South Wales	Extremist	Australian Economic Review	Edmond, C., Holden, R. & Preston, B. (2020). Should We Worry about Government Debt? Thoughts on Australia's Covid-19 Response. *The Australian Economic Review* 53(4): 557-565.	https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8462.12402
2020	Gigi Foster	University of New South Wales	Minimalist	Australian Journal of Labour Economics	Foster, G. (2020). Early Estimates of the Impact of COVID-19 Disruptions on Jobs, Wages, and Lifetime Earnings of Schoolchildren in Australia. *Australian Journal of Labour Economics 23*(2), 129-151.	https://resources.curtin.edu.au/file/faculty/fbl/129339-AJLE-Vol-23-No-2-2020-2527-FINAL.pdf
2020	Stephen Clibborn, Chris Wright	University of Sydney	Minimalist	The Journal of Australian Political Economy	Clibborn, S., & Wright, C. F. (2020). Covid-19 and the Policy-Induced Vulnerabilities of Temporary Migrant Workers in Australia. *The Journal of*	https://hdl.handle.net/2123/25542

					Australian Political Economy (85), 62-70.	
2020	Heather Anderson, Giovanni Caggiano, Farshid Vahid, Benjamin Wong	Monash University	Pragmatist	The Australian Economic Review	Anderson, H., Caggiano, G., Vahid, F., & Wong, B. (2020). Sectoral Employment Dynamics in Australia and the COVID-19 Pandemic. *The Australian Economic Review, 53*(3), 402-414.	https://onlinelibrary.wiley.com/doi/pdfdirect/10.1111/1467-8462.12390
2021	Tom Kompas, Quentin R. Grafton, Tuong Nhu Che, Long Chu, James Camac	University of Melbourne, Australian National University	Extremist	PLoS One	Kompas, T., Grafton, R. Q., Che, T. N., Chu, L., & Camac, J. (2021). Health and Economic Costs of Early and Delayed Suppression and the Unmitigated Spread of COVID-19: The Case of Australia. *PloS One, 16*(6), 1.	https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0252400
2021	Leonora Risse, Angela Jackson	RMIT University, Equity Economics	Minimalist	Australian Journal of Labour Economics	Risse, L., & Jackson, A. (2021). A Gender Lens on the Workforce Impacts of the COVID-19 Pandemic in Australia. *Australian Journal of Labour Economics, 24*(2), 111-143.	https://s37430.pcdn.co/businesslaw/wp-content/uploads/sites/5/2021/10/AJLE242risse.pdf
2021	Christian A. Nygaard, Sharon Parkinson	Swinburne University of Technology	Pragmatist	Australian Journal of Agricultural and Resource Economics	Nygaard, C.A., & Parkinson, S. (2021). Analysing the Impact of COVID-19 on Urban Transitions and Urban-Regional Dynamics in Australia. *Australian Journal of Agricultural and Resource Economics,* 65 (4): 878-899.	https://onlinelibrary.wiley.com/doi/10.1111/1467-8489.12449

Table 1 shows that in their scholarly works, Australian economists were remarkably balanced in their perspectives on the COVID policy choices of Australia. In fact, with three contributions each, the categories of "minimalist" and "pragmatist" are the most populous, followed by "extremist", with two contributions. Perhaps more striking about this table is the paucity of scholarly contributions. This search indicates that while health scientists were busy publishing hundreds of papers on COVID-19, during the nearly two years in which they bore witness to the government's implementation of the most damaging economic policies in over a generation, Australian economists only produced eight easily locatable scholarly pieces in which comment was made on the wisdom of those policies. Even accounting for delays in publishing, this is a modest haul considering the significance of the policy problem that had arisen. No scholarly paper produced by an Australian economist has directly evaluated the welfare impact of the country's choices to restrict the economic (and other) freedoms of its people in pursuit of lower direct damage from COVID-19.[28]

Australian economists' contributions during this period to The Conversation, a popular outlet for the transmission of academic opinion to the common man, were far more prolific and quick to market – unlike in peer-reviewed publishing, publication delays for blogs are basically non-existent – but they were also less balanced. While a few sceptical pieces were published,[29] the great majority of blogs in The Conversation expressed support for Australia's COVID restrictions.

An entire series of pieces on The Conversation by one economist and his co-authors argued for lockdowns, and vehemently against those who claimed their costs outweighed their benefits.[30] One of the first of these, entitled "The costs of the shutdown are overestimated" (Holden and Preston 2020), contains the basic error of assigning the value of a whole life of 80 years to each COVID death. The evaluation of policies that target totals of life years and deaths across individuals should, we argue, treat the value of these respective quantities as

[28] Foster (2020a) comes closest to this, and we did produce a broader evaluation of the welfare impacts of COVID policy (Foster 2020c), but it remains unpublished in a scholarly journal. We are presently constructing a lengthier version of this cost-benefit analysis of Australia's lockdown policies. Basic numbers on the costs and benefits of lockdowns in general have appeared in the peer-reviewed book by Frijters and Krekel (2021).

[29] https://theconversation.com/sweden-eschewed-lockdowns-its-too-early-to-be-certain-it-was-wrong-143829, https://theconversation.com/who-suffers-most-from-melbournes-extended-lockdown-hint-they-are-not-necessarily-particularly-vocal-145938, https://theconversation.com/covid-lockdowns-have-human-costs-as-well-as-benefits-its-time-to-consider-both-137233

[30] https://theconversation.com/vital-signs-the-evidence-that-lockdowns-work-may-not-be-gold-standard-but-its-good-137540, https://theconversation.com/the-costs-of-the-shutdown-are-overestimated-theyre-outweighed-by-its-1-trillion-benefit-138303, https://theconversation.com/vital-signs-the-cost-of-lockdowns-is-nowhere-near-as-big-as-we-have-been-told-142710, https://theconversation.com/vital-signs-australias-anti-lockdown-tribe-battles-on-against-the-evidence-163648, https://theconversation.com/why-most-economists-continue-to-back-lockdowns-164239

identical regardless of to whom they accrue (as the WELLBY, discussed previously, is designed to do). In support of this contention, Kip Viscusi, arguably the grandfather of the value of a statistical life methodology, admitted on ABC Radio National in June 2021 that:

> *Well the quantity of life still matters. So how much life you have left matters. So based on the value of a statistical life you can calculate the value of a statistical life year, and those sorts of numbers have actually been calculated for Australia, to use the value of $182,000 for a life-year. If you're dealing with very short periods of life extension, you wouldn't want to use the $8.7 million Australian number [the value of a statistical life in Australia], you'd want to use a number that reflected the fact that you only have a year of life that you're extending through this policy. Government rarely makes these adjustments. The context where it's really come up is the pandemic. So, how much is it worth to keep old people alive on ventilators? That's an issue that, I think, has come more to the fore with the pandemic than in any other situation I've encountered.*[31]

Once this mistake is corrected, the conclusions of Holden and Preston's (2020) analysis should be counted as opposed to lockdown policies. Nonetheless, the authors resisted this conclusion, saying in a later piece that it is 'intellectual malpractice' to count an averted death differentially by how much life is saved.[32] By that logic, the country should be willing to spend 8 million AUD for every additional second of life extended by any means possible. Postponing a single death by a day in incremental steps of one second (i.e., 'saving a life' every second) would exhaust all productive capacity of the country. To our minds, such arguments are not merely incompatible with 200 years of mainstream economic thinking and government health policy (both of which count streams of utility), but betray an inability to admit a fact that would imply deviation from groupthink.

Similarly confused arguments were on display in two Conversation articles that essentially argued that health services paid for by a higher GDP have no health benefits, begging the question of why we then ever had a health service.[33] They motivated their stance by noting that in the short run one cannot see health improvements in the general population from increased health services. Yet, the reality is that the benefits of functioning health systems are very spread out over time. It is a standard point in the health economics literature that short-run data is useless in estimating the long-run benefits of normal health services, like screening for cancers that take many months to grow from innocuous to life-threatening (Ballester et al. 2019, Stuckler et al. 2010).

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[31] https://www.abc.net.au/radionational/programs/the-economists/title/13406906 (from timestamp 25:39)

[32] https://www.smh.com.au/national/qaly-quality-of-life-pandemic-argument-is-intellectual-malpractice-20200924-p55yqo.html

[33] https://theconversation.com/the-calculus-of-death-shows-the-covid-lock-down-is-clearly-worth-the-cost-137716 and https://theconversation.com/so-you-think-economic-downturns-cost-lives-our-findings-show-they-dont-149711

An article from May 2020 in The Conversation reported on the views of the collection of top Australian economists polled in the National Economic Panel, delivering a clear majority (34 to 9) in favour of the 'social distancing' COVID measures being implemented in Australia.[34] In an even more striking display of collective extremism, The Conversation also published a piece in April 2020 that was later referenced by other economists writing in the national media (see Table 2 below) and garnered the nickname of "the no trade-offs letter". This piece took the form of an open letter authored by four economists and signed by an additional 250 economists. The letter expressed the view, without providing evidence to support it, that the extremist policy of shutting down the economy was the correct response to COVID-19 and that there was no trade-off between public health and the economy.[35]

The evidence presented here raises the question of whether The Conversation and other outlets that published similar pieces should disband, for the good of society.

We now turn to the broader public engagement of Australian economists on the topic of COVID policy, in the form of op-eds in national print media, interviews in broadcast media, extensive coverage in national print media, and open letters. Table 2 presents a timeline of the major contributions made in these fora by Australian economists. We again categorise each contribution as 'extremist', 'pragmatist', or 'minimalist' based on the severity of the restrictions for which the contributor(s) appeared to be advocating.[36]

Table 2:
Media contributions by Australian economists commenting on the wisdom of COVID policies

[34] https://theconversation.com/economists-back-social-distancing-34-9-in-new-poll-138721

[35] https://theconversation.com/open-letter-from-265-australian-economists-dont-sacrifice-health-for-the-economy-136686

[36] Factiva was used as the search engine to generate Table 2, with the main search terms 'COVID 19' and terms related to it, including "pandemic," "lockdown," "coronavirus", "corona virus", "2019-ncov", and "COVID-19". These terms were used in association with the names of economists using the "and" function, where the list of names of economists searched was compiled from four sources: National Economic Panellists; economists featured in the Go8 'Roadmap to Recovery' document (https://go8.edu.au/wp-content/uploads/2020/06/Go8_Capability-Statement-COVID-19.pdf); authors of COVID-policy-related reports put out by think tanks listed on the Economic Society's website; and prominent economists associated with substantial economic institutions like the Reserve Bank of Australia and the Department of Economic Affairs. A full list of the names across these four sources that returned at least one contribution included in Table 2 appears in the Appendix. Search results were restricted to be from January 2020 onwards, and were sourced from the following outlets: Australian Broadcasting Services, Australian Broadcasting Services Transcripts, Sydney Morning Herald Online, Sydney Morning Herald Print, The Age, the Australian Financial Review, The Australian, Special Broadcasting Services, The Guardian, Daily Telegraph (All Sources), The West Australian, and Reuters. While many dissident opinions were aired on Sky News, including by the authors, that channel was not incorporated within the search because the Australian branch of Sky News is not covered by Factiva.

Date	Author	Affiliation	Classification	Medium	Link
06/03/20	Warwick McKibbin	Crawford School of Public Policy, Australia National University	Extremist	Online article	https://www.brookings.edu/blog/up-front/2020/03/06/what-are-the-possible-economic-effects-of-covid-19-on-the-world-economy-warwick-mckibbins-scenarios/
18/03/20	Danielle Wood, Brendon Coates	Grattan Institute	Extremist	Op-Ed (National Newspaper)	https://www.afr.com/policy/economy/second-round-of-stimulus-must-create-safety-net-for-virus-hit-workers-20200317-p54atr
19/03/20	Bob Gregory	Australian National University/ Reserve Bank of Australia	Minimalist	National Newspaper	https://www.theaustralian.com.au/inquirer/coronavirus-buckle-up-for-hell-ride/news-story/5101764f3578c685a69e819977280207
21/03/20	John Daley	Grattan Institute	Extremist	Think Tank Report	https://grattan.edu.au/report/covid-19-the-endgame-and-how-to-get-there/
26/03/20	John Hewson	Crawford School of Public Policy, Australia National University	Pragmatist	Op-Ed	https://www.smh.com.au/national/credibility-the-missing-link-in-our-battle-against-coronavirus-20200325-p54dr6.html
30/03/20	Nicki Hutley	Deloitte Access Economics	Extremist	National Television	https://www.youtube.com/watch?v=39hHq7XAYKE
30/03/20	Stephen Grenville	Lowy Institute	Pragmatist	Think Tank Report	https://www.lowyinstitute.org/publications/balance-between-medicine-and-economics
09/04/20	Robert Carling	Centre for Independent Studies	Minimalist	Think Tank Report	https://www.cis.org.au/commentary/articles/wait-until-we-emerge-from-shelter-and-see-the-economic-damage-done/
13/04/20	Paul Frijters	London School of Economics	Minimalist	National Newspaper	https://www.google.com/search?q=Hysteria+is+ruining+10+million+lives%E2%80%99&rlz=1C1ONGR_en-GBAU933AU933&oq=Hysteria+is+ruining+10+million+lives%

					E2%80%99&aqs=chrome..69i57.736j0j7&sourceid=chrome&ie=UTF-8
19/04/20	Brendon Coates	Grattan Institute	Extremist	Think Tank Report	https://grattan.edu.au/wp-content/uploads/2020/04/Shutdown-estimating-the-COVID-19-employment-shock-Grattan-Institute.pdf
20/04/20	Gigi Foster	University of New South Wales	Minimalist	National Television	https://www.youtube.com/watch?v=mE0TcGS91iw&t=228s
20/04/20	Chris Richardson, Phillip Lowe	Deloitte Access Economics, Reserve Bank of Australia	Extremist	National Television	https://www.abc.net.au/4corners/pandemic/12103600
21/04/20	Joshua Gans, Richard Holden	University of Toronto, University of New South Wales	Extremist	Op-Ed	https://www.afr.com/policy/health-and-education/provide-incentives-for-using-the-tracing-app-20200420-p54lde
22/04/20	Andrew Stone	Reserve Bank of Australia	Pragmatist	National Newspaper	https://www.theaustralian.com.au/business/economics/stimulus-package-big-mistake-says-tony-abbotts-former-chief-economist/news-story/732c12254cb80e4e22b59919cccc0e35
23/04/20	Henry Ergas, Jonathan Pincus	University of Wollongong	Minimalist	Op-Ed (National Newspaper)	https://www.theaustralian.com.au/commentary/coronavirus-return-to-sender-economists-letter-is-gibberish/news-story/1de51d62fab4228cee9204822394b894
24/04/20	Christopher Joye	Menzies Research Institute	Pragmatist consensus (30+ signatories)	Open Letter	https://www.livewiremarkets.com/wires/open-letter-to-prime-minister-from-concerned-australians-on-need-to-exit-covid-19-lockdown
05/05/20	Chris Edmond	University of Melbourne	Extremist	National Television	https://www.youtube.com/watch?v=cGL2f52_xaU

06/05/20	Shane Oliver	AMP Capital	Extremist	Online Article	https://www.livewiremarkets.com/wires/the-lucky-country-three-reasons-why-australia-will-emerge-better-than-most
07/05/20	Nick Biddle, Matthew Gray	Australian National university	Pragmatist	Newspaper Article	https://www.theaustralian.com.au/subscribe/news/1/?sourceCode=TAWEB_WRE170_a_GGL&dest=https%3A%2F%2Fwww.theaustralian.com.au%2Fnation%2Fpolitics%2Fcoronavirus-australians-anxious-but-back-governments-measures%2Fnews-story%2Fb01329e54ff9a78593c2c209fa755ac9&memtype=anonymous&mode=premium
14/05/20	Chris Edmond, Steven Hamilton, Bruce Preston	University of Melbourne, Tax and Transfer Policy Institute (visiting), Australia National University	Extremist	Op-Ed (National Newspaper)	https://www.smh.com.au/national/the-sound-economics-behind-australia-s-health-first-covid-response-20200514-p54st7.html
15/05/20	Saul Eslake	Independent	Extremist	National Television	https://www.youtube.com/watch?v=7HQvXAmyxHM
17/05/20	Richard Holden, Bruce Preston	University of New South Wales	Extremist	Op-Ed (National Newspaper)	https://www.theguardian.com/australia-news/2020/may/17/was-australia-right-to-shut-down-to-slow-coronavirus-the-economists-verdict
19/05/20	Gigi Foster	University of New South Wales	Minimalist	National Newspaper	https://www.afr.com/policy/economy/coronavirus-shutdown-did-it-go-too-far-20200423-p54mgz
28/05/20	Fabrizio Carmagnani	Griffith University	Extremist	Online Article	https://news.griffith.edu.au/2020/05/28/experts-offer-solutions-

					to-australias-economy-problem/
08/06/20	Richard Holden	University of New South Wales	Extremist	National Newspaper	https://www.afr.com/policy/economy/unfair-advantage-needed-for-australia-s-road-out-of-covid-19-20200602-p54yum
08/06/20	Paul Frijters, Gigi Foster	London School of Economics, University of New South Wales	Minimalist	National Newspaper	https://www.theaustralian.com.au/subscribe/news/1/?sourceCode=TAWEB_WRE170_a_GGL&dest=https%3A%2F%2Fwww.theaustralian.com.au%2Fnation%2Fpolitics%2Fcoronavirus-open-borders-now-says-vip-alliance%2Fnews-story%2F8736975b18dc675af12ff80c2f63e020&memtype=anonymous&mode=premium&v21=dynamic-cold-control-score&V21spcbehaviour=append
14/06/20	Matthew Gray	Australian National University	Minimalist	National Newspaper	https://www.afr.com/politics/federal/easing-restrictions-is-better-than-wage-subsidies-anu-survey-20200612-p5523q
20/06/20	Richard Holden	University of New South Wales	Extremist	National Newspaper	https://www.abc.net.au/news/2020-06-20/coronavirus-second-wave-australia-victoria/12372938
30/07/20	Ben Phillips	Australian National University	Extremist	National newspaper	https://www.afr.com/politics/how-victoria-s-suburban-lockdown-will-work-20200630-p557pc
01/07/20	Richard Holden	University of New South Wales	Extremist	Op-Ed (National Newspaper)	https://www.smh.com.au/national/premier-close-the-border-with-victoria-now-20200630-p557nh.html

01/07/20	Joseph Capurso	Committee for Economic Development Australia	Pragmatist	Think Tank Report	https://cedakenticomedia.blob.core.windows.net/cedamediacontainer/kentico/media/general/publication/pdfs/information-paper-international-economics.pdf
15/07/20	Henry Ergas	University of Wollongong	Minimalist	National Newspaper	https://www.theaustralian.com.au/commentary/editorials/states-must-focus-on-economies/news-story/c0d4c055951db4e0bb8a338229eaaeb1
16/07/20	Henry Ergas	University of Wollongong	Minimalist	Op-Ed National Newspaper	https://www.theaustralian.com.au/commentary/prudence-seems-a-lost-virtue-in-coronavirus-pandemic-response/news-story/b5603564d4cf7edcf203e13286e3beaa
21/07/20	Alison Pennington, Danielle Wood, Shamubeel Eaqub	Centre for Future Work, Grattan Institute, Committee for Economic Development Australia	Extremist	National Newspaper	https://www.abc.net.au/news/2020-07-21/coronavirus-elimination-or-suppression-economy/12472888
22/07/20	Danielle Wood	Grattan Institute	Extremist	National Newspaper	https://www.straitstimes.com/asia/australianz/australia-debates-switch-to-covid-19-elimination-plan-as-melbourne-cases-surge
27/07/20	Ian Harper	University of Melbourne	Pragmatist	National Newspaper	https://www.smh.com.au/national/our-longest-winter-20200724-p55f82.html
26/07/20	Gigi Foster	University of New South Wales	Minimalist	National Television	https://www.youtube.com/watch?v=tluXiw3JTyQ
27/07/20	Gigi Foster	University of New South Wales	Minimalist	National Television	https://www.youtube.com/watch?v=kstSJAu-kOE

08/08/20	Gigi Foster	University of New South Wales	Minimalist	National Newspaper	https://www.smh.com.au/business/the-economy/are-the-costs-of-lockdown-worth-the-pain-economists-weigh-in-20200807-p55jkp.html
20/08/20	John Edwards	Lowy Institute	Extremist	Think Tank Report	https://www.lowyinstitute.org/publications/costs-covid-australia-economic-prospects-wounded-world
20/08/20	Ross Garnaut	University of Melbourne	Pragmatist	National Newspaper	https://www.afr.com/policy/economy/conflict-grows-on-restrictions-but-financial-stress-easing-20200819-p55n5q
28/08/20	Ian Harper	University of Melbourne	Extremist	National Newspaper	https://www.afr.com/policy/economy/rba-s-harper-defends-covid-19-restrictions-20200826-p55pla
30/08/20	Stephen Duckett	Grattan Institute	Extremist	Op-Ed (National Newspaper)	https://www.theage.com.au/national/victoria/arguing-against-lockdowns-this-is-why-you-re-wrong-20200828-p55q98.html
02/09/20	Saul Eslake	Independent	Extremist	National Newspaper	https://www.theaustralian.com.au/business/economics/covid19-recession-its-not-bad-at-all-when-you-look-at-the-rest-of-the-world/news-story/62eb4ce644aeb0f0f350e090221bad25
03/09/20	Robert Carling	Centre for Independent Studies	Minimalist	Think Tank Report	https://www.cis.org.au/commentary/articles/coronavirus-australia-lockdowns-and-border-closures-hurting-but-gladys-berejiklians-showing-the-way/

03/09/20	Stephen Duckett	Grattan Institute	Extremist	Think Tank Report	https://grattan.edu.au/report/how-australia-can-get-to-zero-covid-19-cases/
06/09/20	John Quiggin, Fabrizio Carmagnani	University of Queensland, Griffith University	Extremist	National Newspaper	https://www.brisbanetimes.com.au/national/queensland/economists-warn-against-early-border-move-as-hopes-of-christmas-opening-rise-20200906-p55sv8.html
09/09/20	Henry Ergas	University of New South Wales	Minimalist	National Newspaper	https://www.theaustralian.com.au/commentary/covid19-facts-now-clear-lets-shout-them-out/news-story/5d2f3e4bffbd890c17d72a2facfb6d12
11/09/20	Ken Henry	Independent (Formally National Australia Bank Chairman)	Pragmatist	National Newspaper	https://www.afr.com/policy/economy/andrews-top-adviser-calls-for-restrictions-to-be-eased-20200911-p55uqt
13/09/20	Gabriela D'Souza	Committee for Economic Development Australia	Pragmatist	Think tank report	https://www.ceda.com.au/getmedia/90259fbe-025f-464d-9a02-bf187be487d0/CCEP-Labour-2020-GD-immigration-and-COVID.pdf
24/09/20	Richard Holden, Emilia Tjernström and Bruce Preston	University of New South Wales, University of Sydney, University of Melbourne	Extremist	Op-Ed (National Newspaper)	https://www.smh.com.au/national/qaly-quality-of-life-pandemic-argument-is-intellectual-malpractice-20200924-p55yqo.html
26/09/20	Shane Oliver, Sarah Hunter, Tim Reardon	AMP Capital, BIS Oxford Economics, Housing Industry Association	Pragmatist	National Newspaper	https://www.smh.com.au/politics/federal/split-emerges-over-policies-to-lift-population-growth-20200925-p55z49.html

22/10/20	Saul Eslake	Independent	Minimalist	National Newspaper	https://www.afr.com/policy/economy/worse-than-russia-victoria-urged-to-wind-back-covid-19-fines-20201022-p567jd
22/10/20	Jeff Borland	University of Melbourne	Extremist	National Newspaper	https://www.smh.com.au/business/the-economy/we-re-running-scared-and-that-s-a-challenge-for-the-economy-20201021-p56795.html
12/01/20	Allan Fels	University of Melbourne	Pragmatist	National Newspaper	https://www.smh.com.au/politics/federal/financial-support-needs-to-change-economists-back-targeted-help-for-locked-down-businesses-20210112-p56teq.html
14/01/20	John Hewson	Crawford School of Public Policy	Minimalist	Op-Ed	https://www.smh.com.au/national/a-nation-divided-border-problems-bring-home-our-states-of-disarray-20210113-p56ts8.html
26/03/21	Gigi Foster	University of New South Wales	Minimalist	National Television	https://www.youtube.com/watch?v=PsCJnVSp4vM
11/05/21	Natasha Kassam	Lowy Institute	Minimalist	Think Tank Report	https://www.lowyinstitute.org/publications/fortress-australia-what-are-costs-closing-ourselves-world
21/05/21	Gabriela D'Souza	Committee for Economic Development Australia	Pragmatist	National Television	https://www.youtube.com/watch?v=toAhJxYWcbQ
19/06/21	Simon Cowan	Centre for Independent Studies	Minimalist	Think Tank Report	https://www.cis.org.au/commentary/articles/sorry-but-covid-zero-cant-be-our-new-normal/
25/06/21	Richard Holden	University of New South Wales	Pragmatist	National Newspaper	https://www.smh.com.au/national/nsw/sydney-s-delta-despair-what-to-do-when-a-lockdown-doesn-t-work-20210721-p58bmn.html
28/06/21	Gigi Foster	University of New South Wales	Minimalist	Op-Ed (National Newspaper)	https://www.smh.com.au/national/stop-this-human-sacrifice-the-case-against-lockdowns-20210627-p584o7.htm

02/07/21	Stephen Duckett	Grattan Institute	Extremist	National Television	https://www.youtube.com/watch?v=UgUTPlKrFS8
08/07/21	Quentin Grafton	Australian National University	Extremist	Op-ed	https://www.smh.com.au/national/nsw/why-doing-the-lockdown-hard-yards-pays-off-for-the-economy-20210707-p587qf.html
16/07/21	Gigi Foster	University of New South Wales	Minimalist	National Newspaper	https://www.afr.com/policy/economy/covid-19-lockdowns-a-mass-sacrificial-event-20210715-p58a6n
17/06/21	Quentin Grafton	Australian National University	Extremist	National Newspaper	https://www.abc.net.au/news/2021-07-18/wa-hard-lockdown-approach-pathway-out-of-covid/100301206
16/07/21	Alison Pennington	Centre for Future Work	Extremist	National Television	https://www.youtube.com/watch?v=Sfwv7n62Y3A
18/07/21	Richard Holden, Steven Hamilton	University of New South Wales, Tax and Transfer Policy Institute (visiting), Australia National University	Extremist	Op-Ed (National Newspaper)	https://www.afr.com/policy/economy/vaccination-is-the-only-endgame-for-lockdowns-20210718-p58anz
19/07/21	Richard Holden	University of New South Wales	Extremist	National Newspaper	https://www.afr.com/policy/health-and-education/nsw-lockdown-warning-as-outbreak-gathers-pace-20200719-p55dfl
27/07/21	Craig Emerson	Independent	Extremist	National Television	https://twitter.com/ABCthedrum/status/1419946400326979587
29/07/21	Danielle Wood, Stephen Duckett, Brendon	Grattan Institute	Extremist	Think Tank Report	https://grattan.edu.au/report/race-to-80/

	Coates				
16/08/21	Allan Fels	University of Melbourne	Minimalist	National Newspaper	https://www.theaustralian.com.au/subscribe/news/1/?sourceCode=TAWEB_WRE170_a_GGL&dest=https%3A%2F%2Fwww.theaustralian.com.au%2Fnation%2Fteenage-suicides-could-be-sign-of-pandemic-mental-health-toll%2Fnews-story%2F4c2dea7297fcae7d8f609de6e2b59d48&memtype=anonymous&mode=premium&v21=dynamic-cold-control-score&V21spcbehaviour=append
17/08/21	Alison Pennington	Centre for Future Work	Extremist	Social Media	https://twitter.com/ak_pennington/status/1427538395299942401
18/08/21	Robert Carling	Centre for Independent Studies	Minimalist	Think Tank Report	https://www.cis.org.au/app/uploads/2021/08/pp-43.pdf?
26/08/21	Gary Banks	Australian National University	Minimalist	National Newspaper	https://www.afr.com/politics/retreat-at-last-from-zero-covid-20210825-p58lxj

36 of the entries above were of the extremist persuasion, 14 (of which one was a 'consensus' piece) were pragmatist, and 25 were minimalist. Analysing further the strength of support for the three positions across the economics community, we find that of the 25 minimalist contributions, nine were contributed by us. Henry Ergas and Jonathan Pincus contributed four pieces, Robert Carling three, and the rest were contributed by an additional seven economists – for a total of 12 economists publicly coming out in favour of the minimalist position at some point.[37] No 'consensus' minimalist pieces were aired in

[37] A few other economists not included in our list and/or not publishing pieces picked up by our Factiva search also toed a minimalist or at least pragmatist public line, most notably Peter Swan (https://www.theaustralian.com.au/commentary/these-strong-measures-are-going-to-send-us-broke/news-story/695ef4730a0bf72085f66d2f34597863, https://economics-explained.simplecast.com/episodes/running-the-numbers-on-covid-19-measures-with-prof-peter-swan), Andreas Ortmann (https://theconversation.com/sweden-eschewed-lockdowns-its-too-early-to-be-certain-it-was-wrong-143829, https://newsroom.unsw.edu.au/news/business-law/what-doppelganger-sweden-teaches-us-about-their-covid-19-strategy), Peter Robertson (https://theconversation.com/its-hard-to-know-when-to-come-out-from-under-the-doona-itll-be-soon-but-not-yet-137879, https://theconversation.com/who-suffers-most-from-melbournes-extended-lockdown-hint-they-are-not-necessarily-particularly-vocal-145938), and Cameron Murray on ABC Q&A in June 2021 (https://www.abc.net.au/news/2021-06-10/economist-cameron-murray-qa-covid-complacency-australia/100206838). Some economists published support for non-extremist positions in other outlets not covered by our Factiva search, such as Sinclair Davidson's blog on the now-defunct Catallaxy Files website,

these public media fora.[38] Amongst the 36 extremist contributions, over 25 individual economists were represented, with one individual represented 10 times. While the large majority of economists' opinions expressed in these public fora were in support of restrictions, by comparison to what was seen in the American economics community, we deem Australian economic analysis of COVID policy as portrayed in the mainstream media to have been relatively rich in real diversity.

While the balance on display in Australian economists' public media contributions was better than what we saw in professional surveys in other countries, in the sphere of social media, Australian economists who were offering extremist pieces to the public were derogatory towards others both in the profession and outside of it who publicly expressed different views.[39] These attacks took the place of reasoned and respectful discussion that might have led ultimately to better policy advice, and thereby prevented at least some of the damage done to the country.

When Melbourne University VC Duncan Maskell put forward an anti-extremist viewpoint in The Age, Chris Edmond responded with the following tweet (4:54 PM, 20 September 2020):

> *This from the boss is really shallow dumb stuff. So disappointing. Doesn't seem to have learned even the most elementary things about the economics of the pandemic.*

Responding to Rabee Tourky after Tourky expressed non-extremist views, Richard Holden used the phrase 'intellectual malpractice' to refer to taking such non-mainstream positions, and tweeted:

> *Why don't you get your facts straight, do something useful and stop sniping from the sidelines.*

and (0:48, 26 September 2020):

> *Rabee. It's silly to lecture one of Australia's best journalists about the word "foundation". But you certainly are in no position to tell me "how theory works".*

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entitled "I Stand with Gigi", and some appeared in the Go8's non-extremist "Roadmap to Recovery" report (https://go8.edu.au/wp-content/uploads/2020/06/Go8_Capability-Statement-COVID-19.pdf). Worth also mentioning by name are the eight other economists who disagreed (like us) with the policy of social distancing when asked about it on a National Economic Panel poll (https://theconversation.com/economists-back-social-distancing-34-9-in-new-poll-138721) – Hugh Sibly, Jeffrey Sheen, Robert Breunig, Craig Emerson, Tony Makin, Peter Abelson, Uwe Dulleck, and Brian Dollery – and libertarian voices like John Humphreys (https://www.theguardian.com/australia-news/2021/oct/02/what-campbell-newman-did-next-the-making-of-an-unlikely-queensland-libertarian). For space reasons, we do not provide a parallel footnote in respect of the publicly articulated extremist positions omitted from Table 2 due to its limited search criteria, but merely note that there will have been many.

[38] Some 'consensus' efforts were attempted by those in the minimalist camp, such as the Australian Institute for Progress' Open Letter (https://aip.asn.au/2020/06/open-up-our-country-sign-the-open-letter/), but these did not surface in public media contributions.

[39] A focus on compliance rather than content is evident elsewhere in the profession, as we discuss at length in our forthcoming book chapter (Foster and Frijters forthcoming).

You are either unwilling or unable to read the opinion piece correctly. So why don't you just be quiet.

In March 2021, the month that one of us made her third appearance on ABC's Q&A program, John Quiggin reacted to the announcement of both authors' impending keynote addresses at the 2021 Annual Conference of Economists by referring to his previous statements equating the anti-lockdown position to believing that the Earth is flat:

Coming straight after #qanda I got an invitation to the Economics Society of Australia virtual conference. Keynote speakers: two international speakers + Gigi Foster and Paul Frijters.

Next week's #qanda The shape of the earth debate, with guests from the Flat Earth Society and the "Flat as a Pancake" Earth Society #Covidiots

Quiggin also tweeted (8:23 PM, 26 March 2021):

Gigi Foster was even against masks. I think the idea was some kind of herd thinning.

A few brave economists called the authors of such social media posts to account. One such person was Rohan Pitchford, who in a heated exchange with Bruce Preston about the abuse delivered to those with different views, tweeted (May 14 2020):

If you insist. Here's just a few. Adam Crichton [sic] called "thick". Then "lazy" "disingenuous" Gigi Foster having "fringe views" and incoherent. Then induced pile ons. Ad hominem.

Similarly, Andreas Ortmann called Steven Hamilton up on his social media behaviour and this induced a public retraction posted to the latter's account for several days.

We view the tweets above by members of the extremist camp as inappropriate, a mortarboard-hat version of the dangerous proclamations made by members of a witch hunt or a crusade, and not merely unhealthy for the profession. This behaviour is likely to have stymied engagement by dissenters about the crucial economic policy decisions being made during this period, thereby directly damaging not only our profession but also Australia into the long term by preventing more sensible policy options from being aired and discussed openly.

3.2 Recipes for a better future

If one took the view that people should be held individually responsible for the actions they supported, then the demands of justice would be draconian for many Australian economists. Those who supported policies that violated human rights, were expected to destroy social welfare, and terrorised the domestic population – while in several cases also attempting to silence those with dissenting views – should lose their jobs and face retribution from the public that has been so damaged by their actions.[40]

[40] One could argue that academic freedom means nothing if it does not also entail the possibility of making honest mistakes in one's assessments, no matter how large. Yet, the counterargument is that the logic of the Nuremburg code applies: that when supporting medical experiments one must at least have made an

In the case of groupthink-gone-wrong however, historical practice is not to enact justice through holding individuals responsible, but to openly recognise the mistakes of the collective and seek improvements in institutions to prevent a recurrence. We here briefly lay out four main proposals, which are more fully discussed in Frijters et al. (2021):

1. The use of citizen juries to appoint people to the top posts of all government departments, large non-profit institutions that rely significantly on public funding (including universities and the public media), and all semi-independent public institutions. One citizen jury of 20 random citizens would be constructed per top job to be filled, with juries organised and supported administratively by the Australian Electoral Commission. A jury would decide its own terms for finding and appointing someone. Leaders of public institutions would still follow the directions of elected politicians, but the task of appointing them would be in the hands of citizen juries, not politicians or interest groups.
2. Truth commissions at all levels, with independent commissions organised by professions, academic societies, and communities.
3. Ex-post taxation of all profits from political profiteering during this period, with an amnesty from criminal charges for those cooperating early in identifying the profiteering.
4. An embrace of the reformative ideas of scientists, lawyers, doctors, and other professionals who spoke out against the groupthink throughout Australia.

4 Conclusion

In this paper we have documented how the lockdowns enacted in Australia and elsewhere were a disproportionate and largely ineffective policy response to COVID-19. These policies went against the advice contained explicitly and implicitly in prevailing textbooks, blueprints, codes of ethics, and scientific consensus of the previous decades, arguably violating the Nuremberg codes that demand a reasoned view that the cure is no worse than the disease. We have documented how, at the start, some top economists in state bureaucracies and academia in various countries had already calculated that the expected damage of the policies would far outweigh any reasonable estimate of what might be averted by lockdowns, with this advice often buried by governments or, at a minimum, ignored.

The documented damage of the lockdowns was of an entirely different order and type than the losses that can reasonably be claimed to have been averted. The damage was severe for children of disadvantaged backgrounds across the world who witnessed severe disruptions to their education and development. There was mental health damage to those made lonely or idle, disrupted fertility treatments that prevented far more lives from being born than were reasonably 'saved', a large increase in government debt that will mean

effort to truly evaluate the likely pros and cons and have come to the conclusion that the pros outweigh the cons. Without an open evaluation that recognises likely costs, and particularly when they are dismissed outright ('no tradeoffs'), one is supporting medical experiments without due diligence.

reduced expenditures in the future, huge disruptions in normal health services expected to cost a multiple in years of life than can be claimed to have been saved, and on and on. The effects in poorer countries are several times worse, as the disruption to education, economic growth, and health services bite so much more in places with lower initial settings on all of these things. Estimates from six different teams across the Anglo-Saxon countries show how the costs to society as a whole, measured in terms of WELLBYs taken from the whole population, outweigh the benefits of lockdown by a ratio ranging between 4:1 to 1000:1, if there indeed are any actual benefits of lockdowns at all. These directly measured costs still omit any recognition of the losses from violations of human rights, increased authoritarian rule, the rise of mass surveillance, disrupted migration flows, and many other higher-level damages to our social norms.

In contrast to some of the economists inside state institutions, the majority response of Australian academic and other 'independent' economists in public sight was to fall in line with government policies, and produce papers, blogs, and op-eds that rationalised policies already decided upon using assumptions known to be wrong at the time and making basic mistakes regarding standard cost-benefit analysis. In vehicles that allowed for it, there was bullying of dissenters, an outright denial of basic tenets of economics that have been part of the established canon for centuries (like the existence of trade-offs), and a shirking of ethical responsibilities. The majority of Australian economists who became engaged in public commentary about the policies showed themselves to be part of the problem.

As for solutions, we argue there is hope in the use of citizen juries for appointments to the top layer of the Australian public sector. This mechanism would reduce political interference in public media, public universities, government departments, statistical agencies, and many other institutions. It would help to embed more diversity into the public sector as a whole, meaning more vantage points from which to see what is going on. We also expect it to be hugely effective in countering widespread corruption and abuses of power.

For the Australian economics profession and society as a whole, we think truth commissions are a reasonable way forward to recognise that crimes during this period have been aided and abetted by our profession, to acknowledge the domestic and international victims of those crimes, and to establish a more truthful basis from which to move on.

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Appendix

The following table lists alphabetically the names of the economists searched for contributions to include in Table 2 who made at least one such contribution. Also shown is the area in which each economist is prominent, which was the reason for their inclusion in the search.

Economists included in search with at least one relevant authored media contribution

First Name	Surname	ESA Panel	G8 Roadmap	Think Tanks	Industry
Gary	Banks	1	0	0	0
Nick	Biddle	0	1	0	0
Jeff	Borland	1	0	0	0
Joseph	Capurso	0	0	1	0
Robert	Carling	0	0	1	0
Fabrizio	Carmignani	1	0	0	0
Brendon	Coates	0	0	1	0
Simon	Cowan	0	0	1	0
John	Daley	0	0	1	0
Gabriela	D'Souza	0	0	1	0
Stephen	Duckett	0	0	1	0
Shamubeel	Eaqub	0	0	1	0
Chris	Edmonds	1	0	0	0
John	Edwards	0	0	1	0
Craig	Emerson	1	0	0	0
Henry	Ergas	1	0	0	0
Saul	Eslake	1	0	0	0
Gigi	Foster	1	0	0	0
Paul	Frijters	1	0	0	0
Ross	Garnaut	1	1	0	0
Quentin	Grafton	0	1	0	0
Matthew	Gray	0	1	0	0
Robert	Gregory	0	0	0	1
Stephen	Grenville	0	0	1	0
Ian	Harper	1	0	0	0
Ken	Henry	0	0	0	1
Richard	Holden	1	1	0	0
Sarah	Hunter	0	0	0	1
Nicki	Hutley	1	0	0	0
Christopher	Joye	0	0	1	0
Natasha	Kassam	0	0	1	0
Warwick	McKibbin	0	1	0	0
Shane	Oliver	0	0	0	1
Alison	Pennington	0	0	1	0
Ben	Phillips	0	1	0	0
John	Quiggin	1	0	0	0
Tim	Reardon	0	0	0	1
Chris	Richardson	0	0	0	1
Andrew	Stone	0	0	0	1
Danielle	Wood	0	0	1	0

The Time of COVID

A Report by Phillip M. Altman
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Appended:
Australian COVID-19 vaccines Adverse Event Summary & Analysis
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Foreword

I am pleased and proud to endorse the attached letter and monograph, meticulously compiled by Dr Phillip Altman and his colleagues. They address some important aspects of COVID19 management and policy, especially in Australia, with a focus on the nature, deployment and effects of “vaccines”. It is abundantly clear that there has been repression and suppression in scientific circles and the media of any views or suggestions that run counter to the government/mainstream narrative. However, many studies now indicate that the Covid19 vaccines, especially the mRNA vaccines, are less than 'safe and effective', and the ramifications are truly confronting. Armed with these facts, the scientific and medical communities can now begin proper discussions of potential solutions that improve the benefit/risk ratios for the public and do not harm careers and livelihoods of professionals seeking the best outcomes for their patients.

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Index

PART A: Background - COVID-19 Gene-Based 'Vaccines'

1. The Nature of the COVID-19 Gene-Based 'Vaccines'

1.1. The nature of the COVID-19 'vaccines' has been largely misrepresented by mainstream media, big pharmaceutical companies, and governments, and is consequently poorly understood by the population at large. Most people consider vaccines to be relatively safe and well researched and readily accept their widespread use.

1.2. However, these COVID-19 'vaccines' are not really vaccines – they are serious gene-based therapies which employ a gene-based technology which has never before been deployed in a fully approved therapeutic product. In this sense they should properly be considered to be experimental, and much safety and efficacy information has been gained since the introduction of these products more than a year ago.

1.3. COVID-19 'vaccines' as a therapeutic fall under the US Food and Drug Administration (**FDA**) Office of Cellular, Tissue, and Gene Therapies' definition of "gene therapy products", in that it involves "introducing a new or modified gene into the body to help treat a disease"[1]. Despite this, the FDA did not evaluate this therapy in relation to the established gene therapy guidelines. Gene therapies have never been widely used in a general population.

2. Regulatory Status of the COVID-19 Gene-Based 'Vaccines'

2.1. On or about the following dates, the TGA granted conditional Provisional Approval of the following gene-based 'vaccines':

- COMIRNATY Pfizer Australia Pty Ltd – a mRNA vaccine (25 January 2021)
- Pfizer paediatric vaccine has been Provisionally Approved (3 December 2021) 5-11 years
- VAXZEVRIA AstraZeneca Pty Ltd – a viral vector vaccine (15 February 2021)
- COVID-19 VACCINE Janssen-Cilag Pty Ltd – a viral vector vaccine (25 June 2021)
- SPIKEVAX Moderna Australia Pty Ltd, - a mRNA vaccine (9 August 2021)
- Moderna paediatric vaccine has been Provisionally Approved (17 February 2022) 6-11 years & 6 month to 5 years (19 July 2022)
- NUVAXOVID Novavax Inc. – a non-gene protein-based vaccine delivering spike protein in a lipid-nanoparticle matrix carrier (19 January 2022)

2.2. The TGA receives technical and policy advice from the Australian Technical Advisory Group on Immunisation (**ATAGI**). Members of ATAGI have both academic and clinical interests in vaccine research. The TGA relies heavily upon the recommendations of ATAGI in relation to the efficacy, safety and use of vaccines. Many government and

[1] *What is Gene Therapy?* (25/7/2018) US-FDA https://www.fda.gov/vaccines-blood-biologics/cellular-gene-therapy-products/what-gene-therapy

private corporate entities rely, in many cases exclusively, upon the health policy advice issued by ATAGI. The TGA also receives advice from the Advisory Committee on Vaccines (**ACV**) in relation to safety, quality and efficacy of vaccines supplied in Australia.

2.3. Provisional Approval is a relatively new drug regulatory pathway introduced into the Therapeutic Goods Act in 2018. Under this expedited review system, therapeutic agents (including vaccines) can be made available for use when there is a perceived urgent need to use a drug even though the amount of ordinary safety and efficacy data normally required to approve that drug is not available. The manufacturer is required by the TGA to submit additional safety and efficacy data over a defined period to answer specific important outstanding safety and efficacy issues not completed or concluded before the product is Provisionally Approved. Products released under "Provisional Approval" cannot be considered fully evaluated. Under these circumstances and because there is pending or outstanding safety and efficacy data to be generated and evaluated, it is premature to declare such drugs "safe and effective", and the use of these agents needs to be constantly under review in light of emerging safety data to reassess the risk versus any perceived benefit.

2.4. The new generation COVID-19 'vaccines' have not been fully 'approved' by the Australian drug regulator – all these products have been "Provisionally Approved" due to deficiencies in the normal scope and depth of safety and efficacy data normally required for full approval. This is of particular importance in relation to vaccine mandates in so far as the regulatory status of these products establish without any doubt that important safety and efficacy concerns remain in relation to the use of these products. In such circumstances, forcing individuals on a massive scale to receive such serious medications with potentially unknown and serious adverse consequences, including death, using coercive vaccination mandates, is without precedence in medicine.

2.5. Conventional vaccines usually take about 7 years to develop and test. In a 2018 publication sponsored by the Bill and Melinda Gates Foundation[2], vaccines were divided into three categories: simple, complex and unprecedented.

2.6. The unprecedented category represents those vaccines directed towards a disease that has never before been successfully treated and include vaccines against HIV and malaria. According to authors Seneff and Nigh[3] unprecedented vaccines are expected to take more than 12 years to develop due to the technical difficulties, and they are expected to have a very low chance (about 5%) of proving safety and efficacy in even early Phase II clinical trials involving small numbers of individuals, and a very much lower chance (about 2%) of moving to larger Phase III clinical trials and demonstrating safety and efficacy before being considered for marketing. The gene-based COVID-

[2] Young, R., Bekele, T., Gunn, A., Chapman, N., Chowdhary, V., Corrigan, K., Yamey, G. (2018). *Developing New Health Technologies for Neglected Diseases: A Pipeline Portfolio Review and Cost Model.* Gates Open Res 2:23. https://doi.org/10.12688/gatesopenres.12817.2

[3] Seneff, S and Nigh, G; (10/05/2021) *Worse Than the Disease? Reviewing Some Possible Unintended Consequences of the mRNA Vaccines Against COVID-19.* International Journal of Vaccine Theory, practice and Research: 2(1) https://ijvtpr.com/index.php/IJVTPR/article/view/23

19 ‘vaccines’ were developed in less than a year and are supported by abbreviated safety and efficacy clinical data. These gene-based ‘vaccines’ are in the ‘unprecedented’ category.

2.7. Historically, a large number of conventional vaccines have been withdrawn due to safety concerns following widespread use. These include vaccines for Yellow Fever, polio, smallpox, Dengue fever, measles, respiratory syncytial virus, Swine flu, rotavirus, papillomavirus and influenzae.

3. How the Gene-Based COVID-19 ‘Vaccines’ Work

3.1. These ‘vaccines’ use a genetic technology which has not been employed for any fully approved drug and in this sense the use of these products should properly be considered experimental. This technology, due to its inherent safety risks, has previously only been investigated in relatively early clinical research for possible use in certain cancers and rare genetic disorders. These products deliver either RNA in a lipo-nanoparticle (which has never been used previously) or DNA genetic material contained in a viral vector to produce the spike protein, similar to that found on the surface of the coronavirus, in order to provoke an immune response. It is the spike protein which is now known to be the main toxic component of the SARS-CoV-2 coronavirus. It is also the spike protein produced by these ‘vaccines’ which is understood to cause the unprecedented number of serious adverse events and death being reported following vaccination in various international adverse drug reporting systems.

3.2. All COVID-19 ‘vaccines’ employ new generation nanoparticle technology: either non-viral or viral based nanoparticles[4]. The extremely small size of nanomaterials also means that they are much more readily taken up by the human body than larger sized particles. Nanomaterials are able to cross biological membranes and access cells, tissues and organs that larger sized particles normally cannot[5]. Such wide and efficient distribution following administration has significant implications in relation to organ and tissue toxicity as compared to conventional vaccines which largely remain at the site of injection. Specifically, nanoparticles may cross the blood-brain barrier (the membrane protecting the spinal cord and brain) and they may be associated with long term inflammation in various tissues and organs, and they may be associated with cardiovascular adverse effects.[6]

[4] Kisby, T. et al (August 2021) *Reasons for success and lessons learnt from nanoscale vaccines against COVID-19.* Nature Nanotechnology Vol. 16, pp 843-852 https://www.nature.com/articles/s41565-021-00946-9.pdf

[5] Holsapple M, Farland W, Landry T, Monteiro-Riviere N, Carter J, Walker N and Thomas K (2005). *Research strategies for safety evaluation of nanomaterials, Current Challenges and Data needs.* Toxicological Sciences 88(1):12-17 https://academic.oup.com/toxsci/article/88/1/12/1662948

[6] *Nanotechnology and Health Risks* (April, 2008), Health and Environment Alliance https://www.env-health.org/IMG/pdf/17-_NANOTECHNOLOGY_AND_HEALTH_RISKS.pdf

4. Threat Posed by SARS-CoV-2

4.1. The threat posed by SARS-CoV-2 coronavirus in producing the COVID-19 infection to segments of the community has been exaggerated due to the nature of the polymerase chain reaction (**PCR**) test used to detect "cases". The PCR test as used in Australia and elsewhere was set (cycle threshold value: "Ct") to be exquisitely sensitive and could produce a positive result even if no live virus was present or even if a fragment of a single viral particle was present. A survey of the utility of PCR tests reported that positive PCR tests set to a Ct of 35 only correlated with a positive culture in 3% of cases[7]. In Australia and elsewhere, the PCR Ct was normally set at even higher values conferring less reliability. The PCR test was never intended to be diagnostic for COVID-19 due to this attribute. Individuals testing positive for COVID-19 frequently have very low viral loads and are asymptomatic (show no symptoms) and are incapable of transmission of the virus due to their low viral loads. Children, in particular, are at virtually nil threat of serious COVID-19 infection (see below). Some estimates suggest that up to 97% of COVID positive cases" detected by PCR detected no virus on culture and therefore were of questionable value[8]. Indeed, so grave are the many limitations and lack of reliability attributable to PCR tests, that external peer review revealed 10 major scientific[9] flaws that resulted in strong calls for the retraction[10] of the Corman-Drosten paper,[11] published by Eurosurveillance.

4.2. In recognition of the limitations of the PCR testing, these tests are no longer considered generally appropriate by the US Center for Disease Control (**CDC**) in determining the number of COVID-19 cases and their emergency use authorisation has been withdrawn reflecting this fact[12].

4.3. COVID-19 government statistics represent another complicating factor. There is no discrimination between those individuals in hospital or intensive care "dying with" COVID-19 as opposed to 'dying from' COVID-19. Patients in hospital for serious non-COVID-19 related illness are routinely tested for COVID-19 and often return a positive test. These patients are routinely recorded as "COVID cases" and this can be misleading.

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[7] Jaafar, R. et al (2020) Correlation between 3790 Quantitative Polymerase Chain Reaction-Positives Samples and Positive Cell Cultures, Including 1941 Severe Acute Respiratory Syndrome Coronavirus 2 Isolates Clinical Infectious Diseases, Volume 72, Issue 11, 1 June 2021, page e921. 28 September 2020 https://pubmed.ncbi.nlm.nih.gov/32986798/

[8] Jaafar, R., Aherfi, S., Wurtz, N., et al (2021) Correlation between 3790 Quantitative Polymerase Chain Reaction-Positives Samples and Positive Cell Cultures, Including 1941 Severe Acute Respiratory Syndrome Coronavirus 2 Isolates Clinical Infectious Diseases, Volume 72, Issue 11, 1 June 2021, Page e921, https://doi.org/10.1093/cid/ciaa1491

[9] Borger, P et al (November 2020) External peer review of the RTPCR test to detect SARS-CoV-2 reveals 10 major scientific flaws at the molecular and methodological level: consequences for false positive results https://cormandrostenreview.com/report/

[10] Borger, P et al (November 2020) *Retraction request letter to Eurosurveillance editorial board* https://cormandrostenreview.com/retraction-request-letter-to-eurosurveillance-editorial-board/

[11] Corman, V et al (January 20202 *Detection of 2019 novel coronavirus (2019-nCoV) by real-time RT-PCR*, Eurosurveillance, Volume 25, Issue 3

[12] CDC Laboratory Alert (07/21/2021) *Changes to CDC RT-PCR for SARS-CoV-2 Testing* https://www.cdc.gov/csels/dls/locs/2021/07-21-2021-lab-alert-Changes_CDC_RT-PCR_SARS-CoV-2_Testing_1.html

4.4. According to the Australian Bureau of Statistics up to 15 February 2022[13] "There are 2,639 death registrations that have been received by the ABS where an individual is certified as having died from or with COVID-19 between the start of the pandemic and 31 January 2022". The median age for those who died from COVID-19 was 83.7 years (81.2 years for males, 86.0 years for females) among individuals reasonably assumed to have multiple serious co-morbidities. COVID-19 is an infection principally causing more serious illness in older individuals.

4.5. Australian government Department of Health website: *Coronavirus (COVID-19) case numbers and statistics* (updated 7 May 2022) states there have been a total of 6,165,105 "cases" of COVID-19[14]. This translates to a death rate of COVID-19 of 0.0428% (for those 'dying with' COVID-19). COVID-19 was only the 38th leading cause of death in Australia reported in 2020 statistics. With the delta then Omicron waves since late 2021, deaths with COVID-19 have risen, but data where it is available, as in NSW, indicate that proportions of hospitalisations and deaths are as high or higher among vaccinated than among unvaccinated people (see 13.11 below).

4.6. The NSW Respiratory Surveillance Report ending 23 July 2022 states: '*146 COVID-19 deaths were reported this week, a 3% increase from 142 reported last week. All 146 deaths were eligible for a third dose of COVID-19 vaccine…..*', indicating that there were no deaths reported for unvaccinated individuals[15].

4.7. To place these numbers in perspective, the number of deaths due to influenza reported by the Australian Bureau of Statistics increased steadily from 68 in 2011 to 274 in 2016, and rose sharply to 1,183 in 2017[16]. When grouped, influenza and pneumonia contributed to 4,369 deaths in 2017 and were the ninth leading cause of death for the year. During 2018, influenza and pneumonia were the twelfth leading cause of death (n = 3,102 deaths).

4.8. No statistic is available regarding the number of Australians 'dying from' COVID-19. The total number of Australians 'dying from' COVID-19 would be some fraction of the total deaths reported. Officially reported 'COVID-19 deaths' do not discriminate between those dying "with" COVID-19 and those dying "due to" COVID-19. Some government websites make this clear[17].

4.9. The impact of COVID-19 varies depending on the age group. There is no Australian statistic available to demonstrate that any otherwise healthy child died 'due to' or 'from' COVID-19.

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[13] Australian Bureau of Statistics: *Causes of Death, Australia: Doctor Certified Deaths*, Summary Tables. Reference Period 2019. https://www.abs.gov.au/statistics/health/causes-death/causes-death-australia/latest-release

[14] TGA *COVID-19 vaccine weekly safety report (*23 June 2022) https://www.tga.gov.au/periodic/covid-19-vaccine-weekly-safety-report-23-06-2022

[15] NSW Respiratory Surveillance Report – ending 23 July 2022.

[16] Australian Government Department of Health (2018) *Communicable Diseases Intelligence. Report of the National Influenza Surveillance Scheme 2011 to 2018*. Year 2022 Volume 46. Communicable Disease Epidemiology and Surveillance Section https://doi.org/10.33321/cdi.2022.46.12

[17] NSW COVID-19 WEEKLY DATA OVERVIEW: www.health.nsw.gov.au/coronavirus

4.10. The lack of information on the actual cause of death in children in these rare instances makes any assessment of the risk of death due to COVID-19 in this age group tenuous. The risk of death due to COVID-19 may range from exceedingly rare to virtually and statistically nil.

4.11. There is emerging evidence that the COVID-19 gene-based 'vaccines' are showing rapid and significant diminished efficacy against the Omicron variant, particularly in children aged 5-11.[18]

4.12. Some useful information regarding COVID-19 ascribed deaths in the UK was obtained by a Freedom of Information Request (FOI/2021/3368), showing the number of deaths where COVID-19 was the only cause mentioned on the death certificate, from 1 February 2020 to 31 December 2021, by sex and age group in England and Wales[19]. This data (presented below as a downloaded Excel table) is important because it is a record where COVID-19 is the only listed possible cause of death, and it covers a period where the most virulent strain of SARS-CoV-2 was circulating in the global population.

Age group	Males	Females
<1	1	0
1-4	0	0
5-9	0	0
10-14	0	1
15-19	1	0
20-24	4	1
25-29	12	3
30-34	24	7
35-39	42	15
40-44	52	24
45-49	87	43
50-54	138	52
55-59	234	92
60-64	254	102
65-69	279	119
70-74	357	204
75-79	395	252
80-84	492	402
85-89	470	533
90+	520	971

4.13. This data supports the view of a virtually or statistically near nil risk of death due to COVID-19 in very young children, adolescents, and adults through to middle-aged.

[18] Dorabawila, V. et al (February 2022) Effectiveness of the BNT162b2 vaccine among children 5-11 and 12-17 years in New York after the Emergence of the Omicron Variant. MedRxiv preprint https://www.medrxiv.org/content/10.1101/2022.02.25.22271454v1

[19] UK Office of National Statistics FOI/2021/3368. Released 17 January 2022.

4.14. Another study in children and young people (<18 years of age) in the UK covering 12,023,568 individuals, from March 2020 to February 2021, examined the records of 3,105 who died including 61 who were positive for SARS-CoV-2[20].

4.15. This study is instructive, in that it describes in detail an evaluation process which should normally be conducted in evaluating whether or not an individual's death can be ascribed to COVID-19, in light of pre-existing co-morbidities. Many reports of "COVID deaths" do not attempt to discriminate or ascribe causality to this level, and therefore are of limited usefulness. This study was done at a time when the more virulent strain of SARS-CoV-2 was dominant, and it could be assumed to significantly overstate the risk of death due to the current Omicron variant which has been dominant during 2022 worldwide[21].

4.16. Despite the potential for this study to overestimate the risk of death in 2022, the authors conclude:

"…the risk of serious outcomes from SARS-CoV-2 for individuals under 18 years of age remains extremely low" - and even considering child deaths where COVID-19 was not the sole cause, the authors conclude – *"we estimated the infection fatality rate to be five per 100,000 indicating that more than 99.995% of children and young people recover from SARS-CoV-2 infection."*

5. Initial Perceptions of the COVID-19 'Vaccines'

5.1. Initially, despite limited clinical and epidemiological data, a number of community and health professional perceptions were widely held in relation to these new vaccines including:

- the vaccines prevent infection by the SARS-CoV-2 virus and subsequent COVID-19 developing (COVID-19 being the disease caused by the virus)
- the vaccines prevent transmission of the SARS-CoV-2 virus from infected to non-infected individuals
- the vaccines would provide durable immunity
- the vaccines are 95% effective
- the vaccines are safe and effective

5.2. In light of more than a year of widespread COVID-19 vaccination usage all these initial perceptions have been shown to be without foundation. It is undisputed that COVID-

[20] Smith, C et al: Deaths in children and young people in England after SARS-CoV-2 infection during the first pandemic year. Nature Medicine; Vol 28, Jan. 2022, 185-192. https://doi.org/10.1038/s41591-021-01578-1

[21] WANG, L. et al: COVID infection severity in children under 5 years old before and after Omicron emergence in the US. Preprint - doi: https://doi.org/10.1101/2022.01.12.22269179;

19 is commonplace in fully vaccinated individuals and now multiple boosters are being recommended at relatively frequent intervals. The current COVID-19 'vaccines' have lost effectiveness against the emerging variants – to many, they have failed. However, the incidence of serious adverse events from these gene-based 'vaccines' continue to be reported and continue to rise in unprecedented number and severity.[22]

5.3. A good example of the popular misconceptions concerning the gene-based COVID-19 'vaccines' is the claim of 95% efficacy which was repeated and unchallenged in the mainstream media and by health authorities in Australia and elsewhere.

5.4. Approval of the gene-based COVID-19 'vaccines' were based on single clinical trials from each company. These single trials were the sole basis for both the safety and efficacy claims. For example, in the case of the Pfizer gene-based 'vaccine' it was widely stated and generally accepted at the time that the clinical efficacy of the vaccine was determined in a large clinical trial of about 44,000 subjects and the efficacy was 95%.

5.5. Without an understanding of the design, conduct and reporting of clinical trials, the ordinary person might interpret this statement in a number of different ways. For example, this "95%" efficacy might be interpreted to mean that vaccination provides a 95% chance of being protected from being infected following exposure from a person infected with SARS-CoV-2; or it might be interpreted to mean that vaccination reduces the risk of the average healthy person falling seriously ill and needing hospitalisation following SARS-CoV-2 infection; or it might be interpreted as showing the risk of death due to severe COVID-19 illness is reduced by 95%.

5.6. Indeed, none of these interpretations are correct.

5.7. The claimed 95% efficacy was based upon only 170 subjects who contracted COVID-19 during the trial which had a median follow up of two months post-second dose. The claimed clinical efficacy was not based upon 44,000 subjects. Of the 44,000 subjects enrolled and divided roughly equally between receiving active prophylactic vaccination or placebo, only 170 subjects tested positive for COVID-19 AND developed even mild COVID-19 symptoms (similar to the common cold) which was the criterion set for "clinical efficacy"; with eight testing positive in the vaccinated group AND *displaying* a COVID-19 symptom as mild as a sore throat, fever or cough, while 162 tested positive in the placebo group AND *displayed* a COVID-19 symptom as mild as a sore throat, fever or cough. This is where the 95% COVID "vaccine" efficacy claim originated and, based on this pivotal data, it should not be inferred that the Pfizer COVID-19 "vaccine was shown to be 95% effective in preventing serious COVID-19 disease, symptoms, hospitalisation or death"[23].

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[22] US Adverse Event Reporting System (VAERS) – open data – through to 29 April 2022 https://openvaers.com/covid-data RECORDED 27,758 deaths reported as related to the COVID-19 vaccines.

[23] Australian Government – Therapeutic Goods Administration (25 January 2021) *Australian Public Assessment Report for BNT162b2 (mRNA)*, Comirnaty, Pfizer Australia Pty Ltd – PM-2020-05461-1-2 Final https://www.tga.gov.au/sites/default/files/auspar-bnt162b2-mrna-210125.pdf

5.8. The Pfizer trial (mentioned above) reported 99.07% of unvaccinated individuals did not develop symptoms of COVID-19 while 99.95% the vaccinated group did not report COVID-19 symptoms thus producing an absolute risk reduction of symptoms of 0.88%. This statistic is a realistic measure of protection from COVID-19 (which may only present as mild symptoms) in an uninfected population over the trial surveillance period.

5.9. A subsequent Pfizer COMIRNATY gene-based COVID-19 'vaccine' trial which was pivotal in the approval of this 'vaccine' for children 5-11 relied on the clinical symptoms of only 19 children (3 developed symptoms in the Comirnaty vaccine group and 16 in the placebo group) upon which to base its claimed a relative clinical efficacy of 90.7%.[24] Once again, the claimed clinical efficacy only referred to the chance of preventing the mild symptoms, similar to the common cold, in children who tested positive for COVID-19. The absolute vaccine clinical efficacy to prevent even mild symptoms among the 4500 trial participants can then be calculated to be under 1%.

5.10. A similar approach was adopted by other manufacturers such as Moderna claiming similar "efficacy" which has not been understood by either the media or the lay public.

6. Risk of SARS-CoV-2 Infection in Children

6.1. All therapeutic agents, including vaccines, present a safety risk. Therefore, the risk-benefit analysis of any medication needs to be weighed up.

6.2. Drug regulatory agencies now recognise that most children with COVID-19 have either no symptoms (asymptomatic) or have only mild symptoms.

6.3. I have searched without success for evidence and statistics for the incidence of severe COVID-19 and death due principally to COVID-19 in children aged 5-11 in New Zealand and Australia.

6.4. Some information appears in the Australian TGA AusPAR (Public Assessment Report) Pfizer mRNA Vaccine COMIRNATY dated December 2021, which was used to approve the Pfizer COVID-19 vaccine for children 5-11 years of age. On page 11 of this Australian report, Table 1 (below) includes COVID-19 "cases" in Australia by age

[24] Australian Government – Therapeutic Goods Administration (7 December 2021) Australian Public Assessment Report for Tozinameran (mRNA Covid-19 vaccine), Comirnaty, Pfizer Australia Pty Ltd– PM-2021-05012-1-2 https://www.tga.gov.au/sites/default/files/auspar-tozinameran-mrna-covid-19-vaccine-211207.pdf

group and highest level of illness severity – 1 January 2021 to 10 October 2021 the numbers of children in age group 0-4 and 5-11 are presented. It reports that over more than a nine month period in 2021 (at a time that the more virulent stains of SARS-CoV-2 were prevalent) that one person under 18 years of age died either "with" or "due to" COVID-19.

Table 1: COVID-19 cases in Australia by age group and highest level of illness severity (1 January 2021 to 10 October 2021)

Age group	Count					% of cases		
	Not severe[a]	Hospitalised only (not ICU or died)	ICU (not died)	Died	Total cases	Hospitalised only (not ICU or died)	ICU (not died)	Died
0–4	6,848	386	5	0	7,239	5.3%	0.1%	0.0%
5–11	10,184	279	4	0	10,467	2.7%	0.0%	0.0%
12–15	6,220	235	5	1	6,461	3.6%	0.1%	0.0%
16–17	3,418	132	9	0	3,559	3.7%	0.3%	0.0%
18–29	24,837	1,922	130	7	26,896	7.1%	0.5%	0.0%
30–39	16,500	2,018	222	10	18,750	10.8%	1.2%	0.1%
40–49	11,000	1,790	274	25	13,089	13.7%	2.1%	0.2%
50–59	7,760	1,561	368	74	9,763	16.0%	3.8%	0.8%
60–69	3,763	1,192	299	114	5,368	22.2%	5.6%	2.1%
70–79	1,402	800	141	180	2,523	31.7%	5.6%	7.1%
80–89	493	528	26	207	1,254	42.1%	2.1%	16.5%
90+	125	117	0	71	313	37.4%	0.0%	22.7%
Age unknown	1	0	0	0	1	0.0%	0.0%	0.0%
Total	**92,551**	**10,960**	**1,483**	**689**	**105,683**	**10.4%**	**1.4%**	**0.7%**

Table 1: COVID-19 "cases" in Australia by age group and highest level of illness severity – 1 January 2021 to 10 October 2021

6.5. A search of the Risk Management Plan report released by Pfizer in February 2022 reviewed all available US COVID-19 cases and deaths to 14 August 2021. The incident of death in children who tested positive to COVID-19 in ages 0-4 and 5-11 years was listed as "<0.1%" for each group[25]. This statistic, once again, does not distinguish between those children dying "with" COVID-19 or "due to" COVID-19.

6.6. The above data sets are consistent with studies[26] showing the mortality rate in children hospitalised with COVID-19 of less than 0.18%, which is less than the mortality rate

[25] See European Medicines Agency *COMIRNATY (COVID-19 mRNA VACCINE) RISK MANAGEMENT PLAN* Version number: 5.0, page 21 https://www.ema.europa.eu/en/documents/rmp-summary/comirnaty-epar-risk-management-plan_en.pdf;
Leidman, E (et al) (January 2022) *COVID-19 Trends Among Persons Aged 0-24 Years – United States, March 1-December 12, 2020*, CDC https://www.cdc.gov/mmwr/volumes/70/wr/mm7003e1.htm

[26] Patel, N Paediatric (September-October 2020) *COVID-19: Systematic review of the literature* Am J Otolaryngol. 2020 Sep-Oct;41(5):102573. doi: 10.1016/j.amjoto.2020.102573. Epub 2020 Jun 6. PMID: 32531620; PMCID: PMC7833675. https://pubmed.ncbi.nlm.nih.gov/32531620/;
Ludvigsson, J, (March 2020) *Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults AXTA* https://onlinelibrary.wiley.com/doi/10.1111/apa.15270

seen in children from seasonal influenza.[27] These figures correlate with further findings showing 46.7% of children 0 to 18 years [28] being asymptomatic upon infection.

PART B: Emerging Picture of the Safety and Efficacy of the COVID-19 'Vaccines'

7. Failure to Demonstrate a Favourable Risk/Benefit Case for Vaccinating Children with COVID-19 'Vaccines'

7.1. Table 1 above, shows that no children died and 4 aged 5-11 were admitted to Intensive Care Units (**ICU**), however, as indicated previously in this report, it is important to distinguish between those children admitted to ICU "from COVID-19" or "with COVID-19". It is possible that at least some of these children were admitted for serious co-morbidities (as often is the case), but coincidentally tested positive for COVID-19. Until this reasonable possibility is ruled out, this information should not be relied upon as evidence that children suffer, to any meaningful extent, serious disease caused by COVID-19.

7.2. In reality, the risk of COVID-19 death in an otherwise healthy 5-11 year-old is virtually or statistically nil. Investigations of extremely rare cases have been poorly characterised, and it is unclear to what extent any reported death is directly attributable to COVID-19 as opposed to pre-existing medical conditions. A Johns Hopkins study published in July 2021 monitoring 48,000 children diagnosed with COVID-19 found a mortality rate of zero among children without a pre-existing medical condition.[29]

7.3. As COVID-19 is now known to rarely produce serious disease in children, this should have significant impact upon the risk-benefit analysis of using the gene-based 'vaccines' which have known serious short-term serious adverse effects, including death, and potentially serious unknown longer term adverse effects in this age group.

8. Serious Adverse Effects of the COVID-19 'Vaccines'

8.1. Very limited relatively short-term safety data is available from the individuals involved in the controlled clinical trials submitted to drug regulatory agencies in support of the

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[27] Baht, N et al (December 2005) *Influenza-Associated Deaths among Children in the United States, 2003–2004* N Engl J Med 2005; 353:2559-2567, DOI: 10.1056/NEJMoa051721 https://www.nejm.org/doi/full/10.1056/nejmoa051721;
Tingting, S et al (August 2019) *Mortality risk factors in children with severe influenza virus infection admitted to the paediatric intensive care unit* Medicine: August 2019 - Volume 98 - Issue 35 - p e16861 https://journals.lww.com/md-journal/fulltext/2019/08300/mortality_risk_factors_in_children_with_severe.25.aspx
Fleming, D (July 2005) *Mortality in children from influenza and respiratory syncytial virus* Journal Epidemiol Community Health; 59(7): 586–590 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1757088/ ;
Sachedina, N (November 2010) *Paediatric mortality related to pandemic influenza A H1N1 infection in England: an observational population-based study* The Lancet, VOLUME 376, ISSUE 9755, P1846-1852, NOVEMBER 27, 2010 https://www.thelancet.com/journals/lanonc/article/PIIS0140-6736(10)61195-6/fulltex;
Statista (October 2021) *Influenza mortality rate during the 2019-2020 flu season in the United States, by age group** https://www.statista.com/statistics/1127799/influenza-us-mortality-rate-by-age-group/

[28] Pratha, S (August 2021) *Asymptomatic SARS-CoV-2 infection: A systematic review and meta-analysis* PNAS https://www.pnas.org/doi/abs/10.1073/pnas.2109229118?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub++0pubmed

[29] Makari, M (19/07/21) *The Flimsy Evidence Behind the CDC's Push to Vaccinate Children*, Wall St. J, https://www.wsj.com/articles/cdc-covid-19-coronavirus-vaccine-side-effects-hospitalization-kids-11626706868

emergency authorisations or provisional approvals of the COVID-19 'vaccines'. As such, there is a heavy reliance upon post-marketing adverse drug reaction report (ADR) systems to identify the type and incidence of adverse effects which are caused by the 'vaccines'. There are a number of such systems. Australia has the Drug Adverse Event Reporting system (**DAEN**), and the US has the Vaccine Adverse Events Reporting System (**VAERS**) which reports both US and international adverse events.

8.2. The problem with these systems is that they involve voluntary reporting and most doctors are reluctant to report adverse drug reactions to vaccines due to fear of being accused by health regulators (Australian Health Practitioner Regulatory Agency, AHPRA) of being considered to be "anti-vax".[30] Many doctors both here and overseas and other health professionals fear losing their licence to practice if they even apply for vaccine exemptions, and many investigations are currently underway by AHPRA at the present time. Also, the criteria for assessing a causal relationship between a vaccine and an adverse event can be set so high that only a small percentage of serious adverse events or deaths are officially reported as being caused by a vaccine. These are some of the reasons why it is widely acknowledged all adverse event reporting systems suffer from notorious underreporting[31]. This can result in an underreporting factor of between 10-30 or more, i.e.: one must multiply the official incidence of adverse events by 10-30, to obtain a real-world estimate of the true incidence of the adverse event. For US VAERS reporting in respect of the Covid-19 'vaccines', the underreporting factor (URF) is estimated to be between 40x-49x[32].

8.3. In Australia, it is difficult to obtain statistics regarding details of the number of deaths caused by the gene-based 'vaccines'. A Freedom of Information request (FOI-3586) was made to the TGA for data on the deaths reported as possibly related to the COVID-19 'vaccines' and the 196-page report is available online but is almost completely redacted.[33] In the US the VAERS adverse drug reporting system has recorded 27,758 deaths associated with gene-based "vaccine" administration through to 29 April 2022. The TGA COVID-19 vaccine weekly safety report released 23 June 2022[34] indicates a total of 889 deaths in association with COVID-19 gene-based 'vaccines' of which only 13 have been identified by the TGA as definitely causing death. However, there are no public details available as to the criteria used by the TGA in arriving at this number of 13 deaths. This reported incidence of death does not account for any underreporting factor.

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[30] https://caldronpool.com/the-ahpra-inquisition-against-australian-health-professionals/ ; see point 9 in https://support.mips.com.au/home/12-commandments-to-avoid-ahpra-notifications ; https://www.ahpra.gov.au/News/2021-03-09-vaccination-statement.aspx ; an open letter to the American Board of Medical Specialties and the Federation of State Medical Boards: The destruction of Member Boards' credibility (26 June 2022) http://drelef.org/2022-open-letter-fsmb-abms/pmc-support-letter-final.pdf

[31] https://scholar.google.com.au/scholar?hl=en&as_sdt=0%2C5&as_vis=1&q=EMA+ADR+under-reporting&btnG= ; https://vaers.hhs.gov/data/dataguide.html

[32] https://stevekirsch.substack.com/p/latest-vaers-estimate-388000-americans https://jessicar.substack.com/p/the-true-under-reporting-factor-urf

[33] Response to Australian Freedom of Information request FOI-3586: The age of deceased for all reported adverse events resulting in death for events reported against any of the TGA approved COVID-19 vaccine https://www.tga.gov.au/sites/default/files/foi-3586-01.pdf

[34] https://www.tga.gov.au/periodic/covid-19-vaccine-weekly-safety-report-23-06-2022

8.4. Further confounding a proper of assessment of reported deaths is the complete lack of guidance or directions from the TGA or State or Territory health departments, with respect to any requirement to conduct autopsies on persons dying at any time post COVID-19 vaccination. This is an unfortunate state of affairs when it is known to the TGA as a consequence of its Pharmacovigilance duties, that by employing new histopathological methods developed in Germany, that identify the mRNA generated spike proteins at the scene of fatal pathological inflammatory reactions, deaths that could be easily attributed to a 'normal' heart attack, or a 'normal' stroke, are now instead being found to have been caused by COVID-19 vaccines. Critically, in the German studies, of the 15 deceased examined, deaths due to the vaccines were found to be 'likely' and 'very likely' in 80% of cases.[35]

8.5. Prior to COVID-19 vaccinations, over the last 10 years there has been an average of about 155 deaths per year reported in relation to all conventional vaccines to the US VAERS. This includes all standard childhood vaccines on vaccine schedules, annual flu vaccines, travel vaccines, hepatitis, human papilloma virus vaccines, tetanus vaccines, meningococcal vaccines and herpes vaccines.

8.6. The website OpenVAERS extracts VAERS data each week specifically in relation to adverse event reports for the Covid-19 ‘vaccines’. An inspection shows the contrast in reported mortality for the gene-based COVID-19 ‘vaccines’ compared to all other vaccines combined since 1990.[36]

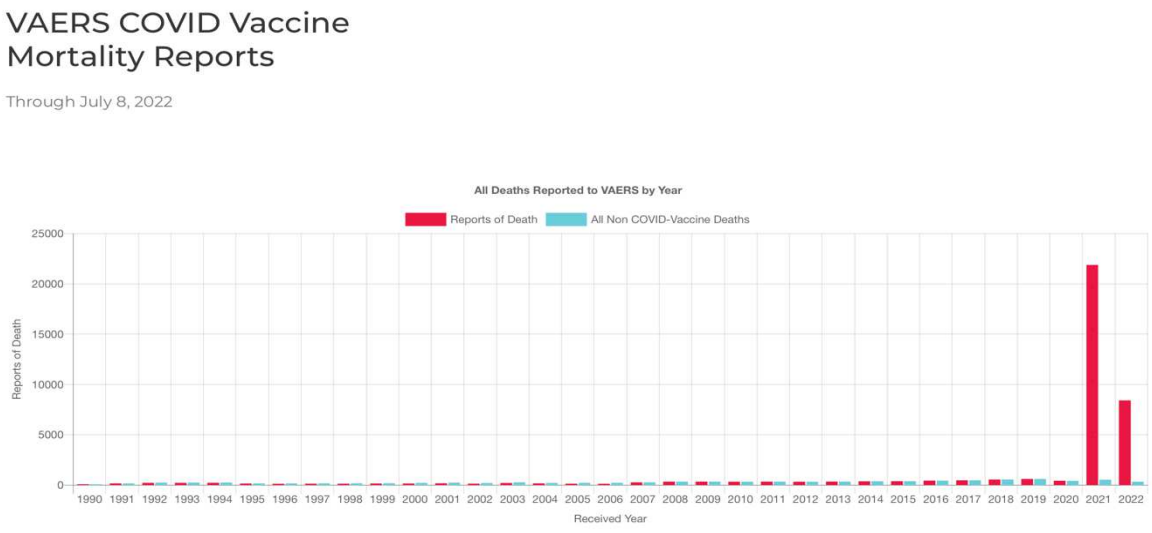


Table 2: All reported potential vaccine deaths to VAERS since 1990 to VAERS

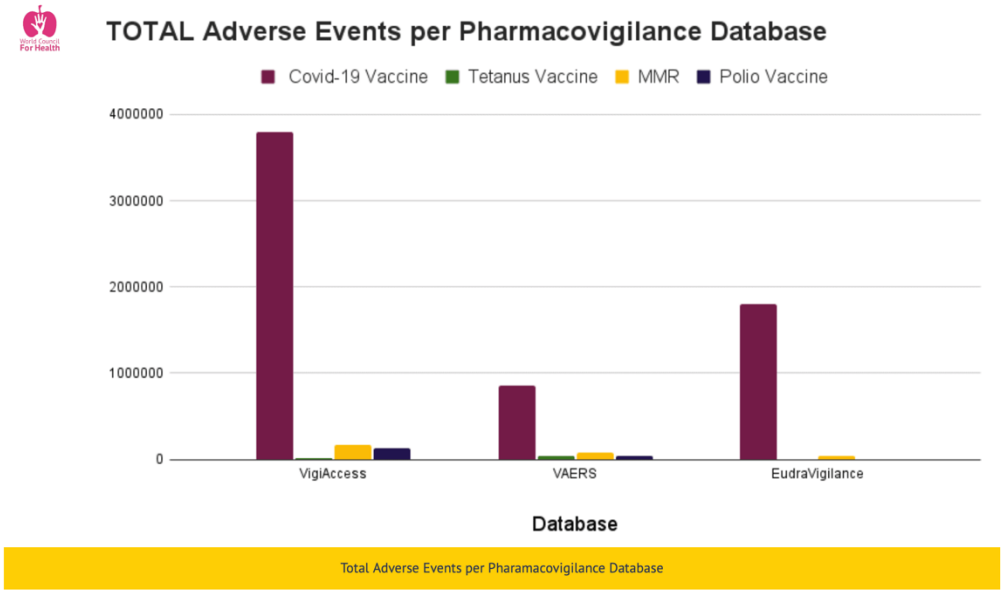
[35] Documents available, but see the recent presentation here: https://odysee.com/@en:a5/Pathology-Conference_Burkhardt_Presentation_EN_20220311:7

[36] US Adverse Event Reporting System (VAERS) – open data- https://openvaers.com/covid-data

8.7. Statistics on the number of flu vaccines administered over many years is provided by the US CDC[37], and range from about 110 million per year to more than 190 million per year since 2008. Similarly, there have been more people who have received measles/mumps/Rubella vaccinations (301,000,000) than COVID-19 vaccinations (255,000,000) since VAERS commenced reporting in 1990[38].

8.8. The relatively high number of adverse reports received by the VAERS (hosted by the US CDC) relative to other commonly used vaccines, is also seen in both of the other two major adverse drug reporting systems: VigiAccess (hosted by WHO) and EudraVigilance (hosted by the European Medicines Agency)[39].

Table 9: Total Adverse Events per Pharmacovigilance Database



Yellow Card data excluded

8.9. Dr. Jessica Rose, specialist data analyst, has focused her attention on the US VAERS data and published on the general ADR data as well as specifically in relation to myocarditis.[40]

37 Centers for Disease Control and Prevention – Historical Reference of Seasonal influenza Vaccine Doses Distributed. Revised 4 August 2021. https://www.cdc.gov/flu/prevent/vaccine-supply-historical.htm

38 Covid-19 Vaccine Pharmacovigilance Report. World council for Health. Updated 4 August 2022.Worldcouncilforhealth.org: https://worldcouncilforhealth.org/resources/covid-19-vaccine-pharmacovigilance-report

39 Covid-19 Vaccine Pharmacovigilance Report. World council for Health. Updated 4 August 2022.Worldcouncilforhealth.org: https://worldcouncilforhealth.org/resources/covid-19-vaccine-pharmacovigilance-report

40 Rose, J (2021) *A report on US Vaccine Adverse Events Reporting system (VAERS) of the COVID-19 Messenger Ribonucleic Acid (mRNA) Biologicals.* Science, Public Health Policy, and the Law. Volume 2:59-80, May 2021. Clinical and Translational Research. https://www.datascienceassn.org/sites/default/files/VAERS%20Report%20on%20Covid19%20Vaccine%20mRNA%20Biologicals%20-%20May%2C%202021.pdf

8.10. As of 22 April 2022, in the United States alone there had been recorded 5,309 cases of myocarditis, 782,665 adverse events, 151,796 severe adverse events, and 14,613 deaths in VAERS following COVID-19 vaccination.[41] Every adverse drug reaction report needs to be individually assessed to rate the probability of causing any particular adverse reaction – not all reports are assessed as "causal". On the other hand, the underreporting factor can range from 5 to perhaps as high as 31 times[42] or more.

8.11. The confounding assessment factors of underreporting of adverse effects on one hand, and the possible lack of evidence of causation on the other hand in relation to deaths caused by vaccines, can be resolved to a large degree by an examination of the statistics of death temporally associated with vaccine administration.

8.12. Dr. Jessica Rose has analysed the percentage of individuals experiencing adverse effects within 24- and 48-hour periods in relation to COVID-19 vaccine administration.

8.13. Of particular interest is the Rose analysis of VAERS % reported deaths following vaccination with the gene-based vaccines versus the number of days following injection[43]. This analysis included a graphical representation of the temporal relationship between the number of deaths reported in association with COVID-19 vaccine administration and the time of death measured in days following injection.

In relation to the widely accepted Bradford Hill criteria for the assessment of adverse drug reactions, a close temporal relationship between drug administration and the adverse event represents some of the strongest evidence upon which to assign a cause-effect relationship.

The following graphical representation depicts the percent of reported deaths versus the number of days following injection of a COVID-19 "vaccine" (data ending December 2021) showing a clustering of deaths within about 2 days of administration (orange line) compared to an expected background incidence of a hypothetical event which is not related temporally to vaccine administration (yellow line).

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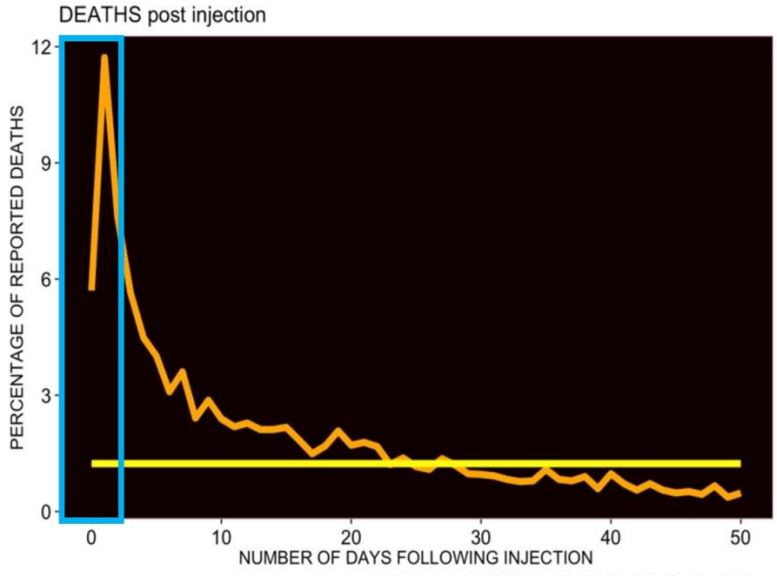
[41] US Adverse Event Reporting System (VAERS) - https://vaers.hhs.gov

[42] Critical Appraisal of VAERS Pharmacovigilance: Is the U.S. Vaccine Adverse Events Reporting System (VAERS) a Functioning Pharmacovigilance System? Jessica Rose, The Institute for Pure and Applied Knowledge. Vol 3:100-129, Oct. 2021. https://cf5e727d-d02d-4d71-89ff-9fe2d3ad957f.filesusr.com/ugd/adf864_0490c898f7514df4b6fbc5935da07322.pdf

[43] Jessica Rose VAERS adverse event data analysis - presentation December 2021 https://maatsmethods-my.sharepoint.com/:p:/g/personal/peter_maatsmethod_com_au/EVmwPI2cfDROiI2ad9z7TWkB9DJUVzvy3t0h8yhbdV41SQ?rtime=mlpjZxh72kg

Evidence of causation remains from previous update…

Clustering of reports around 0 and 1

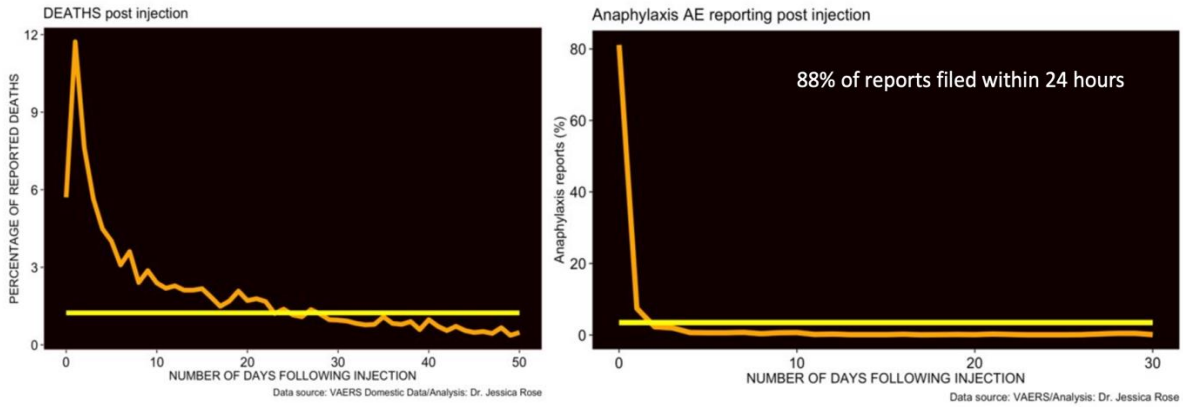


Update as of 12/24/

Data source: VAERS/Analysis: Dr. Jessica Rose

Further evidence to support the cause-effect relationship between death and COVID-19 “vaccine” administration may be seen by comparing the similar characteristic temporal relationship between anaphylaxis and reported deaths. In this respect, anaphylaxis is used as a positive control to assist the interpretation of the data.

Evidence of causation remains from previous update…

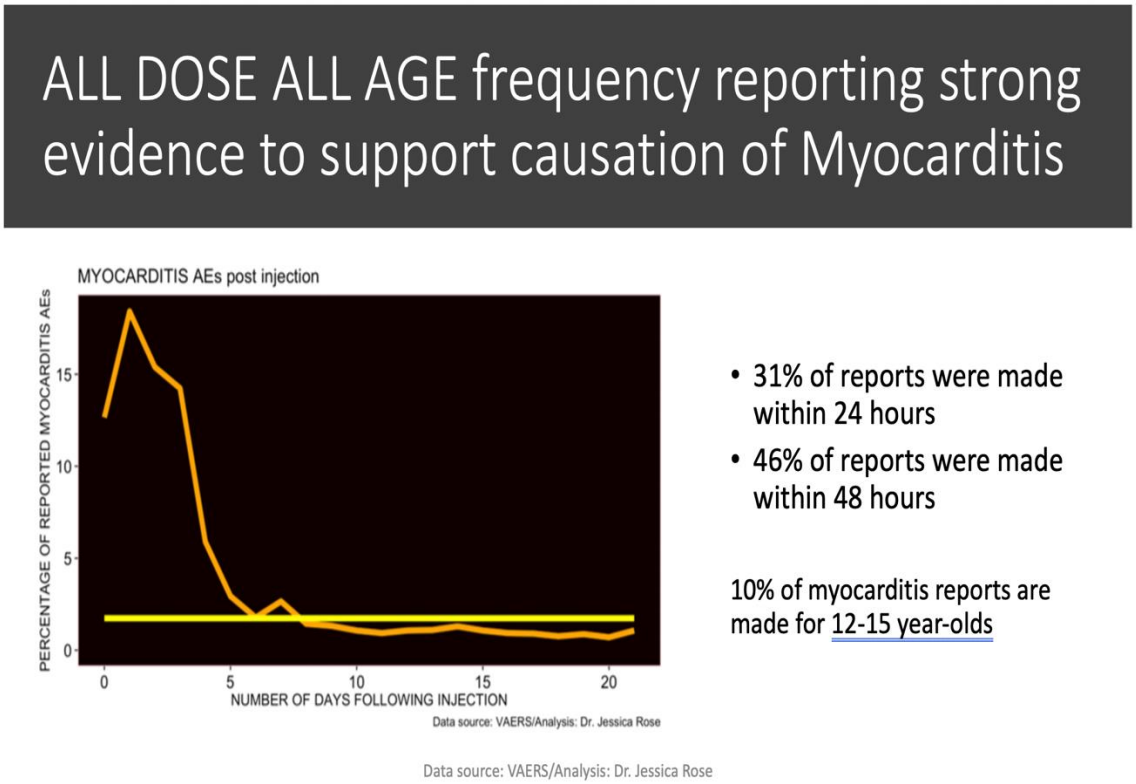


Anaphylaxis as a positive control…

Update as of 12/24/21

Data source: VAERS/Analysis: Dr. Jessica Rose

Another important temporal relationship extracted from the VAERS data is shown below between the incidence of myocarditis and COVID-19 “vaccine” administration.



8.14. The abovementioned analyses are short-term analyses, i.e. observations within days, weeks or months of vaccination. No long-term safety data is available for the COVID-19 gene-based vaccines. The long-term safety of the gene-based vaccines is completely unknown and there are potentially serious concerns which will only be resolved many years into the future. These concerns are based on the identification of pathogenic attributes of the spike protein and include profound disturbances in regulatory control of protein synthesis and natural cancer surveillance protective mechanisms, a potentially causal link to neurodegenerative disease, immune thrombocytopenia, Bell’s palsy, liver disease, impaired adaptive immunity, impaired DNA damage response and tumorigenesis.

8.15. It has been suggested that the increase in deaths temporally associated with the introduction of the gene-based ‘vaccines’ is not due to these new ‘vaccines’ but rather due to increased numbers of injections overall. However, this explanation does not appear valid as the COVID-19 vaccines represent a small proportion of all vaccines given in the US since 1990. For example, just considering flu vaccines, it has been reported that since the 08/09 flu season a total of 1,720,400,000 flu vaccines were administered while only 557,637,223 doses of the COVID-19 vaccines were administered in the USA. Many other types of vaccines are routinely used.

8.16. A detailed summary and analysis of the adverse drug reactions reported in association with the COVID-19 gene-based "vaccines" is presented as an addendum to this Report[44]

Focus on Myocarditis and Pericarditis

8.17. Of all the serious more short-term adverse events receiving attention in relation to the gene-based COVID-19 vaccines, myocarditis has probably received the most attention due to the seriousness of the condition (can cause permanent heart damage and be fatal) and its potential to affect longevity especially in the younger age groups with a predominance among younger males.

8.18. In analysing the possible incidence of myocarditis associated with the gene-based vaccines, it is useful to compare the historical rates of myocarditis prior to the introduction of these vaccines with the rate associated with the vaccine rollouts (Pfizer, Moderna and Janssen) during 2021[45].

8.19. It appears that there is a risk of myocarditis from both COVID-19 infection (especially in the elderly population) and from gene-based COVID-19 vaccines – both considered to be related to the toxic spike protein. The US Center for Disease Control (CDC) has attempted to discriminate between the two causal factors in order to arrive at a risk of myocarditis caused by the vaccines. If there is a risk of people contracting myocarditis from SARS-CoV-2 then this would appear to be negligible, as no health authority has produced a report or meaningful evidence that SARS-CoV-2 significantly elevates the risk of myocarditis.

8.20. The risk of myocarditis, pericarditis and cardiac arrhythmias associated with several gene-based COVID-19 'vaccines' or SARS-CoV-2 infection itself was studied in a large case series study of people aged 16 or older in England between 1 December 2020 and 24 August 2021.[46]

8.21. In this large study the temporal relationship between the gene-based vaccines and myocarditis was seen in the subgroup analysis by age showing an increased risk of myocarditis associated with the two mRNA vaccines in those younger than 40 years of age. Subgroup analysis was only performed for myocarditis. While those under 16 years of age were not studied it is widely recognised and accepted that younger males are most at risk of myocarditis. In addition, the authors state:

'Our findings are relevant to the public, clinicians and policy makers. First, there was an increase in the risk of myocarditis within a week of receiving the first dose of both

[44] Mitchell, Lisa: Summary and analysis on adverse drug reactions regarding COVID-19 vaccines submitted to the Australian Drug Adverse Event Notification (DAEN) system (5 August 2022)

[45] Rose, J and McCullough P (September 2021) A Report on Myocarditis Adverse Events in the U.S. Vaccine Adverse Events Reporting system (VAERS) in Association with COVID-19 injectable Biological Products. Current Problems in Cardiology https://drtrozzi.org/wp-content/uploads/2021/12/Rose-J-McCullough-PA-Myocarditis-in-VAERS-Curr-Prob-Cardiol-2021.pdf

[46] Patone, M et al, (December 2021) Risks of myocarditis, pericarditis, and cardiac arrhythmias associated with COVID-19 vaccination or SARS-CoV-2 infection Nature Medicine, 28, pages410–422 (2022) https://pubmed.ncbi.nlm.nih.gov/34907393/

adenovirus and mRNA vaccines, and a higher increased risk after the second dose of both mRNA vaccines.'

'Myocarditis is underdiagnosed in practice, with clinical bias being directed towards myocardial ischemia or infarction.'

8.22. In a nationwide study in France involving 32 million people aged 12-50 years of age and receiving 46 million doses of mRNA vaccines, 1,612 cases of myocarditis and 1,613 cases of pericarditis occurred in France between 12 May 2021 and 31 October 2021.[47] The risk of myocarditis and pericarditis for both the Pfizer and Moderna mRNA COVID-19 vaccines was found to be increased both after the first and second doses. The risk of this association was statistically significant and particularly evident for the Moderna COVID-19 'vaccine' where the risk of myocarditis/pericarditis was increased 30 times suggesting a dose-response relationship, given Moderna has 100 micrograms of mRNA and COMIRNATY has 30 micrograms of mRNA per dose. The risk was increased in younger age groups. The incidence of both myocarditis and pericarditis reported in this study was consistent with the incidence reported in other countries.

8.23. Another study from Israel investigated the incidence of myocarditis and pericarditis in post COVID-19 unvaccinated patients.[48] This is an important study because some have argued that the myocarditis and pericarditis incidence observed in populations may be due to COVID-19 and not due to COVID-19 'vaccines'. This retrospective cohort study of 196,992 adults following COVID-19 infection and 590,976 control adults who tested negative for COVID-19 concluded:

'Post COVID-19 infection was not associated with either myocarditis or pericarditis. We did not observe an increased incidence of either pericarditis nor myocarditis in adult patients recovering from COVID-19 infection.'

8.24. Aside from being under-diagnosed in practice, it is generally known that many doctors avoid reporting myocarditis and other serious possible adverse events in relation to the gene-based vaccines for fear of being seen as critical of the national health COVID-19 vaccination policies, and possible health regulator intimidation and retribution. This, combined with the inherent underreporting of adverse events in general, suggest the true incidence of adverse effects such as myocarditis may be much higher than officially reported. This needs to be considered in the calculation of the risk-benefit analysis.

8.25. This is most recently outlined in an Australian Government report on *Guidance on Myocarditis and Pericarditis after mRNA COVID-19 Vaccines* dated 29 April 2022 –

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[47] Le Vu, S. (2022) Age and sex-specific risks of myocarditis and pericarditis following Covid-19 messenger RNA vaccines. NATURE COMMUNICATIONS (2022) https://www.nature.com/articles/s41467-022-31401-5

[48] Tuvali, O et al: (2022) *The Incidence of Myocarditis and Pericarditis in Post COVID-19 Unvaccinated Patients – a Large Population-Based Study.* J. Clin. Med. 2022, 11, 2219. https://doi.org/10.3390/jcm11082219

rates of myocarditis per million doses by age cohort and sex (see Table 1 below reproduced image from the report).[49]

Table 1: Rates of myocarditis per million doses by age cohort and sex following dose two of Comirnaty (Pfizer) and Spikevax (Moderna) adapted from the rates reported by the Therapeutic Goods Administration (TGA) in Australia[13]

	Pfizer		Moderna	
	Dose 2		Dose 2	
Age Cohort	**Males**	**Females**	**Males**	**Females**
5-11*	Not available	Not available	Not available	Not available
12-17	**107**	24	**159**	26
18-29	67	20	142	12
30-39	19	6	52	0
40-49	12	9	0	0
50-59	1	4	0	26
60-69	0	0	0	0
≥70	0	4	0	0
All ages	**37**	**12**	**75**	**11**

**Up to 27 February 2022 approximately 1.2 million doses had been administered to children aged 5-11 years, and no cases of myocarditis had been reported, noting that majority of these would have been first doses.*

Up-to-date data on cases and rates of myocarditis and pericarditis reported to the Australian Therapeutic Goods Administration is available at https://www.tga.gov.au/periodic/covid-19-vaccine-weekly-safety-report.

Table 1 - rates of myocarditis per million doses by age cohort and sex in Australia Government report on Guidance on Myocarditis and Pericarditis after mRNA COVID-19 Vaccines dated 29 April 2022

8.26. As of 10 July 2022, since inoculating 5-11 year-olds in Australia began on 10 January 2022, five (5) children were previously reported to have died following receiving a COVID-19 'vaccine', as recorded by the TGA's DAEN website *Australian Government Therapeutic Goods Administration, Database of Adverse Event Notifications*,[50] specifically:

- Case no. 719838 11 Mar 7-year-old male – cardiac arrest, generalised tonic-clonic seizure.
- Case no. 724023 25 Mar 9-year-old female – cardiac arrest.
- Case no. 724925 28 Mar 6-year-old male – adverse event following immunisation (which has since been removed).
- Case no. 733723 6 May 10-year-old male – adverse event following immunisation (which has since been reclassified).

[49] Australian Government report (Updated 28 April 2022) *Guidance on Myocarditis and Pericarditis after mRNA COVID-19 Vaccines* https://www.health.gov.au/sites/default/files/documents/2022/04/covid-19-vaccination-guidance-on-myocarditis-and-pericarditis-after-mrna-covid-19-vaccines.docx

[50] Australian Database of Adverse Event Notifications (DAEN) https://www.tga.gov.au/database-adverse-event-notifications-daen

- Case no. 734187 10 May 5-year-old male – abdominal pain, cardiac arrest.

8.27. Myocarditis and pericarditis are serious medical conditions which may have life-long consequences and may be life threatening and may affect 5-11 year-old children. As of 28-7-2022, despite possibly significant underreporting, there have been 37 suspected cases of chest pain (indicative of myocarditis and pericarditis) have been reported to the DAEN system in this age group[51].

8.28. The paediatric COVID-19 gene-based 'vaccines' have only been available for a limited time as compared to the vaccines for the older age groups. But the safety record of the 'vaccines' used in the older age groups is an indicator of the adverse events one might expect in the younger age groups.

8.29. In this regard, the following information should be taken into consideration:

a. The VAERS database reports that as of 22 April 2022, in the US alone there were 5,309 cases of myocarditis, 782,665 adverse events, 151,796 severe adverse events, and 14,613 deaths recorded following COVID-19 vaccination in the US.[52]

b. After introduction of the gene-based COVID-19 vaccines in the US, VAERS quickly accumulated an unusually large number of adverse events. Between November 3 and December 19, 2021, VAERS received an overwhelming 4,249 adverse reaction reports for children aged five through eleven years who received the Pfizer COVID-19 COMIRNATY 'vaccine'.[53]

8.30. Further, in the documents related to a recent FOIA request, in the Pfizer informed consent document[54] it was revealed that the company recognised the risk of myocarditis to be as high as 1 in 1,000. Myocarditis is overwhelmingly found in younger people.

Other Safety Factors and Issues to Consider

8.31. Another factor which needs to be considered is the delay in assessing and reporting adverse drug events due to the unprecedented number of such events being reported. Pfizer itself has acknowledged this issue in its cumulative analysis of post-authorisation adverse event report 5.3.6 of pf-07302048 (bnt162b2), dated 30 April 2021 (**Pfizer's Adverse Events Report**) (released in or about November 2021

[51] Australian Government Therapeutic Goods Administration COVID-19 Vaccine Safety Report 28-0702022. https://www.tga.gov.au/periodic/covid-19-vaccine-safety-report-28-07-2022

[52] U.S. Adverse Event Reporting System (VAERS) - https://vaers.hhs.gov

[53] Hause, A et al (December 2021) *COVID-19 Vaccine Safety in Children Aged 5-11 Years – United States US November 3- December 19, 2021* CDC Report https://www.cdc.gov/mmwr/volumes/70/wr/mm705152a1.htm

[54] Pfizer Clinical Trial Informed Consent Document. Cincinnati Children's Hospital Medical Center (Sub Study C). Study title: A Study to Evaluate Additional Dose(s) of BNT162b2 in Healthy Individuals Previously Vaccinated with BNT162b2. CCH IRB Approval Date 4 Jan. 2022. IRB Number: 2021-0430 (page 23)

pursuant to court ordered disclosure expedited under the Freedom of Information Act):[55]

"Pfizer has also taken multiple actions to help alleviate the large increase of adverse event reports. This includes significant technology enhancements, and process and workflow solutions, as well as increasing the number of data entry and case processing colleagues. To date, Pfizer has onboarded approximately 600 additional fulltime employees (FTEs). More are joining each month with an expected total of more than 1,800 additional resources by the end of June 2021."[56]

8.32. During phase III clinical trials for the mRNA COVID-19 vaccine products, safety was assessed based on a maximum observation period of 6 months. This is not adequate to assess long-term safety outcomes. A typical timeline of up to 10 years would be considered appropriate for long-term follow up. There are many examples where biological products have been recalled (let alone gene-based products) such as the rotavirus vaccines in 2010, the H1N1 influenza vaccine in 2009 and a meningococcal vaccine in 2005-2008.

8.33. Data from pivotal clinical trials used to support the gene-based 'vaccines' of Moderna, Pfizer and Janssen were re-analysed by Classen[57] to determine '*all cause severe morbidity" defined as "severe infections with COVID-19 and all other severe adverse events between the treatment arms and control arms respectively*'. This type of analysis avoids any bias within the adverse drug reporting system where a cause-effect assessment might be arbitrarily discounted due to the overly strict criteria required to establish such a relationship. This analysis found a statistically significant increase in all cause severe morbidity in the vaccinated group compared to the placebo group. When all types of severe events were considered, the vaccinated group suffered more severe adverse events; this suggests the gene-based vaccines are doing more harm than good.

8.34. In a published paper by a world-expert analyst of the VAERS database for all age groups, Dr. Jessica Rose[58] found that, based on the ratio of expected severe adverse events to observed adverse events in VAERS for a number of conditions, the 'underreporting factor (**URF**)' for COVID vaccine-associated deaths was 31. Using this URF for all VAERS-classified severe adverse events, as of October 2021, COVID-19 'vaccines' were associated with 205,809 deaths, 818,462 hospitalizations, 1,830,891

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[55] FDA released document: *Pfizer 5.3.6 Cumulative analysis of post-authorization adverse event reports* of pf-07302048 (bnt162b2) received through 28-feb-2021 – page 6

[56] The Vault Project: Pfizer Secretly Hired 600+ Employees to Process Flood of COVID Vaccine Adverse Events. April 7, 2022. Taken from unredacted Pfizer documents. https://thevaultproject.org/pfizer-secretly-hired-600-employees-to-process-flood-of-covid-vaccine-adverse-events/

[57] Classen, J.B: Classen B. (2021) US COVID-19 Vaccines Proven to Cause More Harm than Good Based on Pivotal Clinical Trial Data Analyzed Using the Proper Scientific Endpoint, "All Cause Severe Morbidity". Trends Int Med. 2021; 1(1): 1-6. https://www.semanticscholar.org/paper/US-COVID-19-Vaccines-Proven-to-Cause-More-Harm-than-Classen/141e12167e43917c679988bc91c91f7b8a6b9671

[58] Rose, J (October 2021) Critical Appraisal of VAERS Pharmacovigilance: Is the U.S. Vaccine Adverse Events Reporting System (VAERS) a Functioning Pharmacovigilance System? The Institute for Pure and Applied Knowledge. Vol 3:100-129, Oct. 2021 https://cf5e727d-d02d-4d71-89ff-9fe2d3ad957f.filesusr.com/ugd/adf864_0490c898f7514df4b6fbc5935da07322.pdf

emergency room visits, 230,113 life-threatening events, 212,691 disabled and 7,998 birth defects."

8.35. Further relevant background information is provided by life insurance industry data for adults. These data suggest historic increases in death claims coinciding with gene-based 'vaccine' rollouts. A publicly available quarterly report by the Group Life Insurance Industry, covering roughly 90% of the employer-based policies in the US, reported that younger age groups were suddenly dying at historically unprecedented rates beginning in Q3 of 2021.[59]

8.36. Other evidence of the damage caused by the gene-based 'vaccines' comes from the number of ambulance calls in response to cardiac arrests and acute coronary syndromes (heart attacks) for young people in the 16–39 age group during the COVID-19 vaccination rollout in Israel (January–May, 2021) compared with the same period of time in prior years 2019 and 2020.[60]

8.37. There is also an alarming and massive rise in deaths among healthy, young professional athletes from around the world since the COVID-19 vaccination campaign was initiated. As of 4 June 2022, approximately 1,090 athletes[61] suffered a cardiac arrest, with 715 of them dying as a result. The majority of arrests occurred in competition or training. The frequency of these events in comparison to historical data is of great concern. In a 2009 review of professional athletes' deaths[62], published in a prominent European Cardiology journal, they found that from 1966 to 2004, there was an average of only 29 sudden athlete deaths per year worldwide. Compare this number to just the month of January 2022 alone where 127 collapses and 87 deaths among professional athletes were reported. Overall, these athlete deaths reflect an approximately 22-fold increase in the year after the introduction of COVID vaccines, to date unexplained by other identifiable causes.

8.38. Australian Bureau of Statistics data also reflect a similar surge in Excess Deaths commensurate with the rollout of the 'vaccines', where Excess (non-COVID) Deaths for 2022 already are 17.5% above baseline, as the following graph[63] vividly depicts.

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[59] SOA Research Institute (January 2022) *Group Life COVID-19 Mortality Survey Report* (page 23) https://www.soa.org/48ff80/globalassets/assets/files/resources/research-report/2022/group-life-covid-19-mortality.pdf

[60] Sun, C.L.F et al (2022) *Increased emergency cardiovascular events among under-40 population in Israel during vaccine rollout and third COVID-19 wave* Scientific Reports 12:6978. https://doi.org/10.1038/s41598-022-10928-z

[61] 1111 Athlete Cardiac Arrests, Serious Issues, 732 Dead, After COVID Injection. Real Science. https://goodsciencing.com/covid/athletes-suffer-cardiac-arrest-die-after-covid-shot/

[62] Bille, K et al (2006) *Sudden cardiac death in athletes* The Lausanne Recommendations. Eur J Cardiovasc Prev Rehabil 2006 Dec;13(6):859-75. doi: 10.1097/01.hjr.0000238397.50341.4a https://pubmed.ncbi.nlm.nih.gov/17143117/

[63] Australian Bureau of Statistics *Provisional Mortality Statistics* - COVID-19 new infections have been excluded due to the aforementioned unreliability of PCR testing https://www.abs.gov.au/statistics/health/causes-death/provisional-mortality-statistics/latest-release

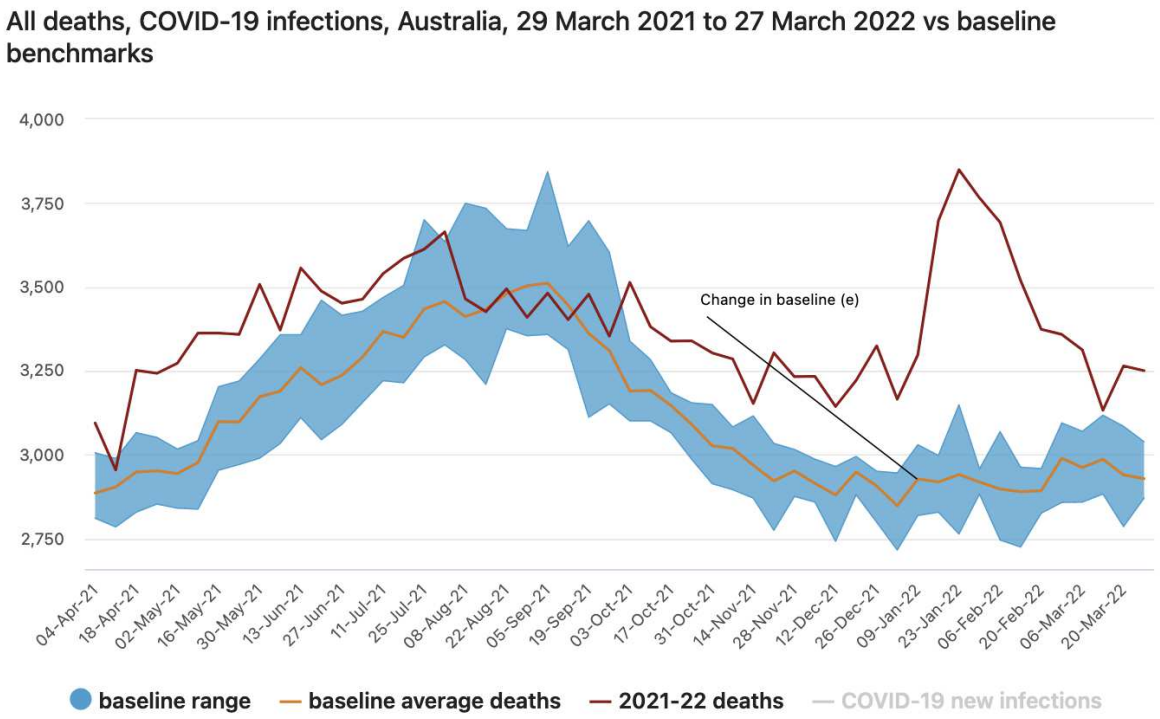

Table 7 - Australian Bureau of Statistics data reflecting surge in Excess Deaths commensurate with the rollout of the COVID-19 'vaccines'

8.39. New South Wales COVID-19 data for hospital admissions, ICU admissions and deaths in the 14 days up to 23 July 2022[64] is shown below. The data shows 693 people with known vaccination status were admitted to hospital; of these, one person was reported as unvaccinated. In interpreting this data it is noted that this is at a time when it is estimated that about 95% of individuals over 16 years of age are reported to be vaccinated. Also, unvaccinated individuals entering hospital for any reason may be more likely to be tested for COVID-19 as compared to those individuals who declare they are vaccinated. Taking these factors into account, the data suggests that Covid-19 vaccinated individuals are placing relatively higher demands on hospital resources as compared to the unvaccinated, a trend that has been occurring in 2022.

[64] https://www.health.nsw.gov.au/Infectious/covid-19/Documents/weekly-covid-overview-20220723.pdf

NSW COVID-19 WEEKLY DATA OVERVIEW

Epidemiological week 29, ending 23 July 2022

www.health.nsw.gov.au/coronavirus

Table 1. People with a COVID-19 diagnosis in the previous 14 days who were admitted to hospital, admitted to ICU or reported as having died in the week ending 23 July 2022

	Admitted to hospital (but not to ICU)	Admitted to ICU	Deaths
Gender			
Female	447	32	65
Male	470	45	81
Not stated / inadequately described	1	0	0
Age group (years)			
0-9	68	1	0
10-19	19	1	0
20-29	56	3	0
30-39	68	6	0
40-49	42	4	0
50-59	54	9	1
60-69	109	16	10
70-79	169	25	30
80-89	218	12	63
90+	115	0	42
Local Health District of residence*			
Central Coast	37	2	4
Illawarra Shoalhaven	58	5	14
Nepean Blue Mountains	20	0	3
Northern Sydney	109	12	18
South Eastern Sydney	108	8	15
South Western Sydney	131	6	17
Sydney	72	6	7
Western Sydney	104	8	12
Far West	8	0	2
Hunter New England	97	7	15
Mid North Coast	19	2	13
Murrumbidgee	31	8	7
Northern NSW	44	1	12
Southern NSW	19	3	3
Western NSW	47	7	4
Vaccination status^			
Four or more doses	221	12	45
Three doses	292	28	55
Two doses	165	10	22
One dose	14	3	5
No dose	1	1	15
Unknown	225	23	4
Total	**918**	**77**	**146**

*Excludes cases in correctional settings

^Vaccination status is determined by matching to Australian Immunisation Register (AIR) data. Name and date of birth need to be an exact match to that recorded in AIR. People with unknown vaccination status were unable to be found in AIR, though may have vaccination details recorded in AIR under a shortened name or different spelling.

Fertility, Birth Rates, miscarriages, stillbirths and neonatal deaths

8.40. One category of death not normally accounted for in Excess Deaths figures are stillbirths. After the deployment of COVID-19 'vaccines' in Germany and Scotland, statistically significant increases in stillbirths, perinatal, and neonatal deaths are now apparent from late 2021 leading into 2022[65].

[65] Guetzkow, J (July 2022) Springtime for Stillbirths in Germany Winter for women and babies, Substack https://jackanapes.substack.com/p/springtime-for-stillbirths-in-germany

8.41. Correspondingly, extraordinarily high drops in birth rates are now apparent in Germany and Taiwan, with an over 10% decline[66] in the former, and an over 25% decline[67] in the latter. Similar declines in birth rates are now also being seen across US states[68], Sweden[69], Canada[70], and highly COVID-19 vaccinated Hungary.[71]

8.42. These declines appear to correlate with data released by Pfizer to regulators on or shortly after 28 February 2021[72], where Pfizer reported on outcomes in 270 pregnant women who received the Pfizer 'vaccine'. No outcome or follow-up by Pfizer was provided for 238 of the pregnancies thus undermining any claims of safety in pregnancy. Of the remaining pregnancies 28 out of 29 babies died, a death rate of 97% in those pregnancies Pfizer did follow-up. Though this Pfizer pregnancy data is grossly lacking, it nonetheless begs critical questions which regulators have to date not asked. Regulators should begin asking questions or considering the continued use of these 'vaccines', particularly now when further studies are confirming relatively high impacts on women's menstrual cycles[73]. Furthermore, data[74]procured from Pfizer under Court order show that the Lipid Nanoparticles (**LNPs**) used as the delivery vehicle for the synthetic mRNA, extensively bio-distributes throughout the human body and accumulates in various organs including the kidney, spleen, adrenal glands, testes and ovaries although 'vaccine' recipients were initially informed the 'vaccines' would remain in the deltoid muscle at the site of injection. Although the effects of the delivered synthetic mRNA upon the various organs studied is currently unknown, many studies[75] show toxic effects of LNPs.

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[66] Syed, A (July 2022) *Children of Men* Substack https://arkmedic.substack.com/p/children-of-men/comments?utm_source=substack&utm_medium=email

[67] Chudov, I (July 2022) *Taiwan: Birth Rate Dropped -27.66% in June 2022!!!* https://igorchudov.substack.com/p/taiwan-birth-rate-cratered-2766-in

[68] Bizuobo (June 2022) *Preview: A US state-focused variant on Jikkyleaks birthrate decline thread* Substack https://baizuobu.substack.com/p/preview-a-us-state-focused-variant/comments

[69] El Gato Malo (July 2022) *Swedish birth rate data: what does it really show us?* Substack https://boriquagato.substack.com/p/swedish-birth-rate-data-what-does

[70] Jestre (July 2022) *Birth rate declines come to Canada* Substack https://jestre.substack.com/p/birth-rate-declines-come-to-canada

[71] Chudov, I (July 2022) Hungary: Highest Vaccinated Counties Have Worst Birth Rate Drops! https://igorchudov.substack.com/p/hungary-most-vaccinated-counties

[72] FDA released document: *Pfizer 5.3.6 Cumulative analysis of post-authorization adverse event reports* of pf-07302048 (bnt162b2) received through 28-feb-2021 – see 'Missing Information' pages 9 & 12: https://phmpt.org/wp-content/uploads/2021/11/5.3.6-postmarketing-experience.pdf https://phmpt.org/wp-content/uploads/2021/11/5.3.6-postmarketing-experience.pdf; and commentary
Bridle, B (April 2022) A Moratorium on mRNA 'Vaccines' is Needed
Substack https://mail.google.com/mail/u/0/#inbox/FMfcgzGpHHKDKvZPqGLrFJVQLcZTBpdB

[73] Lessans, N et al (July 2022) *The effect of BNT162b2 SARS-CoV-2 mRNA vaccine on menstrual cycle symptoms in healthy women* International Journal of Obstetrics and Gynaecology https://doi.org/10.1002/ijgo.14356

[74] FDA released document: Acuitas Therapeutics Inc / Pfizer A Tissue Distribution Study of a [3 H]-Labelled Lipid Nanoparticle-mRNA Formulation Containing ALC-0315 and ALC-0159 Following Intramuscular Administration in Wistar Han Rats https://phmpt.org/wp-content/uploads/2022/03/125742_S1_M4_4223_185350.pdf; and commentary
Bridle, B (April 2022) A Moratorium on mRNA 'Vaccines' is Needed
Substack https://mail.google.com/mail/u/0/#inbox/FMfcgzGpHHKDKvZPqGLrFJVQLcZTBpdB

[75] Dokka, S et al (2000) *Oxygen Radical-Mediated Pulmonary Toxicity Induced by Some Cationic Liposomes* Pharm Res 17, 521–525 https://doi.org/10.1023/A:1007504613351; Hongtao Lv, Shubiao Zhang, Bing Wang, Shaohui Cui, Yan, J (2006) T*oxicity of cationic lipids and cationic polymers in gene delivery,* Journal of Controlled Release, Volume 114, Issue 1, Pages 100-109, ISSN 0168-3659, https://doi.org/10.1016/j.jconrel.2006.04.014; Ranit Kedmi, Ben-Arie, N.; Peer, D. (20210) *The systemic toxicity of positively charged lipid nanoparticles and the role of Toll-like receptor 4 in immune activation*, Biomaterials, Volume 31, Issue 26, 2010, Pages 6867-6875, ISSN 0142-9612, https://doi.org/10.1016/j.biomaterials.2010.05.027;
Filion, M., Phillips, N (1997) *Toxicity and immunomodulatory activity of liposomal vectors formulated with cationic lipids toward immune effector cells*, Biochemical et Biophysica Acta (BBA) – Biomembranes, Volume 1329, Issue 2, 1997, Pages 345-356, ISSN 0005-2736, https://doi.org/10.1016/S0005-2736(97)00126-0

8.43. Collectively, the available peer-reviewed literature points to a number of serious safety concerns regarding COVID-19 'vaccines'. Already by December 2021, in excess of 1,000 peer-reviewed articles and studies focussing upon post-vaccination deaths and injuries had been published[76].

8.44. The long-term potential for the Spike Protein (produced by the COVID-19 'vaccines') to induce a range of autoimmune diseases has been commented upon by several authors. Because there is no long-term safety data available at the moment, the chance of induced autoimmune disease cannot be determined[77].

9. Potential Toxicity of the Spike Protein Produced by Gene-Based 'Vaccines'

9.1. The Spike Protein contained on the surface of the SARS-CoV-2 virus facilitates the binding of the viral particle to human cells, allowing infection of those cells, and has inherent toxicity in its own right.[78] However, the Spike Proteins produced by the COVID-19 'vaccines' are not identical to the Spike Protein on the natural SARS-CoV-2 virus[79] in that some uracil nucleotide bases (there are 4 different nucleotide bases in RNA: uridine, cytosine, guanine and adenine) are replaced with pseudouridine (a methylated derivative). This seemingly small change imparts profound pharmacological characteristics to the mRNA molecule produced by the COVID-19 'vaccines' including the ability to evade natural degradation as happens to natural mRNA. Further, the synthetic mRNA Spike Proteins interfere with the body's natural immune system (including Toll Like Receptors) which explains why these mRNA particles can provoke latent viral eruptions of Herpes Zoster and Epstein-Barr viruses as reported in adverse drug reaction reporting systems.

9.2. Reactivation of the dormant virus Herpes Zoster, which is responsible for shingles, has been reported in relation to COVID-19 vaccination but at the moment no cause-and-effect relationship has been acknowledged. In order to investigate a possible cause-effect relationship, a systematic review of the literature was undertaken[80]. A total of 54 cases reported in the literature were found and reviewed. Thirty-six patients out of 45 (80%) developed herpes zoster following the priming dose of mRNA COVID-19 vaccine. Furthermore, 96% of patients developed it within a temporal timeframe defined by WHO as indicative of a causal relationship. The authors even suggested possible use of prophylactic herpes zoster anti-viral medication prior to vaccination to herpes prone individuals.

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[76] Peer Reviewed Medical Papers for Adverse Events in COVID-19 Vaccine Recipients - AVN https://avn.org.au/peer-reviewed-medical-papers-for-adverse-events-in-covid-19-vaccine-recipients/

[77] Seneff, S and Nigh, G; (May 021) W*orse Than the Disease? Reviewing Some Possible Unintended Consequences of the mRNA Vaccines Against COVID-19.* International Journal of Vaccine Theory, practice and Research: 2(1) https://ijvtpr.com/index.php/IJVTPR/article/view/23

[78] Seneff, S and Nigh, G; (May 2021) *Worse Than the Disease? Reviewing Some Possible Unintended Consequences of the mRNA Vaccines Against COVID-19.* International Journal of Vaccine Theory, practice and Research: 2(1) https://ijvtpr.com/index.php/IJVTPR/article/view/23

[79] McKernan, K. et al (2021) *Differences in Vaccine and SARS-CoV-2 Replication Derived mRNA: Implications for Cell Biology and Future Disease* (Version 4). DOI: 10.31219/osf.io/bcsa6

[80] Desai, H.D. et al (2021) *Can SARS-CoV-2 vaccine increase the risk of reactivation of Varicella zoster? A systematic review.* Journal of Cosmetic Dermatology Volume 20, Issue 11, Pages 3350-3361 https://doi.org/10.1111/jocd.14521

9.3. Multiple modes of Spike Protein toxicity have been reported including those related to blood clotting and mitochondrial damage[81].

9.4. It has been a widespread belief that the Spike Protein produced by the gene-based 'vaccines' is the same as the Spike Protein on the surface of the SARS-CoV-2 virus, therefore, the effects of both will be similar. Furthermore, it has been assumed that exposing an individual to just the Spike Protein of the 'vaccines' is safer than exposure to the natural virus. However, these reasonings are now being questioned. It is now understood that the mRNA produced by the gene-based 'vaccines' contains pseudo-uridine instead of uridine as a nucleotide base and remains in circulation for much longer.

10. mRNA Does Not Remain at the Injection Site and Is Not Rapidly Destroyed

10.1. The normal biochemical protective mechanisms ensure that mRNA molecules are normally rapidly destroyed outside cells. Initially, it was thought that mRNA produced from COVID-19 'vaccines' would be rapidly destroyed. However, evidence now shows that the mRNA from these 'vaccines' may linger for 15 days or more post-vaccination[82]. The persistence of this mRNA has implications for continued production of Spike Protein and associated possible toxicity associated with the Spike Protein. Another study suggests mRNA produced following COVID-19 vaccination may remain in lymph nodes for up to 60 days[83].

10.2. These nucleotide manipulations of the 'vaccine' mRNAs to reduce its rate of degradation and therefore to enhance its capacity to drive Spike Protein production per molecule of mRNA, may produce concentrations much higher than those observed with natural infection in some individuals. Gene-based 'vaccines' appear to drive production of incredibly high numbers of Spike Protein mRNA molecules (13 trillion to 40 trillion) almost instantaneously as compared to natural infection. This may account for the serious adverse effects and deaths reported following administration of gene-based COVID-19 'vaccines' in adverse drug reporting systems, and further research is needed with regard to this important observation.

10.3. The immediate injection of literally trillions of Spike Protein producing mRNA molecules, as distinct from the slower accumulation of Spike Protein by natural infection, could be responsible for the numbers of deaths reported within 48 hours of COVID-19 'vaccine' injection, although this is yet to be proven. This is why COVID-19

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[81] Lei Y, Zhang J, Schiavon CR, et al (2021) *SARS-CoV-2 Spike Protein Impairs Endothelial Function via Downregulation of ACE 2.* Circulation Research 2021, April 30, 2021 Vol 128, Issue 9 https://www.ahajournals.org/doi/full/10.1161/CIRCRESAHA.121.318902

[82] Fertig, T.E. et al (2022) *Vaccine mRNA Can Be Detected in Blood at 15 Days Post-Vaccination* Biomedicines 2022, 10, 1538. https://doi.org/10.3390/biomedicines10071538

[83] Röltgen, K. et al (March 2022) *Immune imprinting, breadth of variant recognition, and germinal center response in human SARS-CoV-2 infection and vaccination.* Cell - Volume 185, Issue 6, 17 March 2022, Pages 1025-1040.e14. https://doi.org/10.1016/j.cell.2022.01.018

'vaccine' related deaths need to be thoroughly investigated, with autopsies that include determination of tissue levels of Spike Protein.

10.4. These authors also reflect upon the lack of transparency regarding lot-to-lot gene sequencing for vaccine quality control which might explain why some batches/lots of gene-based COVID-19 'vaccines' are associated with much high incidences of severe adverse effects[84].

10.5. A biopsy study provided direct evidence linking Spike Protein concentrations produced following vaccination in heart tissue to the development of myocarditis.[85]

11. Long-Term Potential Genetic Damage and Cancer Potential of COVID-19 'Vaccines'

11.1. In considering the safety of any new therapeutic, potential for both genotoxicity (damage to genes) and mutagenicity (potential to cause cancer) are among the highest priorities. This should especially apply to genetic therapeutics such as the COVID-19 'vaccines', and more so when administration of these products to healthy individuals of all ages worldwide was envisioned.

11.2. Evidence shows the spike protein produced by the Pfizer mRNA vaccine can enter into the nucleus of cells and disrupt fundamental cellular processes involved in DNA repair. This adds to concerns and raises serious potential safety issues regarding a diminished ability of the body to prevent the rise of cancers[86]. Neither of these observed genetic type molecular effects are expected in relation to conventional vaccines.

11.3. The gene-based COVID-19 'vaccine' manufacturers presented their products as 'vaccines' to drug regulators even though, by their very nature, they were a new class of gene-based therapies. This had significant impact on reducing the usual safety testing requirements which were normally applied to gene-based therapies. It should be noted that in order to assist and accommodate the introduction of these experimental drugs, the CDC and other organisations began applying recently reduced safety data requirements applicable to conventional vaccines to these gene-based 'vaccines' and the definition of 'vaccine' was amended to accommodate these new gene-based therapies[87].

The World Health Organisation (WHO) Technical Report Series, no. 927m 2005 Annex *1, WHO Guidelines on nonclinical evaluation of vaccine*[88] page 50 section 4.2.3 states:

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72 Batch toxicity analysis by Craig-Paardekooper: https://www.bitchute.com/video/6xlYPZBkydsu/ ; https://www.bitchute.com/video/keoCmPh3vuiG/

85 Baumeier, C. et al: (2022) *Intramyocardial Inflammation after COVID-19 Vaccination: An Endomyocardial Biopsy-Proven Case Series* International Journal Molecular Science 2022, 23, 6940. https://doi.org/10.3390/ijms23136940

86 Jiang, H., Mei. Y.-F. (2021) *SARS–CoV–2 Spike Impairs DNA Damage Repair and Inhibits V(D)J Recombination In Vitro.* Viruses 13:2056 https://doi.org/10.3390/v13102056

87 https://deathship.wordpress.com/2021/09/25/cdc-changes-the-definition-of-vaccines/

88 Jaafar, R. et al (June 2021) Correlation between 3790 Quantitative Polymerase Chain Reaction-Positives Samples and Positive Cell Cultures, Including 1941 Severe Acute Respiratory Syndrome Coronavirus 2 Isolates

'Genotoxicity studies are normally not needed for the final vaccine formulation'. But these guidelines were drafted well before the invention of the gene-based COVID 'vaccines'.

11.4. Drug regulators around the world have accepted official product information statements which acknowledge the omission of this important pre-clinical (in-vitro and/or animal) genotoxicity and mutagenicity safety data.

11.5. Provisional Approval for the new gene-based COVID-19 'vaccines' began early 2021. However, since then important laboratory genetic data has been published which raises the theoretical possibility that the mRNA contained in these gene-based 'vaccines' may be reverse transcribed (that is, incorporated) into one's DNA around the body (including a wide variety of tissues and organs including eggs in the ovary) which is contrary to the assumptions of the drug regulators such as the TGA. This research, according to established protocols, was done on an in-vitro human liver cell line. The potential safety implications for current and future generations are of great relevance and significance and drug regulators should be demanding immediate further investigations[89]. These findings raise the possibility that these gene-based COVID-19 'vaccines' might induce cancers and that these effects may be inherited into future generations. Until this and other questions are addressed it is not prudent nor reasonable to claim these products are "safe".

11.6. Following an extensive critical review of the immunological and metabolic consequences associated with the mRNA based COVID-19 'vaccines', some expert molecular biologists have concluded these 'vaccines' should be withdrawn due to their potentially devastating and wide ranging short-term and long-term adverse effects[90].

11.7. Furthermore, in relation to risk-benefit, it has been reported that "based on publicly available official UK and US data, all age groups under 50 years old are at greater risk of death after receiving a COVID-19 inoculation than an unvaccinated person is at risk of a COVID-19 death[91]. In such circumstances, it is extremely difficult to justify mandatory vaccination.

11.8. It is also unknown if the Danish drug regulator's recent decision to cease its gene-based vaccination program is related to concerns regarding genotoxicity[92]. The

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Clinical Infectious Diseases, Volume 72, Issue 11, 1 June 2021, page e921. 28 September 2020. https://doi.org/10.1093/cid/ciaa1491

89 Aldén, M. et al (2022) I*ntracellular Reverse Transcription of Pfizer BioNTech COVID-19 mRNA Vaccine BNT162b2 In Vitro in Human Liver Cell Line.* Current Issues in Molecular Biology 44: 1115–1126 https://doi.org/10.3390/cimb44030073

90 Seneff, S and Nigh, G; (10/05/2021) *Worse Than the Disease? Reviewing Some Possible Unintended Consequences of the mRNA Vaccines Against COVID-19.* International Journal of Vaccine Theory, practice and Research: 2(1) https://ijvtpr.com/index.php/IJVTPR/article/view/23

91 Dopp, K and Seneff, S. (February 2022) COVID-19 and All-Cause Mortality Data by Age Group Reveals Risk of COVID Vaccine-Induced Fatality is Equal to or Greater than the Risk of a COVID death for all Age Groups Under 80 Years Old as of 6 February 2022 https://www.skirsch.com/covid/Seneff_costBenefit.pdf

92 *COVID-19: Denmark suspends COVID vaccination programme with health chiefs saying virus under control* (28 April 2022) Sky News https://news.sky.com/story/covid-19-denmark-suspends-covid-vaccination-programme-with-health-chiefs-saying-virus-under-control-12600593?fbclid=IwAR2xIYS6Dil45imXz0Flp7JB19JaVNovUgeN8VmYG0mhP5hiE6GJ4zHNnXM

Danish drug regulatory agency has long been considered to rank among the most competent regulatory agencies in the world and is highly regarded.

11.9. The issue of potential mutagenicity and genotoxicity is of high importance and received attention at Australian Senate Estimates on 1 June 2021 (Community Affairs Legislation Committee)[93].

11.10. In that hearing, Prof. Skerritt (head of the Australian TGA) by Senator Malcolm Roberts on the potential for the mRNA to enter the nucleus of cells and cause potentially serious genetic adverse events which could affect future generations:

> "Senator ROBERTS: *How long before we know the intergenerational effects?*
>
> Dr Skerritt: *There is no evidence at all from animal or human studies that the RNA vaccines, if you're talking about them, incorporate into the genetic material of human beings. They wouldn't have received regulatory approval, and that includes by much bigger regulators such as the FDA, if these bits of mRNA incorporated into the human genetic material. In fact, medicines that incorporate into human genetic material and are inherited are currently not permitted in most major countries, including Australia.*"

11.11. The statement by Prof. Skerritt was made prior to the publications referred to above. These events provide compelling evidence to reject the indiscriminate general use of these gene-based COVID-19 'vaccines' and to prevent mandatory vaccination on safety grounds.

12. COVID-19 'Vaccines' Do Not Prevent Infection or Transmission

12.1. The COVID-19 'vaccines' neither prevent infection nor do they prevent transmission of the infection. SARS-CoV-2 infection is via airborne infection of viral particles entering via the mucosa (surface lining) of the nose. COVID-19 'vaccines' do not induce mucosal immunity: instead they induce blood-borne immunity, which is not effective in countering organisms entering and multiplying in the mucosal tract. This is why, despite population vaccination rates approaching 90%, COVID-19 cases remain stubbornly high in many countries.

12.2. 'Dr Anthony Fauci, head of the National Institute of Allergy and Infectious Disease (NIAID) said the viral load of Delta variant in the nasal passages of vaccinated people was "almost identical" to that in noses of unvaccinated people.[94] It is an accepted principle that the viral load or amount of virus present is directly proportional to both

[93] https://parlinfo.aph.gov.au/parlInfo/download/committees/estimate/074f811f-4fa9-49b2-a2d5-f8dc2b74d47d/toc_pdf/Community%20Affairs%20Legislation%20Committee_2021_0601_8809_Official.pdf;fileType=application%2Fpdf#search=%22committees/estimate/074f811f-4fa9-49b2-a2d5-f8dc2b74d47d/0000%22 page 53

[94] https://thehill.com/homenews/sunday-talk-shows/565831-fauci-amount-of-virus-in-breakthrough-Delta-cases-almost-identical

the development of symptoms of infection and the ability to transmit the infection to others.

12.3. Dr Rochelle Walensky, director of the Center for Disease Control (CDC) said publicly that the COVID-19 vaccines "can't prevent transmission" [of SARS-CoV-2][95]. This is basically because the COVID-19 vaccines do not prevent infection in an individual i.e. the COVID-19 'vaccines' are not "sterilizing".

12.4. In addition, three articles in The Lancet report that the current COVID-19 gene-based vaccines do not prevent transmission of SARS-CoV-2[96].

12.5. Contrary to initial popular belief and in light of recent evidence, mandatory COVID-19 vaccination will neither significantly or effectively prevent SARS-CoV-2 infection or prevention of transmission of infection to others. According to Gunter Kampf, fully vaccinated individuals can carry similar viral loads to unvaccinated individuals and spread the virus just as easily[97].

12.6. Gunter Kampf, stated:

> *"There is increasing evidence that vaccinated individuals continue to have a relevant role in transmission. In Massachusetts, USA, a total of 469 new COVID-19 cases were detected during various events in July, 2021, and 346 (74%) of these cases were in people who were fully or partly vaccinated, 274 (79%) of whom were symptomatic. Cycle threshold values were similarly low between people who were fully vaccinated (median 22.8) and people who were unvaccinated, not fully vaccinated, or whose vaccination status was unknown (median 21.5), indicating a high viral load even among people who were fully vaccinated."*

12.7. The author concludes: *"It is therefore wrong and dangerous to speak of a pandemic of the unvaccinated"*.

12.8. A Wisconsin, USA, study in June/July 2021 (when the Delta variant was prominent) found no difference for SARS-CoV-2 infected individuals in viral load measurements by PCR test cycle threshold (Ct) data between 310 fully vaccinated and 389 unvaccinated individuals: Testing found high viral load in 68% of the fully vaccinated

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[95] Jaafar, R. et al (2020) Correlation between 3790 Quantitative Polymerase Chain Reaction-Positives Samples and Positive Cell Cultures, Including 1941 Severe Acute Respiratory Syndrome Coronavirus 2 Isolates Clinical Infectious Diseases, Volume 72, Issue 11, 1 June 2021, page e921. 28 September 2020 https://pubmed.ncbi.nlm.nih.gov/32986798/

[96] https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02243-1/fulltext , https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)00090-3/fulltext#sec1 & https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(21)00768-4/fulltext

[97] Kampf, G. (2021) *COVID-19: stigmatising the unvaccinated is not justified* The Lancet VOLUME 398, ISSUE 10314, P1871, NOVEMBER 20, 2021 https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02243-1/fulltext
Brown CM, et al (July 2021) Outbreak of SARS-CoV-2 infections, including COVID-19 vaccine breakthrough infections, associated with large public gatherings— Barnstable County, Massachusetts, July 2021 CDC MMWR Morb Mortal Wkly Rep 2021;70: 1059–62 https://www.cdc.gov/mmwr/volumes/70/wr/mm7031e2.htm

and 63% of the unvaccinated. This data suggests that vaccinated are just as likely to be spreaders of SARS-CoV-2[98].

12.9. The risk of infection leading to COVID-19 varies depending on age and clinical status (including the presence of natural immunity) and must be weighed against the accumulating evidence of serious adverse effects including death, as well as the waning efficacy of the vaccines in protecting against infection.

13. Diminished 'Vaccine' Efficacy and Potential Negative 'Vaccine' Efficacy

13.1. In the first part of 2022 a number of public health sources in the US, Australia, Denmark, Israel and the UK have suggested the protective efficacy of the COVID 'vaccines' is waning or possibly even resulting in "negative efficacy", i.e. those vaccinated are at a higher risk of infection. This was in the context of the later subvariants of Omicron as reported in an observational study of 22,072,550 SARS-CoV-2 cases[99].

13.2. The authors state:

> *"The vaccine effectiveness (VE) for the third dose was in negative since December 20, 2021, with a significantly increased proportion of SARS-CoV2 cases hospitalizations and deaths among the vaccinated; and a decreased proportion of cases, hospitalizations, and deaths among the unvaccinated."*

13.3. In is acknowledged that epidemiological data interpretation is both challenging and complicated because there are confounding variables to consider such as age, gender, vaccination status and co-morbidities. There is also the added complexity of consideration of the definition of "fully vaccinated" as this varies depending on vaccine schedules. There remains the lack of distinction between someone hospitalised or dying "with" COVID versus someone hospitalised or dying "due to" COVID and often those dying within 14 days of vaccination are often considered as "unvaccinated". Overall, however, this large study suggests a negative vaccine efficacy, which is of great concern.

13.4. The main reason for this negative vaccine efficacy has been mainly ascribed to the fact that the Omicron strain of viruses which we are experiencing now are considerably different to the original Wuhan strain and subsequent Delta strain. Those individuals vaccinated with the gene-based 'vaccines' based on the Wuhan strain of virus are paradoxically more susceptible to Omicron infection.

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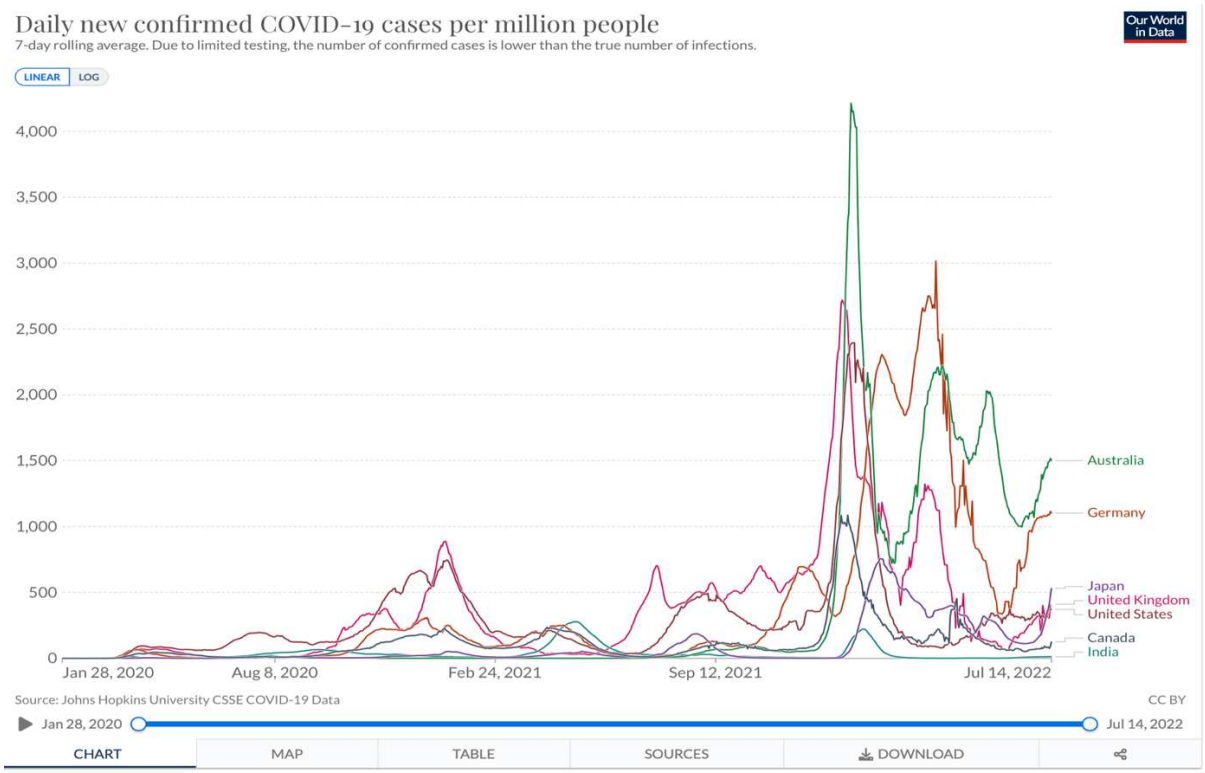
[98] Riemersma, K.K. et al. Shedding of Infectious SARS-CoV-2 Despite Vaccination: Preprint. https://www.medrxiv.org/content/10.1101/2021.07.31.21261387v6.full-text

[99] Emani, V et al (June 2022) Increasing SARS-CoV-2 cases, hospitalizations and deaths among the vaccinated elderly populations during the Omicron (B.1.1.529) variant surge in UK medRixiV preprint https://www.medrxiv.org/content/10.1101/2022.06.28.22276926v2

13.5. Stanford University researchers[100] found that "prior vaccination with Wuhan-Hu-1-like antigens followed by infection with Alpha or Delta variants gives rise to plasma antibody responses with apparent Wuhan-Hu-1-specific imprinting manifesting as relatively decreased responses to the variant virus epitopes compared with unvaccinated patients infected with those variant viruses." Basically, these researchers are saying that vaccination with the current COVID-19 'vaccines' will lead to a diminished ability to protect from infection by the newer variants.

13.6. Pivotal epidemiological data which is useful in determining vaccine effectiveness versus time is published by "Our World in Data", a non-profit organisation based in the United Kingdom.[101] This organisation uses data sourced from Johns Hopkins University Center for Systems Science and Engineering (CSSE).

13.7. The data below plots the rate (cases per million) of confirmed COVID-19 cases by selected country versus time (and is updated regularly).

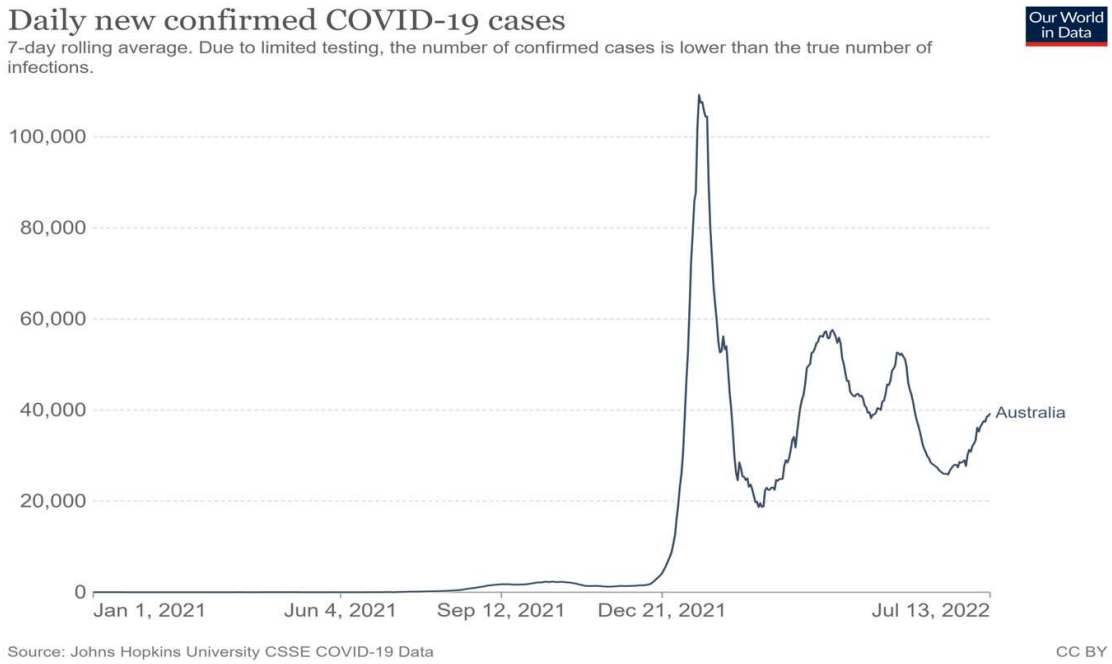


COVID-19 cases by selected country versus time

13.8. This same data can be used to represent the 7-day rolling average of confirmed COVID-19 cases in Australia.

[100] Roltgen, K et al (March 2022) *Immune imprinting, breadth of variant recognition, and germinal center response in human SARS-CoV-2 infection and vaccination.* Cell 185,1025-1040, March 17, 2022 https://doi.org/10.1016/j.cell.2022.01.018 https://www.cell.com/action/showPdf?pii=S0092-8674%2822%2900076-9

[101] https://ourworldindata.org/coronavirus#explore-the-global-situation



7-day rolling average of confirmed COVID-19 cases in Australia

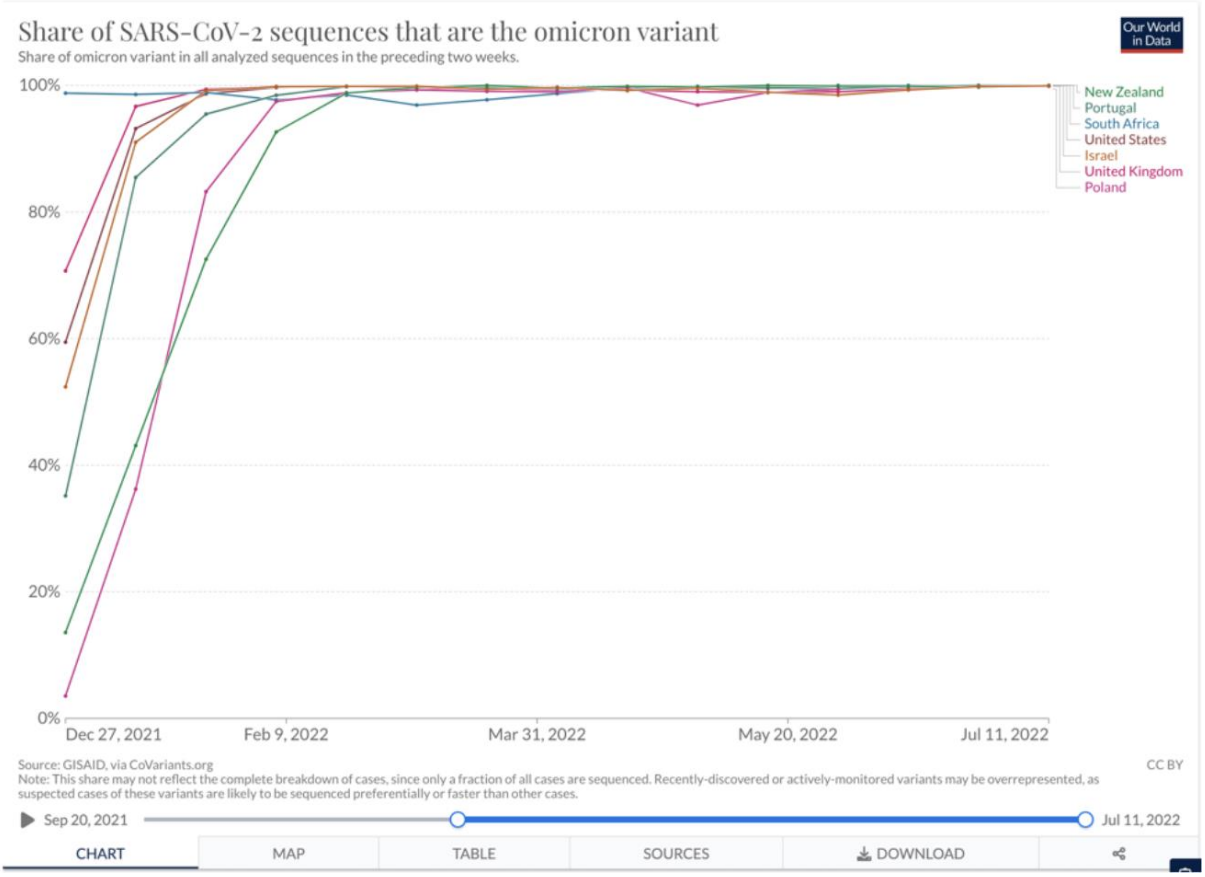
13.9. COVID-19 vaccination commenced in Australia early in 2021. While the both absolute number and percent of the population COVID vaccinated increased rapidly for countries during 2021 and into 2022, the data shows both the rate and absolute number of confirmed COVID-19 cases markedly increased towards the end of 2021. This worldwide data demonstrates a failure of the COVID-19 'vaccines' to prevent infection and transmission of the disease.

13.10. This data strongly suggests that commencing in 2022 the COVID-19 vaccines have substantially lost the ability to prevent infection and transmission of the virus, despite high rates of vaccine uptake in the population. This provides evidence of the futility of vaccine mandates.

13.11. All epidemiological and health statistical data requires careful interpretation as definitions may vary from jurisdiction to jurisdiction and health protocols can impact the interpretation of the data. However, without evidence to the contrary, the above data appears to provide a compelling evidence of a negative vaccine efficacy. In other words, COVID-19 vaccinated individuals are more likely to be infected with the current strain of the COVID-19 virus and be admitted to hospital than compared to non-vaccinated individuals. Similar observations have been made in other countries.

13.12. As mentioned earlier, a major contributing factor to this phenomenon may be due to the fact that since early 2022, the dominant variant of the SARS-CoV-2 virus is

Omicron[102] (see graph below) whereas the current COVID-19 'vaccines' are constructed to produce antibodies towards the original Wuhan strain.



Share of SARS-CoV-2 sequences that is the Omicron variant by country

14. The COVID-19 'Vaccines' Do Not Provide a Similar and Acceptable Risk/Benefit Across All Age Groups irrespective of individual Clinical Status including Natural Immunity

14.1. Mandatory vaccination by its very nature assumes that a therapeutic agent produces a similar risk and a similar benefit for all individuals. However, this is never the case. Therapeutics should always be prescribed with a consideration of the particular clinical status of the individual, which is why prescribing information always contains specific warnings and contraindications of use in relation to age, health status etc. Drugs are never prescribed on a "one size fits all" basis. Prescribing a drug and ignoring the particular clinical circumstances of an individual is not good medical practice.

14.2. Natural immunity plays an important role in COVID-19. There is no evidence to suggest that COVID-19 gene-based 'vaccination' offers superior protection from COVID-19 as compared to natural immunity. Indeed, many believe the reverse is true.

[102] Source: GISAID, via CoVariants.org as presented by Our World in Data up to 11 July 2022 https://ourworldindata.org/covid-cases

14.3. In acknowledgement of the important role of natural immunity, even Bill Gates, perhaps the most prominent vaccine proponent, speaking at the Munich Security Conference reported 23 February 2022[103], admitted that *"the virus itself, particularly the variant called Omicron, is a type of vaccine"*.

14.4. The important role of natural immunity from both a personal and societal point of view needs to be recognised. This societal natural immunity was commonly referred to as 'herd immunity' and was initially widely considered important to limit the impact of the virus.

14.5. Conventional wisdom suggests that natural immunity following COVID-19 infection provides a high level of durable protection from re-infection in many ways superior to "vaccination" because natural immune response is a multifaceted immune response directed against a number of components including the envelope, the membrane, the nucleocapsid and the spike within the virus – unlike the immune response produced by gene-based 'vaccines' which only direct the production of specific antibodies only towards the virus Spike Protein.

14.6. It has been likely that hundreds of millions of people have recovered from COVID-19. Numerous scientists have found that natural immunity offers a decreased risk of re-infection and extremely low rates of hospitalisation in relation to repeat infection[104].

14.7. A study in Qatar found that *'natural infection appears to elicit strong protection against reinfection with an efficacy ~95% for at least seven months'*[105].

14.8. The UK study by Hall et al, with funding from the UK Government, reported a similar level of protection due to natural immunity[106].

14.9. A study in Austria found that the frequency of re-infection from COVID-19 caused hospitalisation in only five out of 14,840 (0.03%) people and death in one out of 14,840 (0.01%)[107].

14.10. In many ways, natural immunity protection will be superior to the protection afforded by gene-based COVID-19 'vaccines'. In such circumstances, voluntary or mandatory

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[103] Published in Locke (johnlocke.org)– Mitch Kokai, (23 February 2022): Bill Gates Gives Omicron More Credit Than Vaccines in Battling COVID. https://www.johnlocke.org/bill- gates-gives-omicron-more-credit-than-vaccines-in-battling-covid/

[104] Klausner, J., Kojima, N. (May 2021) Op-Ed: Quit Ignoring Natural COVID Immunity — Antibody testing and proof of prior infection can allow more people to return to normal Medpage Today, 28 May 2021. www.medpagetoday.com/infectiousdisease/covid19/92836 ;
150 Plus Research Studies Affirm Naturally Acquired Immunity to Covid-19: Documented, Linked, and Quoted https://brownstone.org/articles/79-research-studies-affirm-naturally-acquired-immunity-to-covid-19-documented-linked-and-quoted/

[105] Abu-Raddad, L. et al (May 2021) *SARS-CoV-2 antibody-positivity protects against reinfection for at least seven months with 95% efficacy.* eClinicalMedicine, Part of The Lancet Discovery Science, Vol 35, May 2021, 100861 https://doi.org/10.1016/j.eclinm.2021.100861

[106] Hall, V. J (2021) SARS-CoV-2 infection rates of antibody-positive compared with antibody-negative health-care workers in England: a large, multicentre, prospective cohort study (SIREN) VOLUME 397, ISSUE 10283, P1459-1469, APRIL 17, 2021 https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00675-9/fulltext

[107] Pilz S et al (2021) *SARS-CoV-2 re-infection risk in Austria.* European Journal of Clinical Investigation Volume 51, Issue 4 e13520 https://doi.org/10.1111/eci.13520

vaccination with gene-based COVID-19 'vaccines' do not offer any additional protection. There is no scientific theoretical basis or reliable evidence to suggest that a person with natural immunity might benefit from administration of a Provisionally Approved gene-based COVID-19 'vaccine' while the 'vaccine' itself has significant adverse effects and no long-term safety data to support its use.

14.11. A retrospective observational study of 124,500 individuals, conducted during the Delta wave of SARS-CoV-2 compared two groups: people who had not been previously infected with SARS-CoV-2 and received a 2-dose regimen of the Pfizer COVID-19 "vaccine" and previously infected individuals who had not been vaccinated[108]. Individuals who had been vaccinated had a 13-fold greater chance of breakthrough infection compared to re-infection in the non-vaccinated group.

14.12. The conclusion of the authors was: *'Naturally acquired immunity confers stronger protection against infection and symptomatic disease caused by the Delta variant of SARS-CoV-2, compared to the BNT162b2-2 [Pfizer COVID-19 'vaccine'] dose vaccine-induced immunity'*.

14.13. While the current SARS-CoV-2 variant is Omicron, in the absence of data to the contrary, these data provide a compelling case to support the importance of natural immunity in protecting against SARS-CoV-2 infection.

14.14. The Swedish drug regulator is regarded as one of the most respected regulatory agencies and they have recently reversed its recommendation on the administration of COVID-19 'vaccines' to adolescent children as they do not see any clear benefit in COVID-19 vaccination. According to a Reuters news release in Stockholm on 27 January 2022, Sweden decided against recommending COVID-19 'vaccines' for children aged 5-11, the Swedish Health Agency said that the benefits did not outweigh the risks: 'With the knowledge we have today, with a low risk for serious disease for kids, we don't see any clear benefit with vaccinating them'[109].

14.15. It is reported that children in the population are at a substantially lower risk of developing COVID-19.[110]

14.16. In addition, it has been suggested that a high proportion of children in the population have acquired natural immunity which offers better protection from infection as compared to vaccination. As above, a large study during the Delta wave found vaccinated individuals had a 13-fold greater chance of breakthrough infection than unvaccinated individuals had of being re-infected.

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[108] Gazit, S et al (2022) Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Naturally Acquired Immunity versus Vaccine-induced Immunity, Reinfections versus Breakthrough Infections: A Retrospective Cohort Study. Clinical Diseases Major Article https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9047157/pdf/ciac262.pdf

[109] *Sweden decides against recommending COVID vaccines for kids aged 5-11 (*27 January 2022) Reuters - Stockholm https://www.reuters.com/world/europe/sweden-decides-against-recommending-covid-vaccines-kids-aged-5-12-2022-01-27/

[110] Loske, J. et al (March 2022) *Pre-activated antiviral innate immunity in the upper airways controls early SARS-CoV-2 infection in children.* Nature Biotechnology: Vol 40, March 2022, 319-324 s://doi.org/10

Conclusion

The introduction and worldwide use of COVID-19 gene-based 'vaccines' has been associated, in the short term, with far more deaths, illnesses, injuries, and disabilities than any other therapeutic agent in the history of medicine. Due to the total lack of any long-term safety data, the potential future iatrogenic effects (including neurological, immunological and carcinogenic effects) may be even more devasting.

Despite initial claims, the COVID-19 gene-based 'vaccines' have now been shown to possess disappointing clinical efficacy - they neither prevent SARS-CoV-2 infection nor do they prevent transmission of the virus; any immunological protection wanes rapidly and, coincident with the emergence of the Omicron variant, evidence of negative vaccine efficacy is being reported in many countries including Australia.

In light of widely reported emerging and compelling evidence, there appears to be little scientific or clinical justification to support vaccine mandates as a health policy.

The latest hospital admission statistics do not support the claim that unvaccinated individuals are more at risk of serious COVID-19 disease, hospitalisation or death. Excess non-COVID-19 related deaths coincident with the introduction of the gene-based 'vaccines' are now being reported by many countries, and suggest a surge in heart attack and stroke among both the young, adolescents and middle age individuals (especially males).

Advocating the worldwide use of a new class of serious COVID-19 gene-based 'vaccines' never before deployed, and advocated for use in healthy individuals of all ages regardless of clinical status (eg. natural immunity, pregnancy etc), with relatively little short-term safety data and no long-term safety data, is neither prudent or necessary and defies the Precautionary Principle.

The knowledge that the synthetic mRNA in both the Pfizer and Moderna vaccines can enter the nucleus of human liver cells in culture, raises the serious questions about genotoxicity and carcinogenicity, and adverse impact on future generations. Disturbing safety signals regarding fertility and miscarriages are emerging.

Given the statistically or virtually nil risk of serious COVID-19 in general affecting children aged 6 months to 11 or 12 years of age and the clear and significant risk of serious adverse effects including myocarditis, pericarditis and death in this age group – there seems to be little benefit to be gained by vaccinating these children.

Considerable scientific, clinical and statistical epidemiological data and understanding has been acquired since the introduction (on a provisional basis only) of the investigational COVID-19 gene-based "vaccines". Many of the initial ambitious claims and assumed perceptions regarding the safety and efficacy of these serious therapeutics have now been invalidated and it is now time to review and reconsider the utility of these products in light of the known unprecedented level of serious adverse reactions and death attributed to their use.

The urgency for this review cannot be overestimated given the current and potential future impact on the health and wellbeing of all Australians.

Phillip M. Altman

Appendix A

Abbreviated Curriculum Vitae – Dr Phillip Altman

Dr Phillip Altman has expertise in the areas of clinical medical research and pharmaceutical drug regulatory affairs in Australia.

Holding the degrees Bachelor of Pharmacy (Hons), and Master of Science and Doctor of Philosophy, Phillip's doctorate concerned the development new of cardiotonic drugs with lower intrinsic toxicity, compared to existing drugs including their chemical synthesis and testing in various animal models.

Phillip has worked primarily within the Australian pharmaceutical industry since 1974 in relation to clinical trial design, management, and reporting in relation to obtaining new drug approvals, dealing with the Secretary of the Department of Health, and the Therapeutic Goods Administration (**TGA**). After many years working within multinational pharmaceutical companies, Phillip later became a senior industry pharmaceutical consultant through his contract research company, Pharmaco Pty Ltd., which provided both clinical trial and regulatory consultant services to the Australian pharmaceutical industry, which focussed his experience in critically evaluating clinical trial safety and efficacy data, as submitted in complex new drug dossiers for international regulatory purposes. This work saw Phillip consulted by more than half of the multinational pharmaceutical companies in Australia, in various capacities, with a focus on drug regulatory affairs.

Phillip founded the Association of Regulatory and Clinical Scientists (ARCS), which includes more than 2,000 scientists, clinicians, and associated health professionals involved in both clinical trial and regulatory affairs, in Australia and New Zealand, where ARCS continues to be the foremost educational forum for both industry and government (including the TGA) personnel, involved in clinical trials and regulatory affairs.

Phillip's experience involves more than 100 clinical trials (covering Phases I,II, III and IV, i.e. from first administration to animals, then man, to post-approval trials), and a similar number of new drug applications, TGA appeals, and applications to modify existing approvals. In collaboration with the TGA and on behalf of pharmaceutical companies, Phillip also directed 2 major drug withdrawals in relation to public safety. More recently Phillip has been a senior clinical trial and regulatory affairs advisor to an Australian company which has developed a live virus for the treatment of melanoma.

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05 AUG 2022

TITLE OF REPORT:

SECTION 1: A COMPARISON OF ADVERSE EVENTS RELATED SPECIFICALLY TO THE COVID-19 VACCINES AND NON-COVID-19 VACCINES FROM 1 JAN 1971 TO 31 DEC 2021.

SECTION 2: ADVERSE EVENTS AND DEATHS REPORTED TO TGA DAENS, AUSTRALIA FOLLOWING COVID-19 VACCINES BETWEEN 1 FEBRUARY 2021 TO 8 JUNE 2022 HIGHLIGHTING DEATHS AND ADVERSE EVENTS IN CHILDREN 5-11 YRS OLD.

1 EXECUTIVE SUMMARY

1.1 I have conducted a number of reviews of the Therapeutic Goods Administration's (**TGA**) published adverse events as recorded in the Database of Adverse Event Notifications (**DAENs**) database to 8 June 2022, specifically following the COVID-19 Vaccines entries in that database and I confirm that:

a since 10 January 2022, there were 1,390 Adverse Events and 5 Deaths reported for the 5-11 year age group since the roll out of the Pfizer Vaccine commenced.

b since 1 February 2021, there have been at least 108,542 Adverse Events and 723 Deaths reported in adolescents and adults since the roll out of the Covid-19 Vaccines.

c since 1 February 2021, that together, there have been at least 131,991 Adverse Events following Covid-19 Vaccines reported in all ages.

d since 1 February 2021, together there have been at least 884 total Deaths as the reported outcome following immunisation in all ages. and including unspecified ages,

1.2 By comparison, I have also reviewed the TGA weekly safety reports to 5 June 2022. The TGA reports record that there were:

a 1,470 Adverse Events in 5-11 year olds following 2.2M doses of Pfizer Vaccine.
Source: The TGA weekly safety report https://www.tga.gov.au/periodic/covid-19-vaccine-weekly-safety-report-09-06-2022

b 129,995 Adverse Events in all ages following 59,431,403 doses of Covid-19 Vaccines.
Source: The TGA weekly safety report https://www.tga.gov.au/periodic/covid-19-vaccine-weekly-safety-report-09-06-2022

2 DEFINITION OF TERMS:

2.1 Throughout this report I have used a number of definitions:

Adverse Events:

a) Adverse Events are defined by the TGA as unintended and sometimes harmful occurrences associated with the use of a medicine, vaccine or medical device (collectively known as therapeutic goods). Adverse events include side effects to medicines and vaccines, and problems or incidents involving medical devices.

b) Examples of adverse events are any unfavourable and unintended sign, symptom or disease associated with the use of a therapeutic good.

c) All Adverse events referred to in this document relate to vaccines.

d) Adverse Events reported to the TGA have been classified by MedDRA classification which includes Organ affected and type of reaction. One Adverse Event case can affect many organs and reaction types can include many MedDRA Classifications.

e) Adverse events are defined by the Australian institute of Health and Welfare as '*incidents in which harm resulted to a person receiving health care*'. There is no definition included on the TGA web site.

f) Importantly, an adverse event is not always caused by the therapeutic good itself. The occurrence of an adverse event does not necessarily mean that there is something wrong with the therapeutic good.

Ages:

- **Children:** Individuals whose ages are 5-11 years.
- **Babies/infants:** 0-4years
- **Unspecified:** Age is left blank or marked with a hyphen –
- **Adolescents:** 12-18
- **Adults 19 years and over**

Covid-19 Vaccines: There are 4 vaccines that are being administered in Australia. They include:

- Pfizer Comirnaty Covid-19 vaccine (**Pfizer Vaccine**)
- Covid-19 vaccine Astra Zeneca
- *Nuvaxovid (Moderna) Covid-19 Vaccine
- Spikevax (Moderna) Covid-19 Vaccine
- TNS DAENs database record for Covid-19 Vaccine Type Not Specified.

*In searches up to 31 Dec 2021, I have searched for 4 vaccines only, because Novavax, or Nuvaxovid has only been approved for use in Australia from 20 Jan 2022 for people 18 years and over. On 25 July the provisional approval was extended to 12-17year olds.

Database of Adverse Event Notifications (DAEN): **"**The TGA receives Adverse Event reports associated with medicines and medical devices. These reports come from a wide range of sources, including members of the public, general practitioners, nurses, other health professionals and the therapeutic goods industry and are" stored in an online database.

Source: https://www.tga.gov.au/database-adverse-event-notifications-daen

Deaths: Associated with the TGA reporting, this refers to the number of cases where death was a reported outcome following immunisation from the DAEN website. It should be noted that this does not necessarily imply causality. Also, to determine deaths in TGA DAENs website is quite a convoluted process because the death MedDRA item category has been removed and so one cannot simply search for deaths.

MedDRA Classification: The **Medical Dictionary for Regulatory Activities** (MedDRA) is an internationally used set of terms relating to medical conditions, medicines and medical devices. Refer to some items below for reference:

MedDRA System Organ Classes	MedDRA Reaction Terms for selected medicines
Blood and lymphatic system disorders	Abnormal clotting factor
Blood and lymphatic system disorders	Acquired haemophilia
Blood and lymphatic system disorders	Agranulocytosis
Blood and lymphatic system disorders	Anaemia
Blood and lymphatic system disorders	Anaemia macrocytic
Blood and lymphatic system disorders	Antiphospholipid syndrome
Blood and lymphatic system disorders	Aplastic anaemia
Blood and lymphatic system disorders	Autoimmune haemolytic anaemia
Blood and lymphatic system disorders	Bicytopenia
Blood and lymphatic system disorders	Bone marrow oedema
Blood and lymphatic system disorders	Coagulopathy
Blood and lymphatic system disorders	Disseminated intravascular coagulation
Blood and lymphatic system disorders	Eosinophilia
Blood and lymphatic system disorders	Febrile neutropenia
Blood and lymphatic system disorders	Haemolysis
Blood and lymphatic system disorders	Haemolytic anaemia
Blood and lymphatic system disorders	Haemorrhagic diathesis
Blood and lymphatic system disorders	Heparin-induced thrombocytopenia

Please find a complete listing of MedDRA items using the following link**.** **https://1drv.ms/b/s!Al71AGIGLVVzgUj3L1lBYHafccTF?e=sKvJS2**

Pfizer Vaccine: is the Comirnaty Covid-19 Vaccine as described in DAENs for all age groups. The Pfizer Vaccine was provisionally approved Covid-19 Vaccine for 5-11 year olds. It was approved by the TGA on 5 December 2021. Roll out of the Pfizer Vaccine for 5-11 year olds commenced on or about 10 January 2022.

Spikevax (Moderna) Covid-19 Vaccine: on 17 February 2022 the Spikevax Vaccine was provisionally approved for 6-11 year olds.
Source: https://www.health.gov.au/initiatives-and-programs/covid-19-vaccines/who-can-get-vaccinated/children?gclid=CjwKCAjwzeqVBhAoEiwAOrEmzWO2iNsMIegs1wsBQ0kVEeqpu0m4lo59czwpmIjoPCdeU-ZT4yl1jxoCFJoQAvD_BwE&gclsrc=aw.ds

3. KEY POINTS TO NOTE

3.1 In SECTION 1, all the questions relating to the COVID-19 vaccines ask for figures for each COVID vaccine type from date of approval to the report date.

While the work underlying this report was begun by me around 6 January 2022, the data I collected was for 2021, and as such, I have a hard end to the year 2021 (31 Dec 2021).

Further, it appears that when the database is searched for each vaccine type from date of approval to end of 2021, and then when one adds the results, I do not get the same answer as I do when I search the entire database, all at once, using all 4 vaccines and the dates 1 Jan 2021 and 31 Dec 2021.

For simplicity, I have used this search as my master data search. All the COVID results will balance to that master data (I cannot explain why this phenomenon exists but suffice it to say, it goes to data integrity). I will demonstrate this in the following report.

A search for Pfizer, AstraZeneca, Moderna and unspecified, reveals the following information:

- Pfizer 25/01/2021 to 31/12/2021
  - No. of cases 52,695
  - No. of cases with a single suspected medicine 51,641
  - No. of cases where death was a reported outcome 264

1 medicine selected between 25/01/2021 - 31/12/2021.

Search results

The results are shown in two tabs.

Number of reports (cases): **52695**

Number of cases with a single suspected medicine: **51641**

Number of cases where death was a reported outcome: **264**

Source: Appendix 2.2 - DAEN Results for Individual COVID Vaccines (Including Unspecified Type) with Index, page 2-10

- AstraZeneca 16/02/201 to 31/12/2021
  - No. of cases 43,874
  - No. of cases with a single suspected medicine 43,108
  - No. of cases where death was a reported outcome 439

1 medicine selected between 16/02/2021 - 31/12/2021.

Search results

The results are shown in two tabs.

Number of reports (cases): **43874**

Number of cases with a single suspected medicine: **43108**

Number of cases where death was a reported outcome: **439**

Source: Appendix 2.2 - DAEN Results for Individual COVID Vaccines (Including Unspecified Type) with Index, page 11-19

- Moderna (Spikevax) 09/08/2021 to 31/12/2021
  - No. of cases 3,234
  - No. of cases with a single suspected medicine 3,180
  - No. of cases where death was a reported outcome 7

1 medicine selected between 09/08/2021 - 31/12/2021.

Search results

The results are shown in two tabs.

Number of reports (cases): **3234**

Number of cases with a single suspected medicine: **3180**

Number of cases where death was a reported outcome: **7**

Source: Appendix 2.2 - DAEN Results for Individual COVID Vaccines (Including Unspecified Type) with Index, page 20-28

- Unspecified COVID vaccines 01/01/2021 to 31/12/2021
  - No. of cases 465
  - No. of cases with a single suspected medicine 446
  - No. of cases where death was a reported outcome 25

1 medicine selected between 01/01/2021 - 31/12/2021.

Search results

The results are shown in two tabs.

Number of reports (cases): **465**

Number of cases with a single suspected medicine: **446**

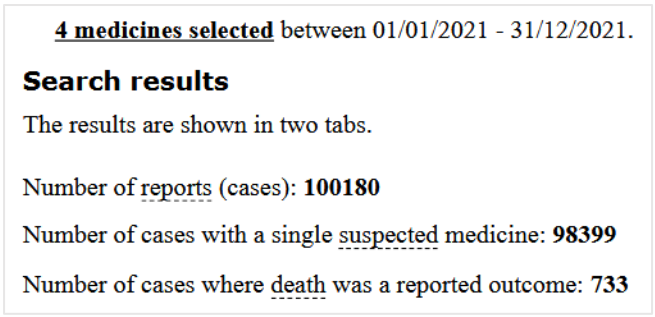
Number of cases where death was a reported outcome: **25**

Source: Appendix 2.2 - DAEN Results for Individual COVID Vaccines (Including Unspecified Type) with Index, page 29-37

- Total for all COVID vaccines plus unspecified COVID vaccines is:
  - No. of cases 100,268
  - No. of cases with a single suspected medicine 98,375
  - No. of cases where death was a reported outcome 735

It is important to note that when I search for all COVID vaccines including unspecified for the period 01/01/2021 to 31/12/2021 I get:

- ***No. of cases: 100,180***
- ***No. of cases with a single suspected medicine 98,399***
- ***No. of cases where death was a reported outcome 733***



4 medicines selected between 01/01/2021 - 31/12/2021.

Search results

The results are shown in two tabs.

Number of reports (cases): **100180**

Number of cases with a single suspected medicine: **98399**

Number of cases where death was a reported outcome: **733**

Source: Appendix 2.1 - DAEN Results for COVID Vaccine (Including Unspecified Type), page 1

So, I have elected to use this as our master COVID data.

3.2 In the entirety of this report, whenever I refer to deaths associated with the Therapeutic Goods Administration (TGA) reporting, I am referring to the number of cases where death was a reported outcome from the Database of Adverse Event Notifications (DAEN) website.

3.3 In Section 2 of this report:

a The data in this report is dated from 1 February 2021 when the Covid-19 Vaccines became available until to 8 June 2022, being the last date the DEANs data was updated and when I was briefed to provide this further report.

b The data was extracted by me from the TGA DAENs system over three days: Wednesday 22 June 2022; Thursday 23 June 2022; and Friday 24 June 2022.

c Despite the TGA website stating that its numbers are up to date as at 8 June 2022, which is 2 weeks before 22 June (first day of data extraction), and 9 June (second day of data extraction), the same search of the data on Wednesday 22 June and then Thursday 23 June produces different numbers. This is an issue I have identified in my previous reports.

d The TGA safety reports contain further information than the DAENs database, such as vaccine doses. I also used the TGA safety reports to cross check the results obtained from DAENs.

e The TGA safety report as at 9 June 2022 includes data predominantly up to the 5 June 2022. The numbers in DAENs and those in the TGA safety report for Adverse Events are comparable, I summarise the TGA safety report Adverse Events by vaccine doses further in my response under Item 5 below.

3.4 All questions that I have answered have been advised by a letter of instruction from the instructing legal experts. The questions are integrated into the document.

3.5 Underreporting.

a) As reporting to the TGA Daen's database is voluntary there is a question regarding data coverage.

b) It is globally accepted that there is significant underreporting of adverse events to all voluntary and spontaneous reporting systems. However, the true extent of underreporting is not known.

c) Whilst not perfect, the suspected underreporting to the DAEN system can be approximately validated by referring to the Ausvax website and then using their publicly available information on the number of adverse events that they are reporting within 3-7 days of vaccines being administered. *Source:* ***Ausvax*** *-* ***https://ausvaxsafety.org.au*** *(Monitors adverse events that occur within 3-7 days after vaccination)*

d) The comparison above suggests that underreporting to the DAEN website is at least 90%: that is, they are reporting a maximum of 10% of adverse events and not reporting some 90% of adverse events (as a minimum).

3.6 Appendices. Throughout this document you will see many references to appendices. These appendices amount to many hundreds of pages and as such are not included with this document. If there is a need for specific appendices to be accessed, please advise and I can make links available.

<u>SECTION 1</u>: A COMPARISON OF ADVERSE EVENTS RELATED SPECIFICALLY TO THE COVID-19 VACCINES AND NON-COVID-19 VACCINES FROM 1 JAN 1971 TO 31 DEC 2021. Pages 4-19 of original document.

The Therapeutic Goods Administration (TGA) receives reports of adverse events associated with medicines and medical devices in Australia. That data it collects is accessible via the Database of Adverse Event Notifications (DAEN) on the TGA website. Please use the DAEN data, and only that data, to answer the following questions, except where otherwise stated. In answering the below questions, please indicate the relevant pages of the DAEN data which you have used in order to answer each question:

1. For all of the vaccines in the DAEN combined, except for;
    a. Comirnaty Covid-19 Vaccine (Pfizer);
    b. Covid-19 Vaccine (TNS) (Janssen);
    c. Covid-19 Vaccine AstraZeneca (AstraZeneca); and
    d. Spikevax Covid-19 vaccine (Moderna);
        i) How many reports of adverse events were made between 1971 and the date of your report? Please set out the process by which you have come to your view.

My Answer:

*The number of adverse events from 1 Jan 1971 until 31 Dec 2021 is **19,330**. On the DAEN search engine, type "vaccine" on the first field. Next, select all vaccines, and then deselect the following COVID-19 vaccines so as to exclude them from the search:*

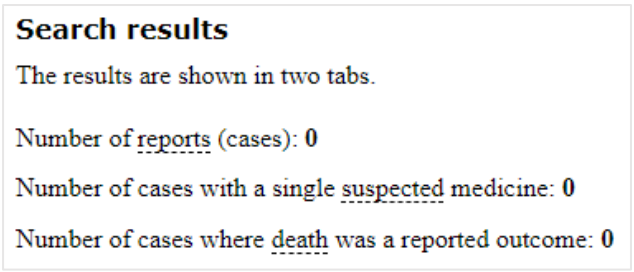
- *COMIRNATY COVID-19 vaccine*
- *COVID-19 Vaccine (TNS)*
- *COVID-19 Vaccine AstraZeneca*
- *Spikevax COVID-19 vaccine*

There should be a total of 76 medicines, but this may change depending on the year. The search process was undertaken by year starting 1971 until 2021. Below is the search result for the entire year of 1971. The search results for the other years until 2021 can be found in Appendix 1.

<u>76 medicines selected</u> between 01/01/1971 - 31/12/1971.

Selected medicines

Trade name	Active ingredients
BCG Vaccine	Mycobacterium bovis (Bacillus Calmette and Guerin (BCG) strain)
Cholerae Vaccine (TNS)	Vibrio cholerae
Coryza Vaccine	Haemophilus influenzae; Klebsiella pneumoniae ssp pneumoniae; Moraxella catarrhalis; Staphylococcus species; Streptococcus pneumoniae; Streptococcus species
Diphtheria And Tetanus Vaccine CDT	dried aluminium phosphate; Tetanus toxoid; Diphtheria toxoid
Diphtheria-tetanus-pertussis Vaccine	Bordetella pertussis; Diphtheria toxoid; dried aluminium phosphate; Tetanus toxoid



Sources:

- ***DAEN Search Engine:*** *https://apps.tga.gov.au/PROD/DAEN/daen-report.aspx*
- ***Appendix 1 - DAEN Bundle (System Organ Class) with Index 20.01.22****, pages 672-1382: adding the data from individual years from 1971 to 2021 totals 19,330 adverse events.*
- ***Appendix 3 – Annual Tally of Non-COVID Adverse Events and Deaths 1971-2021****, pages 1-3: this is a manual tally in reference to the individual searches per year in Appendix 1.*

ii) How many reports of death were made between 1971 and the date of your report? Please set out the process by which you have come to your view.

My Answer:

*There were **59** reported deaths from 1971 to 2021. The same search process as the number of adverse events yields results for the number of deaths in the said period. Please refer to the search results shown above.*

Sources:

- ***DAEN Search Engine:*** *https://apps.tga.gov.au/PROD/DAEN/daen-report.aspx*
- ***Appendix 1 - DAEN Bundle (System Organ Class) with Index 20.01.22****, pages 672-1382: adding the data from individual years from 1971 to 2021 totals 59 deaths.*
- ***Appendix 3 – Annual Tally of Non-COVID Adverse Events and Deaths 1971-2021****, pages 1-3: this is a manual tally in reference to the individual searches per year in Appendix 1.*

2. For the three following vaccines which have been provisionally approved by the TGA in relation to Covid-19, being;

a. Pfizer;
b. AstraZeneca; and
c. Moderna;

i) How many reports of adverse events were made between the date each vaccine was provisionally approved and the date of your report? Please set out the process by which you have come to your view.

My Answer:

Initially, I started searching by COVID vaccine type, however, I soon realized that searching by individual COVID vaccine type from date of provisional approval, to the end of 2021, and adding them up did not give the same result as the search if all were done together and I used the blanket dates 1 Jan 2021 to 31 Dec 2021. I determined to go with the 4 vaccine types and the blanket dates as our master data (as per intro to report). The number of adverse events in total for the 4 vaccines from 1 Jan 2021 to 31 Dec 2021 was 100,180 cases, no of cases with a single suspected medicine were 98,399 and no of deaths were 733. (You can see that the information from each vaccine type is incomplete. It is also inconsistent with the 4-vaccine approach). See search results below:

4 medicines selected between 01/01/2021 - 31/12/2021.

Search results

The results are shown in two tabs.

Number of reports (cases): **100180**

Number of cases with a single suspected medicine: **98399**

Number of cases where death was a reported outcome: **733**

Source: Appendix 2.1 - DAEN Results for COVID Vaccine (Including Unspecified Type)

- *COMIRNATY COVID-19 vaccine (Pfizer): **52,934** reports of adverse events*

1 medicine selected between 25/01/2021 - 06/01/2022.

Selected medicines

Trade name	Active ingredients
COMIRNATY COVID-19 vaccine	tozinameran

Search results

The results are shown in two tabs.

Number of reports (cases): **52934**

Number of cases with a single suspected medicine: **51869**

Number of cases where death was a reported outcome: **265**

- *COVID-19 Vaccine AstraZeneca: **43,912** reports of adverse events*

1 medicine selected between 16/02/2021 - 06/01/2022.

Selected medicines

Trade name	Active ingredients
COVID-19 Vaccine AstraZeneca	ChAdOx1-S (Viral vector)

Search results

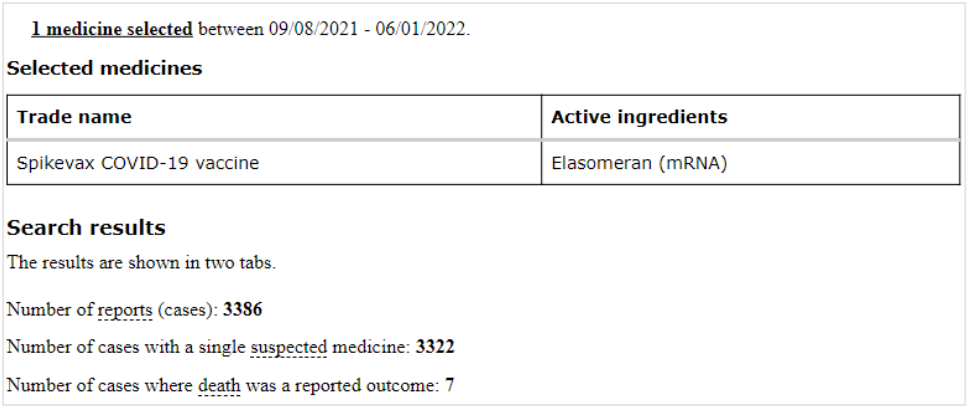
The results are shown in two tabs.

Number of reports (cases): **43912**

Number of cases with a single suspected medicine: **43134**

Number of cases where death was a reported outcome: **439**

- *Spikevax COVID-19 vaccine (Moderna): **3,386** reports of adverse events*



1 medicine selected between 09/08/2021 - 06/01/2022.

Selected medicines

Trade name	Active ingredients
Spikevax COVID-19 vaccine	Elasomeran (mRNA)

Search results

The results are shown in two tabs.

Number of reports (cases): **3386**

Number of cases with a single suspected medicine: **3322**

Number of cases where death was a reported outcome: **7**

Sources:

- ***DAEN Search Engine:*** *https://apps.tga.gov.au/PROD/DAEN/daen-report.aspx*
- ***Appendix 1 - DAEN Bundle (System Organ Class) with Index 20.01.22***

On the DAEN search engine, select the vaccine on the "medicine" field. Adjust the date range accordingly. Here, I am using the 31st of December 2021 as the end date and the start date is the date of provisional approval for the Covid-19 vaccine in question.

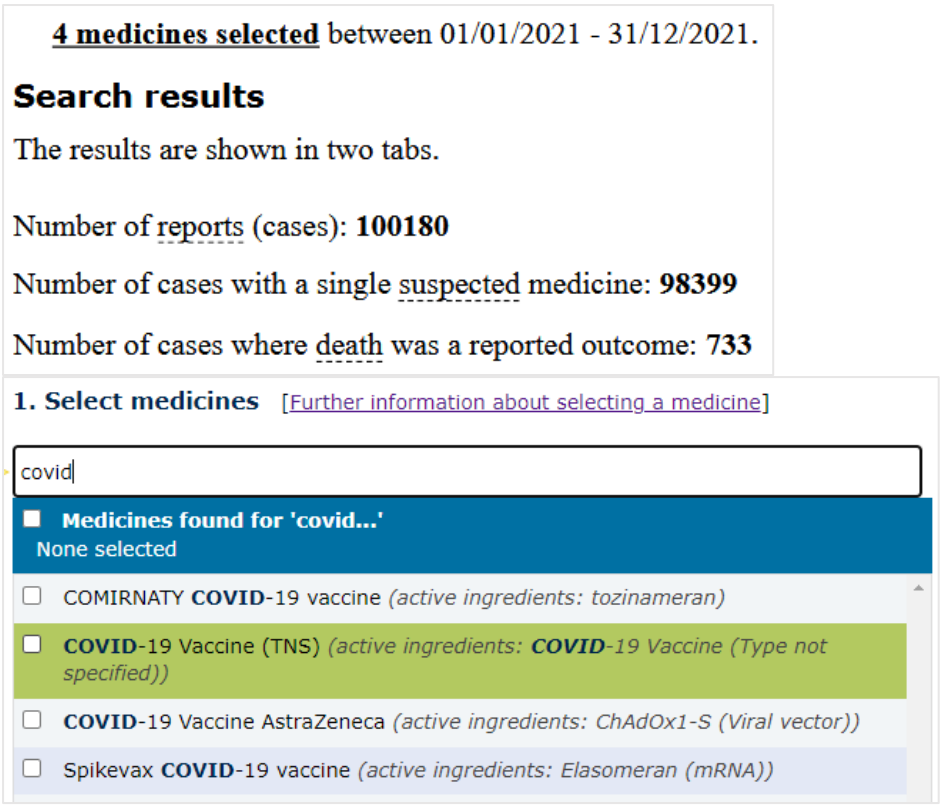
ii) How many reports of death were made between the date each vaccine was provisionally approved and the date of your report? Please set out the process by which you have come to your view.

My Answer:

- *COMIRNATY COVID-19 vaccine (Pfizer):* ***265*** *cases where death was a reported outcome*
- *COVID-19 Vaccine AstraZeneca:* ***439*** *cases where death was a reported outcome*
- *Spikevax COVID-19 vaccine (Moderna):* ***7*** *cases where death was a reported outcome*

The data was taken from Appendix 1 and totals ***711*** *cases where death was a reported outcome. Note that this is for the three (3) aforementioned vaccines only.*

However, as per the DAEN search engine, there is a fourth type of COVID vaccine, medicine name: ***COVID-19 Vaccine (TNS)****.This stands for Type Not Specified. I included this upon pulling out information and found a total of* ***733*** *cases where death was a reported outcome, as opposed to the total of 711 which is the sum of only three (3) COVID vaccines. Actually, I also ran the unspecified vaccine by itself and I found that when I added that to the above individual vaccines I reported 735 deaths, and not 733. I have elected to use the 733 as our master data.*



Source: Appendix 2.1 - DAEN results for COVID Vaccine (including Unspecified type)

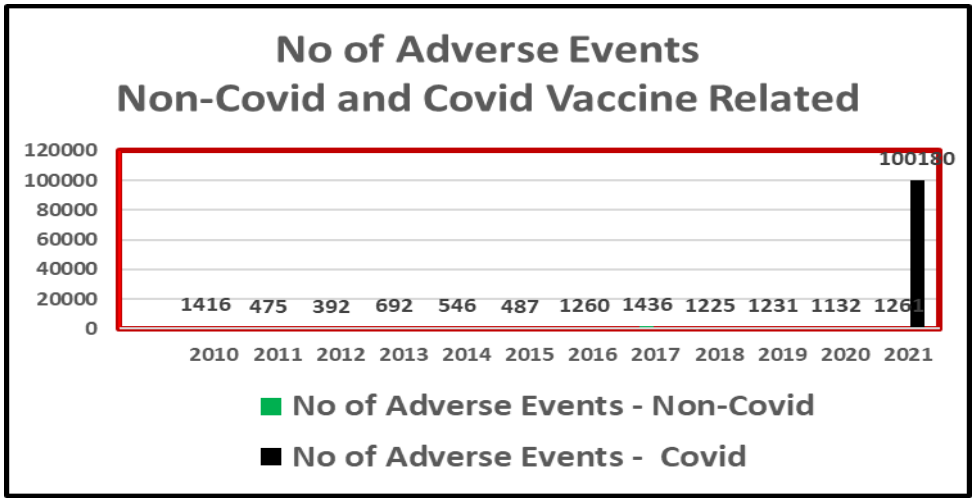
The same search process as the number of adverse events yields results for the deaths related to COVID-19 vaccines. Please refer to the search results shown above.

Note – Pfizer was provisionally approved on 25 January 2021; AstraZeneca was provisionally approved on 16 February 2021; Moderna was provisionally approved on 9 August 2021.

3. Has there been a significant increase in adverse event reports when comparing all other vaccines in the DAEN to Pfizer, AstraZeneca and Moderna? Please set out the process by which you have come to your view.

My Answer:

*Yes, there has been a significant increase in adverse events. Comparing the search results on DAEN, the non-COVID vaccines are at **19,330** adverse events from 1971 until 2021 (50-year range), whereas the COVID-vaccines in the year 2021 alone already had a total of **100,180** reported adverse events. Refer to Appendix 2 - DAEN results for COVID Vaccine (including Unspecified type). Refer to search results presented in questions 1 and 2.*



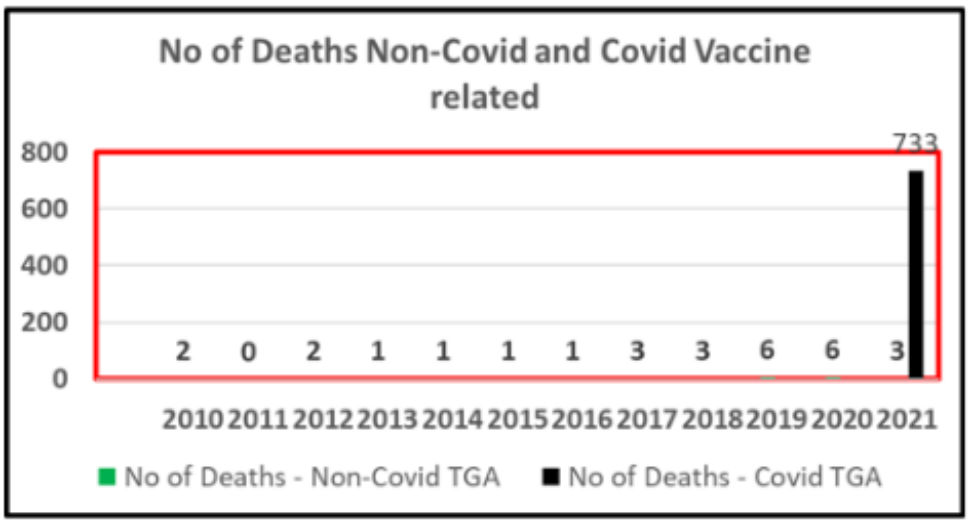
Sources:

- *Appendix 1 – DAEN Bundle (System Organ Class) with Index 20.01.22*
- *Appendix 2.1 – DAEN results for COVID Vaccine (including Unspecified type)*
- *Appendix 3 – Annual Tally of Non-COVID Adverse Events and Deaths 1971-2021*

4. Has there been a significant increase in reports of death when comparing all other vaccines in the DAEN to Pfizer, AstraZeneca and Moderna? Please set out the process by which you have come to your view.

My Answer:

*Yes, there has been a significant increase in cases where death was a reported outcome. Comparing the search results on DAEN, the non-COVID vaccines are at 59 cases where death was a reported outcome from 1971 until 2021 (50-year range), whereas the COVID-vaccines in the calendar year 2021 alone already had a total of **733** cases where death was a reported outcome. Refer to search results presented in questions 1 and 2. I present this data in the following chart from 2010:*



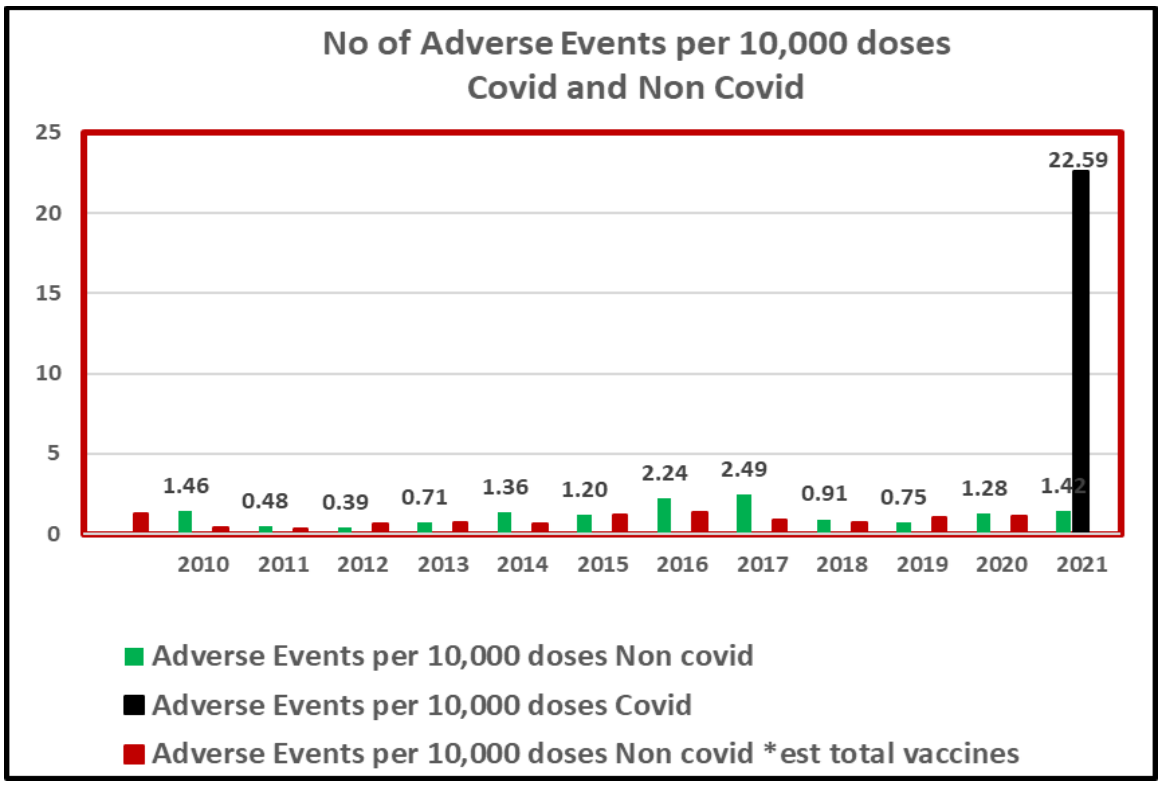
Sources:

- *Appendix 1 – DAEN Bundle (System Organ Class) with Index 20.01.22*
- *Appendix 2.1 – DAEN results for COVID Vaccine (including Unspecified type)*
- *Appendix 3 – Annual Tally of Non-COVID Adverse Events and Deaths 1971-2021*

5. How much more likely is it for an adverse event to be reported to the TGA from Pfizer, AstraZeneca and/or Moderna than it is from all other vaccines in the DAEN combined? Please set out the process by which you have come to your view.

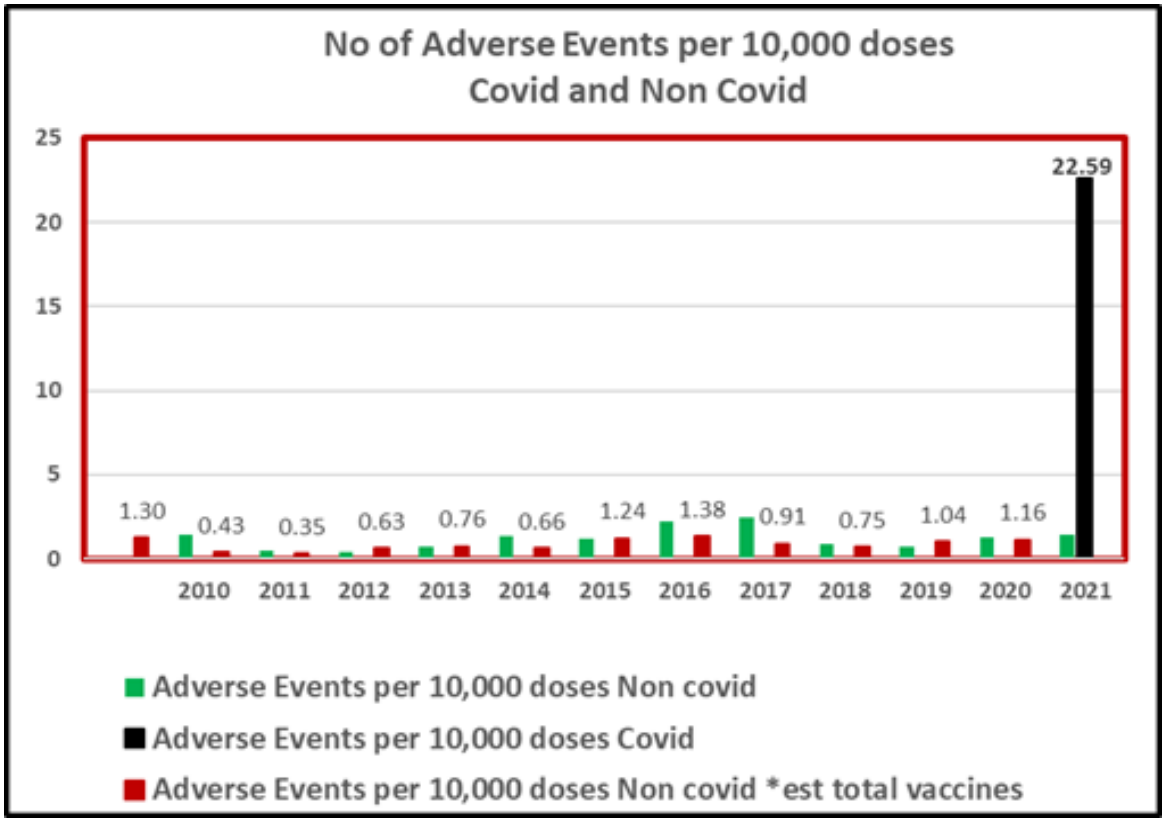
My Answer:

From 2010 to 2020 the likelihood of someone having an Adverse Event as the result of a vaccine was of the order of 1 in every 10,000 doses. It is 1.1 number of doses using the incomplete number of doses data (see Graph 1) and 0.9 using an estimate for total doses (see Graph 2). In 2021 as the result of COVID vaccinations, I can now expect 23 Adverse Events in every 10,000 doses. I set this data out in the below charts:



Graph 1 – Labelled data is based on incomplete data for total non-COVID cases
Sources:

- *No. of adverse events: Appendix 3 - Annual Tally of Non-COVID Adverse Events and Deaths 1971-2021*
- *No of COVID vaccine doses: Appendix 6 – No. of COVID Doses by Vaccine*
- *No of non-COVID vaccine doses: Surveillance of Adverse Events following immunization, annual reports for 2010 to 2019*



Graph 2 – Labelled data uses an estimate for total non-COVID doses
Sources:

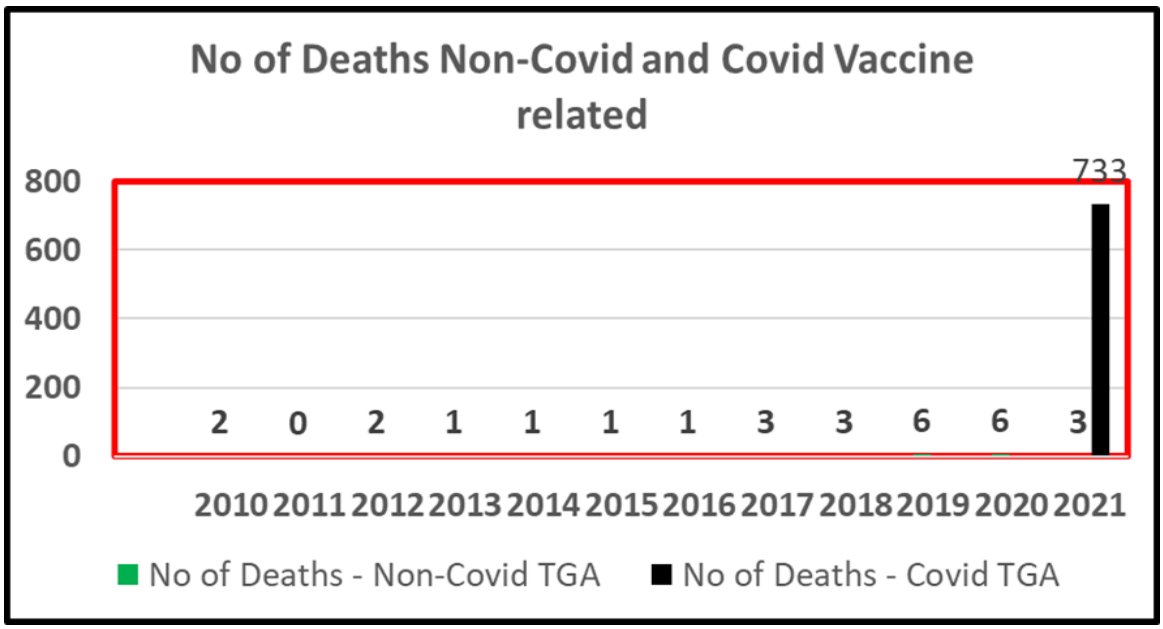
- *No. of adverse events: Appendix 3 - Annual Tally of Non-COVID Adverse Events and Deaths 1971-2021*
- *No of COVID vaccine doses: Appendix 6 – No. of COVID Doses by Vaccine*
- *No of non-COVID vaccine doses: Appendix 5 - Surveillance of Adverse Events following immunization, annual reports for 2010 to 2019*

Refer to search results presented in questions 1 and 2. Note that the non-COVID vaccine adverse events are from 1971 to 2021, while COVID vaccine adverse events are for the year 2021 only.

6. How much more likely is it for a death to be reported to the TGA from Pfizer, AstraZeneca and/or Moderna than it is from all other vaccines in the DAEN combined? Please set out the process by which you have come to your view.

My Answer:

The number of cases where death was a reported outcome to the TGA, associated with a non-COVID vaccine from 2010 to 2021 was 29, or an average of 2.4 deaths per annum vs 733 in 2021 associated with COVID vaccines. This is an increase of 30,442%. It is represented by the below chart.

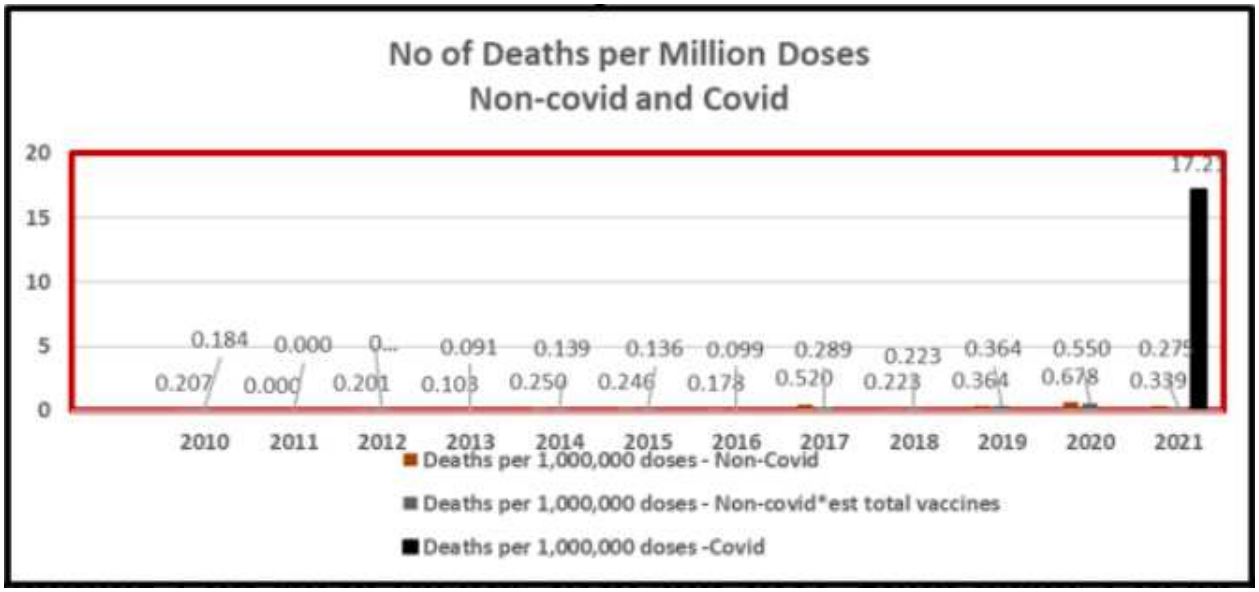


Sources:

- *No. of deaths: Appendix 3 - Annual Tally of Non-COVID Adverse Events and Deaths 1971-2021*

Given the size of the increase reported above, another source of deaths associated with vaccines has been located. The Surveillance of Adverse Events following Immunisation in Australia, Annual Reports from 2010 to 2019, report 31 deaths associated with vaccines over 10 years which is an average of 3.1 deaths per annum. (Author: The Department of Health, Australian Federal Government) It would appear that the TGA reports of death and the annual report referred to above are inconsistent in the no. of deaths that they report. (Both are, however, reporting on the deaths as a result of adverse events and claim to use the DAEN TGA website as their source of information.)

From 2010 to 2021, the likelihood of death from an adverse reaction to a vaccine was 0.22 to 0.27 per million doses (approx. 1 death every 4 million doses). As a result of COVID doses in 2021, I have had 17 deaths per million doses. As a consequence, COVID vaccines are 69 times more likely to result in death as a reported outcome than traditional vaccines. (If I use the death figures from the Surveillance of Adverse Events after immunisation in Australia, annual reports from 2010 to 2019, referred to previously, this shows around 0.463 deaths per million doses or 1 death every 2 million doses. This makes the covid vaccines 36 times more likely to result in deaths as aa reported outcome than traditional vaccines).



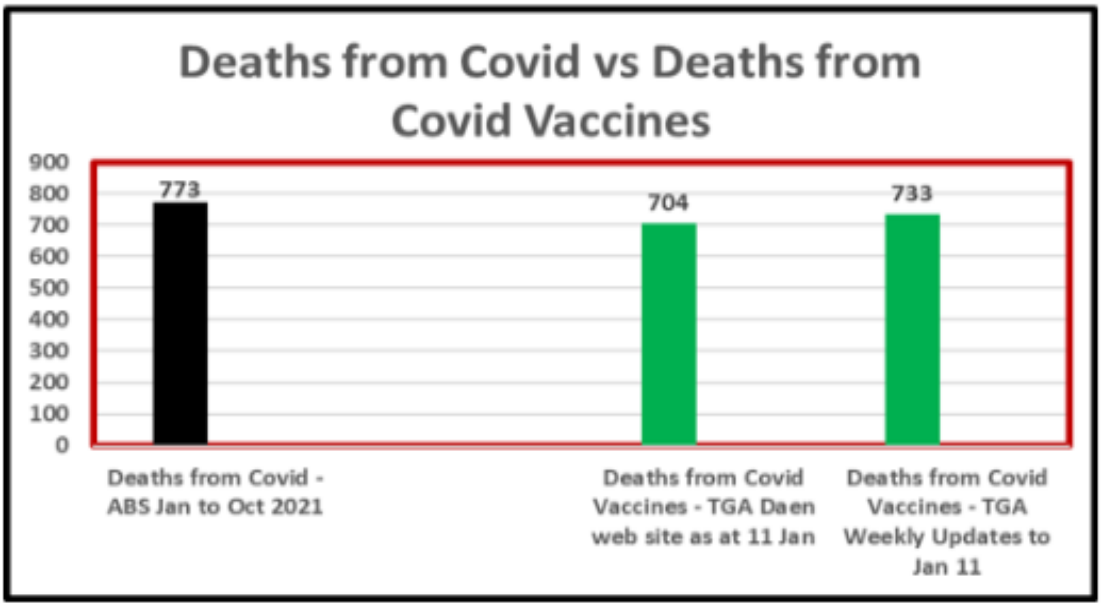
Sources:

- *No. of Deaths: Appendix 3 - Annual Tally of Non-COVID Adverse Events and Deaths 1971-2021*
- *No. of COVID vaccine doses: Appendix 6 – No. of COVID Doses by Vaccine*
- *No. of non-COVID vaccine doses: Appendix 5 – Surveillance of Adverse Events following immunization, annual reports for 2010 to 2019*

7. How do deaths reported to the TGA from Pfizer, AstraZeneca and Moderna compare to deaths recorded in association with Covid-19 itself? You may also refer to data from the Australian Bureau of Statistics to answer this question. Please set out the process by which you have come to your view.

My Answer:

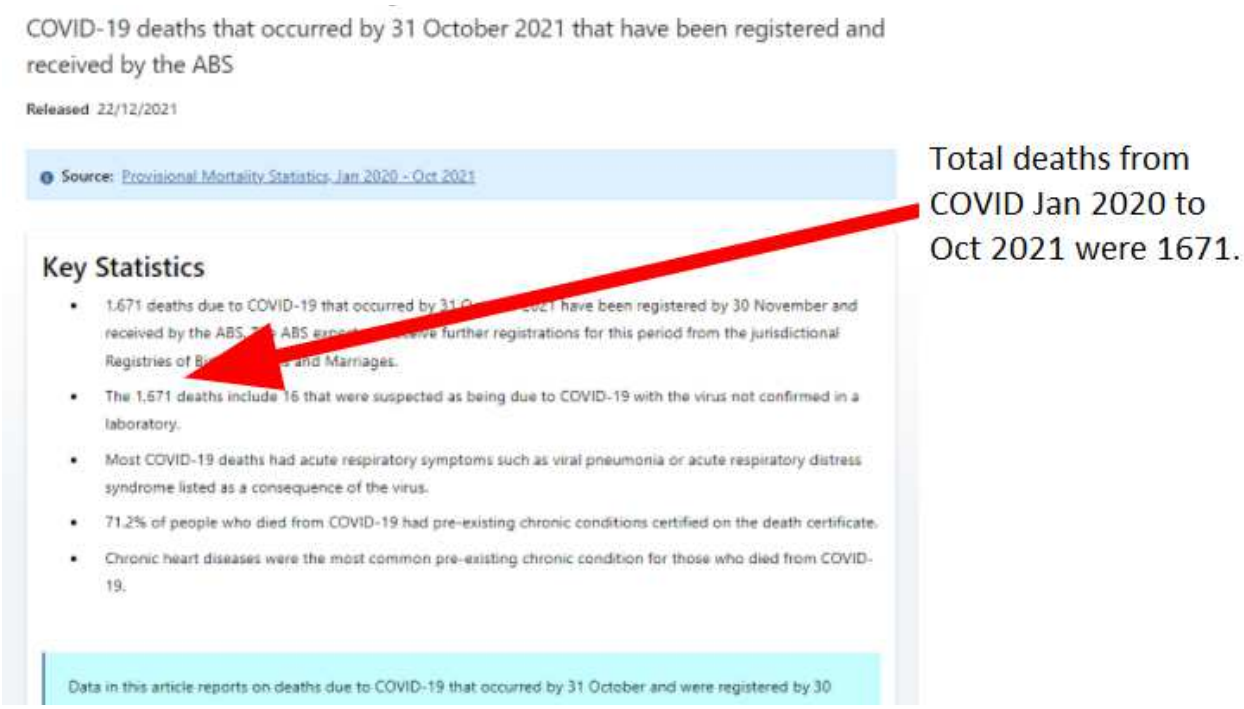
The Australian Bureau of Statistics (ABS) reports 773 deaths from COVID from January to October 2021 albeit 2 months short of the entire year. In the last 2 weeks of January 2022,when this report was being written, the number of cases where death was a reported outcome, associated with a COVID vaccine in 2021 have increased from 704 to 733. This is reported in the below chart:



Sources:

- *Appendix 1 - DAEN Bundle (System Organ Class) with Index 20.01.22. See page 1400 which indicates that 1671 people died from covid Jan 202 to 31 Oct 2021.Refer below to ABS source*
- *Appendix 2.1 - DAEN Results for COVID Vaccine (Including Unspecified Type)*

The ABS reports that the total deaths from COVID Jan 2020 to Oct 2021 were 1671. They also report that the total deaths from COVID in 2020 were 832. Therefore, the total deaths from COVID Jan 2021 to Oct 2021 were 773.



Source: Appendix 1 - DAEN Bundle (System Organ Class) with Index 20.01.22

https://www.abs.gov.au/statistics/health/causes-death/provisional-mortality-statistics/jan-dec-2020

All causes											
2020	141116	11196	10799	11789	11678	12242	11535	12538	12906	11973	11
2015-19 average	140892	10906	9975	11078	11008	12058	12258	13241	13560	12579	12
2015-19 minimum	137278	11408	10399	11467	11352	12482	12904	13971	14606	13603	12
2015-19 maximum	144104	10444	9601	10727	10766	11608	11786	[illegible]	13047	11948	11
COVID-19											
2020	832	0	0	21	63	9	2	133	445	139	15
Respiratory diseases											
2020	12022	1025	949	1107	1009	1027	987	1020	1048	1046	91
2015-19 average	14350	971	849	945	985	1177	1248	1491	1723	1583	13
Influenza and pneumonia											
2020	2131	179	183	237	232	189	186	192	186	152	12
2015-19 average	3332	189	165	178	208	249	280	358	491	466	32
Pneumonia											
2020	2089	169	175	219	228	189	185	191	186	152	12
2015-19 average	2723	177	156	166	187	222	245	296	330	294	25
Chronic lower											

Total deaths from COVID Jan 2020 to Dec 2020 were 832.

Sources:

- *Appendix 1 - DAEN Bundle (System Organ Class) with Index 20.01.22*

Measuring 'excess' deaths

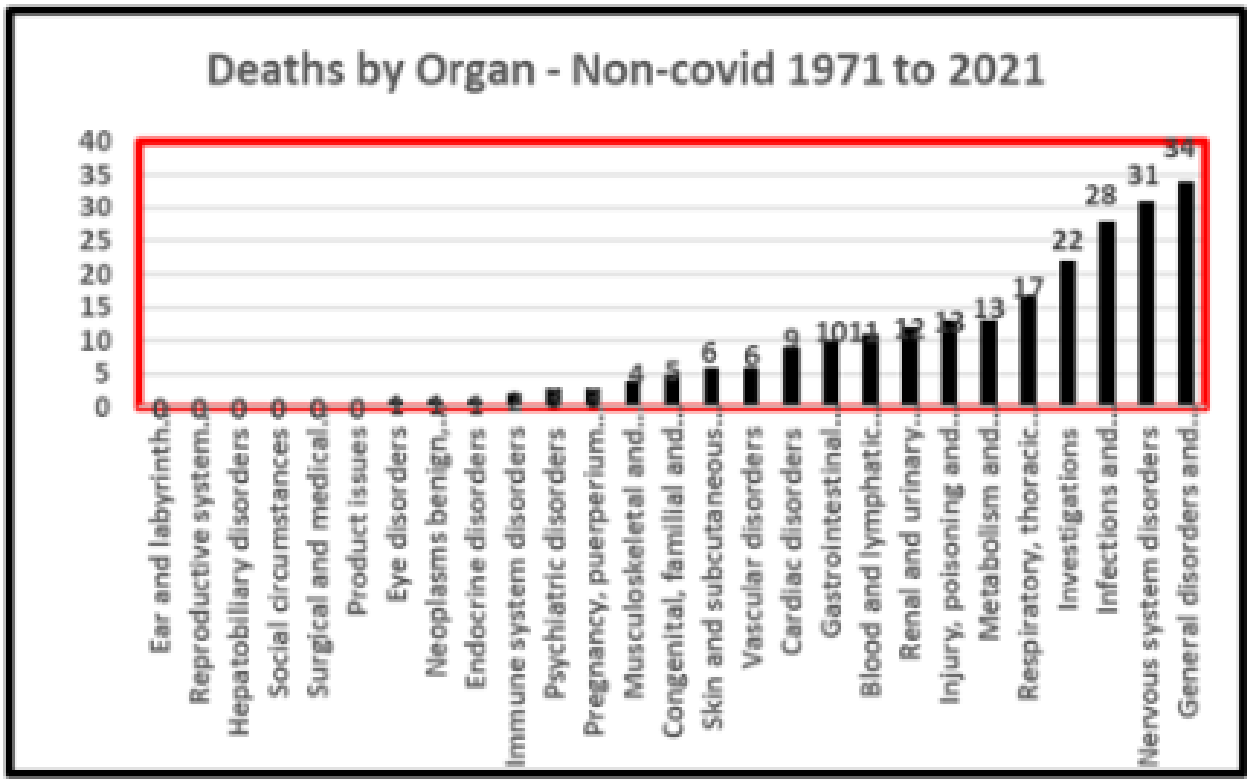
> An article on COVID-19 mortality (https://www.abs.gov.au/articles/covid-19-mortality-2) is available via the Articles link. This article (https://www.abs.gov.au/articles/covid-19-mortality-2) outlines key demographics of the 1,671 people who died due to COVID-19 up until 31 October 2021.

Source: Appendix 1, page 1400

8. What are the most significant categories, or types, of adverse events reported to the TGA for all vaccines except for Pfizer, AstraZeneca and Moderna from 1971 to the date of this report? Please set out the process by which you have come to your view.

My Answer:

The top 5 Categories of Deaths by Organ reported to the TGA from 1971 to 2021 non-COVID were General Disorders and Administrative Site Conditions, Nervous System Disorders, Infections and Infestations, Investigations (undefined by TGA), Respiratory Thoracic and Mediastinal. The top 5 represent 57% of all Deaths by Organ reports. This is represented in the chart below:



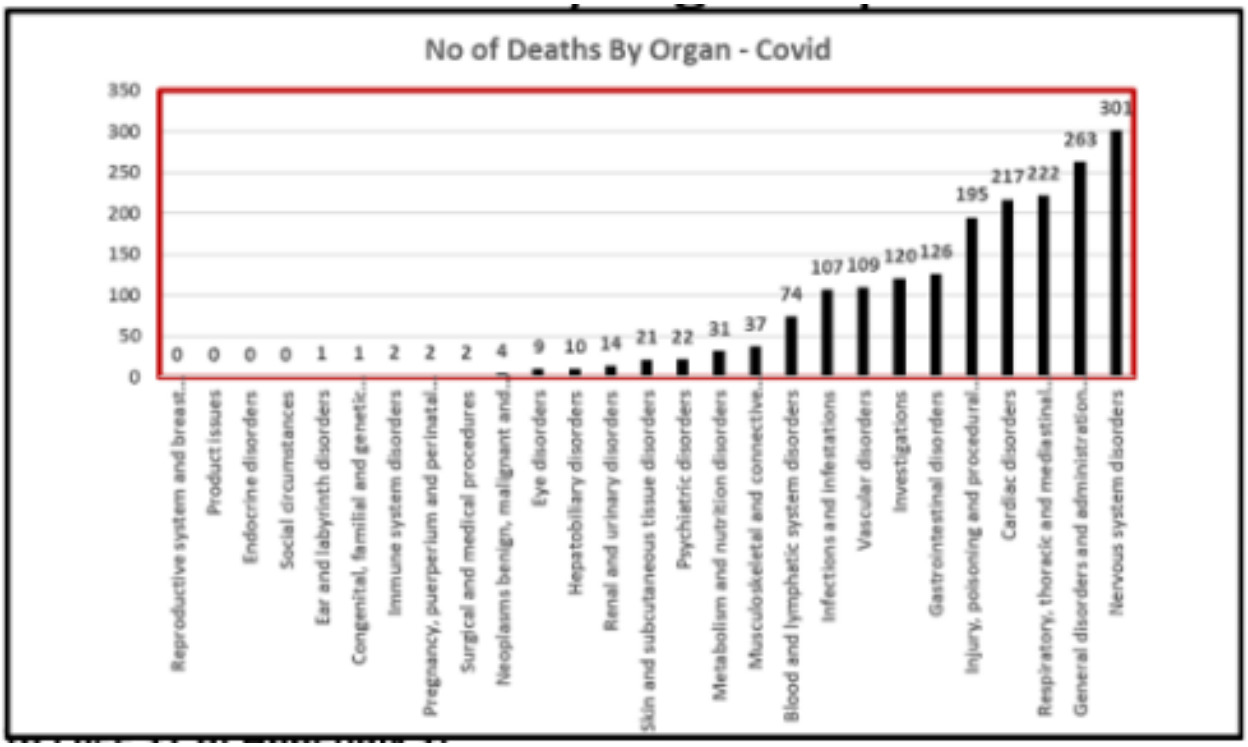
Source:

- *Appendix 4 - Instructions_TGA DAEN Download (*note: to create the above chart, I had to work out how to download the data into a format that allowed us to analyse it; the steps I took are in Appendix 4; the data was sourced from DAEN TGA website on Tue, 25th of Jan 2022)*

9. What are the most significant categories, or types, of adverse events reported to the TGA for Pfizer, AstraZeneca and Moderna? How many more categories, or types, of adverse event reports have been reported to the TGA in relation to Pfizer, AstraZeneca and Moderna than have been reported for all other vaccines combined? Please set out the process by which you have come to your view.

My Answer:

The Top 5 Categories of Deaths by Organ reported to the TGA for 2021 related to Covid vaccines were Nervous System Disorders, General Disorders and Administrative Site Conditions, Respiratory Thoracic and Mediastinal Disorders, Cardiac Disorders and Injury Poisoning and Procedural complications. These categories account for 58.8% of all Death by organ reports. This is represented in the chart below:



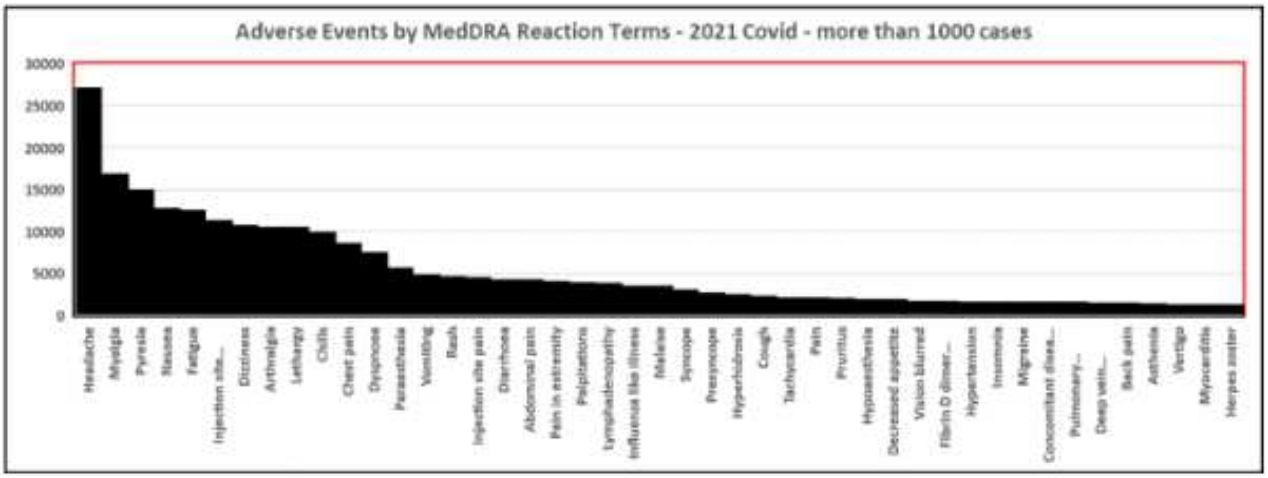
Source:

- *Appendix 4 - Instructions_TGA DAEN Download (*note: to create the above chart, I had to work out how to download the data into a format that allowed us to analyse it; the steps I took are in Appendix 4; the data was sourced from DAEN TGA website on Tue, 25th of Jan 2022)*

10. Have there been any significant increases in categories, or types, of adverse event reports to the TGA since the provisional approval of Pfizer, AstraZeneca and Moderna?

My Answer:

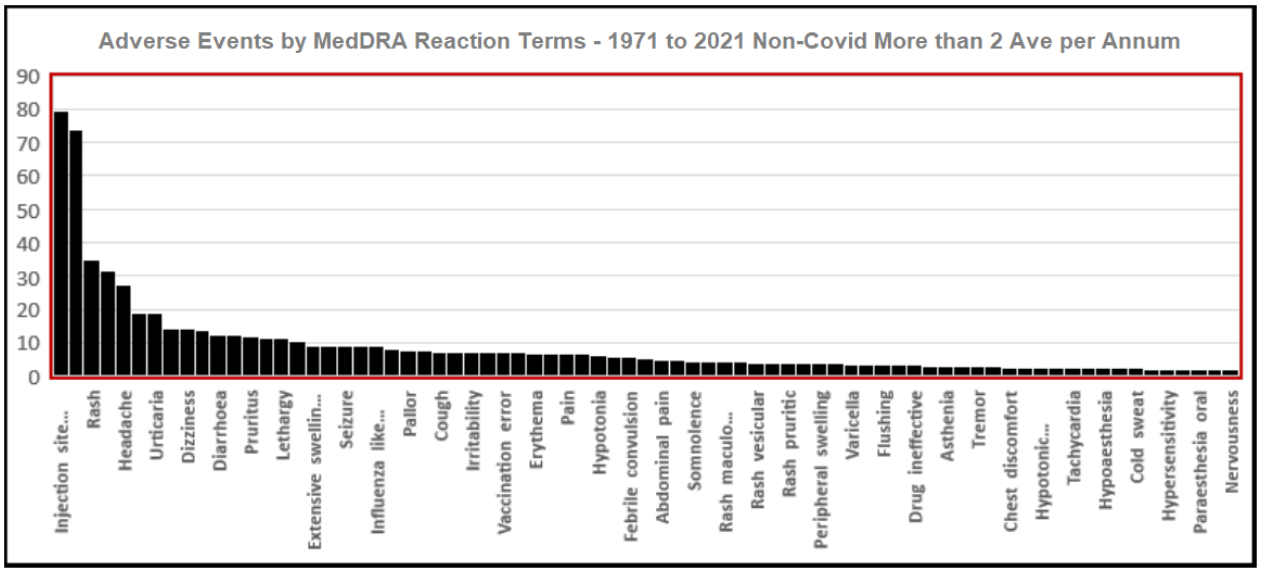
The number of adverse events reported to the TGA in 2021 is 100,180 relating to COVID vaccines. In summarizing these adverse events by disease type, one event can be reported as many diseases/conditions. I now have a list of 3,122 disease types, more than double the number of different conditions that were reported prior to COVID vaccines. See table below:



Source:

- *Appendix 4 - Instructions_TGA DAEN Download (*note: to create the above chart, I had to work out how to download the data into a format that allowed us to analyse it; the steps I took are in Appendix 4; the data was sourced from DAEN TGA website on Tue, 25th of Jan 2022)*

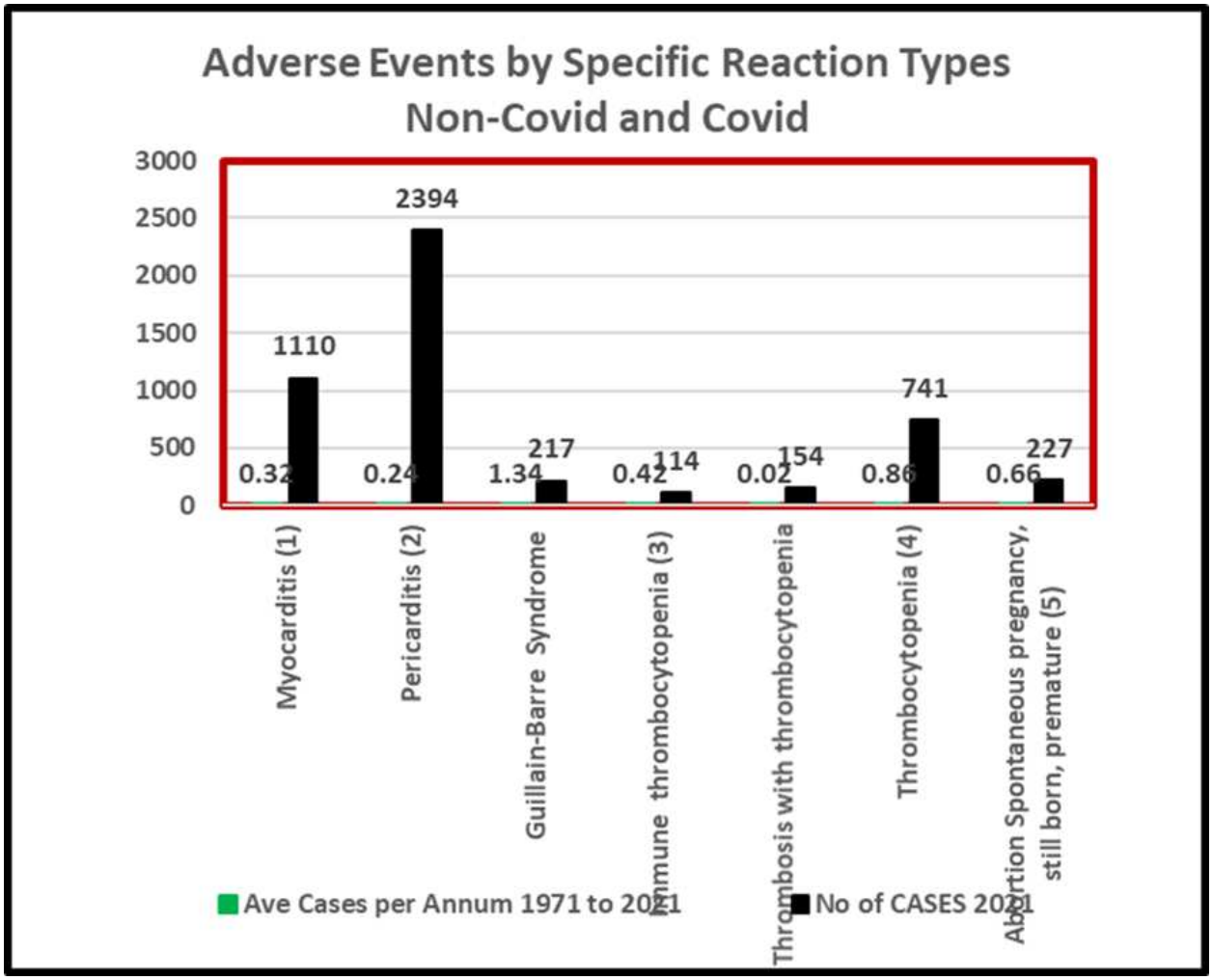
The number of non-COVID adverse events reported to the TGA from 1971 to 2021 was 19,330. In summarizing these adverse events by disease type, one event can be reported as many diseases/conditions. For the last 20 years, I have been able to incorporate all conditions in a list of 1,492 different conditions. See table below:



Source:

- *Appendix 4 - Instructions_TGA DAEN Download (*note: to create the above chart, I had to work out how to download the data into a format that allowed us to analyse it; the steps I took are in Appendix 4; the data was sourced from DAEN TGA website on Tue, 25th of Jan 2022)*

The Specific Reaction types associated with Adverse Events of Myocarditis, Pericarditis, Guillain-Barre Syndrome, Immune Thrombocytopenia, Thrombosis with Thrombocytopenia Syndrome, and Abortions and Spontaneous miscarriages have been analysed to compare their frequency for non-COVID 1971 to 2021 and Covid 2021 vaccines. All categories increased significantly.



Source:

- *Appendix 4 - Instructions_TGA DAEN Download (*note: to create the above chart, I had to work out how to download the data into a format that allowed us to analyse it; the steps I took are in Appendix 4; the data was sourced from DAEN TGA website on Tue, 25th of Jan 2022)*

ADVERSE EVENTS		NON-COVID		COVID 2021	COMPARISON
ORGAN CLASS	ADVERSE EVENT REACTIONS	No of Cases 1971 to 2021	Ave Cases per Annum 1971 to 2021	No of CASES 2021	% Increase Non-Covid to Covid
Cardiac Disorders	Myocarditis (1)	16	0.32	1110	346775%
	Pericarditis (2)	12	0.24	2394	997400%
Nervous System Disorders	Guillain-Barre Syndrome	67	1.34	217	16094%
Blood and ILmphatic System Disorders	Immune thrombocytopenia (3)	21	0.42	114	27043%
	Thrombosis with thrombocytopenia	1	0.02	154	769900%
	Thrombocytopenia (4)	43	0.86	741	86063%
Pregnancy, Puerperium and Perinatal Conditions	Abortion Spontaneous pregnancy, still born, premature (5)	33	0.66	227	34294%
	Subtotal	193	3.86	4957	128320%
	Total reactions reported	43878	878	327015	37145%
	Specific Categories as a% of total	0.44%	0.44%	1.52%	

(1) includes myocarditial infarction, acute myocardial infarction, myocardial ischaema
(2) pericarditis includes pericardial effusion
(3) Immunie thrombocytopenia includes immune thrombocytopenia purpera
(4) Thrombocytopenia includesthrombotic thrombocytopenia purpera and thrombotic cytopenia purpera
(5) Pregnancy, Puerperium and perinatal includes the entire category

Source:

- *Appendix 4 - Instructions_TGA DAEN Download (*note: to create the above chart, I had to work out how to download the data into a format that allowed us to analyse it; the steps I took are in Appendix 4; the data was sourced from DAEN TGA website on Tue, 25th of Jan 2022)*

11. Do you have any final observations on comments to make as the result of undertaking this analysis.

As a final remark, I note that in addition to generating more adverse events and generating more disease types, COVID vaccines are generating more Reaction Reports than seen before by traditional vaccines.

In fact, the TGA is seeing more Adverse Event Reaction reports in 2021, than they have seen in the entire 50 years since 1971.

(This is separate and different to Adverse Event Cases. It says that each Non-Covid 1971 to 2021 Adverse Event Case would have included on average of 2.27 MedDRA reactions per event. Covid Vaccines 2021 include an average of 3.26 reactions per event. Refer table above for examples of Major Organ classes and Adverse Event Reaction Types.)

- *No of Adverse Events Non-covid – 1971 to 2021 – 19330*
- *No of Disease Types Non-covid – 1971 to 2021 - 1492*
- *No of Adverse Event Reactions – Death by Organ Report non-covid 1971 to 2021 – 43878*
- *Adverse Reactions reported per Adverse Event 1971 to 2021 – 2.27 Reactions per Event*

- *No of Adverse Events Covid 2021 – 100,180*
- *No of Disease Types Covid 2021 - 3122*
- *No of Adverse Event Reactions – Death by Organ Report Covid 2021 – 327015*
- *Adverse Reactions reported per Adverse Event 2021 – 3.26 Reactions per Event*

Sources:

- *See DAEN website for no. of adverse events non-COVID and COVID*
- *See DAEN website for Deaths by Organ – no of disease types non-COVID and COVID*
- *See DAEN website for Deaths by Organ – total no of reports using medDRA reaction items, 43,878 non-COVID and 327,015 COVID*
- *Adverse Reactions Reported per Adverse Event = reactions divided by adverse events*

<u>SECTION 2</u>: ADVERSE EVENTS AND DEATHS REPORTED TO TGA DAENS, AUSTRALIA FOLLOWING COVID-19 VACCINES BETWEEN 1 FEBRUARY 2021 TO 8 JUNE 2022 HIGHLIGHTING DEATHS AND ADVERSE EVENTS IN CHILDREN 5-11 YRS OLD. Section 6 onwards.

6.0 ITEM 1

Since 10 January 2022, how many Deaths are reported in DAENs in 5-11 year olds following Covid-19 Vaccines?

6.1 Since 10 January 2022, 135 deaths following Covid-19 Vaccines are recorded on the DAENs database for all ages.

6.2 Since 10 January 2022, 5 Deaths were reported in children 5-11 in DAENs since the roll-out of Covid-19 Vaccines began for this age group.

6.3 Details of these Deaths are set out in Table 1 below. Five screenshots are included in Schedule B to this report. These screenshots are from the DAENs website for each death reported in the 5-11 age cohort since the roll out of the Pfizer Vaccine began. Each screenshot (on the left hand side) confirms "death as a reported outcome" from "a single medicine", namely a Covid-19 Vaccine.

Date	Case Number	Gender	Age	Adverse Event	Result
11 March 2021	719838	M	7	Cardiac Arrest Generalised tonic-clonic seizure	Death as reported Outcome
25 March 2021	724023	F	9	Cardiac Arrest	Death as reported Outcome
28 March 2021	724925	M	6	Adverse Event Following Immunisation	Death as reported Outcome
6 May 2021	733723	M	10	Adverse Event Following Immunisation	Death as reported Outcome
10 May 2021	734187	M	5	Abdominal Pain Cardiac arrest	Death as reported Outcome

Table 1: Summary of deaths reported to DAENs following Covid-19 Vaccine in 5-11 year olds since the roll out to this age group began on 10 January 2022

6.5 The DAENs website also routinely reports Deaths where no age is specified. At the time of producing this report, 90 of the 135 Deaths sampled (14 or 15.6%) had no age specified. It is possible that some of these Deaths where the age is not specified may also fall within the age cohort 5-11 years. I have included a further discussion of these Deaths in my response to Item 3 (below).

7.0 ITEM 2

Since 10 January 2022, how many Adverse Events were reported in the DAENs associated with 5-11 year olds following Covid-19 Vaccines?

7.1 Since 10 January 2022, 27,742 Adverse Events were reported following Covid-19 Vaccines in all ages. This number includes the 135 Death reports reported in Item 1 (6.1) above (in all ages).

7.2 In 5-11 year olds, 1,390 Adverse Events have been reported by DAENs following Covid-19 Vaccines.

7.3 Table 2 below shows breakdown of Adverse Events from 10 January 2022 to 8 June 2022 by Covid-19 Vaccine type for 5-11 year olds (and includes Deaths). The Pfizer and Spikevax (Maderna) Vaccine are the only provisionally approved Covid-19 Vaccines for the 5-11 and 6-11 year old group, respectively. I am not able to explain why there are 5-11 year olds that received Covid-19 Vaccines not provisionally approved for their age.

Vaccine Type	Number of Reports (Cases) Adverse Events	Number of cases with a single suspected medicine	Number of cases where Death was a reported outcome
Pfizer Comirnaty	1371	N/A	5
Astra Zeneca	3	N/A	0
Covid-19 TNS	6	N/A	0
Spikevax	10	N/A	0
Nuvaxovid	-		0
Total	**1390**	**N/A**	**5**

Table 2: number reports of Adverse Events in 5-11 year olds following Covid-19 Vaccines since 10 January 2022

7.4 DAENs also records 28 Adverse Events in 5-11 year olds prior to 10 January 2022, when the Covid-19 Vaccines were rolled out to this age group. I have included details about these 28 reports in Schedule C to this report. These reports begin at 29 September 2021. I cannot explain why children received the Covid-19 Vaccines before they were provisionally approved and rolled out to this age group. Nor can I explain why they received Covid-19 Vaccines not provisionally approved for this age group.

7.5 Note, since 10 January 2022 there are 5,221 Adverse Events in DAENs where no age range is specified. Absent that detail from the DAENs database, it is not possible for me to say whether there are more Adverse Events in the 5-11 year old age cohort. I have dealt with this further under Item 4 below.

Source: DAENs 10 January 2022 to 8 June 2022 https://1drv.ms/x/s!Al71AGIGLVVzgk90LkH0sKUeqH9b?e=0Y6AZ0

7.6 These 1,390 Adverse Events resulted in 3,635 reactions all classified as per the MedDRA reaction types. At Schedule D to this report, I have listed out the types of Adverse Events being reported by DAENs by frequency from highest to lowest.

7.7 Table 3 below shows the top 10 Adverse Events reaction types being reported in 5-11 year olds following Covid-19 Vaccines. These top 10 Adverse Events represent 1,327 reactions or 37% (1,327/3,635) of Total Adverse Event reactions being reported in children aged 5-11 years of age.

MedDRA reaction	Number of Adverse Events Reactions	Potentially Serious	% of Total
Chest pain	211		5.80%
Vomiting	163		4.48%
Pyrexia	159	x	4.37%
Headache	131		3.60%
Abdominal pain	127		3.49%
Dyspnoea	118		3.25%
Vaccination error	111		3.05%
Nausea	110		3.03%
Lethargy	99		2.72%

Table 3: Top 10 Adverse Events Reaction types reported in children 5-11 years since 10 January 2022

7.8 Table 4 below shows the number of Adverse Events reactions by the organ affected. The top 10 organs affected (down to cardiac disorders) represent 89% of all reactions reported by DAENs in 5-11 year olds following Covid-19 Vaccine.

Organ Class	Number of Reactions	% of Total
General disorders and administration site conditions	750	21%
Nervous system disorders	544	15%
Gastrointestinal disorders	534	15%
Skin and subcutaneous tissue disorders	336	9%
Respiratory, thoracic and mediastinal disorders	287	8%
Injury, poisoning and procedural complications	221	6%
Musculoskeletal and connective tissue disorders	163	4%
Investigations	137	4%
Infections and infestations	131	4%
Cardiac disorders	127	3%
Vascular disorders	107	3%
Blood and lymphatic system disorders	63	2%
Eye disorders	52	1%

Organ Class	Number of Reactions	% of Total
Psychiatric disorders	43	1%
Metabolism and nutrition disorders	37	1%
Other (Non-aligned)	33	1%
Immune system disorders	20	1%
Renal and urinary disorders	19	1%
Reproductive system and breast disorders	17	0%
Ear and labyrinth disorders	8	0%
Endocrine disorders	3	0%
Hepatobiliary disorders	2	0%
Neoplasms benign, malignant and unspecified (incl cysts and polyps)	1	0%
Total	**3635**	100%

Table 4: Top 10 Adverse Events Reaction Types reported in children 5-11 years since 10 January 2022

7.9 Following is Table 5, that lists Potentially Serious Adverse Events in children 5-11 years. The DAENs Adverse Event Database does not advise which events are serious. The TGA does report on serious adverse events in their weekly reports. The specific adverse events which are considered serious are not specifically identified. As such, in absence of information from the TGA, I have assessed and interpret the following reaction types to be potentially serious. This is my assessment as this detail is not information provided in DAENs or by the TGA.

MedDRA reaction	Number of Adverse Events	Potentially Serious	% of Total Adverse Event Reactions
Pyrexia	159	x	4.37%
Syncope	98	x	2.70%
Tachycardia	27	x	0.74%
Pericarditis	23	x	0.63%
Seizure	21	x	0.58%
Expired product administered	17	x	0.47%
Product administered to patient of inappropriate age	16	x	0.44%
Appendicitis	12	x	0.33%
Myocarditis	9	x	0.25%
Adverse event following immunisation	7	x	0.19%
Hypotension	6	x	0.17%
Kawasaki's disease	6	x	0.17%
Loss of consciousness	6	x	0.17%

MedDRA reaction	Number of Adverse Events	Potentially Serious	% of Total Adverse Event Reactions
Pneumonia	4	x	0.11%
Urinary incontinence	4	x	0.11%
Cardiac arrest	3	x	0.08%
Myocarditis/pericarditis	3	x	0.08%
Carditis	2	x	0.06%
Product administered at inappropriate site	2	x	0.06%
Vaginal haemorrhage	2	x	0.06%
Demyelination	1	x	0.03%
Myocardial infarction	1	x	0.03%
Pleurisy	1	x	0.03%
Total Potentially Serious Adverse Events	**430**	**x**	**11.8%**
Total Adverse Event Reactions	**3635**		**100%**

Table 5: Potentially serious adverse events.

8.0 ITEM 3

Since 1 February 2021, how many Deaths were reported in the DAENs in adolescents and adults following Covid-19 Vaccines?

8.1 Since 1 February 2021, 884 Deaths have been reported in the DAENs database following Covid- 19 Vaccines (all ages).

8.2 After removal of the Deaths in 5-11 year olds, that leaves 879 Deaths reported in DAENs.

8.3 As mentioned, in Item 1 above, there are a number of reports of Death in DAENs where no age is specified. I have reviewed in excess of 90% of these deaths and 147 of them had no age detailed against them. That is 17.6% of the Deaths did not have an age specified, so I have extrapolated that to be 156 Deaths out of the total 884 Deaths (all ages) where no age is specified.
Source: Death Sample link https://1drv.ms/x/s!Al71AGIGLVVzgkwl1C85ztAq5BTW?e=nz49ZT

8.4 Therefore, from the DAENs data, there are 723 deaths that have been reported in adolescents and adults following Covid-19 Vaccines (after removal of the unspecified age Deaths and Deaths in 5-11 year olds).

8.5 Table 6 below sets out the Deaths reported on the DAENs website following Covid-19 Vaccines per age cohort is set out as follows:

	Deaths 1 February 2021 to 8 June 2022
Infant deaths (one foetal death) not counted	0
Deaths in 5-11 years	5
Deaths in adolescents and adults	723
Unspecified Age Deaths	156
Total Deaths	884

Table 6: Adolescent and adult deaths from 1 February 2021 to 8 June 2022

9.0 ITEM 4

Since 1 February 2021, how many adverse events were reported in DAENs associated with adolescents and adults following Covid-19 Vaccines?

9.1 Since 1 February 2021, there were 131,991 Adverse Events reported in DAENs following Covid-19 Vaccines (all ages), as per the "Number of reports (cases)" in the screenshot from the DAENs website below:

Home › Safety information › Safety information & education

A- A+ Share

Database of Adverse Event Notifications - medicines

« New search | « Modify search

Important information! The TGA uses adverse event reports to identify when a safety issue may be present.

- An adverse event report does **not** mean that the medicine is the cause of the adverse event.
- If you are experiencing an adverse event, or think you may be experiencing one, please **seek advice** from a health professional as soon as possible.
- The TGA strongly advises people taking prescription medicines **not** to change their medication regime without prior consultation with a health professional.

Related information

- About the DAEN - medicines
- Report an adverse event
- Consumer Medicines Information
- Product Information
- DAEN - medicines: consumer questions and answers

5 medicines selected between 01/02/2021 - 08/06/2022.

Search results

The results are shown in two tabs.

Number of reports (cases): **131991**

Number of cases with a single suspected medicine: **129244**

Number of cases where death was a reported outcome: **884**

Screenshot 1: Adverse Events reported in DAENs following Covid-19 Vaccines (all ages)

9.2 Of those Adverse Events reported, the DAENs database states 129,244 are "with a single medicine". That is the Adverse Event was following a single medication, ie Covid-19 Vaccine. I do not use this number for my analysis.

9.3 Separately, I have reviewed the Adverse Events by Covid-19 Vaccine and have set these figures out in Table 7 below.

Vaccine Type	Adverse Events	Suspected Single Medication	Deaths as a Reported Outcome
Pfizer Comirnaty	76,938	75,110	370
Astra Zeneca	47,567	46,553	464
Nuvaxovid	753	721	1
Spikevax	6,506	6,283	25
Type Not Specified	620	577	25
Total	**132,384***	**129,244**	**885***

Table 7: Total of Adverse Events reported by Covid-19 Vaccine type since 1 February 2021 – see screenshot in Schedule E

9.4 The number of Adverse Event "report (cases)" on the DAENs website is 131,991 (screenshot 1 above). This number is different to the number of Adverse Events I tallied up by each Covid-19 Vaccine type by 393 events. From the data, I am not able to explain this difference.

9.5 The number of Deaths I tallied up by Covid-19 Vaccine type is 885 and is also different to the number of Deaths reported on the DAENs website (884) (screenshot 1 above). From the data, I am not able to explain this difference.

9.6 Of the 132,384 Adverse Events reported since 1 February 2021 in DAENs, there were 22,007 Adverse Events that were unspecified in terms of age. I have set these out in Table 8.

Vaccine Type	Unspecified Adverse Events 1 February 2021 to 9 January 2022	Unspecified Adverse Events 10 January 2022 to 8 June 2022	Total Unspecified Adverse Events 1 February 2021 to 8 June 2022
Pfizer Comirnaty	9,345	4,082	13,427
Astra Zeneca	6,923	616	7,539
Nuvaxovid (Moderna)	0	65	65
Spikevax (Moderna)	341	409	750
Covid-19 TNS	177	49	226
Total	16,786	5,221	22,007

Table 8: Unspecified Adverse Events from 1 February 2021 to 8 June 2022

9.7 As explained under Item 3 above, unspecified means that the age range was left blank or noted with hyphens. These Adverse Events therefore could cover any age.

9.8 Links to the original source data set to derive unspecified Adverse Events follows. This data set also provided adverse events in infants 0-4 and children 5-11.
Source: DAENs1 February 2021 to 9 January 2022 https://1drv.ms/x/s!Al71AGIGLVVzglBTiDtJYJ_v-JqM?e=Zqz2bD
*Source: DAENs 10 January 2022 to 8 June 2022*https://1drv.ms/x/s!Al71AGIGLVVzgk90LkH0sKUeqH9b?e=0Y6AZ0

9.9 Table 9 below shows the calculation for the Number of Adverse Events for adolescents and adults from 1 February 2021 to 8 June 2022.

Vaccine Type	Number of Reports (Cases) Adverse Events All Ages 1 February 2021 to 8 June 2022	Number of Reports(Cases) Adverse Events Unspecified ages 1 February 2021 to 8 June 2022	Number of Reports (Cases) Adverse Events 5-11 Years 10 January 2022 to 8 June 2022	Number of Reports (Cases) Adverse Events 0-4 years 10 January 2022 to 8 June 2022	Number of Reports (Cases) Adverse Events Adolescents and Adults 1 February 2021 to 8 June 2022
Pfizer Comirnaty	76,938	13,427	1371	22	62,118
Astra Zeneca	47,567	7,539	3	1	40,024
Nuvaxovid (Moderna)	753	65	0	0	688
Spikevax	6,506	750	6	1	5749
Type Not Specified	620	226	10	0	384
Total (by ind Covid vaccine type)	**132,384**	**22,007**	**1390**	**24**	**108,963**
Total (all Covid vaccines)	**131,991**	**22,007**	**1390**	**24**	**108,570**

Table 9: Number of adverse events in adolescents and adults by Covid-19 Vaccine type since 1 February 2021

9.10 There are somewhere between 108,570 and 108,963 Adverse Events from 1 February 2021 to 8 June 2022 which have been reported by the TGA as relating to adolescents and adults following Covid-19 Vaccine. This includes the 28 Adverse Events in 5-11 year olds which occurred prior to 10 January 2022 (as detailed in Schedule C to this report). Removing the Adverse Events in 5-11 year olds prior to roll out of Covid-19 Vaccines to this age group, leaves 108,542 and 108,935 Adverse Events in adolescents and adults.

9.11 There are no COVID-19 Vaccines that have been provisionally approved or otherwise for children <5, therefore I am unable to explain why there are a number of Adverse Events reported in 0-4 year olds.

10.0 ITEM 5

Where the TGA safety report numbers differ from DAENs, I have also been asked to comment on the reporting in the TGA safety reports for Adverse Events following Covid-19 Vaccines with respect children 5-11 and all ages.

10.1 In my previous reports, I have compared reporting of Adverse Events in NON-covid Vaccines to Covid-19 Vaccines. On 31 January 2022, the likelihood of someone having an Adverse Event as the result of a NON-Covid Vaccine (between 2010-2020) was 1 in every 10,000 doses. With Covid-19 Vaccines the likelihood of someone having an Adverse Events as the result of the vaccine was 23 Adverse Events per 10,000 doses as at 31 January 2022. This is highlighted in Table 10 below.

10.2 Using the TGA's more up to date data, the likelihood now of someone having an adverse event as the result of a Covid-19 vaccine as at 5 June 2022 is 21.87 Adverse Events per 10,000 doses. This is 20 times worse than Non-covid times and is reasonably consistent with the Adverse Events I was reporting on at the end of January 2022.

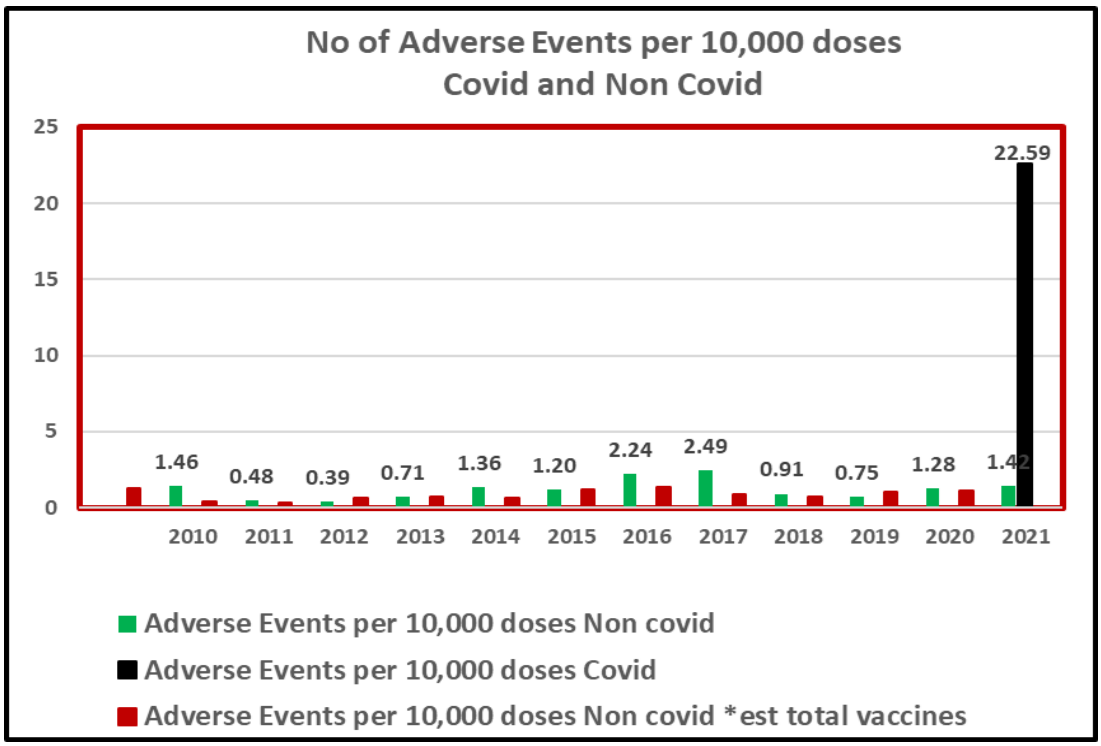


Table 10: – number of Adverse Events reported per 10,000 doses between Non-Covid (2010-2020) and Covid-19 (2021) Vaccines

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END OF REPORT

Schedule A includes CV.

"A"

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Resume

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Personal Profile

I am an internationally experienced director, senior executive, advisor, leader & business transformation and performance improvement specialist.

I have deep experience and knowledge of strategic problem solving and frameworks, delivering large scale projects and am a qualified and licensed change and transformation leader, statistician, facilitator and management practitioner.

I have extensive commercial expertise & operate across the end to end value chain of the organisation.
I lead large scale high value creation, high corporate priority initiatives to generate long term sustainable results using advanced tools and optimisation techniques in complex organisations through holistic leveraging of people, process, technology and capital. The value that I bring to corporations is in increased revenue through improved customer service levels, reduced costs driving improved ROI through improved purchasing, and operational performance, improved cash flow, through reduced lead times and improved product velocity through supply chain. All of this on a sound base of optimised operational performance linked to the corporations' goals and objectives using sound change management models and practices.

I have 12 years solid blue-chip corporate experience working at the highest levels in E.I. Du Pont de Nemours Pty Ltd and Coca Cola Amatil as well as 10 years consulting with firms such as Partners in Performance, Maxx implementation and Momentum Partners as well as directly to clients.

My work has been in the areas of sustainable and timely value creation through strategy, business planning, business portfolio optimisation, capital value maximisation, business and supply chain management, planning and optimisation, procurement and strategic sourcing and all aspects of achieving and sustaining operational excellence.

I am an executive, advisor, consultant, and contractor, seeking roles which will allow me to use my broad and deep expertise for the long term benefit for a selection of specially selected businesses.

Career Highlights so far…..

E. I. Du Pont de Nemours Pty Ltd: With Chad Holliday, the CEO and Chairman of the entire Du Pont co and the 34 Strategic Business Unit leaders of Du Pont globally, I developed the Asia Pacific Strategic planning process and then the Strategic plan for Du Pont in Asia Pacific. I have in depth detailed knowledge of every one of Du Pont's strategic portfolios. I also developed the Global Strategic Business unit pre-profit objective process, which was required to align the global business unit profit objectives with the board expectations which delivered billions in revenue to the global Du Pont business. Developed Du Pont global supply chain approach in Printing and Publishing and Medical x-ray film businesses in preparation for their eventual sale.

CCA: With Mark Clark director of CCA, and reporting to the board, responsible for the optimisation of the entire end to end value chain including development of planning systems and processes such as D&OP across Asia Pacific which delivered coke to within an arms' reach of desire at the desired cost adding many hundreds of millions in value across AP.

BlueScope Steel: With Len Blackmore VP of Procurement, established and ran the PMO within BlueScope Steel (second most critical initiative in corporation after safety.) Developed PMO rules, governance and operating procedures. PMO included several thousand projects occurring across the organisation, accounting for more than $Billion in cost and many hundreds of millions in savings potential.

QR: With Paul Sonego VP, Lead capital value maximisation team within QR prior to listing and name change to Aurizon. Delivered millions in savings to the corporation in below and above rail areas. Employed specifically to work with McKinsey.

Mondelez: With Hunter Burke VP, Led major global transformation initiative for EEMEA establishing the basis for profitable growth and sustainability into the future.

Executive director (CTS) where I consult to multinational corporations. My business is a channel partner of IBM which ensures that I am in the best position to introduce the most advanced technology into corporations to transform their operations.

Core Competencies

- **Leadership -** Personal and Professional Development Focus.
- **People Skills -** Proven and demonstrated ability to partner, influence and inspire
- **Demonstrated superior supply chain and value chain leadership capability -** Demonstrated capability to work with and 'transform' value chains and organisations in a way that engages positively all stakeholders and results in sustainable outcomes.
- **Results focused strategic planning capability -** Developed and tested in several top 100 multinationals.
- **Extensive strategic marketing capability -** Demonstrated capability in reviewing products and services and how they align with markets, growth industries and key drivers of growth, (completed for most AP countries, including Australia, Europe and US) and the implications for the business.
- **Internationally developed and results focused organizational problem solving skills** as well as demonstrated capability in benchmarking profitability.(globally) Demonstrated capability in most basic organizational problem solving to high level development of complex models and systems to optimize performance.
- **Superior Quantitative capability and disciplined business approach** – Optimised the planning and operations of the entire end to end value chain across APAC for CCA. Qualified statistician using advanced techniques and technology.
- **Sound knowledge of Asia Pacific countries, economies and cultures -** I have lived, worked and been required to deliver results on every continent and as such have internationally developed business skills and highly developed cultural sensitivity.
- **Superior ability to influence-** I have proven and demonstrated ability to partner, influence and inspire at all levels in an organisation, from very senior management through to operations.
- **P&L Accountability –** I have been accountable for financial outcomes, budgets and direct reports across global regions such as LA & APAC.

Experience

- I have worked in many areas including: Global Value/Supply Chain strategy, planning & operational improvement (S&OP), Business Strategy, development, implementation, & benefits realisation (suppliers, competitors, customers, market conditions, risk assessment and mitigation, Portfolio Optimisation, transforming businesses into money making powerhouses including innovation and commercialisation ,Leading Business transformation & cross functional Change Program Delivery, Restructuring & rationalisation, Outsourcing, divestment or acquisition, Strategic partnerships - Realising the business case, Procurement, Strategic Sourcing, including commercial negotiation, Capital Value Maximisation (CVM) improving capital, resource utilisation & productivity , pre and post merger separation and integration and the analysis of all of the above.
- I have worked with more than 40 Multinationals & many medium sized businesses. Every assignment that I have ever had, has involved problem solving (of some kind) and as such has needed my analytic skills, to measure the current state and indeed work out what needs to be done, to deliver the appropriate output, then measure the impact of initiatives implemented.
- Demonstrated capability in **broad range of industries**: FMCG, Pharmaceuticals, Healthcare, Printing and Publishing, Chemicals, Services, Industrial products, heavy industrial including steel manufacturing, rail infrastructure and Mining. I have worked in industrial, consumer and service industries.

- I have consulted independently; both directly to my clients and to a variety of tier 1strategy and operational consulting firms. I am an organizational strategic and operational improvement specialist and my focus is on all aspects of making the organization work better, and then delivering profitable growth faster. I work on the organization as well as in it. I work from the top down
- My skills apply to large and small organizations although my primary experience is in multinational corporations. I have consulted to 10 major multinationals and 1 GOC since 2003 as well as several national, and privately held companies. I have fulfilled interim **senior executive roles including CEO and General Manager.**
- Prior to 2005 I worked in line management roles and internal consulting roles, at the very highest levels of E.I. Du Pont. De Nemours and Coca Cola Amatil. **With Chad Holliday, the CEO and Chairman of the entire Du Pont company and subsequently with the 34 Strategic Business Unit leaders of Du Pont globally**.
- As a Business and supply chain strategist for **Coca Cola (Amatil), responsible for the optimisation of the entire end to end value chain across Asia Pacific.**
- **My line of reporting for the last 15 years has been to directors, chairman, boards and global VP's.**
- I have lived, worked and been required to deliver results on every continent (short and long term assignments) in Japan, 11 other Asian countries, US, Europe and the UK as well as Australia and has as such well developed international business skills along with highly developed cultural sensitivity.

Career Summary

January 2005 to present	**Director, CTS (Corporate Transformation Services) Pty Ltd** **Panellist and Thought leader, Current and Convetit Advisor, Start-ups** **Engagement Manager and Consultant – Direct to client and to various tier 1 strategy and operational consulting firms including Partners in Performance reporting to Director Level**
September 1998 to January 2005	**Manager, Asia Pacific Customer Consumer Services Systems** **Coca Cola Amatil (Asia Pacific) - Reporting to Director level**
September 1996 to August 1998	**Business Manager P&P AP (Asia Pacific), P&L responsibility** **E.I. Du Pont de Nemours Pty Ltd - Reporting to Regional Director P&P– AP**
September 1994 to August 1996	**Regional Manager LAAP (Latin America Asia Pacific), P&L responsibility** **E.I. Du Pont de Nemours Pty Ltd - Reporting to VP of finance and Global VP Printing and Publishing – plus special assignments for CEO and Chairman**
September 1993 to August 1994	**Manager, Marketing services and export – Supply Chain (Asia Pacific), Du Pont in Asia Pacific** **Reporting to General Manager P&P, Australia**
September 1991 to August 1993	**Strategic Planning Consultant** **Du Pont in Asia Pacific - Reporting to Director of Finance in Asia Pacific and Chairman of Asia Pacific**
October 1990 to August 1991	**Strategic Planning Consultant – Du Pont (Australia)** **Reporting to Country Manager Du Pont (Australia)**

Education

B. Sc (Majors Statistics and Psychology) Sydney University
M. App. Stats (Masters in Applied Statistics) Macquarie University
M.B.A (Business Strategy, Management and Leadership) University of Technology, Sydney

Company director training and FAICD qualification received
Completed International Company directors qualification

Key Training Courses

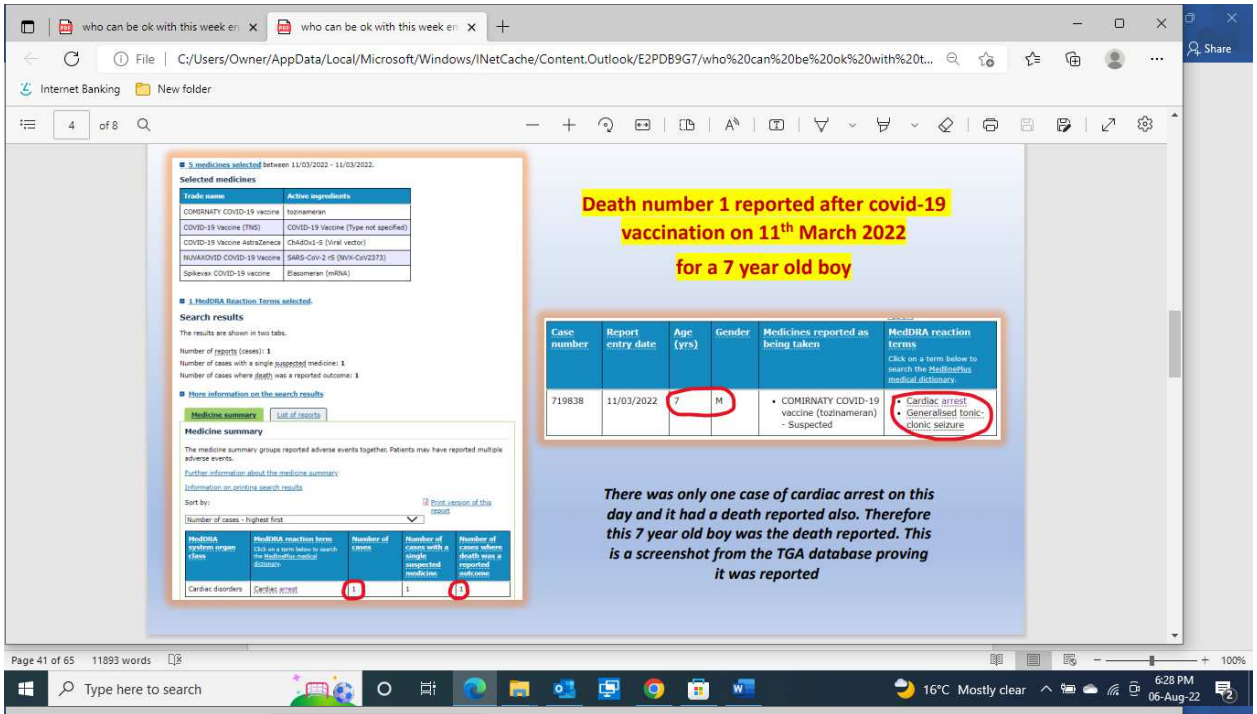
- Extensive and continuous responsibility for my own personal and professional development has meant that I have attended numerous training courses, extending from technical application training to human resource training.

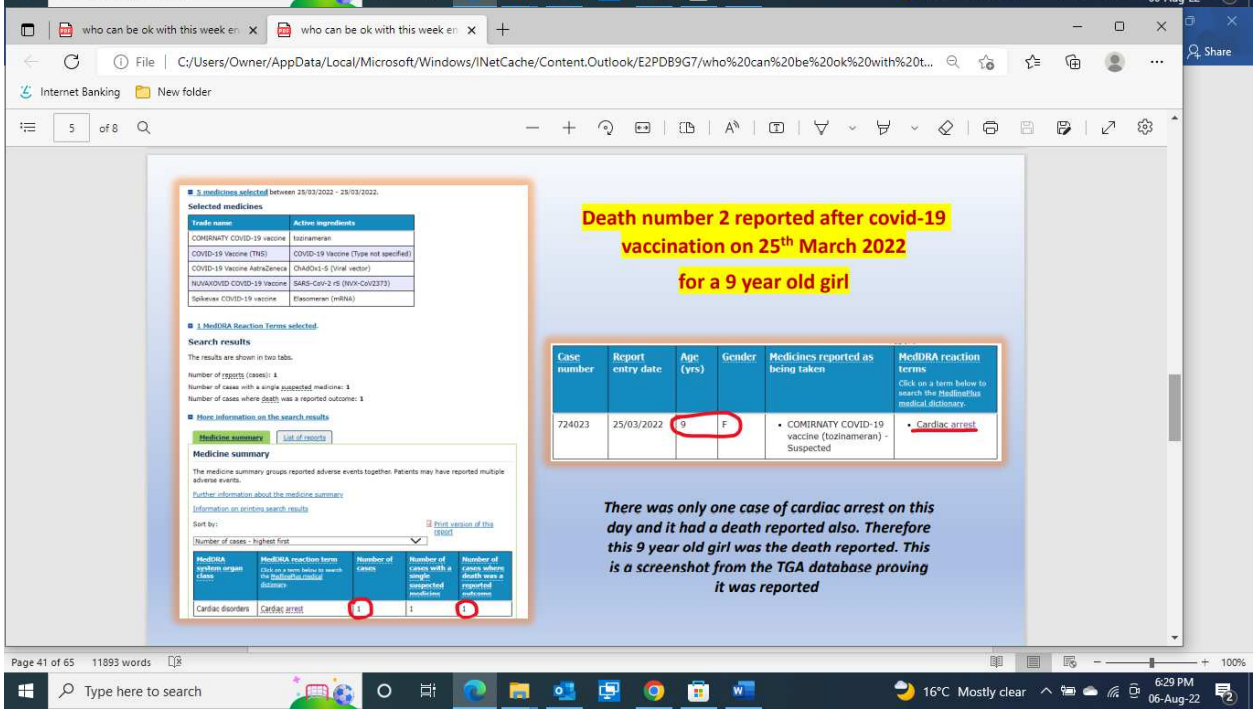
1990	**E.I.Du Pont de Nemours Business Strategy and Planning – Gary Hamel**
1990	**E.I Du Pont de Nemours Safety training**
1990	**E.I.Du Pont de Nemours – Organisational Effectiveness Training**
1992	**Envisioning the future – Ram Charam – Ed Woollard then CEO and chairman of Du Pont and senior Du Pont SBU leaders**
1992 to 1996	**Various organisational effectiveness training and change management programmes, various strategy development training sessions, interpersonal behaviour training, relationship mastery, negotiation training, physical mastery, emotional mastery, emotional intelligence training**.
1996 to 2003	**Strategic selling, leadership development, Value Chain planning, D&OP training, CSS training, MGSM Strategic management programme,**

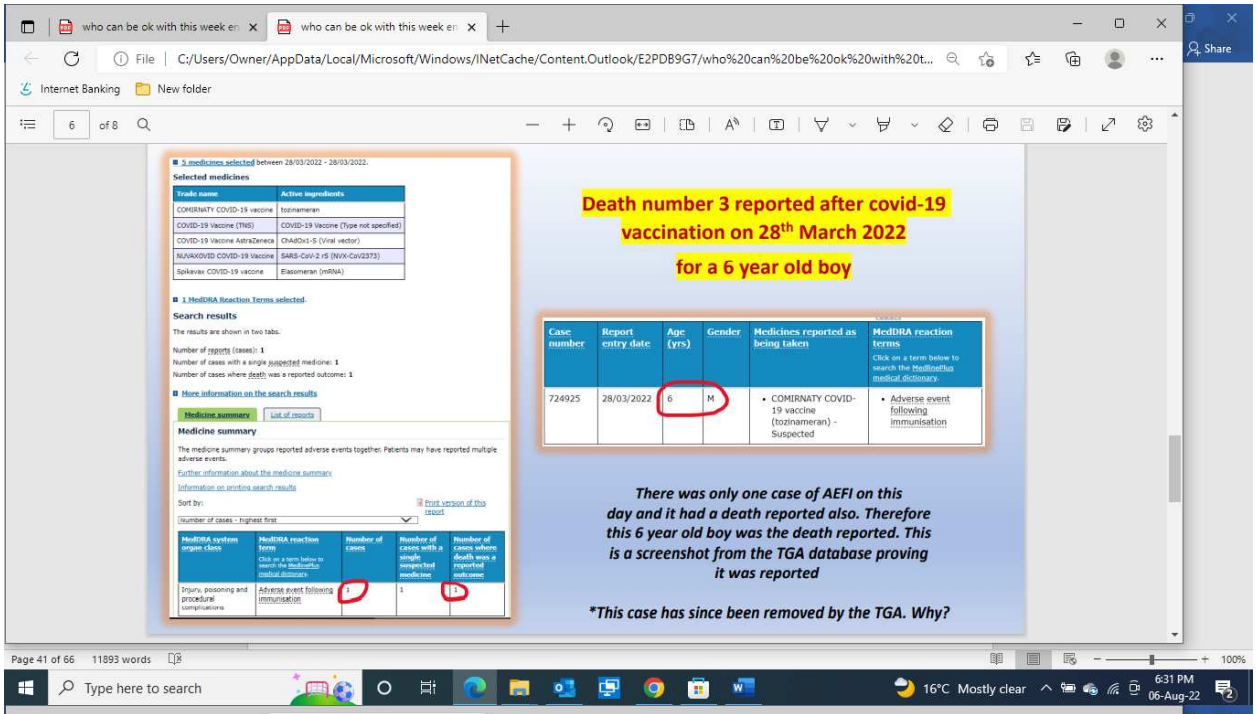
Personal Details

- Fellow of Australian Institute of Company directors (youngest ever)
- Interests are in human group psychology and organisational behaviour, Business strategy and value chain.
- Keen collector of antique furniture from Europe and the Orient.
- Enjoys keeping fit, Ashtanga yoga and walking

SCHEDULE B – from Item 1 - screenshots of DAENs database of 5-11 year olds where Death was the reported outcome



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Share
Internet Banking
New folder
6 of 8
5 medicines selected between 28/03/2022 - 28/03/2022.
Selected medicines
Trade name | Active ingredients
COMIRNATY COVID-19 vaccine | tozinameran
COVID-19 Vaccine (TNS) | COVID-19 Vaccine (Type not specified)
COVID-19 Vaccine AstraZeneca | ChAdOx1-S (Viral vector)
NUVAXOVID COVID-19 Vaccine | SARS-CoV-2 rS (NVX-CoV2373)
Spikevax COVID-19 vaccine | Elasomeran (mRNA)
1 MedDRA Reaction Terms selected.
Search results
The results are shown in two tabs.
Number of reports (cases): 1
Number of cases with a single suspected medicine: 1
Number of cases where death was a reported outcome: 1
More information on the search results
Medicine summary
List of reports
Medicine summary
The medicine summary groups reported adverse events together. Patients may have reported multiple adverse events.
Further information about the medicine summary
Information on printing search results
Sort by:
Print version of this report
Number of cases - highest first
MedDRA system organ class | MedDRA reaction term | Number of cases | Number of cases with a single suspected medicine | Number of cases where death was a reported outcome
Injury, poisoning and procedural complications | Adverse event following immunisation | 1 | 1 | 1
Death number 3 reported after covid-19 vaccination on 28th March 2022
for a 6 year old boy
Case number | Report entry date | Age (yrs) | Gender | Medicines reported as being taken | MedDRA reaction terms
Click on a term below to search the MedlinePlus medical dictionary.
724925 | 28/03/2022 | 6 | M | • COMIRNATY COVID-19 vaccine (tozinameran) - Suspected | • Adverse event following immunisation
There was only one case of AEFI on this day and it had a death reported also. Therefore this 6 year old boy was the death reported. This is a screenshot from the TGA database proving it was reported
*This case has since been removed by the TGA. Why?
Page 41 of 66
11893 words
100%
Type here to search
16°C Mostly clear
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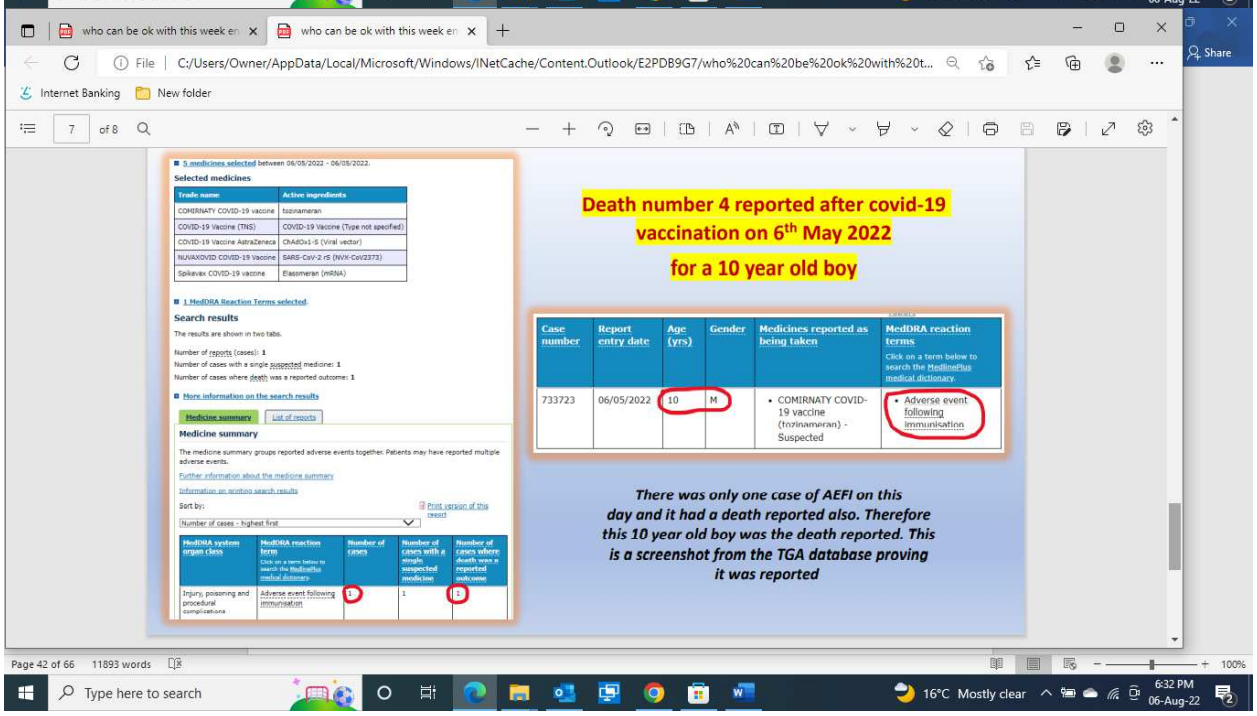
06-Aug-22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Share
Internet Banking
New folder
7 of 8
5 medicines selected between 06/05/2022 - 06/05/2022.
Selected medicines
Trade name | Active ingredients
COMIRNATY COVID-19 vaccine | tozinameran
COVID-19 Vaccine (TNS) | COVID-19 Vaccine (Type not specified)
COVID-19 Vaccine AstraZeneca | ChAdOx1-S (Viral vector)
NUVAXOVID COVID-19 Vaccine | SARS-CoV-2 rS (NVX-CoV2373)
Spikevax COVID-19 vaccine | Elasomeran (mRNA)
1 MedDRA Reaction Terms selected.
Search results
The results are shown in two tabs.
Number of reports (cases): 1
Number of cases with a single suspected medicine: 1
Number of cases where death was a reported outcome: 1
More information on the search results
Medicine summary
List of reports
Medicine summary
The medicine summary groups reported adverse events together. Patients may have reported multiple adverse events.
Further information about the medicine summary
Information on printing search results
Sort by:
Print version of this report
Number of cases - highest first
MedDRA system organ class | MedDRA reaction term | Number of cases | Number of cases with a single suspected medicine | Number of cases where death was a reported outcome
Injury, poisoning and procedural complications | Adverse event following immunisation | 1 | 1 | 1
Death number 4 reported after covid-19 vaccination on 6th May 2022
for a 10 year old boy
Case number | Report entry date | Age (yrs) | Gender | Medicines reported as being taken | MedDRA reaction terms
Click on a term below to search the MedlinePlus medical dictionary.
733723 | 06/05/2022 | 10 | M | • COMIRNATY COVID-19 vaccine (tozinameran) - Suspected | • Adverse event following immunisation
There was only one case of AEFI on this day and it had a death reported also. Therefore this 10 year old boy was the death reported. This is a screenshot from the TGA database proving it was reported
Page 42 of 66
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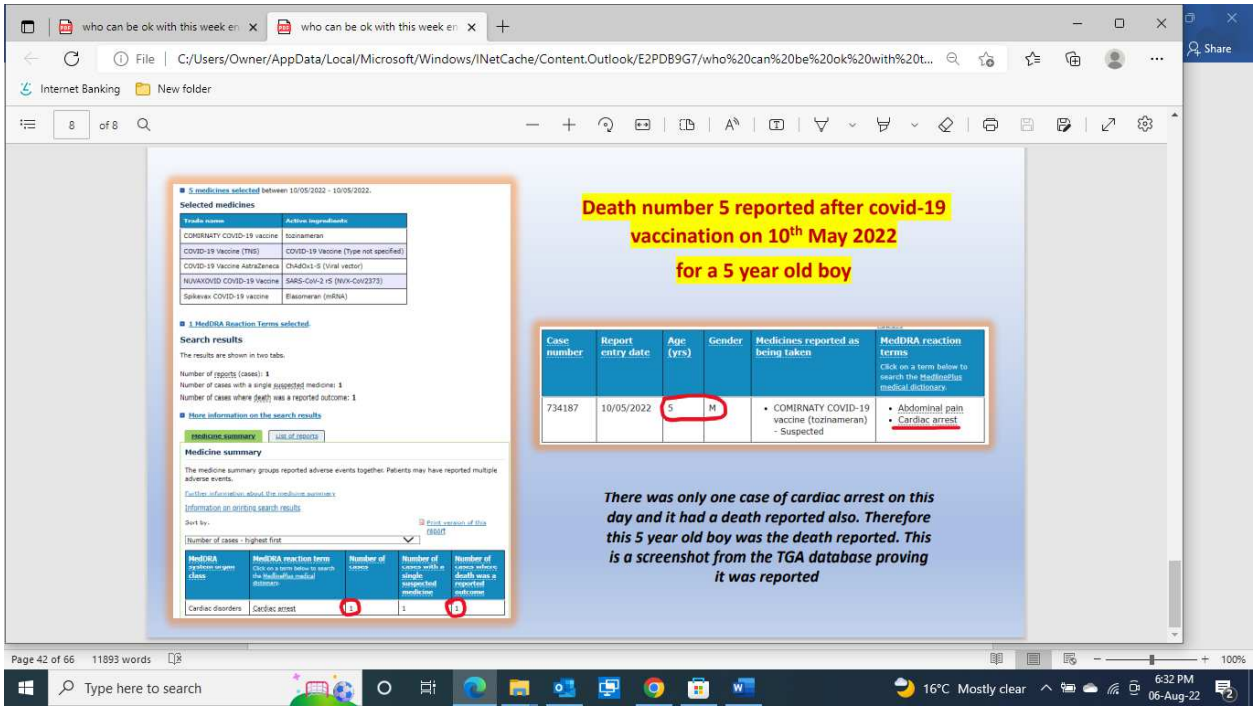
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Share
Internet Banking
New folder
8 of 8
5 medicines selected between 10/05/2022 - 10/05/2022.
Selected medicines
Trade name | Active ingredients
COMIRNATY COVID-19 vaccine | tozinameran
COVID-19 Vaccine (TN5) | COVID-19 Vaccine (Type not specified)
COVID-19 Vaccine AstraZeneca | ChAdOx1-S (Viral vector)
NUVAXOVID COVID-19 Vaccine | SARS-CoV-2 rS (NVX-CoV2373)
Spikevax COVID-19 vaccine | Elasomeran (mRNA)
1 MedDRA Reaction Terms selected
Search results
The results are shown in two tabs.
Number of reports (cases): 1
Number of cases with a single suspected medicine: 1
Number of cases where death was a reported outcome: 1
More information on the search results
medicine summary
list of reports
Medicine summary
The medicine summary groups reported adverse events together. Patients may have reported multiple adverse events.
Further information about the medicine summary
Information on printing search results
Sort by:
Print version of this report
Number of cases - highest first
MedDRA system organ class
MedDRA reaction term
Click on a term below to search the MedlinePlus medical dictionary
Number of cases
Number of cases with a single suspected medicine
Number of cases where death was a reported outcome
Cardiac disorders
Cardiac arrest
1
1
1
Death number 5 reported after covid-19 vaccination on 10th May 2022 for a 5 year old boy
Case number
Report entry date
Age (yrs)
Gender
Medicines reported as being taken
MedDRA reaction terms
Click on a term below to search the MedlinePlus medical dictionary
734187
10/05/2022
5
M
• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected
• Abdominal pain
• Cardiac arrest
There was only one case of cardiac arrest on this day and it had a death reported also. Therefore this 5 year old boy was the death reported. This is a screenshot from the TGA database proving it was reported
Page 42 of 66
11893 words
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06-Aug-22

SCHEDULE C – Adverse Events reported in 5-11 year olds prior to 10 January 2022 following Covid-19 Vaccine

Case number	Report entry date	Age (years)	Gender	Medicines reported as being taken	MedDRA reaction terms
633664	29/09/2021	10	Male	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
635551	1/10/2021	10	Male	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
650124	25/10/2021	10	Male	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
658593	5/11/2021	10	Female	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
685756	21/12/2021	10	Male	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Vaccination error • Wrong product administered
651053	26/10/2021	11	Female	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Injection site reaction • Product administered to patient of inappropriate age • Vaccination error
651064	26/10/2021	11	Female	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Injection site reaction • Product administered to patient of inappropriate age • Vaccination error
653735	1/11/2021	11	Male	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
655365	3/11/2021	11	Female	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Injection site reaction • Product administered to patient of inappropriate age
658365	4/11/2021	11	Male	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Product administered to patient of inappropriate age • Vaccination error

Case number	Report entry date	Age (years)	Gender	Medicines reported as being taken	MedDRA reaction terms
664723	15/11/2021	11	Female	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
666052	17/11/2021	11	Not Specified	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
670461	23/11/2021	11	Female	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age
669960	23/11/2021	11	Not Specified	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
678287	7/12/2021	11	Male	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
679963	9/12/2021	11	Female	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Incorrect dose administered • Product administered to patient of inappropriate age • Vaccination error
680889	12/12/2021	11	Female	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
681491	14/12/2021	11	Female	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
683931	17/12/2021	11	Female	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
684667	20/12/2021	11	Female	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age • Vaccination error

Case number	Report entry date	Age (years)	Gender	Medicines reported as being taken	MedDRA reaction terms
688859	31/12/2021	11	Female	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
689991	5/01/2022	11	Male	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
690115	5/01/2022	11	Male	• Spikevax COVID-19 vaccine (Elasomeran (mRNA)) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
690395	6/01/2022	11	Male	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Incorrect dose administered • Product administered to patient of inappropriate age • Vaccination error
580704	6/07/2021	8	Male	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Product administered to patient of inappropriate age • Vaccination error
635726	1/10/2021	8	Female	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Fatigue • Pain in extremity • Product administered to patient of inappropriate age • Vaccination error
526666	25/03/2021	9	Female	• COMIRNATY COVID-19 vaccine (tozinameran) - Suspected	• Headache • Myalgia • Product administered to patient of inappropriate age
580197	5/07/2021	9	Male	• COVID-19 Vaccine AstraZeneca (ChAdOx1-S (Viral vector)) - Suspected	• Product administered to patient of inappropriate age

SCHEDULE D – Total Adverse events reported by DAENs in children 5-11 from 10 January 2022 to 8 June 2022 being 1,390 Adverse Events, which resulted in 3,635 reactions - classified as per the MedDRA reaction types. Types listed by frequency from highest to lowest.

MedDRA reaction	Count	Potentially Serious	% of Total
Chest pain	211		5.80%
Vomiting	163		4.48%
Pyrexia	159	x	4.37%
Headache	131		3.60%
Abdominal pain	127		3.49%
Dyspnoea	118		3.25%
Vaccination error	111		3.05%
Nausea	110		3.03%
Lethargy	99		2.72%
Syncope	98	x	2.70%
Rash	90		2.48%
Dizziness	84		2.31%
Pallor	82		2.26%
Urticaria	76		2.09%
Injection site reaction	66		1.82%
Fatigue	57		1.57%
Myalgia	52		1.43%
Diarrhoea	50		1.38%
Malaise	45		1.24%
Palpitations	44		1.21%
Presyncope	41		1.13%
Chest discomfort	39		1.07%
Lymphadenopathy	39		1.07%
Arthralgia	33		0.91%
Injection site pain	31		0.85%
Cough	30		0.83%
Oropharyngeal pain	30		0.83%

MedDRA reaction	Count	Potentially Serious	% of Total
Pain in extremity	29		0.80%
Tachycardia	27	x	0.74%
Rash pruritic	26		0.72%
Concomitant disease aggravated	25		0.69%
Pruritus	25		0.69%
Decreased appetite	24		0.66%
Abdominal pain upper	23		0.63%
Incorrect dose administered	23		0.63%
Pericarditis	23	x	0.63%
Hyperhidrosis	22		0.61%
Cold sweat	21		0.58%
Seizure	21	x	0.58%
Covid-19	20		0.55%
Asthma	19		0.52%
SARS-CoV-2 test positive	18		0.50%
Expired product administered	17	x	0.47%
Rhinorrhoea	17		0.47%
Chills	16		0.44%
Electrocardiogram abnormal	16		0.44%
Product administered to patient of inappropriate age	16	x	0.44%
Influenza like illness	15		0.41%
Swelling face	14		0.39%
Epistaxis	13		0.36%
Lymphadenitis	13		0.36%
Anxiety	12		0.33%
Appendicitis	12	x	0.33%
Eye swelling	12		0.33%
Wrong product administered	12		0.33%
Abdominal discomfort	11		0.30%
Feeling hot	11		0.30%

MedDRA reaction	Count	Potentially Serious	% of Total
Influenza	11		0.30%
Hypersensitivity	10		0.28%
Paraesthesia	10		0.28%
Rash erythematous	10		0.28%
Angioedema	9		0.25%
Croup infectious	9		0.25%
Lip swelling	9		0.25%
Myocarditis	9	x	0.25%
Pain	9		0.25%
Troponin	9		0.25%
Musculoskeletal chest pain	8		0.22%
Ocular hyperaemia	8		0.22%
Throat tightness	8		0.22%
Tremor	8		0.22%
Wheezing	8		0.22%
Adverse event following immunisation	7	x	0.19%
C-reactive protein increased	7		0.19%
Electrocardiogram	7		0.19%
Erythema	7		0.19%
Gastroenteritis	7		0.19%
Herpes zoster	7		0.19%
Neck pain	7		0.19%
Rash maculo-papular	7		0.19%
Troponin increased	7		0.19%
Asthenia	6		0.17%
Cyanosis	6		0.17%
Disorientation	6		0.17%
Generalised tonic-clonic seizure	6		0.17%
Heart rate increased	6		0.17%
Hypotension	6	x	0.17%

MedDRA reaction	Count	Potentially Serious	% of Total
Inappropriate schedule of product administration	6		0.17%
Kawasaki's disease	6	x	0.17%
Loss of consciousness	6	x	0.17%
Muscle spasms	6		0.17%
Product preparation issue	6		0.17%
SARS-CoV-2 antibody test positive	6		0.17%
Sneezing	6		0.17%
Tonsillitis	6		0.17%
Underdose	6		0.17%
Vaccine breakthrough infection	6		0.17%
Varicella	6		0.17%
Arrhythmia	5		0.14%
Axillary pain	5		0.14%
Conjunctivitis	5		0.14%
Flushing	5		0.14%
Incorrect dosage administered	5		0.14%
Migraine	5		0.14%
Peripheral swelling	5		0.14%
Rash macular	5		0.14%
Rash papular	5		0.14%
Sleep disorder	5		0.14%
Throat irritation	5		0.14%
Abdominal lymphadenopathy	4		0.11%
Breakthrough Covid-19	4		0.11%
Dehydration	4		0.11%
Dysphonia	4		0.11%
Haematuria	4		0.11%
Heart rate irregular	4		0.11%
Injection site rash	4		0.11%
Irritability	4		0.11%

MedDRA reaction	Count	Potentially Serious	% of Total
Menstrual disorder	4		0.11%
Multisystem inflammatory syndrome in children	4		0.11%
Oropharyngeal discomfort	4		0.11%
Oxygen saturation decreased	4		0.11%
Periorbital swelling	4		0.11%
Photophobia	4		0.11%
Pneumonia	4	x	0.11%
Thrombocytopenia	4		0.11%
Urinary incontinence	4	x	0.11%
Vision blurred	4		0.11%
Visual impairment	4		0.11%
Anaphylactic reaction	3		0.08%
Cardiac arrest	3	x	0.08%
Contusion	3		0.08%
Costochondritis	3		0.08%
Diabetic ketoacidosis	3		0.08%
Dyspnoea exertional	3		0.08%
Dysuria	3		0.08%
Ear infection	3		0.08%
Electrocardiogram ST segment elevation	3		0.08%
Henoch-Schonlein purpura	3		0.08%
Infection	3		0.08%
Musculoskeletal stiffness	3		0.08%
Myopericarditis	3	x	0.08%
Nasal congestion	3		0.08%
Oral pruritus	3		0.08%
Painful respiration	3		0.08%
Pleuritic pain	3		0.08%
Pollakiuria	3		0.08%
Rash vesicular	3		0.08%

MedDRA reaction	Count	Potentially Serious	% of Total
Respiratory rate increased	3		0.08%
Somnolence	3		0.08%
Swollen tongue	3		0.08%
Tachypnoea	3		0.08%
Thirst	3		0.08%
Troponin I	3		0.08%
Troponin I increased	3		0.08%
Urinary tract infection	3		0.08%
Vertigo	3		0.08%
Viral infection	3		0.08%
Abdominal pain lower	2		0.06%
Acne	2		0.06%
Alopecia	2		0.06%
Bacterial infection	2		0.06%
Bell's palsy	2		0.06%
Cardiac murmur	2		0.06%
Carditis	2	x	0.06%
Confusional state	2		0.06%
Conjunctival hyperaemia	2		0.06%
Crying	2		0.06%
Delirium	2		0.06%
Dyspepsia	2		0.06%
Dysphagia	2		0.06%
Echocardiogram normal	2		0.06%
Electrocardiogram normal	2		0.06%
Erythema multiforme	2		0.06%
Exercise tolerance decreased	2		0.06%
Eye pain	2		0.06%
Eye pruritus	2		0.06%
Feeling abnormal	2		0.06%

MedDRA reaction	Count	Potentially Serious	% of Total
Feeling cold	2		0.06%
Fibrin D dimer increased	2		0.06%
Flank pain	2		0.06%
Fracture	2		0.06%
Haematemesis	2		0.06%
Hepatitis	2		0.06%
Hypoaesthesia	2		0.06%
Hypotonia	2		0.06%
IgA nephropathy	2		0.06%
Inflammation	2		0.06%
Inflammatory marker increased	2		0.06%
Joint swelling	2		0.06%
Lymph node pain	2		0.06%
Lymphopenia	2		0.06%
Mouth ulceration	2		0.06%
No adverse event	2		0.06%
Oligomenorrhoea	2		0.06%
Oral herpes	2		0.06%
Osteomyelitis	2		0.06%
Pain in jaw	2		0.06%
Pharyngeal swelling	2		0.06%
Pharyngitis	2		0.06%
Pityriasis rosea	2		0.06%
Postictal state	2		0.06%
Product administered at inappropriate site	2	x	0.06%
Psoriasis	2		0.06%
Purpura	2		0.06%
Red blood cell sedimentation rate increased	2		0.06%
Renal impairment	2		0.06%
Respiratory tract infection	2		0.06%

MedDRA reaction	Count	Potentially Serious	% of Total
Retching	2		0.06%
SARS-CoV-2 test	2		0.06%
SARS-CoV-2 test negative	2		0.06%
Scrotal swelling	2		0.06%
Secretion discharge	2		0.06%
Sensation of foreign body	2		0.06%
Sinus arrhythmia	2		0.06%
Sinus tachycardia	2		0.06%
Skin discolouration	2		0.06%
Skin exfoliation	2		0.06%
Swelling	2		0.06%
Synovitis	2		0.06%
Taste disorder	2		0.06%
Testicular swelling	2		0.06%
Tinnitus	2		0.06%
Tongue discomfort	2		0.06%
Tongue pruritus	2		0.06%
Type 1 diabetes mellitus	2		0.06%
Unresponsive to stimuli	2		0.06%
Upper respiratory tract infection	2		0.06%
Vaginal haemorrhage	2	x	0.06%
Abdominal distension	1		0.03%
Abnormal faeces	1		0.03%
Administration site irritation	1		0.03%
Allergy to arthropod sting	1		0.03%
Ankle fracture	1		0.03%
Appendicitis perforated	1		0.03%
Arthritis	1		0.03%
Aspartate aminotransferase increased	1		0.03%
Atrial tachycardia	1		0.03%

MedDRA reaction	Count	Potentially Serious	% of Total
Attention deficit hyperactivity disorder	1		0.03%
Autonomic nervous system imbalance	1		0.03%
Axillary mass	1		0.03%
Back pain	1		0.03%
Basal ganglia haemorrhage	1		0.03%
Basedow's disease	1		0.03%
Blood blister	1		0.03%
Blood creatine increased	1		0.03%
Blood creatine phosphokinase increased	1		0.03%
Blood glucose abnormal	1		0.03%
Blood glucose increased	1		0.03%
Blood pressure increased	1		0.03%
Blood pressure measurement	1		0.03%
Blood urea increased	1		0.03%
Bradycardia	1		0.03%
Breath holding	1		0.03%
Bundle branch block right	1		0.03%
Cardiac discomfort	1		0.03%
Cardiac disorder	1		0.03%
Cardiomegaly	1		0.03%
Cellulitis	1		0.03%
Cerebrovascular accident	1		0.03%
Chapped lips	1		0.03%
Cheilitis	1		0.03%
Chest wall mass	1		0.03%
Chest X-ray	1		0.03%
Chest X-ray abnormal	1		0.03%
Chest X-ray normal	1		0.03%
Chillblains	1		0.03%
Clonic convulsion	1		0.03%

MedDRA reaction	Count	Potentially Serious	% of Total
Coma scale abnormal	1		0.03%
Conjunctival haemorrhage	1		0.03%
Constipation	1		0.03%
Corneal reflex decreased	1		0.03%
Coronary artery aneurysm	1		0.03%
C-reactive protein	1		0.03%
Cutaneous vasculitis	1		0.03%
Deafness	1		0.03%
Demyelination	1	x	0.03%
Dermatitis	1		0.03%
Diabetes mellitus	1		0.03%
Dizziness postural	1		0.03%
Drug ineffective	1		0.03%
Dyskinesia	1		0.03%
Dyspareunia	1		0.03%
Dysphemia	1		0.03%
Ear pain	1		0.03%
Ear swelling	1		0.03%
Echocardiogram	1		0.03%
Eczema	1		0.03%
Electrocardiogram QRS complex prolonged	1		0.03%
Electroencephalogram abnormal	1		0.03%
Empyema	1		0.03%
Encephalopathy	1		0.03%
Endocarditis	1		0.03%
Enterocolitis	1		0.03%
Epidemic polyarthritis	1		0.03%
Epigastric discomfort	1		0.03%
Eructation	1		0.03%
Erythromelalgia	1		0.03%

MedDRA reaction	Count	Potentially Serious	% of Total
Excessive eye blinking	1		0.03%
Extensive swelling of vaccinated limb	1		0.03%
Extrasystoles	1		0.03%
Eye inflammation	1		0.03%
Eye irritation	1		0.03%
Eye movement disorder	1		0.03%
Eyelid oedema	1		0.03%
Febrile convulsion	1		0.03%
Feeling of body temperature change	1		0.03%
Foaming at mouth	1		0.03%
Food allergy	1		0.03%
Frequent bowel movements	1		0.03%
Gait disturbance	1		0.03%
Gastrointestinal infection	1		0.03%
Gastrooesophageal reflux disease	1		0.03%
Gianotti-Crosti syndrome	1		0.03%
Gingival blister	1		0.03%
Gingivitis	1		0.03%
Glassy eyes	1		0.03%
Goitre	1		0.03%
Haemoglobin decreased	1		0.03%
Haemoglobin increased	1		0.03%
Hallucination	1		0.03%
Hallucination, visual	1		0.03%
Hand fracture	1		0.03%
Head discomfort	1		0.03%
Heart rate decreased	1		0.03%
Heavy menstrual bleeding	1		0.03%
Hypertensive encephalopathy	1		0.03%
Hypoglycaemia	1		0.03%

MedDRA reaction	Count	Potentially Serious	% of Total
Hypothyroidism	1		0.03%
Increased appetite	1		0.03%
Influenza A virus test positive	1		0.03%
Influenza virus test positive	1		0.03%
Injection site erythema	1		0.03%
Injection site swelling	1		0.03%
Insomnia	1		0.03%
Intestinal obstruction	1		0.03%
Intracranial pressure increased	1		0.03%
Joint instability	1		0.03%
Kidney infection	1		0.03%
Lacrimation increased	1		0.03%
Limb discomfort	1		0.03%
Limb injury	1		0.03%
Lip discolouration	1		0.03%
Lip dry	1		0.03%
Lip ulceration	1		0.03%
Lipase increased	1		0.03%
Listless	1		0.03%
Lower respiratory tract infection	1		0.03%
Lymphadenopathy mediastinal	1		0.03%
Lymphocyte count decreased	1		0.03%
Lymphoedema	1		0.03%
Lymphoma	1		0.03%
Molluscum contagiosum	1		0.03%
Mood altered	1		0.03%
Multiple use of single-use product	1		0.03%
Muscle fatigue	1		0.03%
Muscle rigidity	1		0.03%
Muscle twitching	1		0.03%

MedDRA reaction	Count	Potentially Serious	% of Total
Muscular weakness	1		0.03%
Musculoskeletal discomfort	1		0.03%
Musculoskeletal pain	1		0.03%
Mydriasis	1		0.03%
Myelitis transverse	1		0.03%
Myocardial infarction	1	x	0.03%
Nasal discomfort	1		0.03%
Nasopharyngitis	1		0.03%
Neutrophilia	1		0.03%
Night sweats	1		0.03%
Nightmare	1		0.03%
Nystagmus	1		0.03%
Obstructive airways disorder	1		0.03%
Oesophageal discomfort	1		0.03%
Oral candidiasis	1		0.03%
Oral disorder	1		0.03%
Pain of skin	1		0.03%
Panic attack	1		0.03%
Paraesthesia oral	1		0.03%
Penile pain	1		0.03%
Perioral dermatitis	1		0.03%
Periorbital oedema	1		0.03%
Petechiae	1		0.03%
Petit mal epilepsy	1		0.03%
Pharyngeal erythema	1		0.03%
Pharyngeal paraesthesia	1		0.03%
Pleurisy	1	x	0.03%
Pneumothorax	1		0.03%
Polydipsia	1		0.03%
Polyuria	1		0.03%

MedDRA reaction	Count	Potentially Serious	% of Total
Post-acute COVID-19 syndrome	1		0.03%
Posterior reversible encephalopathy syndrome	1		0.03%
Posture abnormal	1		0.03%
Protein urine present	1		0.03%
Radius fracture	1		0.03%
Rectal haemorrhage	1		0.03%
Red blood cell count decreased	1		0.03%
Red blood cell sedimentation rate	1		0.03%
Respiratory distress	1		0.03%
Respiratory symptom	1		0.03%
Respiratory syncytial virus infection	1		0.03%
Rhinitis	1		0.03%
Rhinovirus infection	1		0.03%
Scarlet fever	1		0.03%
Scrotal oedema	1		0.03%
Scrotal pain	1		0.03%
Sepsis	1		0.03%
Serum ferritin increased	1		0.03%
Serum sickness	1		0.03%
Sinus bradycardia	1		0.03%
Sinus rhythm	1		0.03%
Sinusitis	1		0.03%
Skin reaction	1		0.03%
Skin warm	1		0.03%
Sleep terror	1		0.03%
Splenomegaly	1		0.03%
Staphylococcal bacteraemia	1		0.03%
Staphylococcal infection	1		0.03%
Staphylococcus test positive	1		0.03%
Status epilepticus	1		0.03%

MedDRA reaction	Count	Potentially Serious	% of Total
Streptococcus test	1		0.03%
Superior sagittal sinus thrombosis	1		0.03%
Supraventricular tachycardia	1		0.03%
Swelling of eyelid	1		0.03%
Tardive dyskinesia	1		0.03%
Temperature regulation disorder	1		0.03%
Testicular pain	1		0.03%
Tic	1		0.03%
Tongue dry	1		0.03%
Tonic clonic movements	1		0.03%
Tonic convulsion	1		0.03%
Trismus	1		0.03%
Troponin normal	1		0.03%
Vaccination site reaction	1		0.03%
Weight decreased	1		0.03%
White blood cell count increased	1		0.03%
Yellow skin	1		0.03%
Total	3635		100.00%

SCHEDULE E – Screenshots of total Adverse Events reported by DAENs per Covid-19 Vaccine type

- ***PFIZER VACCINE (01FEB2021TO08JUN2022):***

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Important information! The TGA uses adverse event reports to identify when a safety issue may be present.

- An adverse event report does **not** mean that the medicine is the cause of the adverse event.
- If you are experiencing an adverse event, or think you may be experiencing one, please **seek advice** from a health professional as soon as possible.
- The TGA strongly advises people taking prescription medicines **not** to change their medication regime without prior consultation with a health professional.

Related information

- About the DAEN - medicines
- Report an adverse event
- Consumer Medicines Information
- Product Information
- DAEN - medicines: consumer questions and answers

1 medicine selected between 01/02/2021 - 08/06/2022.

Search results

The results are shown in two tabs.

Number of reports (cases): **76938**

Number of cases with a single suspected medicine: **75110**

Number of cases where death was a reported outcome: **370**

- ***ASTRAZENECA (01FEB2021TO08JUN2022):***

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Related information

- About the DAEN - medicines
- Report an adverse event
- Consumer Medicines Information
- Product Information
- DAEN - medicines: consumer questions and answers

1 medicine selected between 01/02/2021 - 08/06/2022.

Search results

The results are shown in two tabs.

Number of reports (cases): **47567**

Number of cases with a single suspected medicine: **46553**

Number of cases where death was a reported outcome: **464**

- ***NUVAXOVID (01FEB2021TO08JUN2022):***

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Related information

- About the DAEN - medicines
- Report an adverse event
- Consumer Medicines Information
- Product Information
- DAEN - medicines: consumer questions and answers

1 medicine selected between 01/02/2021 - 08/06/2022.

Search results

The results are shown in two tabs.

Number of reports (cases): **753**

Number of cases with a single suspected medicine: **721**

Number of cases where death was a reported outcome: **1**

- ***SPIKEVAX (01 FEB 2021 TO 08 JUN 2022):***

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Related information

- About the DAEN - medicines
- Report an adverse event
- Consumer Medicines Information
- Product Information
- DAEN - medicines: consumer questions and answers

1 medicine selected between 01/02/2021 - 08/06/2022.

Search results

The results are shown in two tabs.

Number of reports (cases): **6506**

Number of cases with a single suspected medicine: **6283**

Number of cases where death was a reported outcome: **25**

- ***TYPE NOT SPECIFIED (01EB2021TO08JUN2022):***

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- The TGA strongly advises people taking prescription medicines **not** to change their medication regime without prior consultation with a health professional.

Related information

- About the DAEN - medicines
- Report an adverse event
- Consumer Medicines Information
- Product Information
- DAEN - medicines: consumer questions and answers

1 medicine selected between 01/02/2021 - 08/06/2022.

Search results

The results are shown in two tabs.

Number of reports (cases): **620**

Number of cases with a single suspected medicine: **577**

Number of cases where death was a reported outcome: **25**