Kitchener Court File No.: CV-21-00000095-0000
St. Thomas Court File No.: CV-21-08

ONTARIO
SUPERIOR COURT OF JUSTICE

B E T W E E N:

THE ATTORNEY GENERAL OF ONTARIO

Applicant (Responding Party)

-and-

TRINITY BIBLE CHAPEL, JACOB REAUME, WILL SCHUURMAN, DEAN WANDERS, RANDY FREY, HARVEY FREY and DANIEL GORDON

Respondents (Moving Parties)

A N D B E T W E E N:

HER MAJESTY THE QUEEN IN ONTARIO

Applicant (Responding Party)

-and-

THE CHURCH OF GOD (RESTORATION) AYLMER, HENRY HILDEBRANDT, ABRAM BERGEN, JACOB HIEBERT, PETER HILDEBRANDT, SUSAN MUTCH, ELVIRA TOVSTIGA, and TRUDY WIEBE

Respondents (Moving Parties)

AFFIDAVIT OF DR. THOMAS WARREN
(Sworn May 25, 2021)

I, **THOMAS WARREN**, of the City of [redacted] in the Province of, Ontario MAKE OATH AND SAY:

1. I am an Infectious Diseases consultant and Medical Microbiologist currently practicing in Oakville, Milton and Georgetown, Ontario, and as such have knowledge of the matters hereinafter deposed to.

2. I have been a member of the College of Physicians and Surgeons of Ontario since 2009. My curriculum vitae is attached hereto and marked as **Exhibit "A".**

3. I obtained my Doctor of Medicine (MD) from the University of Western Ontario in 2005, after which I completed a three-year residency in Internal Medicine through the University of Ottawa. Following my Internal Medicine residency, I completed a Fellowship in Infectious Diseases and a second residency in Medical Microbiology, both at the University of Toronto. During my residencies and fellowship, I regularly taught medical students and junior residents.

4. I have practiced in these specialty areas for ten (10) years. As part of my clinical practice, I teach through my appointment as an Assistant Clinical Professor (Adjunct) at McMaster University in Hamilton, ON. This includes supervising Infectious Diseases Clinical Rotations for physician assistant students, medical students, and Infectious Diseases fellows.

5. I am currently enrolled in a Master of Science (Epidemiology) at the London School of Hygiene and Tropical Medicine, University of London, with an expected completion date of 2022. Areas of study include the framework for understanding the epidemiology of infectious diseases and the mathematical theory underlying epidemiological studies.

6. In my medical microbiology residency, I was trained to develop, use and interpret reverse transcription polymerase chain reaction (RT-PCR) testing. I have practiced as a microbiologist for ten years in a microbiology laboratory that uses a variety of PCR tests. As an infectious diseases consultant, I interpret PCR test results in the context of clinical care.

7. The Moving Parties' counsel contacted me about providing expert testimony in support of their motion to set aside the enforcement order against them. I have

been asked to address issues surrounding the virus SARS-CoV-2 and Covid-19 disease, specifically: their description, PCR testing, asymptomatic transmission, and the utility of masks.

8. I acknowledge that in preparing this report and providing expert evidence, the Moving Parties' counsel explained that my role is to assist the court to determine 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.

SARS-CoV-2 and COVID-19

9. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a novel coronavirus. There are six other coronaviruses that are known to infect humans. Four coronaviruses, HCoV-NL63, HCoV-HKU1, HCoV-229E, and HCoV-OC43 circulate worldwide and together are the second most common cause of the common cold[1, 2]. Severe acute respiratory syndrome coronavirus 1 (SARS-CoV-1) infected 8096 people in 2003 resulting in 774 deaths[3]. After 2003 there has not been any further human to human transmission. Middle East respiratory syndrome coronavirus (MERS-CoV) was first identified in humans in 2012[4]. MERS-CoV continues to cause sporadic infection and outbreaks in the Arabian peninsula, as well as occasional other cases and outbreaks in other parts of the world linked to travelers to the Arabian peninsula[5].

10. Bats were the source of SARS-CoV-1[6] and are known to be a natural reservoir for related coronaviruses[7,8]. SARS-CoV-2 was likely circulating in bats for decades[9]. In late 2019, SARS-CoV-2 was first detected in humans and is established as the cause of the disease now designated coronavirus disease 2019 (COVID-19). Approximately 10-20% of persons with SARS-CoV-2 infection are asymptomatic[10,11]. In those who are symptomatic, there is a wide range of illness from those with mild symptoms such as runny nose to those with severe disease affecting particularly the respiratory tract with high mortality[12]. Most people with

SARS-CoV-2 infection are asymptomatic or have mild-moderate symptoms not requiring hospitalization. In one study of a relatively healthy population, those with COVID-19 requiring hospital care was < 2%, and the mortality rate was < 0.1%[11].

SARS-CoV-2 transmission and mortality

11. The timing of peak SARS-CoV-2 transmission is primarily affected by seasonal patterns (i). The scale of SARS-CoV-2 transmission in a susceptible population is primarily determined by population density (ii). The mortality of COVID-19 is primarily determined by the age structure of the population (iii). Each of these important factors for SARS-CoV-2 transmission and mortality is non-modifiable.

(i) The timing of peak SARS-CoV-2 transmission is primarily affected by seasonal patterns

12. The four human coronaviruses (OC43, 229E, NL63, HKU1) are known to have a seasonal pattern of increased transmission[1]. The peak of the transmission wave in the United States is in the coldest months of the year, usually January. SARS-CoV-2 transmission appears to have a similar seasonal pattern of transmission to the other seasonal human coronaviruses[13]. There are numerous studies that show climate (season) is one of the most important factors for SARS-CoV-2 transmission[14-26]. In general, colder temperatures are associated with increased SARS-CoV-2 transmission.

(ii) The scale of SARS-CoV-2 transmission is primarily determined by population density.

13. The transmission of SARS-CoV-2 is strongly associated with population density, particularly population-weighted density[15-18, 24, 27-31]. In the United States, incidence and mortality are ten times higher in the most densely populated areas compared to the least densely populated areas [32,33]. The association between population density and SARS-CoV-2 transmission has been identified in Europe[34], Italy[35], India[36,37], Argentina[38], Turkey[39], Algeria[40], Brazil[22], Japan[25], and China[41].

14. This is also evident in Canada. Provinces with the highest population density (e.g. Ontario) have the highest number of cases. Within provinces (e.g. Ontario), regions with the highest population density have the highest number of cases (e.g. Toronto).

(iii) The mortality of COVID-19 is primarily determined by the age structure of the population.

15. Age is the most important risk factor for COVID-19 mortality. Compared to persons under age 40, persons over the age of 80 have a greater than 300 times chance of dying from COVID-19[42]. The infection fatality ratio (IFR) in persons over 80 is approximately 1000 times the IFR in those under 20[43]. In Canada, 68% of deaths are in persons over 80, 87.5% of deaths are in persons over 70, and > 95% of deaths are in persons over 60[13].

16. The risk of death due to COVID-19 in persons under 60 is very small[44]. In Canada, there have been 1,010 COVID-19 deaths in persons < 60 years old as of April 16, 2021[13]. In Canada in 2018 there were 1,191 motor vehicle fatalities in persons under 55[45]. So, the risk of death due to COVID-19 in persons < 60 is less than the risk of death due to a motor vehicle fatality.

Asymptomatic transmission

17. A *British Medical Journal* editorial concisely summarizes the risk of asymptomatic transmission: "The transmission rates to contacts within a specific group (secondary attack rate) may be 3-25 times lower for people who are asymptomatic than for those with symptoms."[46] This is consistent with the conclusions from several peer-reviewed systematic reviews and meta-analyses[47-50].

18. To further exemplify the risk of asymptomatic transmission, it is useful to look specifically at a few large or comprehensive studies. A very large study in Wuhan China of 9,899,828 city residents found 300 asymptomatic cases but there were

no positive tests amongst 1,174 close contacts of asymptomatic cases[51]. Similarly, a very thorough study of 100 cases from Taiwan, found that "none of the 9 asymptomatic case patients transmitted a secondary case."[52]

19. Household transmission is one of the most important modes of transmission. In a meta-analysis of household transmission, which included 54 studies and 77 758 participants[53], transmission from asymptomatic cases was 0.7% compared to 18% transmission from symptomatic cases. In other words, symptomatic transmission was roughly 25 times higher than asymptomatic transmission.

20. Asymptomatic transmission does occur but the rates of transmission from asymptomatic persons is substantially less than from symptomatic persons and does not warrant being considered a significant contributor to the overall transmission burden.

Evidence for lockdown measures, including closing churches, to control SARS-CoV-2 transmission

21. Almost all of the research done prior to 2020 examining the effectiveness of interventions such as avoiding crowding (which would include church closure) to control respiratory tract infections was done with influenza. Prior to 2020, social distancing was a term that included quarantine, school closures, work closures as well as avoiding crowding.[54]

22. As noted in a recent systemic review, "clear biological and epidemiologic rationale supports the potential effectiveness of social distancing measures"[55] in the control of viral respiratory tract infections; however, the actual evidence for avoiding crowding by the general public for the control of viral respiratory tract infections is negligible.

23. A 2019 WHO review[54] of non-pharmaceutical public health measures for mitigating the risk and impact of epidemic and pandemic influenza found only three studies[56-

[58] relevant to "avoiding crowding". In all three studies the quality of evidence was rated as very low. Two of those studies were retrospective analysis of the 1918 pandemic,[56-57] both published in 2007. The limitations of studies done almost a century after an event should be self-evident, and hence the quality of that evidence is rated as very low. Importantly, in reference to "avoiding crowding" (which would include church closure) the WHO document notes[54]:

> Ethical considerations
>
> In urban locations it can be difficult to avoid crowding without considerable social costs.
>
> Modification, postponement or cancellation of mass gatherings may have cultural or religious considerations, in addition to public health aspects.
>
> Knowledge gaps
>
> There are still major gaps in our understanding of person-to-person transmission dynamics. Reducing mass gatherings is likely to reduce transmission in the community, but the potential effects are difficult to predict with accuracy. Large-scale RCTs [randomized controlled trials] are unlikely to be feasible.

24. A 2020 Cochrane systematic review[59] "found only one RCT [randomized controlled trial] of quarantine, and no trials of screening at entry ports or physical distancing [emphasis added]." Since there is a complete absence of high-quality evidence regarding physical distancing, the authors state: "Physical distancing represents another major research gap which needs to be addressed expediently, especially within the context of the COVID-19 pandemic setting as well as in future epidemic settings."[59]

25. In summary, while there is clear biological and epidemiological rationale for avoiding crowding, there is an absence of high-quality evidence, such as randomized-controlled trials, that prove the effectiveness of lockdown measures to avoid crowding in particular groups or contexts, including churches.

COVID-19 cases and deaths related to church outbreaks in the Canadian epidemiological context

26. The majority of deaths related to COVID-19 in Canada are related to outbreaks. As of April 3, 2021 there were 23,050 COVID-19 deaths in Canada, and 13,634 (59.1%) of those deaths were related to outbreaks[60]. Outbreaks are known to be important in the transmission of SARS-CoV-2, with perhaps 80% of all transmissions related to approximately 20% of infections, so-called superspreader events[61]. In Canada, 99.8% (13,600/13,634) of outbreak-related deaths are in settings that might be considered non-modifiable - long term care (12,473 deaths), healthcare (812 deaths), corrections/shelters (226 deaths), communities such as Indigenous communities (89 deaths)[60]. It is hard to imagine closing long term care homes, hospitals, corrections facilities and Indigenous communities - yet outbreaks in those settings account for 99.8% of outbreak-related COVID-19 deaths in Canada.

27. Religious gatherings appear to be grouped in the "Other" category which includes "social gatherings, office workplaces, recreational facilities, etc." in the Canadian epidemiologic summary[60]. The number of cases related to outbreaks in the "Other" category is 5,331. That is less than 1% (5,331/1,001,658) of all cases. Presumably, cases related to religious gatherings outbreaks make up only a fraction of cases in the "Other" category, with cases related to other social events more common, so the number of cases related to religious gatherings outbreaks is actually only a fraction of <1%.

28. Outbreak data from Ontario[62] show that less than 1% of all outbreaks (23/4151) are due to places of worship. Less than 1% of all outbreak cases (221/39774) are due to outbreaks at places of worship. Places of worship account for only 0.1% (5/3460) of all outbreak associated hospitalizations, and places of worship account for 0% (0/3681) of all outbreak associated deaths.

Evidence for masks in churches to prevent the spread of SARS-CoV-2

29. In short, and as stated by the World Health Organization (WHO), "there is only limited and inconsistent scientific evidence to support the effectiveness of masking of healthy people in the community to prevent infection with respiratory viruses, including SARS-CoV-2"[63].

30. The best evidence for any medical intervention comes from large randomized controlled trials or meta-analysis of randomized trials. There are no randomized controlled trials or meta-analysis of randomized controlled trials that support the effectiveness of masking of healthy people in the community to prevent infection with respiratory viruses, including SARS-CoV-2.

31. There is only one published randomized controlled trial on the effectiveness of masking of healthy people in the community to prevent infection with SARS-CoV-2. That study found there was no significant difference in SARS-CoV-2 infection rates between those who wore masks and those who did not wear masks[64].

32. Three recent meta-analyses show no benefit of masking healthy people in the community to prevent infection with respiratory viruses. Cochrane systematic reviews are widely recognized in the medical community as authoritative. A 2020 Cochrane meta-analysis of masks versus no masks in preventing viral respiratory illness found no difference in preventing influenza-like illness or laboratory confirmed illness[65]. Similarly, another meta-analysis published in 2020 showed that masks make no difference in preventing pandemic influenza in nonhealthcare settings[66]. Another meta-analysis by the WHO in 2019 also failed to show a substantial protective effect of face masks[67].

33. When the analysis is limited to the strongest types of evidence (randomized trials and meta-analyses of randomized trials), there is no evidence that healthy persons wearing masks in non-healthcare settings prevents the spread of SARS-CoV-2.

34. In the absence of evidence from randomized controlled trials and meta-analyses, the WHO's report on masking from December 1, 2020[63] references a number of other types of studies that purport to show that healthy persons wearing masks in non-healthcare settings prevents the spread of SARS-CoV-2; however, these studies have significant limitations that need to be considered.

35. The majority of the studies referenced by the WHO are ecological studies,[68-89] also called correlational studies. The ecological studies referenced by WHO compare mask use and COVID-19 rates between geographic region, such as country, state or city. The descriptive analysis of these rates does not provide an evidentiary base for concluding causation. Ecological studies have "many methodologic problems that severely limit causal inference, including ecologic and cross-level bias, problems of confounder control, within-group misclassification, lack of adequate data, temporal ambiguity, collinearity, and migration across groups."[90] The WHO report also acknowledges those studies have "have important limitations to consider"[63,91-93].

36. Cohort studies[94], case control[95-97] and case series[98-100] are all referenced in the WHO document, but these study types are considered much weaker than randomized controlled trials or meta-analysis. Due to the limitation of the study designs, particularly bias and confounding, the true effect of masking is uncertain. Many of these studies also have limited generalizability. For example, a study looking at secondary transmission of SARS-CoV-2 in households[94] has limited generalizability to universal masking in the wider general public. The findings from case series of persons who traveled on the same flight[98,99] cannot be generalized to universal masking.

37. Finally, a comment should be made on the study[101] by Chu et al. as that study is referenced by the WHO and has been widely cited in the media. As noted in the 2020 Cochrane review referenced above, the Chu et al. study "has been criticised for several reasons: use of an outdated 'Risk of bias' tool; inaccuracy of distance

measures; and not adequately addressing multiple sources of bias, including recall and classification bias and in particular confounding. Confounding is very likely, as preventive behaviours such as mask use, social distancing, and hand hygiene are correlated behaviours, and hence any effect estimates are likely to be overly optimistic."[65]

38. In summary, there is "inconsistent scientific evidence to support the effectiveness of masking of healthy people in the community to prevent infection with respiratory viruses, including SARS-CoV-2"[63]. Studies that support the effectiveness of masking are of poorer methodological quality and hence provide weaker evidence. Randomized controlled trial and meta-analysis, which provide stronger scientific evidence, do not support the effectiveness of masking of healthy people in the community to prevent infection with respiratory viruses, including SARS-CoV-2.

Polymerase chain reaction (PCR) for diagnosis of SARS-CoV-2 infection

39. Polymerase chain reaction (PCR) is a technology to amplify DNA fragments[102,103]. It is widely used in molecular biology, biotechnology, and medicine. Real time reverse transcription-polymerase chain reaction (real time RT-PCR) is a modification of PCR with an additional step of reverse transcription (RT) of RNA to DNA to enable amplification of an RNA target rather than a DNA target.

40. PCR is a relatively quick and inexpensive process that is highly sensitive. The process detects genetic material (DNA or RNA), even in minute quantities, and then copies it in a series of steps (cycles) that is usually done by a machine in a fully automated process. Each cycle doubles the amount of target DNA, and the newly created DNA is labeled with a fluorescent dye for detection. If a certain level of fluorescence is surpassed and detected by the machine, the test is considered positive. The cycle of the test that passes this threshold is called the cycle threshold (Ct).

41. PCR is commonly used in microbiology laboratories for the diagnosis of infectious diseases. While PCR can be the best diagnostic tool to diagnose many infections, it does have important limitations that also need to be considered.

Limitations of PCR

42. The World Health Organization (WHO) recognizes the limitations of PCR and advises that "health care providers must consider any result in combination with timing of sampling, specimen type, assay specifics, clinical observations, patient history, confirmed status of any contacts, and epidemiological information"[104]. The WHO guidance goes on to say that "disease prevalence alters the predictive value of test results; as disease prevalence decreases, the risk of false positive increases. This means that the probability that a person who has a positive result (SARS-CoV-2 detected) is truly infected with SARS-CoV-2 decreases as prevalence decreases, irrespective of the claimed specificity."

43. A positive RT-PCR result represents the identification of SARS-CoV-2 virus fragments, but a positive RT-PCR result does not necessarily indicate the entire virus is present, replication competent virus is present, or the patient has COVID-19. If the entire virus is not present in the person, or the virus is not replication competent, then the person is not infectious.

44. A study from Singapore[105] showed that the higher the Ct value, the larger degree of viral fragmentation and the less likely that an entire viral genome is actually present. In other words, the higher the Ct, the more likely it is that only bits of virus are being detected, and less likely that entire virus is present in the patient. Only complete virus particles can be replication competent and therefore infectious and transmissible.

45. Many studies have convincingly shown that the higher the Ct, the less likely replication-competent virus (infectious virus) can be detected through cell culture[106-113]. An editorial in *Clinical Infectious Diseases* concluded "that PCR

positivity is likely not a reliable surrogate marker for determining the infectious status of COVID-19 patients"[114]. A systematic review on the topic concluded that test results "with high cycle threshold are unlikely to have infectious potential."[115]

46. That a positive test does not necessarily indicate infectiousness is indicated by recommendations for stopping isolation in persons previously positive for SARS-CoV-2. The WHO[116-117], CDC[118], and Canadian jurisdictions[119] recommend discontinuing isolation of persons with COVID-19 ten days after symptom onset, and in persons who have tested positive for SARS-CoV-2 without symptoms ten days after their first positive RT-PCR result, even though it is well established that many persons in these groups will continue to have positive RT-PCR results after those time frames. Those guidelines recommend against RT-PCR testing in these groups because it is known that positive tests in these groups does not indicate infectiousness. This is a concrete application of the evidence that late in the course of SARS-CoV-2 infection, which corresponds to increasing Ct, there is no risk of transmission. In another example, Ontario uses point-of-care tests, that are less sensitive than RT-PCR, to rule out SARS-CoV-2 infection[120] in persons who are symptomatic without known contact with a positive case. In this case, even though a more sensitive test such as RT-PCR might detect more positives, a less sensitive test[121] is sufficient to rule out significant infection.

47. Evidence shows that the higher the Ct value, the more likely it is that a person is in the later stages of the infection, and therefore less infectious. The nearer the Ct value approaches 40, the closer the likelihood that the patient is infectious approaches zero. A report from the Emerging Sciences Group of the Public Health Agency of Canada[122] concludes that in symptomatic persons there is "a peak in viral load ranging from just before to during the first week after onset of illness" and in asymptomatic persons "viable virus and viral RNA was highest during the first week of infection and declined in subsequent weeks." In persons that are asymptomatic or mildly symptomatic, late in the course of illness the Ct value is

higher[110] and viable virus cannot be detected though cell culture. The likelihood of a positive cell culture correlates with disease severity[123], and therefore risk of infectiousness correlates with disease severity.

48. The Ct value early in the course of illness is significantly lower than the Ct value late in the course of illness[124]. The Ct value of pre-symptomatic persons has been shown to be low, and not be significantly different from symptomatic persons; in one study, the Ct value was 23.1 for pre-symptomatic persons compared to 24.8 in persons with typical symptoms[10]. There is a clear association between Ct value and stage of infection; the higher the cycle threshold[123], the more likely the patient is in the later stages of the infection, and the less likely the patient is infectious or at risk of transmitting the virus to another person.

SARS-CoV-2 infection versus COVID-19 disease

49. It is important to recognize the difference between SARS-CoV-2 infection and COVID-19 disease. This is an important distinction that is made with many other infections. As noted in a *British Medical Journal* editorial: "Unusually in disease management, a positive test result is the sole criterion for a Covid-19 case. Normally, a test is a support for clinical diagnosis, not a substitute."[125] In other words, for COVID-19, a positive test is sufficient to make the diagnosis, which is not done in other infections that are similarly mild and short-lived.

50. A positive SARS-CoV-2 PCR test means that a person has or recently had SARS-CoV-2 (virus) in their body; however, it does not mean that the person is infectious or that they have COVID-19 disease (i.e. symptoms). If we wanted to define specificity as diagnosing infectiousness or disease (i.e. symptoms or pathology), then the specificity of RT-PCR would be dramatically lower. This distinction can be better understood if we look at how PCR is used in other infections.

51. To cite just a few examples, positive PCR tests for Group A Streptococcus, Salmonella, E. coli O157, Campylobacter, C. difficile, Epstein-Barr Virus (EBV),

Cytomegalovirus (CMV) do not necessarily indicate disease. In the absence of symptoms or other tests indicating pathological effects, persons with positive PCR tests for those infections are not considered to have disease and they are usually not treated. The distinction between infection and disease is important. Over 50% of adult Canadians will be infected with EBV or CMV for most of their life; once acquired, those infections persist lifelong and PCR tests can detect those viruses, to varying degrees, throughout their lifetime. It would be inaccurate to say that over 50% of Canadians have disease associated with those viruses even though they can be detected by PCR.

52. A positive PCR result also does not necessarily indicate infectiousness. At any time, about 10% of school-aged children will have throat swabs positive for Group A Streptococcus (GAS)[126,127]. GAS can cause pharyngitis (strep throat), scarlet fever, rheumatic fever, and necrotizing fasciitis (flesh eating disease), but a positive test in an asymptomatic person is not considered significant in most cases.

53. Even a positive RT-PCR result in a person living with HIV does not necessarily mean that the person is considered infectious. According to Canadian law[128], "the combined effect of condom use and low viral load precludes a realistic possibility of transmission of HIV". Similarly, the Ontario Court of Appeal stated that "viral loads below a defined level, standing on their own, are sufficient to negate the realistic possibility of HIV transmission"[129].

54. The presence of SARS-CoV-2 virus as detected by PCR is necessary but not sufficient to indicate either infectiousness or COVID-19 *disease* properly defined. If a true positive is defined as the presence of complete virus, or replication competent virus (i.e. infectious virus) then the specificity of PCR is much lower and the number of false positives associated with PCR would be considered much higher.

Outdoor transmission of SARS-CoV-2

55. The risk of outdoor transmission of SARS-CoV-2 at outdoor religious services is negligible when physical distancing is maintained. The evidence for this assertion can be examined in two domains: First, by examining the evidence for outdoor transmission of other important respiratory tract infections such as tuberculosis (TB) and influenza; second, by examining the evidence for transmission of SARS-CoV-2 itself.

56. Since we only have just over one year of experience with SARS-CoV-2, it is helpful to look at the risk of outdoor transmission of two other very important respiratory tract infections, TB and influenza. TB is a respiratory tract infection that is transmitted through airborne particles. The *Canadian Tuberculosis Standards* published by the Public Health Agency of Canada state that TB "transmission is rarely thought to occur outdoors"[130] and the "risk of [outdoor] transmission is negligible provided they are not in very close contact with susceptible individuals for prolonged periods of time"[131]. The result is that "outdoor exposures are not investigated during a contact tracing exercise"[132].

57. Influenza is another important respiratory tract infection. In a systematic review of outdoor mass gatherings and respiratory disease (mostly influenza) performed by the United States Centers for Disease Control and Prevention, "no single-day mass gathering-related outbreaks were identified in our review"[133]. Similarly, a global review of outbreaks (including influenza outbreaks) at outdoor large gatherings from 1980 to July 2012 did not identify any outbreaks associated with single day gatherings[134]. These studies and others were included in a systematic review of outdoor transmission of SARS-CoV-2 and other respiratory viruses; influenza outbreaks only occurred in the context of multiday outdoor events or communal housing[135].

58. The primary mode of SARS-CoV-2 transmission is known to occur indoors. Household transmission (indoors) accounted for 78%-85% of all SARS-CoV-2 transmission in China in one report from the World Health Organization[136]. Household contacts and travel together were the most important sources of SARS-CoV-2 transmission in another study[137]. Outbreaks in indoor contexts such as long-term care facilities, hospitals and shelters have been established as an important source of indoor transmission in the Canadian context[138].

59. The evidence for outdoor SARS-CoV-2 transmission, when present, is negligible. In one comprehensive study from China[139], only one outdoor outbreak involving two cases occurred out of 7324 identified cases. The reason for negligible outdoor transmission is that airflow outdoors rapidly dilutes any SARS-CoV-2 virus present to negligible amounts not considered to be infectious[140].

60. As shown above, outdoor religious gatherings of short duration (less than 24 hours; no overnight component) should be considered safe based on the evidence. The risk of outdoor transmission of SARS-CoV-2 is negligible, similar to other important respiratory infections such as TB and influenza. As long as physical distancing can be maintained, outdoor religious gatherings should be considered safe.

61. I make this affidavit *bona fide*.

SWORN REMOTELY by videoconference by Dr. Thomas Warren at the City of [redacted] in the County of [redacted] before me at the City of London, in the County of Middlesex, this 25th day of May, 2021 in accordance with O.Reg. 431/20 Administering Oath or Declaration Remotely

A Commissioner, etc.

LISA D.S. BILDY
BARRISTER & SOLICITOR

DR. THOMAS WARREN

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This is Exhibit "A" referred to
in the Affidavit of
Dr. Thomas Warren

Sworn before me this 25th day
of May A.D., 20 21

A Commissioner for Oaths In and for Ontario

LISA D.S. BILDY
BARRISTER & SOLICITOR

Thomas A. Warren, MD

[redacted]

Employment

2011 -	**Infectious Diseases consultant & Medical Microbiologist** Halton Healthcare, Oakville ON
2010-2011	**Internal Medicine specialist – locum coverage** St. Michael's Hospital, Toronto ON Hamilton Health Sciences, Hamilton ON Lakeridge Health, Oshawa ON
2010-2011	**University of Toronto** Department of Laboratory Medicine & Pathobiology, Toronto ON *Resident, Medical Microbiology*
2008-2010	**University of Toronto** Department of Medicine, Division of Infectious Diseases, Toronto ON *Fellow, Infectious Diseases*
2005-2008	**University of Ottawa** Department of Medicine, Ottawa ON *Resident, Internal Medicine*
1997-2003	**University of Western Ontario** Department of Medicine, London ON *Computer Programmer & Web Developer*

Education

2018 -	**London School of Hygiene and Tropical Medicine, University of London** *Master's of Science (Epidemiology)* Expected Completion 2022
2010-2011	**Royal College of Physicians & Surgeons of Canada** *Residency in Medical Microbiology*

2008-2010	**Royal College of Physicians & Surgeons of Canada** *Fellowship in Infectious Diseases*
2005-2008	**Royal College of Physicians & Surgeons of Canada** *Residency in Internal Medicine*
2001-2005	**University of Western Ontario** Schulich School of Medicine & Dentistry *Doctor of Medicine*
1997-2001	**University of Western Ontario** *Bachelor of Science - Honors Microbiology & Immunology* *(Scholar's Electives Program)* Graduated With Distinction

Continuing Medical Education

2018	**IDEAS Foundations of Quality Improvement Program** May 30 McMaster University Hamilton, ON
2018	**Clinical Teaching Fundamentals** January – March McMaster University Hamilton, ON

Peer-Reviewed Publications

2015	**Warren T**, Lau R, Ralevski F, Rau N, Boggild AK. Fever in a visitor to Canada: a case of mistaken identity. *J Clin Microbiol*. 53:1783-1785.
2012	**Warren TA**, Yau Y, Ratjen F, Tullis E, Waters V. Serum galactomannan in cystic fibrosis patients colonized with Aspergillus species. *Medical Mycology*. 2012; 50: 658-660.
2010	**Warren TA**, McTaggart L, Richardson SE, Zhang SX. Candida bracarensis Bloodstream Infection in an Immunocompromised Patient. *Journal of Clinical Microbiology*. 2010; 48: 4677–4679.

Abstracts & Conference Presentations

2011 **Warren TA**, Yau Y, Waters V.
Serum galactomannan in cystic fibrosis patients colonized with Aspergillus species.
Poster session presented at: Association of Medical Microbiology and Infectious Disease (AMMI) Canada 2011 Annual Conference
2011 April 7-9; Montreal, QC.

2010 **Warren TA**, Yau Y, Waters V.
Serum galactomannan in cystic fibrosis patients colonized with Aspergillus species.
Poster session presented at: North American Cystic Fibrosis Conference
2010 October 21-23; Baltimore, MD.

2010 **Warren TA,** Govindapillai S, Tullis E, Devlin HR, Ferris W, Matukas LM.
Evaluation of Etest Combination Testing of Antibiotics Against Isolates from Patients with Cystic Fibrosis.
Poster session presented at: 50th Interscience Conference on Antimicrobial Agents and Chemotherapy
2010 September 12-15; Boston, MA.

2010 **Warren TA**, Rotstein C, Cole EH, Singer LG, Keshavjee S4, Husain S.
Posaconazole therapy in solid organ transplant recipients refractory to or intolerant of standard therapy.
Poster session presented at: Canadian Society for Transplantation Annual Conference
2010 August 12-15; Vancouver, BC.

2010 **Warren TA**, McTaggart L, Zhang S. Candida bracarensis
Blood Stream Infection in an Immunocompromised Patient: Case Report.
Poster session presented at: Focus on Fungal Infections
2010 March 3-5; New Orleans, LA.

2007 **Warren TA**, McCarthy AE.
A Ten-Year Retrospective Study of Vaccination Rates, Prophylactic Antibiotic Use, Serious Infection and Overwhelming Postsplenectomy Sepsis Rates in Splenectomized Patients.
Poster session presented at: Annual Meeting of the Infectious Diseases Society of America
2007 October 4-7; San Diego, CA.

Awards

2011 **Best Student Poster Award – 2011 Annual Conference**
Association of Medical Microbiology and Infectious Disease (AMMI) Canada
Montreal, QC

2010 **ASM ICAAC Infectious Diseases Fellows Grant**
2010 Interscience Conference on Antimicrobial Agents and Chemotherapy
Boston, MA

2008 **Internal Medicine CanMeds Award for Communication**
University of Ottawa, Department of Medicine
Ottawa, ON

2006 **Resident Research Day Award of Excellence – PGY1**
University of Ottawa, Department of Medicine
Ottawa, ON

2001 **Laurene Paterson scholarship**
University of Western Ontario
London, ON

1997-2001 **Dean's Honor List**
University of Western Ontario, Faculty of Science
London, ON

1997 **Western Scholarship of Excellence**
University of Western Ontario
London, ON

Appointments

2013 - **McMaster University**
Assistant Clinical Professor (Adjunct)
Department of Medicine, Faculty of Health Sciences
Hamilton, ON

Teaching

2012-2021 **Infectious Diseases – Clinical Rotations**
Supervised physician assistant students, medical students, residents and infectious diseases fellows from the University of Toronto and McMaster University
Oakville, ON

2009	**Pathobiology of Disease** *Taught microbiology to second year medical students* University of Toronto Toronto, ON
2008	**Pathobiology of Disease** *Taught microbiology to second year medical students* University of Toronto Toronto, ON
2008	**Physical Skills Development Course** *Taught physical exam skills to first year medical students* University of Ottawa Ottawa, ON

Memberships

Association of Medical Microbiology and Infectious Diseases Canada

Canadian Medical Association

Canadian Medical Protective Association

College of Physicians and Surgeons of Ontario

Ontario Medical Association

Royal College of Physicians and Surgeons of Canada

FORM 53

Kitchener Court File No.: CV-21-00000095-0000
St. Thomas Court File No.: CV-21-08

ONTARIO
SUPERIOR COURT OF JUSTICE

B E T W E E N:

THE ATTORNEY GENERAL OF ONTARIO

Applicant (Responding Party)

-and-

TRINITY BIBLE CHAPEL, JACOB REAUME, WILL SCHUURMAN, DEAN WANDERS, RANDY FREY, HARVEY FREY and DANIEL GORDON

Respondents (Moving Parties)

A N D B E T W E E N:

HER MAJESTY THE QUEEN IN ONTARIO

Applicant (Responding Party)

-and-

THE CHURCH OF GOD (RESTORATION) AYLMER, HENRY HILDEBRANDT, ABRAM BERGEN, JACOB HIEBERT, PETER HILDEBRANDT, SUSAN MUTCH, ELVIRA TOVSTIGA, and TRUDY WIEBE

Respondents (Moving Parties)

ACKNOWLEDGMENT OF EXPERT'S DUTY

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1. My name is Dr. Thomas Warren. I live in [redacted], Ontario.

2. I have been engaged on behalf of the Moving Parties, Trinity Bible Chapel et al. and The Church of God, et al., to provide evidence in relation to the above-noted court proceeding.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:

   (a) to provide opinion evidence that is fair, objective and non-partisan;

   (b) to provide opinion evidence that is related only to matters that are within my area of expertise; and

(c) to provide such additional assistance as the court may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date: May 25, 2021

Signature

NOTE: This form must be attached to any expert report under subrules 53.03(1) or (2) and any opinion evidence provided by an expert witness on a motion or application.

Kitchener Court File No.: CV-21-00000095-0000
St. Thomas Court File No.: CV-21-08

HER MAJESTY THE QUEEN IN RIGHT OF ONTARIO	***and***	**CHURCH OF GOD (RESTORATION) AYLMER et al.**
THE ATTORNEY GENERAL OF ONTARIO	***and***	**TRINITY BIBLE CHAPEL et al.**
Applicants		*Respondents*

ONTARIO
SUPERIOR COURT OF JUSTICE

Proceeding commenced at St. Thomas

AFFIDAVIT OF DR. THOMAS WARREN

JUSTICE CENTRE FOR CONSTITUTIONAL FREEDOMS

[redacted]

Lisa D.S. Bildy (LSO #36583A)

[redacted]

Lawyer for the Respondents