UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CAPITOL HILL BAPTIST CHURCH, **Plaintiff,** **v.** **MURIEL E. BOWSER, *et al.*,** **Defendants.**	**Civil Action No. 20-2710 (TNM)**

DECLARATION OF LAQUANDRA NESBITT IN SUPPORT OF DEFENDANTS' OPPOSITION TO PLAINTIFF'S MOTION FOR A PRELIMINARY INJUNCTION

I, LaQuandra Nesbitt, pursuant to 28 U.S.C. § 1746, affirm that I am over 18 years of age and competent to make the following Declaration.

1. I have served as the Director of the District of Columbia Department of Health (DC Health) since January 2015.

2. Before becoming Director of DC Health, I was Director of the Louisville Metro Department of Public Health and Wellness from July 2011 until January 2015.

3. I received my B.S. degree in Biochemistry from the University of Michigan, my medical degree from Wayne State University School of Medicine, and my Master's Degree in Public Health in Health Care Management and Policy from the Harvard School of Public Health. I am a board-certified family physician and have served on many commissions and advisory groups relating to public health.

4. Under Section II(A) of Mayor's Order 2020-045 (Mar. 11, 2020), I and the Director of the Homeland Security and Emergency Management Agency, Dr. Christopher Rodriguez, provide consultation to the City Administrator "to implement any measures as may be necessary

or appropriate to protect persons and property in the District of Columbia from the impacts of COVID-19."

5. As a practical matter, that means I provide recommendations to the Mayor, the City Administrator, and other members of the District of Columbia (the District) government dedicated to addressing the public health emergency. This includes recommendations on the development of Mayor's Orders and the guidance the District provides on, among other things, how to protect the city's residents, employees, and visitors from COVID-19.

6. I provided similar recommendations to the ReOpenDC Advisory Group, providing my best medical judgment on the provisions that need to be taken to protect against this novel coronavirus.

7. In my professional opinion, people are going to get sick and die if the Court permits faith-based organizations to conduct worship services outdoors in unlimited size.

8. My professional opinion about the spread of sickness and death is based not only on such formal rules as may be established but also on how people behave. It is not appropriate to expect that social distancing—people keeping themselves six feet apart—can be maintained when unlimited group sizes are allowed to convene, indoors or outdoors.

9. This point has been repeatedly demonstrated during the COVID-19 pandemic. For example, I have seen videos of fans in football stadiums in other jurisdictions failing to adhere to the "pod concept" and to follow other guidance to which they agreed to submit. Public health officials rely on case studies such as these when evaluating whether large outdoor masked events would be safe because epidemiologists cannot ethically study this question in a randomized controlled trial study design.

10. This is why, for example, I recommended against the opening of public swimming pools this summer, even though chlorine kills the virus. There will be instances of non-compliance—even by those who are fully committed to complying with the rules—with virtually any rule that might be imposed as to social distancing. As public health professionals, we must take into account these potential errors or other forms of non-compliance.

11. The current restrictions on mass gatherings under the Mayor's Orders were designed based on how many people could gather with a reasonable risk, taking into account the current levels of community spread and rates of transmission. The current information available about the risks of transmission of COVID-19 does not support distinctions based on the size of the indoor venue or parcel of outdoor land.

12. As noted in Section X.4 of Mayor's Order 2020-075 and laid out in the two attached Morbidity and Mortality Weekly Report articles, published by the Centers for Disease Control and Prevention on May 15 and 22, 2020, the traditional activities that happen in places of worship such as singing, communion, and other rituals, pose a particular risk that must be taken into account when determining the size of mass gatherings that can reasonably be approved by the District's public health authorities. In my professional opinion, these traditional worship activities pose a risk for the spread of COVID-19, even when performed outdoors.

13. In fact, DC Health did not initially support the provision in the Mayor's Order allowing places of worship to have a mass gathering of 100 instead of the 50-person limit for other mass gatherings during Phase Two of the District's reopening plan.

14. The District should not increase the size of allowable gatherings to 250 until the level of community spread is consistently below a 7-day average of 5 cases per 100,000 people per day. The most recent average is 7.54 daily cases.

15. In setting restrictions on gatherings, the District cannot rely on the venue size or promises of social distancing, or enforcement of those rules by the organizer of a gathering. That is why the District has not allowed crowds even in such spacious venues such as Nationals Park, the Convention Center, Capitol One Center, the Entertainment and Sports Arena, or the proposed Citi Open, which would have been outdoors, even with promises and plans that fans would be spread out.

16. Although my office has not studied the proposals of Capitol Hill Baptist Church in particular, the scientific knowledge about COVID-19 is clear that large gatherings, even when outdoors and attended by people who wear masks, become progressively more likely to lead to a spread of the disease the longer a group is together. There is evidence of an increased risk of transmission when those gathered are stationary and in close proximity for 15 minutes or more. Thus, any long gathering poses too great a risk of community transition to be safely authorized at this time.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information and belief.

Dated: 10/9/2020

LaQuandra S. Nesbitt

LaQuandra Nesbitt, M.D., MPH
Director, District of Columbia Department of Health

Exhibit A

Morbidity and Mortality Weekly Report

High SARS-CoV-2 Attack Rate Following Exposure at a Choir Practice — Skagit County, Washington, March 2020

Lea Hamner, MPH[1]; Polly Dubbel, MPH[1]; Ian Capron[1]; Andy Ross, MPH[1]; Amber Jordan, MPH[1]; Jaxon Lee, MPH[1]; Joanne Lynn[1]; Amelia Ball[1]; Simranjit Narwal, MSc[1]; Sam Russell[1]; Dale Patrick[1]; Howard Leibrand, MD[1]

On May 12, 2020, this report was posted as an MMWR *Early Release on the* MMWR *website (https://www.cdc.gov/mmwr).*

On March 17, 2020, a member of a Skagit County, Washington, choir informed Skagit County Public Health (SCPH) that several members of the 122-member choir had become ill. Three persons, two from Skagit County and one from another area, had test results positive for SARS-CoV-2, the virus that causes coronavirus disease 2019 (COVID-19). Another 25 persons had compatible symptoms. SCPH obtained the choir's member list and began an investigation on March 18. Among 61 persons who attended a March 10 choir practice at which one person was known to be symptomatic, 53 cases were identified, including 33 confirmed and 20 probable cases (secondary attack rates of 53.3% among confirmed cases and 86.7% among all cases). Three of the 53 persons who became ill were hospitalized (5.7%), and two died (3.7%). The 2.5-hour singing practice provided several opportunities for droplet and fomite transmission, including members sitting close to one another, sharing snacks, and stacking chairs at the end of the practice. The act of singing, itself, might have contributed to transmission through emission of aerosols, which is affected by loudness of vocalization (*1*). Certain persons, known as superemitters, who release more aerosol particles during speech than do their peers, might have contributed to this and previously reported COVID-19 superspreading events (*2*–*5*). These data demonstrate the high transmissibility of SARS-CoV-2 and the possibility of superemitters contributing to broad transmission in certain unique activities and circumstances. It is recommended that persons avoid face-to-face contact with others, not gather in groups, avoid crowded places, maintain physical distancing of at least 6 feet to reduce transmission, and wear cloth face coverings in public settings where other social distancing measures are difficult to maintain.

Investigation and Findings

The choir, which included 122 members, met for a 2.5-hour practice every Tuesday evening through March 10. On March 15, the choir director e-mailed the group members to inform them that on March 11 or 12 at least six members had developed fever and that two members had been tested for SARS-CoV-2 and were awaiting results. On March 16, test results for three members were positive for SARS-CoV-2 and were reported to two respective local health jurisdictions, without indication of a common source of exposure. On March 17, the choir director sent a second e-mail stating that 24 members reported that they had developed influenza-like symptoms since March 11, and at least one had received test results positive for SARS-CoV-2. The email emphasized the importance of social distancing and awareness of symptoms suggestive of COVID-19. These two emails led many members to self-isolate or quarantine before a delegated member of the choir notified SCPH on March 17.

All 122 members were interviewed by telephone either during initial investigation of the cluster (March 18–20; 115 members) or a follow-up interview (April 7–10; 117); most persons participated in both interviews. Interviews focused on attendance at practices on March 3 and March 10, as well as attendance at any other events with members during March, other potential exposures, and symptoms of COVID-19. SCPH used Council of State and Territorial Epidemiologists case definitions to classify confirmed and probable cases of COVID-19 (*6*). Persons who did not have symptoms at the initial interview were instructed to quarantine for 14 days from the last practice they had attended. The odds of becoming ill after attending each practice were computed to ascertain the likelihood of a point-source exposure event.

No choir member reported having had symptoms at the March 3 practice. One person at the March 10 practice had cold-like symptoms beginning March 7. This person, who had also attended the March 3 practice, had a positive laboratory result for SARS-CoV-2 by reverse transcription–polymerase chain reaction (RT-PCR) testing.

In total, 78 members attended the March 3 practice, and 61 attended the March 10 practice (Table 1). Overall, 51 (65.4%) of the March 3 practice attendees became ill; all but one of these persons also attended the March 10 practice. Among 60 attendees at the March 10 practice (excluding the patient who became ill March 7, who also attended), 52 (86.7%) choir members subsequently became ill. Some members exclusively attended one practice; among 21 members who only attended March 3, one became ill and was not tested (4.8%), and among three members who only attended March 10, two became ill (66.7%), with one COVID-19 case being laboratory-confirmed.

Summary

What is already known about this topic?

Superspreading events involving SARS-CoV-2, the virus that causes COVID-19, have been reported.

What is added by this report?

Following a 2.5-hour choir practice attended by 61 persons, including a symptomatic index patient, 32 confirmed and 20 probable secondary COVID-19 cases occurred (attack rate = 53.3% to 86.7%); three patients were hospitalized, and two died. Transmission was likely facilitated by close proximity (within 6 feet) during practice and augmented by the act of singing.

What are the implications for public health practice?

The potential for superspreader events underscores the importance of physical distancing, including avoiding gathering in large groups, to control spread of COVID-19. Enhancing community awareness can encourage symptomatic persons and contacts of ill persons to isolate or self-quarantine to prevent ongoing transmission.

Because illness onset for 49 (92.5%) patients began during March 11–15 (Figure), a point-source exposure event seemed likely. The median interval from the March 3 practice to symptom onset was 10 days (range = 4–19 days), and from the March 10 practice to symptom onset was 3 days (range = 1–12 days). The odds of becoming ill after the March 3 practice were 17.0 times higher for practice attendees than for those who did not attend (95% confidence interval [CI] = 5.5–52.8), and after the March 10 practice, the odds were 125.7 times greater (95% CI = 31.7–498.9). The clustering of symptom onsets, odds of becoming ill according to practice attendance, and known presence of a symptomatic contagious case at the March 10 practice strongly suggest that date as the more likely point-source exposure event. Therefore, that practice was the focus of the rest of the investigation. Probable cases were defined as persons who attended the March 10 practice and developed clinically compatible COVID-19 symptoms, as defined by Council of State and Territorial Epidemiologists (*6*). The choir member who was ill beginning March 7 was considered the index patient.

The March 10 choir rehearsal lasted from 6:30 to 9:00 p.m. Several members arrived early to set up chairs in a large multipurpose room. Chairs were arranged in six rows of 20 chairs each, spaced 6–10 inches apart with a center aisle dividing left and right stages. Most choir members sat in their usual rehearsal seats. Sixty-one of the 122 members attended that evening, leaving some members sitting next to empty seats. Attendees practiced together for 40 minutes, then split into two smaller groups for an additional 50-minute practice, with one of the groups moving to a smaller room. At that time, members in the larger room moved to seats next to one another, and members in the smaller room sat next to one another on benches. Attendees then had a 15-minute break, during which cookies and oranges were available at the back of the large room, although many members reported not eating the snacks. The group then reconvened for a final 45-minute session in their original seats. At the end of practice, each member returned their own chair, and in the process congregated around the chair racks. Most attendees left the practice immediately after it concluded. No one reported physical contact between attendees. SCPH assembled a seating chart of the all-choir portion of the March 10 practice (not reported here because of concerns about patient privacy).

Among the 61 choir members who attended the March 10 practice, the median age was 69 years (range = 31–83 years); 84% were women. Median age of those who became ill was 69 years, and 85% of cases occurred in women. Excluding the laboratory-confirmed index patient, 52 (86.7%) of 60 attendees became ill; 32 (61.5%) of these cases were confirmed by RT-PCR testing and 20 (38.5%) persons were considered to have probable infections. These figures correspond to secondary attack rates of 53.3% and 86.7% among confirmed and all cases, respectively. Attendees developed symptoms 1 to 12 days after the practice (median = 3 days). The first SARS-CoV-2 test was performed on March 13. The last person was tested on March 26.

Three of the 53 patients were hospitalized (5.7%), including two who died (3.8%). The mean interval from illness onset to hospitalization was 12 days. The intervals from onset to death were 14 and 15 days for the two patients who died.

SCPH collected information about patient signs and symptoms from patient interviews and hospital records (Table 2). Among persons with confirmed infections, the most common signs and symptoms reported at illness onset and at any time during the course of illness were cough (54.5% and 90.9%, respectively), fever (45.5%, 75.8%), myalgia (27.3%, 75.0%), and headache (21.2%, 60.6%). Several patients later developed gastrointestinal symptoms, including diarrhea (18.8%), nausea (9.4%), and abdominal cramps or pain (6.3%). One person experienced only loss of smell and taste. The most severe complications reported were viral pneumonia (18.2%) and severe hypoxemic respiratory failure (9.1%).

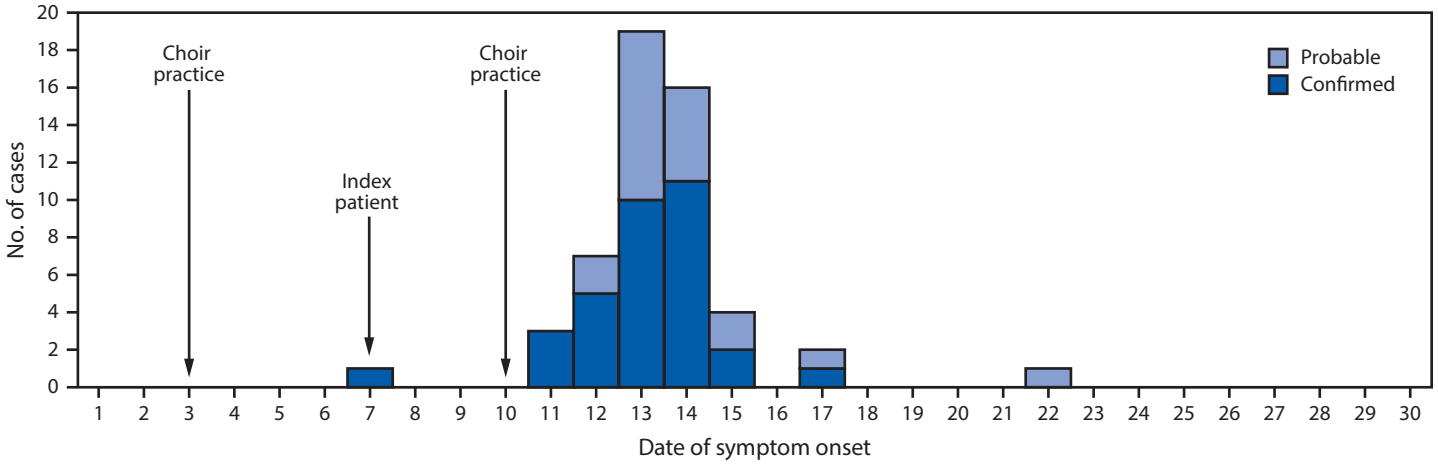
Among the recognized risk factors for severe illness, the most common was age, with 75.5% of patients aged ≥65 years. Most patients (67.9%) did not report any underlying medical conditions, 9.4% had one underlying medical condition, and 22.6% had two or more underlying medical conditions. All three hospitalized patients had two or more underlying medical conditions.

TABLE 1. Number of choir members with and without COVID-19–compatible symptoms (N = 122)* and members' choir practice attendance† — Skagit County, Washington, March 3 and 10, 2020

	No. (row %)					
	March 3 practice			March 10 practice		
Attendance	Total	Symptomatic	Asymptomatic	Total	Symptomatic	Asymptomatic
Attended	78	51 (65.4)	27 (34.6)	61	53§ (86.9)	8 (13.1)
Did not attend	40	4 (10.0)	36 (90.0)	61	3 (4.9)	58 (95.1)
Attendance information missing	4	1 (25.0)	3 (75.0)	0	0 (—)	0 (—)
Attended only one practice	21	1 (4.8)	20 (95.2)	3	2 (66.7)	1 (33.3)

Abbreviation: COVID-19 = coronavirus disease 2019.
* No choir members were symptomatic at the March 3 practice.
† Thirty-seven choir members attended neither practice; two developed symptoms, and 35 remained asymptomatic.
§ Includes index patient; if the index patient excluded, 52 secondary cases occurred among the other 60 attendees (attack rate = 86.7%).

FIGURE. Confirmed* and probable† cases of COVID-19 associated with two choir practices, by date of symptom onset (N = 53) — Skagit County, Washington, March 2020



Abbreviation: COVID-19 = coronavirus disease 2019.
* Positive reverse transcription–polymerase chain reaction test result.
† Attendance at the March 10 practice and clinically compatible symptoms as defined by the Council of State and Territorial Epidemiologists, Interim-20-ID-01: Standardized surveillance case definition and national notification for 2019 novel coronavirus disease (COVID-19). https://cdn.ymaws.com/www.cste.org/resource/resmgr/2020ps/interim-20-id-01_covid-19.pdf.

Public Health Response

SCPH provided March 10 practice attendees with isolation and quarantine instructions by telephone, email, and postal mail. Contacts of patients were traced and notified of isolation and quarantine guidelines. At initial contact, 15 attendees were quarantined, five of whom developed symptoms during quarantine and notified SCPH.

Before detection of this cluster on March 17, Skagit County had reported seven confirmed COVID-19 cases (5.4 cases per 100,000 population). At the time, SCPH informed residents that likely more community transmission had occurred than indicated by the low case counts.* On March 21, SCPH issued a press release to describe the outbreak and raise awareness about community transmission.† The press release emphasized the highly contagious nature of COVID-19 and the importance of following social distancing guidelines to control the spread of the virus.

Discussion

Multiple reports have documented events involving superspreading of COVID-19 (*2*–*5*); however, few have documented a community-based point-source exposure (*5*). This cluster of 52 secondary cases of COVID-19 presents a unique opportunity for understanding SARS-CoV-2 transmission following a likely point-source exposure event. Persons infected with SARS-CoV-2 are most infectious from 2 days before through 7 days after symptom onset (*7*). The index patient developed symptoms on March 7, which could have placed the patient within this infectious period during the March 10 practice. Choir members who developed symptoms on March 11 (three) and March 12 (seven) attended both the March 3

* Skagit County, updated social distancing information. https://skagitcounty.net/departments/home/press/031620.htm.
† Skagit County, public health investigating cluster of related COVID-19 cases. https://skagitcounty.net/departments/home/press/032120.htm.

TABLE 2. Signs and symptoms reported at the onset of COVID-19 illness and during the course of illness among persons infected at a choir practice (N = 53)* — Skagit County, Washington, March 2020

Sign or symptom	No. (%)		no./No. (%)	
	Reported at onset of illness		Reported during course of illness	
	All cases (N = 53)	Confirmed cases (N = 33)	All cases (N = 53)	Confirmed cases (N = 33)
Cough	27 (50.9)	18 (54.5)	47/53 (88.7)	30/33 (90.9)
Fever	28 (52.8)	15 (45.5)	36/53 (67.9)	25/33 (75.8)
Myalgia	13 (24.5)	9 (27.3)	34/52 (65.4)	24/32 (75.0)
Headache	10 (18.9)	7 (21.2)	32/53 (60.4)	20/33 (60.6)
Chills or rigors	7 (13.2)	6 (18.2)	23/51 (45.1)	16/31 (51.6)
Congestion	4 (7.5)	2 (6.1)	25/52 (48.1)	15/32 (46.9)
Pharyngitis	2 (3.8)	2 (6.1)	12/52 (23.1)	8/32 (25.0)
Lethargy	4 (7.5)	2 (6.1)	5/52 (9.6)	3/32 (9.4)
Fatigue	3 (5.7)	1 (3.0)	24/52 (46.2)	15/32 (46.9)
Aguesia (loss of taste)	1 (1.9)	1 (3.0)	11/48 (22.9)	5/28 (17.9)
Anosmia (loss of smell)	1 (1.9)	1 (3.0)	10/48 (20.8)	5/28 (17.9)
Chest congestion or tightness	1 (1.9)	1 (3.0)	5/52 (9.6)	4/32 (12.5)
Weakness	1 (1.9)	1 (3.0)	3/52 (5.8)	2/32 (6.3)
Eye ache	1 (1.9)	1 (3.0)	1/52 (1.9)	1/32 (3.1)
Dyspnea	0 (—)	0 (—)	8/51 (15.7)	8/31 (25.8)
Diarrhea	0 (—)	0 (—)	8/52 (15.4)	6/32 (18.8)
Pneumonia	0 (—)	0 (—)	6/53 (11.3)	6/33 (18.2)
Nausea	0 (—)	0 (—)	3/52 (5.8)	3/32 (9.4)
Acute hypoxemic respiratory failure	0 (—)	0 (—)	3/53 (5.7)	3/33 (9.1)
Abdominal pain or cramps	0 (—)	0 (—)	2/52 (3.8)	2/32 (6.3)
Malaise	1 (1.9)	0 (—)	1/52 (1.9)	0/32 (—)
Anorexia	0 (—)	0 (—)	1/52 (1.9)	0/32 (—)
Vomiting	0 (—)	0 (—)	0/52 (—)	0/32 (—)

Abbreviation: COVID-19 = coronavirus disease 19.
* Including the index patient.

and March 10 practices and thus could have been infected earlier and might have been infectious in the 2 days preceding symptom onset (i.e., as early as March 9). The attack rate in this group (53.3% and 86.7% among confirmed cases and all cases, respectively) was higher than that seen in other clusters, and the March 10 practice could be considered a superspreading event (*3*,*4*). The median incubation period of COVID-19 is estimated to be 5.1 days (*8*). The median interval from exposure during the March 10 practice to onset of illness was 3 days, indicating a more rapid onset.

Choir practice attendees had multiple opportunities for droplet transmission from close contact or fomite transmission (*9*), and the act of singing itself might have contributed to SARS-CoV-2 transmission. Aerosol emission during speech has been correlated with loudness of vocalization, and certain persons, who release an order of magnitude more particles than their peers, have been referred to as superemitters and have been hypothesized to contribute to superspeading events (*1*). Members had an intense and prolonged exposure, singing while sitting 6–10 inches from one another, possibly emitting aerosols.

The findings in this report are subject to at least two limitations. First, the seating chart was not reported because of concerns about patient privacy. However, with attack rates of 53.3% and 86.7% among confirmed and all cases, respectively, and one hour of the practice occurring outside of the seating arrangement, the seating chart does not add substantive additional information. Second, the 19 choir members classified as having probable cases did not seek testing to confirm their illness. One person classified as having probable COVID-19 did seek testing 10 days after symptom onset and received a negative test result. It is possible that persons designated as having probable cases had another illness.

This outbreak of COVID-19 with a high secondary attack rate indicates that SARS-CoV-2 might be highly transmissible in certain settings, including group singing events. This underscores the importance of physical distancing, including maintaining at least 6 feet between persons, avoiding group gatherings and crowded places, and wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain during this pandemic. The choir mitigated further spread by quickly communicating to its members and notifying SCPH of a cluster of cases on March 18. When first contacted by SCPH during March 18–20, nearly all persons who attended the practice reported they were already self-isolating or quarantining. Current CDC recommendations, including maintaining physical distancing of at least 6 feet and wearing cloth face coverings if this is not feasible, washing hands often, covering coughs and sneezes, staying home when ill, and frequently cleaning and disinfecting

high-touch surfaces, remain critical to reducing transmission. Additional information is available at https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html.

Acknowledgments

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All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. All authors report receipt of funding through Public Health Emergency Preparedness grant from the Washington State Department of Health during the conduct of the study. No other potential conflicts of interest were disclosed.

References

1. Asadi S, Wexler AS, Cappa CD, Barreda S, Bouvier NM, Ristenpart WD. Aerosol emission and superemission during human speech increase with voice loudness. Sci Rep 2019;9:2348. https://doi.org/10.1038/s41598-019-38808-z
2. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA 2020;323:1061–9. https://doi.org/10.1001/jama.2020.1585
3. McMichael TM, Currie DW, Clark S, et al. Epidemiology of COVID-19 in a long-term care facility in King County, Washington. N Engl J Med 2020;NEJMoa2005412. https://doi.org/10.1056/NEJMoa2005412
4. Ghinai I, Woods S, Ritger KA, et al. Community transmission of SARS-CoV-2 at two family gatherings—Chicago, Illinois, February–March 2020. MMWR Morb Mortal Wkly Rep 2020;69:446–50. https://doi.org/10.15585/mmwr.mm6915e1
5. South Korean city on high alert as coronavirus cases soar at 'cult' church. The Guardian, US Edition. February 20, 2020. https://www.theguardian.com/world/2020/feb/20/south-korean-city-daegu-lockdown-coronavirus-outbreak-cases-soar-at-church-cult-cluster
6. Council of State and Territorial Epidemiologists. Interim-20-ID-01: standardized surveillance case definition and national notification for 2019 novel coronavirus disease (COVID-19). Atlanta, GA: Council of State and Territorial Epidemiologists; 2020. https://cdn.ymaws.com/www.cste.org/resource/resmgr/2020ps/interim-20-id-01_covid-19.pdf
7. He X, Lau EHY, Wu P, et al. Temporal dynamics in viral shedding and transmissibility of COVID-19. Nat Med 2020;26:672–5.
8. Lauer SA, Grantz KH, Bi Q, et al. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. Ann Intern Med 2020;172:577. https://doi.org/10.7326/M20-0504
9. van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med 2020;382:1564–7. https://doi.org/10.1056/NEJMc2004973

Exhibit B

Morbidity and Mortality Weekly Report

High COVID-19 Attack Rate Among Attendees at Events at a Church — Arkansas, March 2020

Allison James, DVM, PhD[1,2]; Lesli Eagle[1]; Cassandra Phillips[1]; D. Stephen Hedges, MPH[1]; Cathie Bodenhamer[1]; Robin Brown, MPAS, MPH[1]; J. Gary Wheeler, MD[1]; Hannah Kirking, MD[3]

On May 19, 2020, this report was posted as an MMWR *Early Release on the* MMWR *website (https://www.cdc.gov/mmwr).*

On March 16, 2020, the day that national social distancing guidelines were released (*1*), the Arkansas Department of Health (ADH) was notified of two cases of coronavirus disease 2019 (COVID-19) from a rural county of approximately 25,000 persons; these cases were the first identified in this county. The two cases occurred in a husband and wife; the husband is the pastor at a local church (church A). The couple (the index cases) attended church-related events during March 6–8, and developed nonspecific respiratory symptoms and fever on March 10 (wife) and 11 (husband). Before his symptoms had developed, the husband attended a Bible study group on March 11. Including the index cases, 35 confirmed COVID-19 cases occurred among 92 (38%) persons who attended events held at church A during March 6–11; three patients died. The age-specific attack rates among persons aged ≤18 years, 19–64 years, and ≥65 years were 6.3%, 59.4%, and 50.0%, respectively. During contact tracing, at least 26 additional persons with confirmed COVID-19 cases were identified among community members who reported contact with church A attendees and likely were infected by them; one of the additional persons was hospitalized and subsequently died. This outbreak highlights the potential for widespread transmission of SARS-CoV-2, the virus that causes COVID-19, both at group gatherings during church events and within the broader community. These findings underscore the opportunity for faith-based organizations to prevent COVID-19 by following local authorities' guidance and the U.S. Government's Guidelines: Opening Up America Again (*2*) regarding modification of activities to prevent virus transmission during the COVID-19 pandemic.

On March 10 and 11, the wife of the church pastor, aged 56 years, and the pastor, aged 57 years, developed fever and cough. On March 12, the pastor, after becoming aware of similar nonspecific respiratory symptoms among members of their congregation, closed church A indefinitely. Because of fever, cough, and increasing shortness of breath, the couple sought testing for SARS-CoV-2 on March 13; both were notified of positive results by reverse transcription–polymerase chain reaction testing on March 16. The same day, ADH staff members began an investigation to identify how the couple had been exposed and to trace persons with whom they had been in contact. Based on their activities and onset dates, they likely were infected at church A events during March 6–8, and the husband might have then exposed others while presymptomatic during a Bible study event held on March 11.

During March and April 2020, all persons in Arkansas who received testing for SARS-CoV-2 at any laboratory were entered into a database (Research Electronic Data Capture [REDCap]; version 8.8.0; Vanderbilt University) managed by ADH. Using a standardized questionnaire, ADH staff members interviewed persons who had positive test results to ascertain symptoms, onset date, and potential exposure information, including epidemiologic linkages to other COVID-19 patients; this information was stored in the database. Close contacts of patients with laboratory-confirmed cases of COVID-19 were interviewed and enrolled in active symptom monitoring; those who developed symptoms were tested and their information was also entered into the database. Church A–associated cases were defined as those in 1) persons who had laboratory results positive for SARS-CoV-2 who identified contact with church A attendees as a source of exposure and 2) actively monitored contacts of church attendees who had a test result positive for SARS-CoV-2 after becoming symptomatic.

The public health investigation focused on the transmission of SARS-CoV-2 among persons who attended church A events during March 6–11. To facilitate the investigation, the pastor and his wife generated a list of 94 church members and guests who had registered for, or who, based on the couple's recollection, might have attended these events.

During March 6–8, church A hosted a 3-day children's event which consisted of two separate 1.5-hour indoor sessions (one on March 6 and one on March 7) and two, 1-hour indoor sessions during normal church services on March 8. This event was led by two guests from another state. During each session, children participated in competitions to collect offerings by hand from adults, resulting in brief close contact among nearly all children and attending adults. On March 7, food prepared by church members was served buffet-style. A separate Bible study event was held March 11; the pastor reported most attendees sat apart from one another in a large room at this event. Most children and some adults participated in singing during the children's event; no singing occurred during the March 11 Bible study. Among all 94 persons who might have attended any of the events, 19 (20%) attended both the children's event and Bible study.

Summary

What is already known about this topic?

Large gatherings pose a risk for SARS-CoV-2 transmission.

What is added by this report?

Among 92 attendees at a rural Arkansas church during March 6–11, 35 (38%) developed laboratory-confirmed COVID-19, and three persons died. Highest attack rates were in persons aged 19–64 years (59%) and ≥65 years (50%). An additional 26 cases linked to the church occurred in the community, including one death.

What are the implications for public health practice?

Faith-based organizations should work with local health officials to determine how to implement the U.S. Government guidelines for modifying activities during the COVID-19 pandemic to prevent transmission of the virus to their members and their communities.

The husband and wife were the first to be recognized by ADH among the 35 patients with laboratory-confirmed COVID-19 associated with church A attendance identified through April 22; their illnesses represent the index cases. During the investigation, two persons who were symptomatic (not the husband and wife) during March 6–8 were identified; these are considered the primary cases because they likely initiated the chain of transmission among church attendees. Additional cases included those in persons who attended any church A events during March 6–11, but whose symptom onset occurred on or after March 8, which was 2 days after the earliest possible church A exposure. One asymptomatic attendee who sought testing after household members became ill was included among these additional cases.

Consistent with CDC recommendations for laboratory testing at that time (*3*), clinical criteria for testing included cough, fever, or shortness of breath; asymptomatic persons were not routinely tested. To account for this limitation when calculating attack rates, upper and lower boundaries for the attack rates were estimated by dividing the total number of persons with laboratory-confirmed COVID-19 by the number of persons tested for SARS-CoV-2 and by the number of persons who attended church A during March 6–11, respectively. All analyses were performed using R statistical software (version 4.0.0; The R Foundation). Risk ratios were calculated to compare attack rates by age, sex, and attendance dates. Fisher's exact test was used to calculate two-sided p-values; p-values <0.05 were considered statistically significant.

Overall, 94 persons attended church A events during March 6–11 and might have been exposed to the index patients or to another infectious patient at the same event; among these persons, 92 were successfully contacted and are included in the analysis. Similar proportions of church A attendees were aged ≤18 years (35%), 19–64 years (35%), and ≥65 years (30%) (Table 1). However, a higher proportion of adults aged 19–64 years and ≥65 years were tested (72% and 50%, respectively), and received positive test results (59% and 50%), than did younger persons. Forty-five persons were tested for SARS-CoV-2, among whom 35 (77.8%) received positive test results (Table 2).

During the investigation, two church A participants who attended the March 6–8 children's event were found to have had onset of symptoms on March 6 and 7; these represent the primary cases and likely were the source of infection of other church A attendees (Figure). The two out-of-state guests developed respiratory symptoms during March 9–10 and later received diagnoses of laboratory-confirmed COVID-19, suggesting that exposure to the primary cases resulted in their infections. The two primary cases were not linked except through the church; the persons lived locally and reported no travel and had no known contact with a traveler or anyone with confirmed COVID-19. Patient interviews revealed no additional common exposures among church attendees.

The estimated attack rate ranged from 38% (35 cases among all 92 church A event attendees) to 78% (35 cases among 45 church A event attendees who were tested for SARS-CoV-2). When stratified by age, attack rates were significantly lower among persons aged ≤18 years (6.3%–25.0%) than among adults aged 19–64 years (59.4%–82.6%) (p<0.01). The risk ratios for persons aged ≤18 years compared with those for persons aged 19–64 years were 0.1–0.3. No severe illnesses occurred in children. Among the 35 persons with laboratory-confirmed COVID-19, seven (20%) were hospitalized; three (9%) patients died.

At least 26 additional confirmed COVID-19 cases were identified among community members who, during contact tracing, reported contact with one or more of the 35 church A members with COVID-19 as an exposure. These persons likely were infected by church A attendees. Among these 26 persons, one was hospitalized and subsequently died. Thus, as of April 22, 61 confirmed cases (including eight [13%] hospitalizations and four [7%] deaths) had been identified in persons directly and indirectly associated with church A events.

Discussion

This investigation identified 35 confirmed COVID-19 cases among 92 attendees at church A events during March 6–11; estimated attack rates ranged from 38% to 78%. Despite canceling in-person church activities and closing the church as soon as it was recognized that several members of the congregation had become ill, widespread transmission within church A and within the surrounding community occurred. The primary patients had no known COVID-19 exposures in

TABLE 1. Demographic characteristics, church A event attendance, and SARS-CoV-2 testing status of persons who attended church A events where persons with confirmed COVID-19 (N = 92) also attended — Arkansas, March 2020

Characteristic	All attendees No. (%)*	No. (%) tested†	p-value§	No. (%) who tested positive†	p-value§
Total	**92 (100)**	**45 (49)**	—	**35 (38)**	—
Age group (yrs)					
≤18	32 (35)	8 (25)	0.001	2 (6)	0.004
18–64	32 (35)	23 (72)		19 (59)	
≥65	28 (30)	14 (50)		14 (50)	
Sex					
Male	44 (48)	22 (50)	1.0	17 (39)	1.0
Female	48 (52)	23 (48)		18 (38)	
Church A event attendance					
Weekend only (Mar 6–8)	64 (70)	33 (52)	0.28	28 (44)	0.16
Bible study only (Mar 11)	9 (10)	2 (22)		1 (11)	
Both weekend and Bible study	19 (21)	10 (53)		6 (32)	

Abbreviation: COVID-19 = coronavirus disease 2019.
* Includes all persons who were confirmed to have attended church A events during March 6–11; percentages are column percentages.
† Percentage of attendees (row percentages).
§ Calculated with Fisher's exact test.

TABLE 2. Estimated attack rates of COVID-19 among attendees at church A events — Arkansas, March 6–11, 2020

	All Mar 6–11 church A attendees (lower bound)			All tested Mar 6–11 church A attendees (upper bound)		
Characteristic	No. of cases/no. exposed (%)	Risk ratio (95% CI)	p-value	No. of cases/no. tested (%)	Risk ratio (95% CI)	p-value
Overall	**35/92 (38.0)**	—	—	**35/45 (77.8)**	—	—
Age group (yrs)						
≤18	2/32 (6.3)	0.1 (0.03–0.4)	<0.001	2/8 (25.0)	0.3 (0.1–1.0)	0.003
19–64	19/32 (59.4)	Referent	—	19/23 (82.6)	Referent	—
≥65	14/28 (50.0)	0.8 (0.5–1.3)	0.47	14/14 (100.0)	1.2 (1.0–1.5)	0.10
Sex						
Male	17/44 (38.6)	1.0 (0.6–1.7)	0.91	17/22 (77.3)	1.0 (0.7–1.3)	0.94
Female	18/48 (37.5)	Referent	—	18/23 (78.3)	Referent	—
Church A event attendance						
Weekend only (Mar 6–8)	28/64 (43.8)	1.4 (0.7–2.8)	0.3	28/33 (84.8)	1.4 (0.8–2.4)	0.09
Bible study only (Mar 11)	1/9 (11.1)	0.4 (0.05–2.5)	0.25	1/2 (50.0)	1.7 (0.4–6.8)	0.21
Both weekend and Bible study	6/19 (31.6)	Referent	—	6/10 (60.0)	Referent	—

Abbreviations: CI = confidence interval; COVID-19 = coronavirus disease 2019.

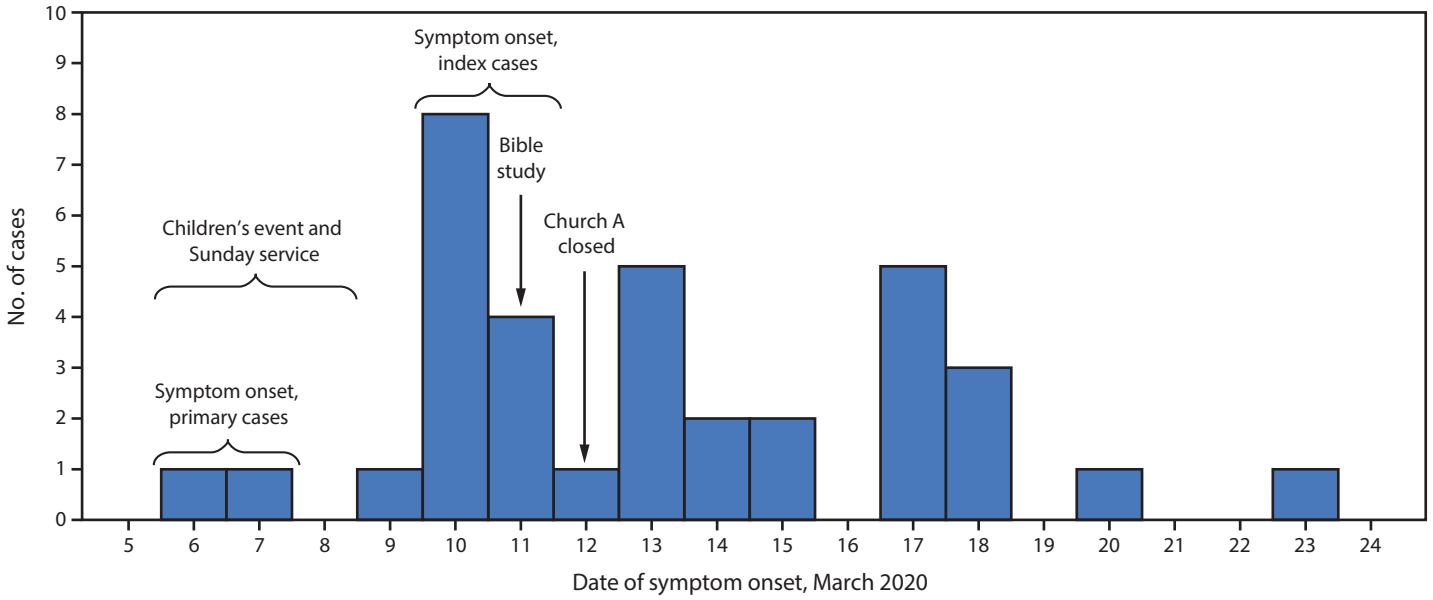
the 14 days preceding their symptom onset dates, suggesting that local transmission was occurring before case detection.

Children represented 35% of all church A attendees but accounted for only 18% of persons who received testing and 6% of confirmed cases. These findings are consistent with those from other reports suggesting that many children with COVID-19 experience more asymptomatic infections or milder symptoms and have lower hospitalization rates than do adults (*4*,*5*). The role of asymptomatic or mildly symptomatic children in SARS-CoV-2 transmission remains unknown and represents a critical knowledge gap as officials consider reopening public places.

The risk for symptomatic infection among adults aged ≥65 years was not higher than that among adults aged 19–64 years. However, six of the seven hospitalized persons and all three deaths occurred in persons aged ≥65 years, consistent with other U.S. data indicating a higher risk for COVID-19–associated hospitalization and death among persons aged ≥65 years (*6*).

The findings in this report are subject to at least four limitations. First, some infected persons might have been missed because they did not seek testing, were ineligible for testing based on criteria at the time, or were unable to access testing. Second, although no previous cases had been reported from this county, undetected low-level community transmission was likely, and some patients in this cluster might have had exposures outside the church. Third, risk of exposure likely varied among attendees but could not be characterized because data regarding individual behaviors (e.g., shaking hands or hugging) were not collected. Finally, the number of cases beyond the cohort of church attendees likely is undercounted because tracking out-of-state transmission was not possible, and patients might not have identified church members as their source of exposure.

FIGURE. Date of symptom onset* among persons with laboratory-confirmed cases of COVID-19 (N = 35) who attended March 6–11 church A events — Arkansas, March 6–23, 2020



Abbreviation: COVID-19 = coronavirus disease 2019.
* One asymptomatic person who had a positive test result is included on the date of specimen collection (March 18).

High transmission rates of SARS-CoV-2 have been reported from hospitals (*7*), long-term care facilities (*8*), family gatherings (*9*), a choir practice (*10*), and, in this report, church events. Faith-based organizations that are operating or planning to resume in-person operations, including regular services, funerals, or other events, should be aware of the potential for high rates of transmission of SARS-CoV-2. These organizations should work with local health officials to determine how to implement the U.S. Government's guidelines for modifying activities during the COVID-19 pandemic to prevent transmission of the virus to their members and their communities (*2*).

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References

1. Office of the President of the United States. Coronavirus guidelines for America. Washington, DC: Office of the President of the United States; 2020. https://www.whitehouse.gov/briefings-statements/coronavirus-guidelines-america/
2. Office of the President of the United States. Guidelines: opening up America again. Washington, DC: Office of the President of the United States; 2020. https://www.whitehouse.gov/openingamerica/
3. CDC. Health Alert Network: update and interim guidance on outbreak of coronavirus disease 2019 (COVID-19). Atlanta, GA: US Department of Health and Human Services, CDC; 2020. https://emergency.cdc.gov/han/2020/HAN00428.asp
4. Bialek S, Gierke R, Hughes M, McNamara LA, Pilishvili T, Skoff T; CDC COVID-19 Response Team. Coronavirus disease 2019 in children—United States, February 12–April 2, 2020. MMWR Morb Mortal Wkly Rep 2020;69:422–6. https://doi.org/10.15585/mmwr.mm6914e4
5. Dong Y, Mo X, Hu Y, et al. Epidemiology of COVID-19 among children in China. Pediatrics 2020. Epub March 16, 2020. https://doi.org/10.1542/peds.2020-0702
6. Bialek S, Boundy E, Bowen V, et al.; CDC COVID-19 Response Team. Severe outcomes among patients with coronavirus disease 2019 (COVID-19)—United States, February 12–March 16, 2020. MMWR Morb Mortal Wkly Rep 2020;69:343–6. https://doi.org/10.15585/mmwr.mm6912e2
7. Heinzerling A, Stuckey MJ, Scheuer T, et al. Transmission of COVID-19 to health care personnel during exposures to a hospitalized patient—Solano County, California, February 2020. MMWR Morb Mortal Wkly Rep 2020;69:472–6. https://doi.org/10.15585/mmwr.mm6915e5
8. McMichael TM, Currie DW, Clark S, et al. Epidemiology of Covid-19 in a long-term care facility in King County, Washington. N Engl J Med 2020. Epub March 27, 2020. https://doi.org/10.1056/NEJMoa2005412
9. Ghinai I, Woods S, Ritger KA, et al. Community transmission of SARS-CoV-2 at two family gatherings—Chicago, Illinois, February–March 2020. MMWR Morb Mortal Wkly Rep 2020;69:446–50. https://doi.org/10.15585/mmwr.mm6915e1
10. Hamner L, Dubbel P, Capron I, et al. High SARS-CoV-2 attack rate following exposure at a choir practice—Skagit County, Washington, March 2020. MMWR Morb Mortal Wkly Rep 2020;69:606–10. https://doi.org/10.15585/mmwr.mm6919e6