File No. CI 20-01-29284

THE QUEEN'S BENCH
Winnipeg Centre

APPLICATION UNDER: *The Constitutional Questions Act*, C.C.S.M., c. 180

AND UNDER: The Court of Queen's Bench Rules, M.R. 553/88

IN THE MATTER OF: *The Public Health Act*, C.C.S.M. c. P210

BETWEEN:

GATEWAY BIBLE BAPTIST CHURCH, PEMBINA VALLEY BAPTIST CHURCH, REDEEMING GRACE BIBLE CHURCH, THOMAS REMPEL, GRACE COVENANT CHURCH, SLAVIC BAPTIST CHURCH, CHRISTIAN CHURCH OF MORDEN, BIBLE BAPTIST CHURCH, TOBIAS TISSEN, ROSS MACKAY

Applicants,

– and –

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA, DR. BRENT ROUSSIN in his capacity as CHIEF PUBLIC HEALTH OFFICER OF MANITOBA, and DR. JAZZ ATWAL in his capacity as ACTING DEPUTY CHIEF OFFICER OF HEALTH OF MANITOBA

Respondents.

AFFIDAVIT OF JAY BHATTACHARYA
SWORN MARCH 31, 2021

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Respondents.

AFFIDAVIT OF JAY BHATTACHARYA

I, JAY BHATTACHARYA of the City of Los Altos, in the County of Santa Clara, in the State of California,

MAKE OATH AND SAY AS FOLLOWS:

1. I have personal knowledge of the facts and matters hereinafter deposed to by me, except where same are stated to be based upon information and belief, and those I do verily believe to be true.

2. I have reviewed the affidavits filed by the Respondents in this matter, and I make this affidavit and a responding expert report in order to address the evidence provided by the Respondents in support of their Covid-19 Public Health Orders.

3. While the Respondents' affiants and experts address many topics related to my January 5, 2021 expert report, I note at the outset one overarching issue that their affiants did not address. In particular, nowhere do their affiants provide a formal analysis of the marginal benefits and vast harms of the various lockdown policies – church closures, restrictions on outdoor gatherings, restrictions on private in-home gatherings, restrictions on social interactions, etc. – that the Respondents have imposed. The Respondents' affiants provide their views and analyses on the benefits of these policies in terms of reduced COVID-19 disease spread, but do not provide any formal analyses of the harms of these policies, many of which I documented with reference to the scientific literature in my January 5, 2021 expert report. This insufficient consideration of a policy's harms violates a basic principle of public health, which I outlined in my expert report and which the Respondents did not contest.

4. In my responding expert report, I organize my responses to the Respondents' affiants on 9 topics: (1) the lack of a causal link between lockdown policies and subsequent growth in COVID-19 cases; (2) the evidence on emergence of mutated variants of the SARS-CoV-2 virus; (3) the relative inefficiency of asymptomatic viral carriers to infect others; (4)

errors in the polymerase chain reaction (PCR) test use to identity viral presence; (5) the futility of contact tracing programs to eliminate COVID-19 disease spread; (6) the Respondents' affiants' mischaracterization of the Great Barrington Declaration; (7) the possibility of effective focused protection of the vulnerable; (8) a problematic analysis by Dr. Jason Kindrachuk on the possibility of herd immunity as the long run outcome; and (9) a failure by the Respondents to consider the collateral harms of lockdown policies.

5. As of March 29, 2021, the online signature count on the Great Barrington Declaration has increased to include 13,796 medical & public health scientists, 41,890 medical practitioners and 764,085 concerned citizens around the world.

6. I acknowledge that in preparing my January 5, 2021 and March 31, 2021 expert reports and providing expert evidence, the Applicants' counsel explained that my role is to assist the court in determining the matters in issue. I further acknowledge that it is my duty to provide evidence that is fair, objective and non-partisan and to opine only on matters that are within my area of expertise. This duty prevails over any obligation that I may owe to any party on whose behalf I am engaged.

7. I make this affidavit *bona fide*.

SWORN before me in the City of Winnipeg, in the Province of Manitoba, through the use of video conferencing as permitted by order under *The Emergency Measures Act*, this 31st day of March, 2021.

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JAY BHATTACHARYA

A Commissioner of Oaths in and
For the Province of Manitoba
My Commission Expires: July 8/21

THIS IS EXHIBIT "A" TO THE AFFIDAVIT OF JAY BHATTACHARYA SWORN BEFORE ME IN THE CITY OF WINNIPEG THIS 31st DAY OF MARCH, 2021

L Lee

A COMMISIONER OF OATHS IN AND FOR THE PROVINCE OF MANITOBA

MY COMMISSION EXPIRES: July 8/21

JAY BHATTACHARYA M.D., Ph.D. – RESPONDING EXPERT REPORT ON THE COVID-19 EPIDEMIC RESPONSE IN MANITOBA

March 31, 2021

There is no established causal link between lockdown policies and COVID-19 case growth and mortality rate

The Respondents' arguments are all premised on the assertion that lockdown policies, such as prohibitions on gatherings, in-person worship and non-essential business closures, etc. work to reduce the risk of COVID-19 infection in the community. Much of the evidence they refer to in their affidavits/reports (especially, Kindrachuk) is based on modeling studies, which as noted in the original January 5, 2021 expert report, have a poor track record.

Now, however, there has emerged a growing peer-reviewed empirical literature that demonstrates the futility of lockdowns to control COVID case growth over a long period of time. This may be illustrated by describing one peer-reviewed study recently published in the *European Journal of Clinical Investigation*, of which I am a co-author. This study compares the effectiveness of mandatory lockdown orders (stay-at-home orders and forced business closures) versus less restrictive policies adopted by ten European and Asian countries on case growth in Spring 2020.[1] This study re-analyzes and revises the results from an earlier study by using countries that did not introduce mandatory stay-at-home orders and business closures over this period (like Sweden and South Korea) as a comparison with countries that did.[2] The main conclusion arising from this analysis is that "While small benefits cannot be excluded, [my co-authors and I] do not find significant benefits on case growth of more restrictive NPIs. Similar reductions in case growth may be achievable with less restrictive interventions."

Other peer-reviews papers, using different methodologies, and different comparison countries and regions, confirm this finding.[3,4,5] Perhaps the best peer-reviewed study evaluating the efficacy of lockdowns was published this past month in the prestigious journal, *Scientific Reports*. The analysis considers the effects of non-pharmaceutical interventions such as those imposed in Canada on COVID-19 related mortality in 87 regions around the world. The primary finding is that in the vast majority of cases there is no detectable effect of lockdowns on COVID

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[1] Bendavid E, Oh C, Bhattacharya J, Ioannidis J (2020) "Assessing Mandatory Stay-at-Home and Business Closure Effects on the Spread of COVID-19" *European Journal of Clinical Investigation*. 5 January 2020. doi:10.1111/eci.13484

[2] Hsiang S, Allen D, Annan-Phan S, et al. The effect of large-scale anti-contagion policies on the COVID-19 pandemic. *Nature*. 2020;584(7820):262-267. doi:10.1038/s41586-020-2404-8

[3] Savaris, R. F., Pumi, G., Dalzochio, J., & Kunst, R. (2021). Stay-at-home policy is a case of exception fallacy: an internet-based ecological study. Scientific Reports, 11(1), 5313. https://doi.org/10.1038/s41598-021-84092-1

[4] Berry, C. R., Fowler, A., Glazer, T., Handel-Meyer, S., & MacMillen, A. (2021). Evaluating the effects of shelter-in-place policies during the COVID-19 pandemic. Proceedings of the National Academy of Sciences of the United States of America, 118(15). https://doi.org/10.1073/pnas.2019706118

[5] Karáth, K. (2020). Covid-19: How does Belarus have one of the lowest death rates in Europe? The BMJ, 370. https://doi.org/10.1136/bmj.m3543

mortality. The authors conclude that "With our results, we were not able to explain if COVID-19 mortality is reduced by staying at home in ~ 98% of the comparisons after epidemiological weeks 9 to 34." Earlier work[6], which used modeling methodologies that held as a fixed assumption that lockdowns reduce disease spread to conclude that lockdowns were effective, have been criticized on methodological grounds.[7] The observational data analyses cited here do not suffer from this methodological flaw.

Another response to the Respondents' conclusions that lockdowns (Public Health Orders) are needed in order to reduce transmission, reduce cases and prevent death is to examine a case study contrasting COVID results in California (which has implemented extended lockdowns, including mandatory stay-at-home orders, curfews, school, church, and business closures, among other strategies at various points during the epidemic), and Florida which is demographically similar to California, but has not implemented harsh lockdown since May 2020 (and entirely lifted lockdowns in September 2020).

Through March 28th, 2021, 8.9% of all Californians have been identified as COVID cases – 3.6 million cases.[8] Since most infections are not recognized as cases, a much larger fraction of the population has been infected with COVID.[9] Through March 31st, nearly 58,000 people have died in California with COVID.[10] In sharp contrast with California, Florida partially lifted its lockdown in May 2020[11] and then further relaxed restrictions in September 2020.[12] Most Florida schools and universities have been open for in-person instruction since the fall, normal human

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[6] Flaxman S, Mishra S, Gandy A, Unwin HJT, Mellan TA, Coupland H, Whittaker C, Zhu H, Berah T, Eaton JW, Monod M; Imperial College COVID-19 Response Team, Ghani AC, Donnelly CA, Riley S, Vollmer MAC, Ferguson NM, Okell LC, Bhatt S. Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe. *Nature*. 2020 Aug;584(7820):257-261. doi: 10.1038/s41586-020-2405-7. Epub 2020 Jun 8. PMID: 32512579.

[7] Kuhbandner, C., & Homburg, S. (2020). Commentary: Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe. *Frontiers in Medicine*, 7, 257–261. https://doi.org/10.3389/fmed.2020.580361

[8] Financial Times COVID Tracker (2021) "Cumulative Confirmed Cases of COVID-19 in Florida and California" ? https://ig.ft.com/coronavirus-chart/?areas=can&areas=swe&areasRegional=usfl&areasRegional=usca&cumulative=0&logScale=0&per100K=1&startDate=2020-03-01&values=cases Accessed March 31, 2021.

[9] Sood N, Simon P, Ebner P, Eichner D, Reynolds J, Bendavid E, Bhattacharya J. Seroprevalence of SARS-CoV-2-Specific Antibodies Among Adults in Los Angeles County, California, on April 10-11, 2020. JAMA. 2020 Jun 16;323(23):2425-2427. doi: 10.1001/jama.2020.8279. PMID: 32421144; PMCID: PMC7235907.

[10] Financial Times COVID Tracker (2021) "Cumulative Deaths Attributed to COVID-19 in Florida and California" https://ig.ft.com/coronavirus-chart/?areas=can&areasRegional=usfl&areasRegional=usca&cumulative=0&logScale=0&per100K=1&startDate=2020-03-01&values=deaths Accessed March 31, 2021.

[11] Emily Crane (2020) "Florida is Back in Business!" *Daily Mail*. May 4, 2020. https://www.dailymail.co.uk/news/article-8285211/Florida-reopens-economy-states-continue-lift-COVID-19-lockdowns.html

[12] Greg Allen (2020) "Florida's Governor Lifts All COVID-19 Restricitons on Businesses Statewide" National Public Radio KQED. September 25, 2020. https://www.npr.org/sections/coronavirus-live-updates/2020/09/25/916969969/floridas-governor-lifts-all-covid-19-restrictions-on-businesses-statewide

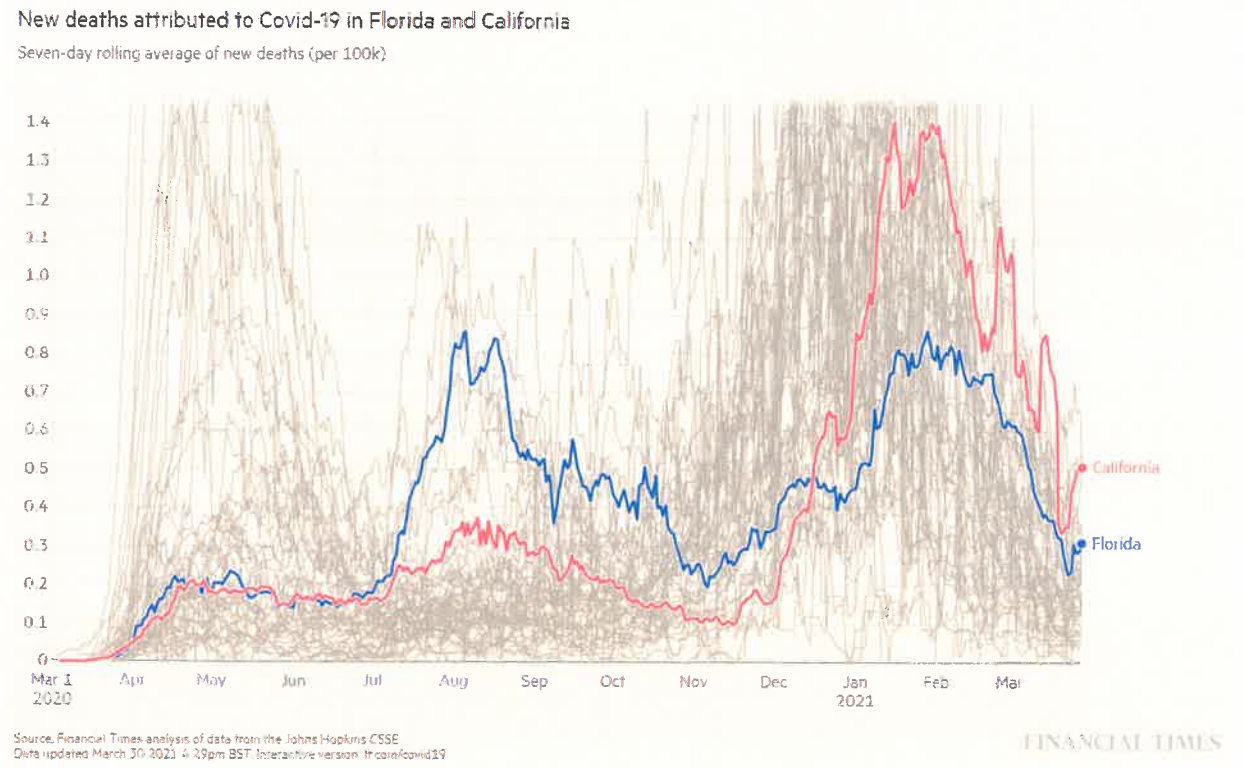
activities – sports, church-going, visits to the park – occur with regularity, and businesses have been open for in-person activities.[13] Local ordinances can recommend masks and social distancing and impose indoor capacity limitations but cannot mandate closures, as is the case in California. Disneyworld in Orlando, Florida has been open since July.[14] At the same time, Florida increased testing and protection of its nursing homes to reduce the risk of COVID among its most vulnerable residents.

Despite the dramatically different policies, the infection control results to date in Florida look remarkably similar to California's, and in some ways better. Through March 28th, 2021, 9.5% of Floridians have been identified as COVID cases.[15] Once we account for the fact that Florida has the fifth oldest population in the country and California the seventh youngest,[16] the death rates with COVID through January 20th are, by my calculations, almost identical in the two states. In fact, the COVID mortality rate for *both* the under-65 population and the over-65 population are lower to date in Florida than in California.

Figure 1, immediately below, illustrates the numbers cited above; it compares the trend in COVID-19 deaths in California and Florida through the entire epidemic. Despite one of the sharpest lockdowns in the United States (including closed schools, shuttered businesses and churches, periodic shelter-in-place orders and curfews, and mask mandates), California has had higher COVID-19 mortality since December 2020. At best, one can say that the lockdowns delayed spread of the disease in California by a few months, at enormous harm to the population.

[13] USA Today (2020/1) "COVID-19 Restrictions. Map of COVID-19 Case Trends, Restrictions, and Mobility" https://www.usatoday.com/storytelling/coronavirus-reopening-america-map/ Accessed February 18, 2021.
[14] Janine Puhak and Michael Bartiromo (2020) "Disney World Targets July 11 as Reopening Date for Theme Park" Fox News. https://www.foxnews.com/travel/disney-world-present-reopening-plans-theme-park.
[15] Financial Times COVID Tracker (2021) "Cumulative Confirmed Cases of COVID-19 in Florida and California" https://ig.ft.com/coronavirus-chart/?areas=can&areasRegional=usfl&areasRegional=usca&cumulative=0&logScale=0&per100K=1&startDate=2020-03-01&values=deaths Accessed March 31, 2021.
[16] World Population Review (2021) Median Age by State 2021. https://worldpopulationreview.com/state-rankings/median-age-by-state. Accessed March 31, 2021.

Figure 1: COVID-19 Deaths in California vs. Florida. March 2020 – March 2021.



The Respondents in their affidavits/reports seem to think of lockdowns as the only possible way to protect the population from exposure to COVID risk. In reality, the California lockdowns and elsewhere have served to protect only a portion of the population – the rich. Data from L.A. County, where a large fraction of COVID cases in California has occurred, put this fact in stark relief.[17] Through January 23rd, in the wealthiest parts of L.A. county (with less than 10% poverty), the age-adjusted death rate with COVID-19 was 76 people per 100,000 population. As we look in poorer and poorer areas, the death rate mounts; areas with more than 30% poverty have faced a death rate of 263 people per 100,000 population – more than three times as many deaths. Hispanics in L.A. have borne the worst of the pandemic, with a death rate of 219 per 100,000 people. By contrast, black, Asian, and white residents have experienced 131, 96, and 78 deaths per 100k residents, respectively. The California and Canadian[18] lockdowns are a form of trickle-down epidemiology. In Florida, by contrast, there is little difference between races in

[17] LA County Public Health (2021) "Age-Adjusted Death Rates due to COVID-19 per 100K." http://publichealth.lacounty.gov/media/Coronavirus/data/index.htm#graph-deathrate. Accessed January 23, 2021.

[18] Kulldorff M and Gupta S (2020) Canada's COVID-19 Strategy is an Assault on the Working Class. Toronto Sun, Nov. 28, 2020. https://torontosun.com/opinion/columnists/opinion-canadas-covid-19-strategy-is-an-assault-on-the-working-class

COVID-related death rates throughout the epidemic, with the Hispanic population dying at lower rates than the white population.[19]

The Emergence of Variant Strains of the SARS-CoV-2 Virus Does Not Justify Continuing Lockdowns

Kindrachuk and Roussin both express concern about Covid variants in their affidavits/reports and suggest a continuance of measures which would reduce community transmission. Their assertion echoes predictions made by the Canadian public health forecast dated February 19th 2021. The Canadian Public Health Agency's forecast examined the impact of new mutated variants of the SARS-CoV-2 virus on future case growth. In particular, the Agency's model predicted that the spread of particular variants common in the U.S. and in the U.K. throughout Canada would lead to a sharp increase in the number of COVID-19 cases throughout Canada in the coming months. In February, The Public Health Agency of Canada predicted an imminent catastrophic new wave of cases of greater magnitude than the cases in the first and second wave combined, based on the assumptions that a mutated variant of the SARS-CoV-2 virus will spread throughout Canada in the next weeks.[20] Figure 2, immediately below, shows this official Canadian forecast. In the figure, there are three lines, one corresponding to the lifting of all restrictions, one corresponding to the maintenance of the lockdowns as they were in mid-February, and a third corresponding to a tightening of restrictions. The first two predicted a sharp growth in Canadian cases, while the third predicted a decline in cases. In point of fact, several Canadian provinces started lifting restrictions in February 2021.[21, 22]

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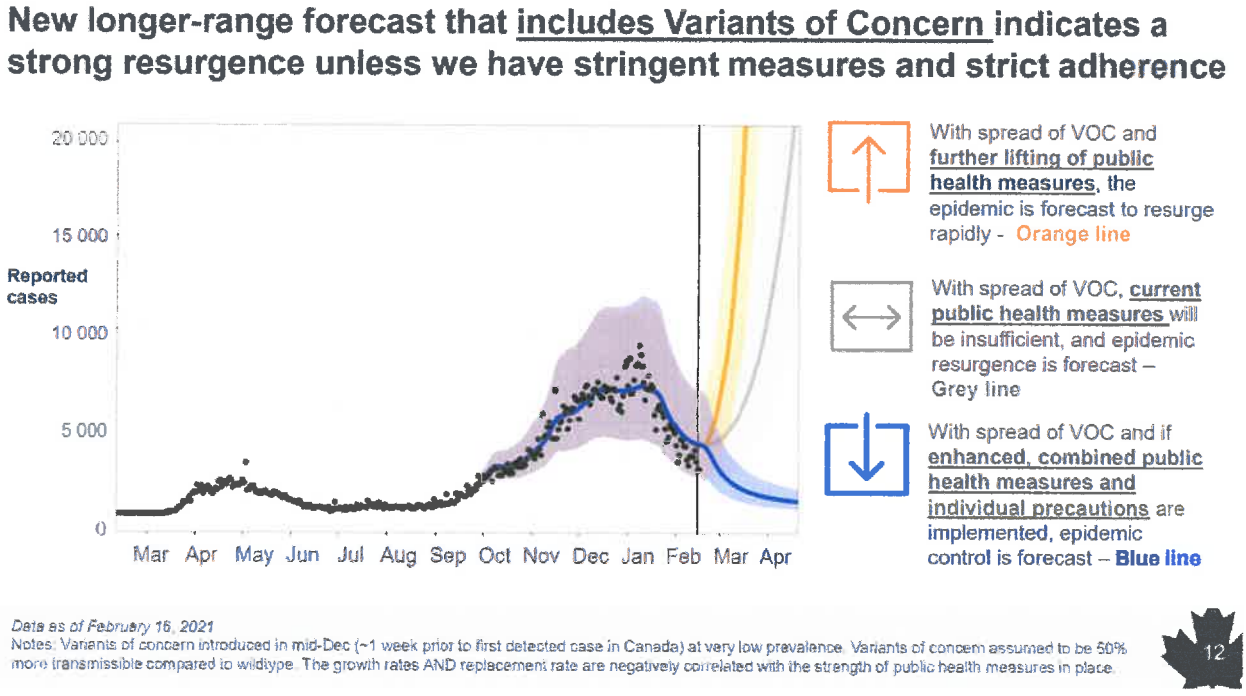
[19] COVID Tracking Project (2021) "The Data: Florida" https://covidtracking.com/data/state/florida. Accessed January 23, 2021.

[20] Public Health Agency of Canada (2021) *Update on COVID-19 in Canada: Epidemiology and Modelling*. https://www.canada.ca/content/dam/phac-aspc/documents/services/diseases-maladies/coronavirus-disease-covid-19/epidemiological-economic-research-data/update-covid-19-canada-epidemiology-modelling-20210219-en.pdf

[21] Serebrin J (2021) COVID-19 Restrictions Relaxed in Several Provinces, but Variant Concerns Persist. Canada's National Observer. February 9, 2021. https://www.nationalobserver.com/2021/02/08/news/covid-19-restrictions-relaxed-provinces-variant

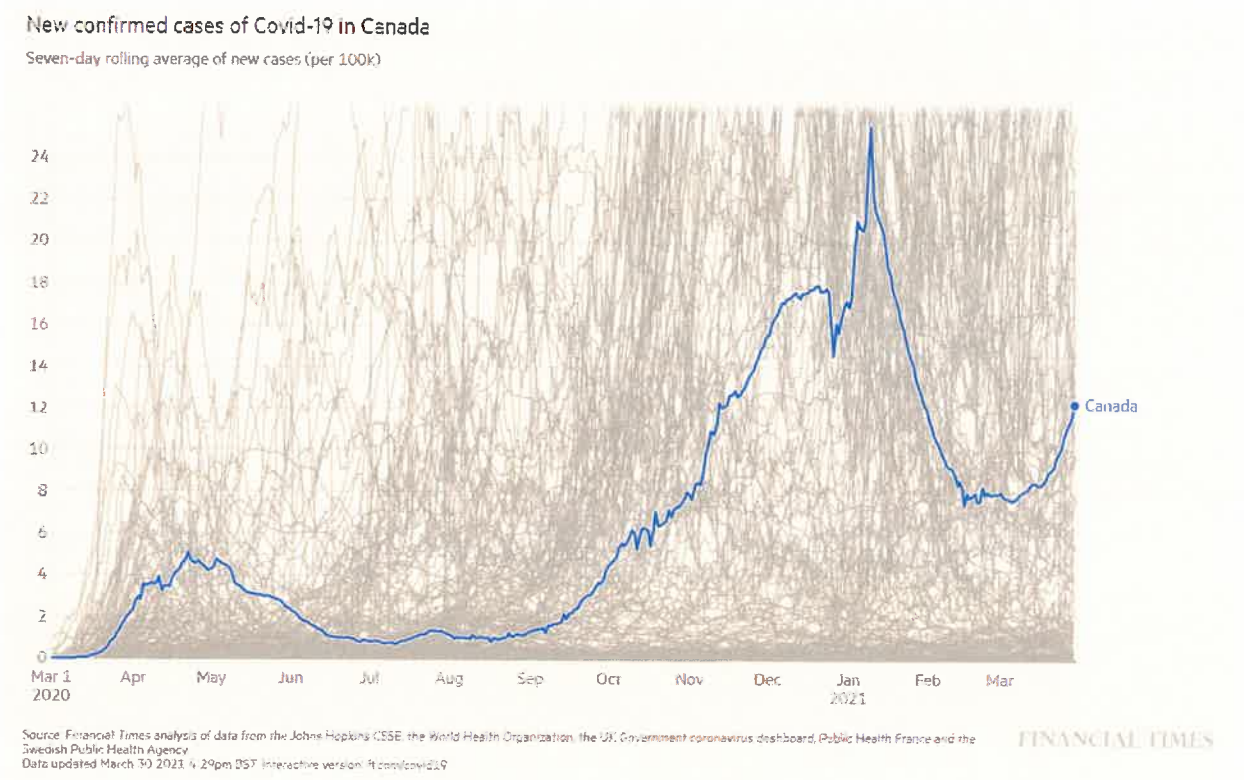
[22] The Canadian Press (2021) Quebec to Ease COVID-19 Restrictions Outside Montreal Area March 8. March 4, 2020. https://www.msn.com/en-ca/news/canada/quebec-to-ease-covid-19-restrictions-outside-montreal-area-march-8/vi-BB1edsPI?parent-subcat=cookingschool+%22+target

Figure 2: February 29th 2021 Canadian Forecast of COVID-19 Case Growth Assuming Spread of Variants



The experience in Canada through March has contradicted those predictions. Figure 3, immediately below, plots the number of cases in Canada from March 2020 through the end of March 2021. Rather than the sharp increase in cases predicted by Canadian public health unless sharp new restrictions were implemented, Canada experienced a mild increase in cases through March 2021. Please notice that the increase in cases through March that Canada actually experienced remained below the peak of cases during the previous wave, contrary to the February forecasting model by Canadian public health.

Figure 3: COVID-19 Confirmed Cases in Canada– March 2020 to March 2021



That the actual case estimates have diverged from the modeling predictions should not be surprising, as epidemic forecasting has proved unreliable (typically in the direction of overestimating disease spread) throughout the epidemic.

The empirical literature belies these predictions. First, the mutant variants do not escape the immunity provided by previous infection with the wild-type virus, or by the vaccines.[23,24,25] Although it is possible for a reinfection to occur, people who have been previously infected by the wild-type (non-variant) virus are unlikely to have a severe outcome (hospitalization or death) after exposure to a variant virus. This means that the presence of a variant circulating in the

[23] Alison Tarke, A., Sidney, J., Methot, N., Zhang, Y., Dan, J. M., Goodwin, B., Rubiro, P., Sutherland, A., da Silva Antunes, R., Frazier, A., Rawlings, S. A., Smith, D. M., Peters, B., Scheuermann, R. H., Weiskopf, D., Crotty, S., Grifoni, A., & Sette, A. (2021). Negligible impact of SARS-CoV-2 variants on CD4 + and CD8 + T cell reactivity in COVID-19 exposed donors and vaccinees. BioRxiv, 2021.02.27.433180. https://doi.org/10.1101/2021.02.27.433180

[24] Wu, K., Werner, A. P., Moliva, J. I., Koch, M., Choi, A., Stewart-Jones, G. B. E., Bennett, H., Boyoglu-Barnum, S., Shi, W., Graham, B. S., Carfi, A., Corbett, K. S., Seder, R. A., & Edwards, D. K. (2021). mRNA-1273 vaccine induces neutralizing antibodies against spike mutants from global SARS-CoV-2 variants. BioRxiv : The Preprint Server for Biology, 2021.01.25.427948. https://doi.org/10.1101/2021.01.25.427948

[25] Redd, A. D., Nardin, A., Kared, H., Bloch, E. M., Pekosz, A., Laeyendecker, O., Abel, B., Fehlings, M., Quinn, T. C., & Tobian, A. A. (2021). CD8+ T cell responses in COVID-19 convalescent individuals target conserved epitopes from multiple prominent SARS-CoV-2 circulating variants. MedRxiv : The Preprint Server for Health Sciences, 2021.02.11.21251585. https://doi.org/10.1101/2021.02.11.21251585

population poses little additional risk of hospital overcrowding or excess mortality due to viral infection.

As a general matter, such predictions are based on compartment models that are known to rely on faulty assumptions and have proven to be unreliable guides to the effects of COVID-19 containment policies on the track of the epidemic. One comprehensive peer-reviewed assessment of these models cautions against their use: [26]

> "Epidemic forecasting has a dubious track-record, and its failures became more prominent with COVID-19. Poor data input, wrong modeling assumptions, high sensitivity of estimates, lack of incorporation of epidemiological features, poor past evidence on effects of available interventions, lack of transparency, errors, lack of determinacy, looking at only one or a few dimensions of the problem at hand, lack of expertise in crucial disciplines, groupthink and bandwagon effects and selective reporting are some of the causes of these failures. … When major decisions (e.g. draconian lockdowns) are based on forecasts, the harms (in terms of health, economy, and society at large) and the asymmetry of risks need to be approached in a holistic fashion, considering the totality of the evidence."

Second, theoretical work suggests that lockdowns place selective pressure that promote the development and establishment of more deadly variants. This, in part explains why the most concerning variants have emerged in places like the UK, South Africa, and California, where severe lockdowns have been imposed for extended periods of time.[27] While this hypothesis awaits a definitive empirical test, it is consistent with the *prima facie* evidence on mutant variants' development. None of these facts is accounted for in the Canadian Public Health Agency's or Institut National de Sante Publique Quebec's forecasts.[28]

Third, the variants have been widely spreading in many countries these past months, even as cases have been dropping. This is true, for instance, in Florida, where the UK variant B.1.1.7 is widespread[29], but cases have dropped sharply over the same period that variant has been spreading. That variants with a small infectivity advantage – but no more lethality -- make up a larger fraction of a smaller number of cases is an interesting scientific observation but not important for public health policy.

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[26] Ioannidis JPA, Cripps S, Tanner MA. Forecasting for COVID-19 has failed. Int J Forecast. 2020 Aug 25. doi: 10.1016/j.ijforecast.2020.08.004. Epub ahead of print. PMID: 32863495; PMCID: PMC7447267.

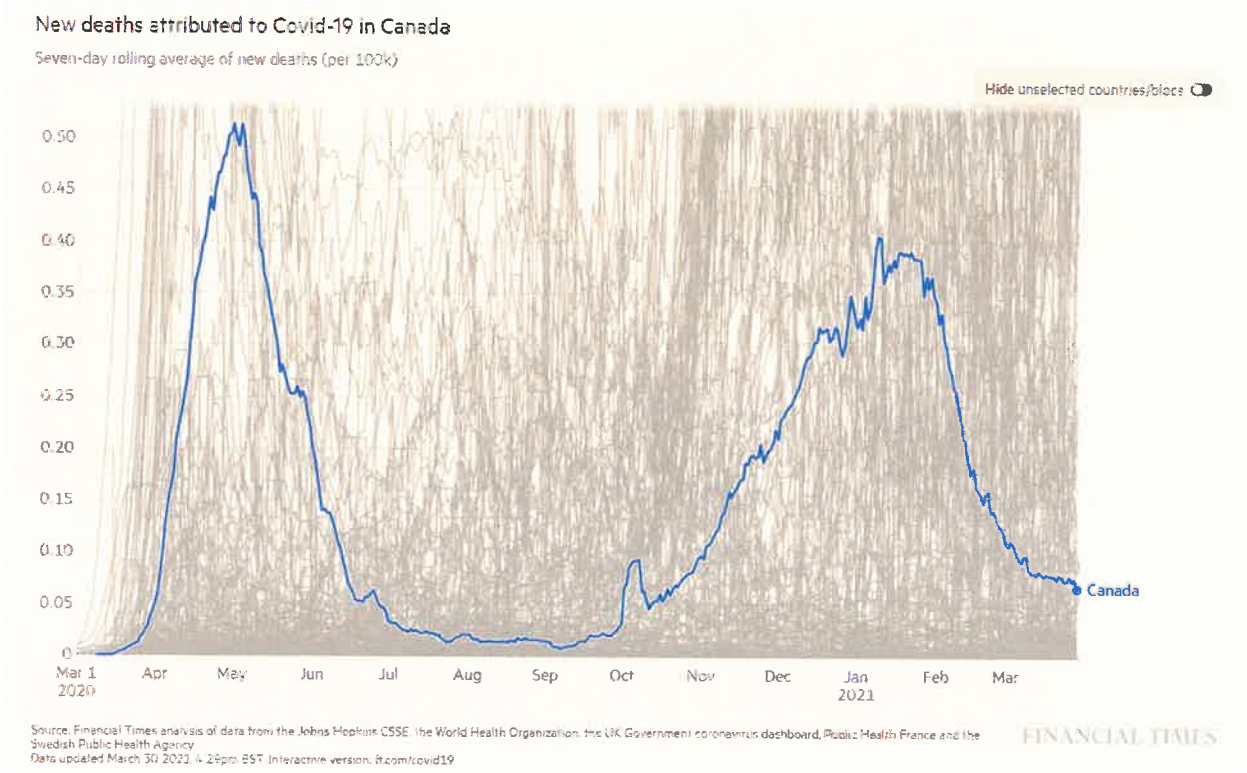
[27] Moran J. (2021) Mutant variations and the danger of lockdowns. The Critic Magazine. March 2, 2021. https://thecritic.co.uk/mutant-variations-and-the-danger-of-lockdowns/

[28] Brisson M. et al. (2021) *Modélisation de l'impact potentiel d'un variant COVID-19 plus transmissible au Québec.* Institut National de Sante Publique Québec. https://www.inspq.qc.ca/sites/default/files/covid/projections/inspq-projections-4mars2021.pdf

[29] US Centers for Disease Control (2021) US COVID-19 Cases Caused by Variants. https://www.cdc.gov/coronavirus/2019-ncov/transmission/variant-cases.html

Fourth, the dissemination of vaccines that protect against hospitalizations and deaths upon COVID-19 infection throughout the older population in Canada have decoupled the growth in COVID-19 cases from COVID-19 mortality. Vaccinated people can still perhaps be infected, but rarely have severe symptoms in response to infection. Figure 4 plots the number of COVID-19 deaths in Canada over this same time period as cases were plotted in Figure 3. Strikingly, the number of COVID-19 deaths have declined in Canada in February and March 2021 despite the mildly increasing number of cases. Throughout last year, a rise in cases has inevitably been accompanied by an increase in deaths with a two to three week lag. However, during this most recent wave, there has been no rise in deaths to accompany the rise in cases because of the deployment of the vaccine in the vulnerable older population in Canada. This is true despite the spread of new variant forms of the virus throughout Canada in February and March of 2020.[30] Because of the success of the Canadian vaccination effort among the vulnerable elderly, COVID-19 cases and COVID-19 deaths are now effectively decoupled.

Figure 4: COVID-19 Deaths in Canada – March 2020 to March 2021.



[30] Bensadoun E (2021) Coronavirus variants are spreading throughout Canada. Is it still safe to reopen? Global News. Feb. 9, 2021. https://globalnews.ca/news/7627391/coronavirus-variants-canada-provinces-reopen/

Fifth, and perhaps most importantly, even if it is accepted the increased transmissibility of the new variants, the harsh lockdowns that Manitoba has implemented over the past year as its primary infection control policy are unlikely to work to limit the number of COVID-19 infections. Despite the harsh lockdowns and the circulation of the somewhat less infectious wild type virus, over the previous year, nearly a million Canadians have been infected, and tens of thousands of Canadians have died with COVID-19. If the lockdowns did not work to protect Canadians from the less infectious wild type virus (and they did not – see the discussion in the next section) – then there is little reason to expect that they would work to suppress a more infectious variant.

Scientific Evidence Indicates Asymptomatic and Pre-symptomatic Individuals Spread the Disease Inefficiently

In my original expert report, I provided evidence from a large meta-analysis of within household spread of the virus, from an infected person to someone else living in the same home, where none of the safeguards that restaurants recommended by the CDC are typically applied. This study represents the most comprehensive survey of the vast empirical literature on asymptomatic spread; because it focuses on a single setting (household transmission), it is not subject to the same problems that other studies on this topic might have. The primary result is that symptomatic patients passed on the disease to household members in 18% of instances, while asymptomatic and pre-symptomatic patients passed on the disease to household members in 0.7% of instances.[31] Kindrachuk does not address this evidence on the relatively low risk of asymptomatic disease spread drawn from real-world transmission data and focuses instead on modeling studies that require a substantial number of unverifiable assumptions. In particular, these models often make the *assumption* that lockdowns actually work in reducing interactions between individuals in ways that reduce disease transmission risk. It is inappropriate to then conclude from such modeling studies that lockdowns work in a way predicted by the model. The Respondents' affidavits provide no evidence that they have conducted any validation exercises which would suggest that the models on which they rely to infer the efficacy of church closures have actually match real-world evidence I provided from the scientific literature of low levels of asymptomatic spread. Many of the studies cited by Kindrachuk were taken into consideration within the large meta-analysis, which ultimately found, after analyzing 54 studies (including Kindrachuk's cited studies and others) a very low chance of asymptomatic and pre-symptomatic disease spread.

One clear implication of the small likelihood of asymptomatic and pre-symptomatic disease spread and a higher likelihood of symptomatic spread is that the Respondents have available a

[31] (Madewell ZJ, Yang Y, Longini IM, Halloran ME, Dean NE. Household Transmission of SARS-CoV-2: A Systematic Review and Meta-analysis. *JAMA Netw Open.* 2020;3(12):e2031756. doi:10.1001/jamanetworkopen.2020.31756)

simple policy that would have similar infection control properties but with substantially lower harms. In response to Roussin's and Kindrachuk's concerns about the spread of Covid in church settings, the Respondents could require churches to screen for COVID-like symptoms at the door and ask congregants who have such symptoms to not worship indoors. They could also provide public health advice (through advertisements and other means) to tell the public to stay at home if they experience such symptoms. There is no rational basis for the Respondents' current policy given the availability of this less harmful and equally effective alternate policy. Since asymptomatic and pre-symptomatic disease spread from an infected individual to an uninfected individual is unlikely to occur inside of a household, it is even less likely to occur within a church, especially a church that asks its members to socially distance and wear masks.

In response to Roussin's and Kindrachuk's concerns about the spread of Covid indoors, the insights from this literature could also be used to replace the Respondents' draconian policy restricting in-home private gatherings – with a less draconian policy. In particular, the public health authorities could inform citizens of the higher risk of disease transmission posed by symptomatic individuals and advise people with symptoms consistent with COVID-19 infection to stay at home and avoid private gatherings with people outside of their households. If people without symptoms are gathering, even if they come from different households, the likelihood of disease spread occurring is an order of magnitude lower than if symptomatic people gather alongside uninfected people.

A special consideration for church services involves the risk posed by singing in terms of disease spread. The evidence cited by the Respondents regarding the risk of "super spreader" events in churches comes from locations (e.g. South Korea, early in the epidemic) where no precautions were taken for social distancing or mask wearing in service. However, there is evidence that churches that ask congregants to wear masks, and asks congregants with symptoms to stay at home, can safely worship indoors, and permit singing, without an undue risk of causing a super spread event.

The Errors in PCR Testing Render them Unfit for Public Health Decision Making

This section is in response to Bullard's and Roussin's affidavits. In the January 5, 2021 report, it was explained that the to scientific evidence[32] that the test on which Canada bases its count of COVID infections – the RT-PCR test for the presence of the SARS-CoV-2 virus – will often generate a positive result even when an individual is not infectious (that is, does not pose a danger of infecting other people). The difficulty is that the RT-PCR test permits too many doubling cycles of viral particles before declaring a negative test. The functional false positive rate increases with the number of cycles (known as a Ct value) required to produce a positive

[32] (T. Jefferson, et al., *Viral Cultures for COVID-19 Infectivity Assessment – A Systematic Review (Update 3)* (Sept. 3, 2020), medRxiv, https://www.medrxiv.org/content/10.1101/2020.08.04.20167932v3.full.pdf.)

result. As was stated in the January 5, 2021 report, according to a careful study published in *Eurosurveillance* (a top journal in the field of epidemiology), if 27 cycles are needed for a positive test, the false positive rate is 34%; if 32 cycles are needed for a positive test, the false positive rate is 72%, and if 37 cycles are need for a positive test, the false positive rate is 92%.[33] If more than 40 cycles are needed for a positive test, the functional false positive rate is nearly 100%. Many laboratories in Canada run the RT-PCR test up to 45 cycles, so false positive results are not just a theoretical possibility.

Bullard states in his report that the term "functional false positive" does not exist in the literature. This is false. I introduced the term in the published scientific literature[34] to make a key distinction between a test that is a gold standard for viral presence (the PCR test) and a gold standard for infectivity (a viral culture test). A true positive PCR test, which indicates viral presence, may be a functional false positive result with regard to viral infectivity if the number of duplication cycles needed to find a positive result is sufficiently high. This key distinction has been made by other scientists as well in the published literature[35], and the concept of a "functional false positive" provides an easy way to refer to the phenomenon.

This error in the test is a major problem with Manitoba's epidemic policy making because it relies on the accuracy of the RT-PCR tests to determine whether an individual is infected with the virus. The PCR test's inaccuracies imply Manitoba's epidemic planning does not reflect the risk of community spread of the virus because a high case count or positivity rate may be due instead to functional false positive outcomes. Given this scientific evidence, it is certain that Canadian provinces are imposing sharp lockdowns – along with their attendant costs– even when the risk of community spread of COVID-19 does not warrant it.

Surprisingly, none of the Respondents' affiants dispute any of these points. Instead, they assert that the RT-PCR test is a "gold standard" test for checking for the presence of SARS-CoV-2 virus – a fact not in dispute. The important question is not whether RT-PCR is a "gold standard" test for viral presence, but rather whether it is a gold standard test for determining whether a patient is infectious, which it is not. Rather, the gold standard test for infectivity involves checking whether a sample taken from the nasopharynx of a patient can infect, in vitro, a cell culture. Infectious samples are known as "culture positive", while non-infectious samples are known as "culture negative". From an epidemiological point of view, infectivity measurement is

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[33] Singanayagam A, Patel M, Charlett A, Lopez Bernal J, Saliba V, Ellis J, et al. Duration of infectiousness and correlation with RT-PCR cycle threshold values in cases of COVID-19, England, January to May 2020. Eurosurveillance. 2020;25(32):2001483. 2020

[34] Bhattacharya J and Packalen M (2020) On the Futility of Contact Tracing. Inference 5(3) : 1/5-5/5 September 28, 2020. https://inference-review.com/assets/pdf/articles/on-the-futility-of-contact-tracing.pdf

[35] Jefferson T, Heneghan C, Spencer E, Brassey J (2020) Are You Infectious If You Have a A Positive PCR Test Result for COVID-19? The Centre for Evidence-Based Medicine. Oxford University. August 5, 2020. https://www.cebm.net/covid-19/infectious-positive-pcr-test-result-covid-19/

more important than a measurement of whether the virus is present, since it is possible for a patient to have non-viable viral fragments present, a positive PCR test, and yet not be infectious.

The relevant question then, is whether the RT-PCR test is sufficiently accurate to use as a tool to decide whether to sharply curtail the normal activities of more than a million people living in Manitoba, imposing untold harm on them related to the lockdown. None of the Respondents' affiants provide any argument or analysis in support of an affirmative answer to that question. Instead, they provide details about standardization procedures that the province uses to correct for other problems in the province's case estimates that the original January 5, 2021 did not discuss. None of these standardization procedures fix the problem of functional false positives.

Bullard provides data from December 2020 that out of 5825 positive PCR results in Manitoba, 18% had a Ct of 25-30, 18% had a Ct of 30-36, and 7% had a Ct of 36-40. Bullard argues that it is good public health practice to ignore the errors of the PCR test because it is in the interest of Canadian public health to identify every single person virally infected person and quarantine them, whether or not they pose any risk whatsoever in spreading the virus. The assertion that we need to capture every case, regardless of the risk that the person poses to infection spread, ignores a basic public health principle, which is that both the costs and benefits of public health actions should be considered. Quarantining people who are positive but not infectious imposes costs on the quarantined, with no benefit whatsoever for the population. According to Bullard's own report, 25% of the 5825 people that Manitoba considered a case in December of 2020 had Ct values that strongly suggest they were not infectious. Nevertheless, an estimated 1,456 people were forced to quarantine, with their civil liberties violated, but with no discernable public health benefit in terms of infection control. This is poor public health practice.

It is also problematic that there is no mention in any of the Respondents' affidavits of a communication between the lab and Roussin of the Ct values. Such information is critical to inform good decision making and good public health policy in terms of the risk that a person who tests positive presents to the public, and in balancing the costs and benefits of making public health orders based on that information. Roussin states in his affidavit that some of the factors that determines what special measures are necessary to reduce the threat of Covid include the total number of cases, and the test positivity rate and trend. Without knowing the Ct value of those positive tests, it is impossible to determine whether the proportion of people in the population who are at risk of spreading the disease is increasing or decreasing. Faulty case counts that do not correct for this issue with Ct values do not reflect the risk that the identified cases pose to the population, and thus cannot provide a scientific basis for drastic public health orders (such as lockdown orders) that violate basic civil liberties.

Although the Respondents' affiants do not address the topic, there are simple alternative tracking methods available – using existing technology – that would yield more accurate information about disease risk. In particular, Canadian provinces could premise epidemic policy making on the number of cycles necessary to achieve a positive RT-PCR test result (a number already

produced by the PCR test, but not used by Canadian policy makers in decision making about lockdowns). The Respondents' affiants dismiss this possibility by arguing that the RT-PCR is a qualitative test rather than a quantitative test. This is not responsive, since the number of cycles to achieve a positive result is a readily available (though unreported) output of the RT-PCR test currently in use in clinical laboratories throughout Canada. It is suggested that a patient should only be counted as a case if the RT-PCR test result indicates that the patient is very likely infectious, and not counted otherwise. There is support for this approach from even pro-lockdown scientists, like Harvard University epidemiology professor Marc Lipsitch, who recently wrote:[36]

> "Our findings suggest that instead of discarding individual Ct values from positive specimens, incorporation of viral loads into public health data streams offers a new approach for real-time resource allocation and assessment of outbreak mitigation strategies, even where repeat incidence data is not available. Ct values or similar viral load data should be regularly reported to public health officials by testing centers and incorporated into monitoring programs."

Since the January 5, 2021 expert report, the World Health Organization on January 13th, 2021, issued a technical report that supports the points made in that report.[37] The report emphasizes two things. First, it points out that a positive COVID test does not necessarily mean that someone has any capacity of infecting someone else with the virus. Therefore, it instructs laboratories to report the replication number, as I suggested. And second, the WHO warns against relying on a single test for patients without considering clinical COVID-19 symptoms, as Manitoba does. There is no mention in the Respondents' affidavits that a positive case (patient) must be assessed clinically after diagnosis with Covid based on that positive test. Manitoba decision making about the lockdowns is thus not aligned with WHO guidelines for using the PCR test data.

On the Futility of Contact Tracing to Control Disease Spread

Most of the Respondents' affiants explain that the Respondents rely on contact tracing programs as a means to control the spread of COVID-19 disease. Contact tracing programs require people who have been identified as COVID-19 cases to divulge to public health officials all the people with whom they have been in contact with during their illness, as well as all the locations they may have visited. Health officials have asked Canadians to install a phone application that aids in contact tracing by providing officials information about the locations where a person has

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[36] Hay JA, Kennedy-Shaffer L, Kanjilal S, Lipsitch M, Mina M. (2020) Estimating Epidemiologic Dynamics from Single Cross-Sectional Viral Load Distributions. medRxiv preprint.
https://www.medrxiv.org/content/10.1101/2020.10.08.20204222v1

[37] WHO (2021) "WHO Information Notice for IVD Users 2020/05" January 13, 2021.
https://www.who.int/news/item/20-01-2021-who-information-notice-for-ivd-users-2020-05

frequented. In Manitoba, public health officials have recently implemented an "aggressive" stance toward contact tracing, including asking restaurants to report on the names of all the customers who have patronized a location.[38]

Despite extensive expenditures devoted to these efforts, there has been no demonstration that contact tracing programs in Canada have contributed to limiting disease spread. Manitoba has not provided any data to illustrate the effectiveness of contact tracing. Rather, news reports suggest that contact tracing programs have been overwhelmed throughout Canada whenever COVID-19 case frequency starts to rise.[39, 40,41,42] Canadian researchers who have examined the topic concluded that Canadians were wary of the COVID Alert app because they do not believe that their privacy will be protected.[43] The failure of contact tracing programs to control disease spread is not unique to Canada; a recent government report in the UK concluded that there was no clear evidence that it had accomplished much, despite an expenditure of 37 billion pounds over a two year span.[44]

The futility of contact tracing to control COVID-19 disease spread is entirely predictable. While contact tracing is a useful public health technique for diseases where the location of disease spread is readily identifiable (e.g. sexually transmitted diseases), it is less efficacious for diseases like COVID-19, where the moment of disease transmission is harder to identify. This is especially true since a large fraction of COVID-19 cases involve no symptoms at all. Though asymptomatic disease spread is much less efficient than symptomatic disease spread, it does occur (0.7% of the time in intimate household settings), and it renders contact tracing efforts less likely to succeed. Errors in the PCR testing, which render it unable to distinguish a COVID-19 patient who is highly infectious from a patient who has recovered from the disease, still has non-infectious viral fragments detectable, and is no longer a threat to spread the disease, also make contact tracing efforts less likely to succeed. When contact tracers are overwhelmed, delays in identifying, contacting, and testing contacts makes it more likely that contacts will be found long

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[38] Erik Pindera (2021) Passive-'aggressive' contact tracing raises questions. Winnipeg Free Press March 17, 2021. https://www.winnipegfreepress.com/special/coronavirus/passive-aggressive-contact-tracing-raises-questions-574012022.html#long-story

[39] CBC News (2020) Ottawa Public Health to focus contact tracing on high-risk spreaders. Oct. 6, 2020. https://ca.news.yahoo.com/ottawa-public-health-focus-contact-152847281.html

[40] CBC News (2020) Overwhelmed by increase in cases, Montreal public health narrows contact-tracing efforts Social Sharing. Sept. 24, 2020. https://www.cbc.ca/news/canada/montreal/montreal-public-health-officials-reduce-contact-tracing-amid-shortage-1.5737248

[41] Joel Dryden (2020) Alberta's contact tracers are now overwhelmed at a critical time, infectious disease expert says. CBC News. November 6, 2020. https://www.msn.com/en-ca/news/canada/alberta-s-contact-tracers-are-now-overwhelmed-at-a-critical-time-infectious-disease-expert-says/ar-BB1aK0AU

[42] Gary Mason (2021) Canada's overwhelmed contact-tracing efforts have been a gross failure. The Globe and Mail. Jan. 7, 2021. https://www.theglobeandmail.com/opinion/article-canadas-overwhelmed-contact-tracing-efforts-have-been-a-gross-failure/

[43] Lynn Desjardins (2021) Why People Don't Use COVID Contact Tracing Apps. Radio Canada International. March 22, 2021. https://www.rcinet.ca/en/2021/03/22/why-people-dont-use-covid-contract-tracing-apps/

[44] Lizzy Buchan (2021) 'No clear evidence' Test and Trace is effective despite 'unimaginable' £37billion cost. UK Mirror. March 10, 2021. https://www.mirror.co.uk/news/politics/no-clear-evidence-test-trace-23649758

after they pose any risk of disease spread. Finally, from a privacy point of view, the reluctance of Canadians (and others) to cooperate with contact tracers is entirely understandable – there is little to no private benefit derived by the infected patient from reporting on their friends, family, churches, or favorite restaurants, and there is some possible social harm from the unwanted attention and privacy violations inherent in contact tracing. I discuss many of these issues in a paper entitled "On the Futility of Contact Tracing", that I published in September of last year.[45]

Criticism of the Great Barrington Declaration

Roussin criticizes the Great Barrington Declaration (hereafter, GBD)[46] in his affidavit. The logic of the GBD is that the return to normal life will improve health and other outcomes for the non-vulnerable by reducing lockdown harms, while focused protection policies will protect the vulnerable. The aim of focused protection is to minimize overall mortality from *both* COVID-19 *and* other diseases by balancing the need to protect high-risk individuals from COVID-19 while reducing the harm that lockdowns have had on other aspects of medical care and public health. The GBD represents a return to standard public health practices, which acknowledge that human health requires more than just infection control and is instead concerned with the health and well-being of populations in a much broader way.[47]

The Possibility of Effective Focused Protection of the Vulnerable

Roussin writes skeptically about the possibility of protecting vulnerable people (the elderly primarily, but also others with certain chronic conditions for whom COVID-19 infection poses a high mortality risk) from infection without lockdowns. He argues that the only way to protect the vulnerable is to reduce community disease spread. In particular, he argues that focused protection of the vulnerable – as described in the Great Barrington Declaration – is impossible without lockdown. He mischaracterizes focused protections as requiring a complete segregation of vulnerable and non-vulnerable populations, when what is necessary are policies that reduce the probability that infected people will have extended contact with vulnerable people in a context where the spread of the disease is likely. The former is impossible, while the latter is certainly possible, especially since the leading meta-analysis study discussed above shows that asymptomatic spread is exceedingly rare. There are several other major problems with Roussin's argument.

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[45] Bhattacharya J, Packalen M. On the Futility of Contact Tracing. *Inference* 5(3) September (2020) https://inference-review.com/article/on-the-futility-of-contact-tracing

[46] Kulldorff M, Gupta S, and Bhattacharya J (2020) Great Barrington Declaration, Oct. 4, 2020. https://gbdeclaration.org/

[47] Public Health Leadership Society (2002) Principles of the Ethical Practice of Public Health. American Public Health Association. https://www.apha.org/-/media/files/pdf/membergroups/ethics/ethics_brochure.ashx

As we have seen, there is good theoretical and empirical evidence that lockdowns do not and cannot control community spread of the disease over an extended period of time. Even if lockdowns slow the spread, vulnerable people will ultimately be infected. The best example of success of the Focused Protection approach is in Florida, which, as discussed above, has reduced its death and case count without lockdown, and has fared slightly better than California (with some of the harshest lockdown restrictions in the US) in terms of its overall Covid death rate accounting for age.[48]

Focused protection is possible as long as public health experts deeply understand the particular living circumstances of the vulnerable and are creative in designing effective interventions based on that understanding. Empirical evidence from around the world shows that focused protection of nursing homes is possible. During the first wave of the epidemic, there was an unfortunately high rate of exposure of nursing home residents to COVID-19 infections – a failure of focused protection. In the US, nearly half of all COVID-19 deaths occurred in nursing home settings, fueled by policies – famously adopted by New York state – that sent elderly COVID-19 infected patients back to nursing homes that could not effectively quarantine them.[49] The same was true in Quebec and elsewhere in Canada. The proportion of COVID-19 deaths in nursing homes dropped sharply during the second wave of COVID-19 infections over the summer as these facilities adopted better policies to protect their elderly residents.[50]

A strategy of focused protection involves a suite of policies that protect people who are particularly vulnerable (e.g. the elderly) from COVID-19 infection. Those strategies have been discussed thoroughly in the January 5, 2021 report.

Finally, and most importantly, the new and effective vaccines make it relatively simple to implement a policy of focused protection. By prioritizing the older, most vulnerable, population for vaccination, it is possible to provide near perfect focused protection, even without adopting any of the policy suggestions outlined above. Certainly, no lockdown is necessary for reducing hospitalization and deaths from COVID, as long as the older population is prioritized for vaccination.

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[48] "Vindication for Ron DeSantis" *Wall Street Journal*, Allysia Finley, March 5, 2021, online: https://www.wsj.com/articles/vindication-for-ron-desantis-11614986751

[49] Perrett C (2020) Gov. Cuomo's controversial order requiring nursing homes to admit COVID-19 patients was reportedly removed from New York's health website. *Business Insider*. May 27, 2020. https://www.businessinsider.com/new-york-deleted-cuomos-order-nursing-homes-order-2020-5. Accessed Dec. 7, 2020.

[50] Ioannidis JPA, Axfors C, Contopoulos-Ionnidis DG (2020) Second versus first wave of COVID-19 deaths: shifts in age distribution and in nursing home fatalities. medRxiv. https://www.medrxiv.org/content/10.1101/2020.11.28.20240366v1.full-text (accessed Dec. 7, 2020)

Problematic Analysis of the Possibility of Herd Immunity

Kindrachuk also provides a misleading analysis of the role that herd immunity plays in the control of the epidemic. Herd immunity – also known as endemic equilibrium – occurs when enough people have immunity so that most infected people cannot find new uninfected people to infect, leading to the end of the epidemic.[51] This means that the epidemic will end before everyone is infected, although it will continue in endemic form with low rates of infections. Sooner or later, herd immunity will be reached either through natural infection or through a combination of vaccinations and natural infection. Since worldwide zero COVID is impossible, herd immunity is the endpoint of this epidemic regardless of whether we choose lockdowns or focused protection to address it.

Kindrachuk cites the experience of Manaus, Brazil to assert that herd immunity cannot be achieved. The basic fact cited is that Manaus has experienced two very large epidemic waves, and that high levels of population immunity achieved during the first wave did not protect the population from a large second epidemic wave. The major problem with this reasoning is that it is based on a single, flawed, seroprevalence study conducted in Manaus in the middle of 2020. The 76% estimate was not based on a random survey, but on blood donors, who are a very select group of people in the developing world. Moreover, the seroprevalence among the blood donors was 52%, which was adjusted upwards based on questionable mathematical modelling of the waning of anti-bodies. Hence, we do not really know the level of immunity in Manaus from earlier this year.

Apart from this factual problem, there are several other explanations for the Manaus, Brazil experience that Kindrachuk does not consider, and would need to be ruled out from a scientific point of view before accepting the proposition that herd immunity failed in Brazil. First, residential segregation in Manaus (along socio-economic lines) could lead to a separation in the peaks of epidemics occurring in different communities. An unfortunate feature of the reporting of figures during this pandemic has been the misleading aggregation of data from different geographical locations. For instance, the impression of a bigger 'second wave' occurring within the same jurisdiction, may be due to a bigger area being affected during the second wave compared to the first. But even within the same location, residential and socio-economic segregation can create the conditions for a second wave to occur more or less independently of the first.

Second, the herd immunity threshold is not a single constant that is known in the literature, but instead is likely to vary substantially from place to place and by season of the year since interaction patterns between people – and disease contagion risk – vary along these dimensions.

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[51] Fine P, Eames K, Heymann DL. (2011) "Herd Immunity": A Rough Guide. *Clinical Infectious Disease* 52(7):911-6. doi: 10.1093/cid/cir007

The herd immunity thresholds differ sharply by location and time, depending upon factors such as population density, living arrangements, social interactions, climate, season and hygiene. It is not a universal constant determined by biological characteristics of the virus alone. One cannot learn much about herd immunity thresholds in Manitoba from the experience of Manaus, Brazil.

Third, based on a location (Manaus, Brazil) with a largely uncontrolled epidemic, it is impossible to conclude that lockdowns are a good strategy to control the epidemic. It is scientifically unconvincing to attempt to make inferences about the efficacy of lockdowns from one single location where lockdowns were not implemented. A similar serosurvey conducted in the Dharavi slums in Mumbai, India,– the focus of an intense lockdown through May and only limited reopening in June, 2020 – found a seroprevalence of 57% in early July, 2020.[52] One of the researchers who conducted the study conveyed the hypothesis to me that the lockdown may have intensified the spread of the disease in the densely packed region by forcing residents to spend long days in packed rooms with poor ventilation. Similarly, nearly 40% of the population of Lima, Peru has SARS-CoV-2 specific antibodies, despite one of the longest lasting and harshest lockdown policies in the world.[53]

Fourth, the experience of Manaus, Brazil does not rule out the possibility of replacing Manitoba lockdowns with a policy of focused protection with good results. Manaus, Brazil did not adopt a focused protection strategy. As expected with a largely uncontrolled epidemic, the seroprevalence was roughly equal across the age-distribution in Manaus, which makes it similar to lockdown countries like Spain.[54] As a contrast, in Sweden seroprevalence (which adopted something more akin to a focused protection strategy) was more than twice as high among ages 20-64 compared to those over 65, belying the assertion that focused protection is impossible.

No Consideration of Harms of Lockdown Restrictions

Although a fundamental principle of public health requires that officials conduct a careful consideration of *both the costs and benefits* before imposing any policy, the Respondents' affidavits do not show any evidence that Manitoba has conducted a rigorous evaluation of the lockdown policies it has adopted. It is clear from the Respondents' affidavits that the Province has worked to quantify the purported public health benefit from its lockdown policy (though this analysis has its problems that are addressed in the original expert report and here). However, it

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[52] Biswas S (2020) India coronavirus: 'More than half of Mumbai slum-dwellers had Covid-19. BBC News. July 29, 2020, https://www.bbc.com/news/world-asia-india-53576653

[53] Andina: Agencia Peruana de Noticas (2020) Peru: Nearly 4 million people may already have had COVID-19 in Lima Metropolitan Area. Dec. 29, 2020. https://andina.pe/Ingles/noticia-peru-nearly-4-million-people-may-already-have-had-covid19-in-lima-metropolitan-area-827959.aspx

[54] Baral S, Chandler R, Prieto RG, Gupta S, Mishra S, Kulldorff M. Leveraging epidemiological principles to evaluate Sweden's COVID-19 response. Ann Epidemiol. 2021 Feb;54:21-26. doi: 10.1016/j.annepidem.2020.11.005. Epub 2020 Nov 23. PMID: 33242596; PMCID: PMC7682427.

is striking that there is no discussion whatsoever of the collateral harms from these forced closures.

For instance, the forced closure of churches has had and is likely to have a substantial impact on the financial viability of churches, including on the ability of churches to employ its staff. The forced limitation of church activities is also likely to have ripple impacts on the businesses from which churches purchase goods and services. Many churches are also active in communities in the provision of social services to indigent populations and in the organization of charitable giving to providers of such services. The forced closure or limitation of church activities is likely to impact the ability of churches and other religious organization to provide such services. The Respondents have conducted no analysis of the direct or indirect economic impacts of their closure orders, and yet have continued to impose them on religious organizations.

Instead, the Respondents have offered the testimony of an expert (Komlodi) who discusses at length the various financial programs that the Province has put in place to offset the financial harms from the lockdowns to businesses. None of this testimony addresses the distributional effects of the harms (poor are hardest hit), nor does it establish whether the financial programs sufficiently offset the lockdown induced financial harm to the businesses affected. Most importantly, however, these programs cannot possibly offset the harms done by the lockdown policies to church members, whose fundamental right to worship freely have been violated. No pecuniary renumeration would be sufficient to offset this harm, which can only be addressed by once more permitting the free exercise of religion in Canada.

Loeppky's affidavit reports significant increases in alcohol abuse, hospitalizations for suicide attempts, and intentional injuries in mid-2020. In response, Komlodi discusses how the Province has offered two free sessions of online counselling to people plus a "help line" in order to cope with mental health issues arising over the past year. What Komlodi and the government have not established – because it would not be accurate – is that these counseling sessions are sufficient to undo the psychological and other harms caused by the lockdowns.

In my original expert report, I discussed some of the scientific evidence for the psychological benefits of church attendance. It is also clear from the Respondents' affidavits that they make no attempt to quantify or consider in any way the positive public health benefits forgone by shutting down churches and banning worship, both for congregants and the positive ripple effects in the community. Policies enacted without a careful consideration of *both* its costs and benefits cannot possibly be construed to have a rational basis.