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Closed but Not Protected: Excess Deaths Among the Amish and Mennonites During the COVID-19 Pandemic

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Abstract

"Excess deaths" is a means to estimate the lethality of COVID-19 (directly and indirectly). Assessing "excess death" in closed religious communities provides information on how COVID-19 impacted these communities. We use obituary information published in an Amish/Mennonite newspaper to examine excess death among the Amish/Mennonites in 2020. Our results indicate the Amish/Mennonite excess death rates are similar to the national trends in the USA. The excess death rate for Amish/Mennonites spiked with a 125% increase in November 2020. The impact of COVID-19 on this closed religious community highlights the need to consider religion to stop the spread of COVID-19.

Keywords Closed religious groups · COVID-19 · Excess death · Amish

Introduction

Infectious diseases often take root in closed religious communities (CRCs) such as the Amish (Arciuolo et al., 2013; Gastañaduy et al., 2016; Thompson & Kisjes, 2016). These communities tend to limit or discourage interaction between members and outsiders (Iannaccone, 1994; Stark & Finke, 2000). Consequently, they are a challenging population to reach with public health messaging. Information (about health, current events, and so forth) circulating in CRCs is subject to distortion and echo-chamber effects (Galanter, 1999; Greil & Rudy, 1984). Distrust of the government, science, and modern medicine renders groups like the Amish vulnerable to communicable disease outbreaks (Arciuolo et al., 2013; Armer & Radina, 2006; Galanter, 1999; Gastañaduy et al., 2016; Glassman, 2018; Miller & Karkazis, 2013;

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Offit, 2015; Thompson & Kisjes, 2016). Since many CRCs rely on communal rituals and interpersonal interaction (Iannaccone, 1994; Kanter, 1972), this dynamic is particularly dangerous for disease outbreaks where isolation and social distance are the only apparent means for slowing transmission.

The COVID-19 global pandemic of 2020–2021 focused research and public health interventions on reducing the virus's spread and impact (Rocklöv & Sjödin, 2020; Schuchat, 2020; World Health Organization, 2020). Much of this work tracks infections and consequent mortality (Centers for Disease Control & Prevention, 2020b; Mavragani, 2020; Menni et al., 2020; Unwin et al., 2020; World Health Organization, 2021). CDC researchers found that infectious diseases (such as SARS-CoV-2) spread rapidly in close-knit communities (Ali et al., 2020). Thus, local community cultures play a role in their public health. Religion is not a neutral force in this arrangement. For example, measles, a disease once thought eradicated, ripped through Ultra-Orthodox Jewish and Old Order Amish communities in the past decade (Arciuolo et al., 2013; Gastañaduy et al., 2016; Thompson & Kisjes, 2016). These CRCs share important sectarian characteristics. They aggressively cultivate differences between themselves and the broader culture, apparent in their behavior, attire, and social conventions. These cultural differences feed antagonism with the dominant culture, encouraging separation (Bainbridge & Stark, 1980). Sect members have limited exposure to the broader culture. In turn, they rely on other members for social support. Moreover, sectarian religious communities, such as the Amish, depend on regular face-to-face worship rituals that draw the entire congregation together in one place (Iannaccone, 1994; Kanter, 1972). "Sunday church services reenact the deep meanings of *Gelassenheit*[1] in the Amish moral order" (Kraybill et al., 2013, p. 77). The Amish consider Sunday church a sacrament blending social structure, cultural values, and deep religious beliefs. Communal worship is understood to be a sacred duty. That dynamic creates principled resistance against mitigation strategies for novel diseases, where isolation and social distance appear to be the only way to slow transmission.

Closed religious communities also resist epidemiological surveillance. The same factors that put these communities at high risk for infectious disease outbreaks—lack of trust in medicine and the state, reluctance to receive routine and preventative healthcare, and closed communication networks—also make their members less likely to avail themselves of testing for COVID-19 (Ali et al., 2020; Nolt, 2016). Even among those tested, it may be difficult to connect their tests back to their religious communities without information about religious affiliation. Moreover, it is difficult to distinguish their COVID-19 transmission and death rates from surrounding communities.

In this study, we use the case of Amish and Mennonite CRCs, which past research has identified as communities at high risk for infectious diseases (Thompson & Kisjes, 2016), to estimate COVID-19 excess deaths based upon 2015–2020 obituary

[1] In the Anabaptist tradition, *Gelassenheit* conveys "yielding fully to God's will and forsaking all selfishness" (Kraybill et al. 2013, p. 66). This is an important concept mediating how Anabaptist believers evaluate risk relative to consequences.

data from these communities. The CDC and other researchers have used excess deaths to estimate direct and indirect COVID-19-related deaths (Beaney et al., 2020; Bilinski & Emanuel, 2020; Centers for Disease Control & Prevention, 2020a; Faust et al., 2021; Rossen et al., 2020; Woolf et al., 2020) to identify the overall impact of COVID-19. Following this method, we use 2015–2019 death data as a baseline to estimate the percent of excess deaths among the Amish and Mennonites in 2020 that may signal COVID-19 outbreaks and resulting deaths in these communities. This provides a method of tracking potential outbreaks in these communities and other closed religious communities that publicly publish their obituaries.

Closed Religious Groups and Infectious Diseases

CRCs are sectarian groups in tension with their environment's dominant culture (Bainbridge & Stark, 1980). This tension leads these communities to erect boundaries between themselves and outsiders, limiting interaction. They also cultivate differences manifested in members' attire, diet, vocation, recreational activities, and adoption (or refusal to adopt) technology (Bainbridge & Stark, 1980; Iannaccone, 1994; Kanter, 1972). This separation and tension with the dominant culture increase the salience of intra-group interaction. "Closed" affiliations, such as Orthodox Jews, the Amish, Fundamentalist Latter Day Saints, and Jehovah's Witnesses, strictly demarcate social and theological boundaries (Bainbridge & Stark, 1980; Iannaccone, 1994; Smith & Emerson, 1998; Smith, 1990; Stark & Finke, 2000; Wellman Jr & Corcoran, 2013). These boundaries lead particular perceptions to entrench within the community. Closed communication networks prevent counter-evidence from correcting distorted perceptions of medicine and the government (Greil & Rudy, 1984). Many such groups are skeptical of modern medicine, science, and the government, which makes them particularly prone to health misinformation circulating through their closed communication networks and a reluctance to seek preventative and routine medical care (Arciuolo et al., 2013; Armer & Radina, 2006; Dickinson et al., 1996; Galanter, 1999; Gastañaduy et al., 2016; Glassman, 2018; Miller & Karkazis, 2013; Offit, 2015; Thompson & Kisjes, 2016). For instance, US Christian nationalists, who exhibit a moderate level of closure from society, are less likely to engage in COVID-19 preventative behaviors (i.e., wearing masks and washing hands) (Perry et al., 2020) and more likely to engage in dangerous behaviors (i.e., not social distancing/isolating) and oppose science (Baker et al., 2020; Perry et al., 2020). More highly closed religious communities are thus high-risk sites for infectious disease outbreaks as many vaccine-preventable disease outbreaks have occurred within them (Arciuolo et al., 2013; Gastañaduy et al., 2016; Thompson & Kisjes, 2016).

These communities warrant close monitoring, given their history of infectious disease outbreaks. However, some community members distrust state officials and medical providers, which undermine efforts to monitor public health. Additionally, since some groups prefer natural remedies to modern medicine, their members avoid routine medical care (Arciuolo et al., 2013; Gastañaduy et al., 2016; Hurst & McConnell, 2010; Thompson & Kisjes, 2016) and are less likely to be

tested for COVID-19. After a COVID-19 outbreak in an Amish community in Ohio, the local health department set up a testing site to track the spread. According to Ali et al (2020), more traditional community members did not participate in the testing clinic, implying they won't seek testing independently. We propose using excess death rates to identify likely COVID-19 outbreaks and to estimate the direct and indirect impact of COVID-19 in these communities.

Excess Deaths and the Impact of COVID-19

"Excess death," defined as "the difference between the observed numbers of deaths in specific time periods and expected numbers of deaths in the same time periods" (Centers for Disease Control & Prevention, 2020a), allows for historical comparison (Rossen et al., 2020). The construct assumes that mortality is stable. An increase in deaths over baseline expectations can be attributed, directly or indirectly, to COVID-19 (Beaney et al., 2020). COVID-19 may be cited as a direct cause when an infection contributed to the deceased demise. It is an indirect cause when the healthcare system becomes overburdened and incapable of fully treating all patients, leading to deaths (Centers for Disease Control & Prevention, 2020a).

Jurisdictions inconsistently attribute COVID-19 as an underlying cause of death (Centers for Disease Control & Prevention, 2020a). Some analysts attribute death to COVID-19, where it is a potential contributing factor, while others exclude COVID-19 when there are other more lethal comorbidities. Such administrative biases do not influence excess death estimates. Rather than parse the various contributing causes, excess death simply indexes mortality before, during, and after a disease outbreak. As such, the measure provides a "whole system" impact of COVID-19 on a community (Beaney et al., 2020). Epidemiologists have consistently measured excess deaths in the USA beginning in March 2020 and continuing throughout the year (Bilinski & Emanuel, 2020; Faust et al., 2021; Rossen et al., 2020; Woolf et al., 2020).

Patterns of excess death may be affected by mortality displacement. Many people with underlying health risks died from COVID-19 or COVID-19 complications. These deaths were avoidable. As such, outbreaks in vulnerable populations may cause short-term spikes in mortality. These spikes can decrease total mortality over time as those most susceptible to the disease die early in the pandemic. Since age seems to mediate COVID-19 mortality, it is vital to examine people's age represented in overall death (Beaney et al., 2020).

Moreover, research has shown men are more likely to die from COVID-19 than women (Bhopal & Bhopal, 2020; Gebhard et al., 2020); however, in their cross-national study, Kontis et al. (2020) indicate excess death patterns are similar across men and women. Cross-national studies on excess death recognize the complex interactions of the social, economic, and health systems within each country impact death rates (Kontis et al., 2020). We examine excess death in a subset of US society, the Amish and Mennonites, where there is consistency across social and economic

characteristics. In addition, people in these groups have relatively similar viewpoints on healthcare.

Case: The Amish and Mennonites

Anabaptist groups, including the Amish and Mennonite sects, formed as part of the sixteenth-century Protestant reformation. Unlike other Protestant groups, the Anabaptists insisted that the church remain separate from the state. The Amish and some Mennonites migrated to North America in the eighteenth and nineteenth centuries, and their communities have steadily grown over time (Donnermeyer, 2015). Today, North American Amish live in rural communities interspersed with non-Amish people. For Amish and Mennonite communities, the church dominates community life (Nolt, 2016). Church doctrine teaches Anabaptist believers to identify and avoid "worldly" things that threaten the church and community, ranging from technology to higher education (Kraybill, 2001). The Amish maintain a slower pace of life, evident in their technological restrictions (e.g., electricity, phones, computers, Internet) and transportation (e.g., cars). Compared to Amish, most Mennonites take advantage of modern technology (e.g., cell phones, Internet, cars) but maintain a central focus on the church as the basis of their community.

Amish reliance on horses and buggies for transportation limits their geographic footprint. Congregations gather every two weeks for church services at a members' home. This means nearly all the families in the community live within a short distance of each other. Population density thus limits congregations to 20–40 families (approximately 160–320 children and adults) due to space constraints. Groups of congregations located in the same geographical area form a settlement. Mennonite groups are not geographically bound in the same way, as they use cars for transportation and meet weekly in church buildings for religious services. While traditional Mennonite groups restrict technology usage, assimilated groups embrace modern technologies and have slight separation from larger society (Hurst & McConnell, 2010; Kraybill, 2010).

Amish and Mennonite religious beliefs also influence how they view and use the health care system. Amish and Mennonites tend not to seek preventative or routine healthcare, instead preferring natural remedies or relying on God to heal them. Medical costs also deter care-seeking. The Amish and most conservative Mennonites do not participate in social security, receive Medicare, or purchase coverage in commercial insurance plans (Anderson & Potts, 2020; Hurst & McConnell, 2010; Rohrer & Dundes, 2016). Their lower rates of routine and preventative health care use, reliance on natural remedies, and emphasis on face-to-face collective rituals, which involves crowding into a member's home for religious services, have contributed to measles, polio, and rubella outbreaks in Amish communities (Thompson & Kisjes, 2016). Consequently, Amish communities are high-risk sites for viral outbreaks (Thompson & Kisjes, 2016). For instance, one of the largest post-vaccine measles outbreaks in the USA occurred in the summer of 2014 in an Ohio Amish community. The CDC also identified a

COVID-19 outbreak in an Ohio Amish community in May 2020, connected to six in-person gatherings that had occurred in a two week time span (Ali et al., 2020).

Data and Methods

The Budget is a weekly newspaper that publishes dispatches from Amish and Mennonite communities, primarily located in North America (Carey, 2012). "Scribes" prepare updates on local news, including marriages, births, accidents, illnesses, and deaths. Approximately 18,500 copies of the newspaper circulate weekly in nearly all known Amish settlements.[2] Accordingly, *The Budget* is "an important institution, serving as the major means of communication among all Amish settlements" (Hostetler, 1993, p. 377).

Scribes submit obituaries for deceased community members. Since the Amish and Mennonites restrict communication technologies (Hurst & McConnell, 2010; Kraybill, 2001; Nolt, 2016), *The Budget*'s obituaries provide an efficient index of mortality in these communities. We coded all obituaries published in *The Budget* from 2015 through January 2021 for the decedent's death date, age at death, sex, and the state in which the death occurred. Our dataset excludes deaths occurring before January 1, 2015, and after December 31, 2020, yielding 2,438 cases across 34 states.

To analyze these data, we calculated the average number of deaths and the average age of the deceased for each month (January, February, March, etc.) in the five years preceding the pandemic (2015–2019). We compared the number of deaths, the average age of death, and the sex ratio (male/female) of death for each month of 2020 against its 5-year baseline average. These comparisons yield estimates of percent change. For example, ((2020 deaths—5-year baseline average of deaths)/5-year baseline average deaths)*100 = % change in death. The results represent an excess death rate percentage by month.

COVID-19 began to spread across the USA in March of 2020. We expect the excess death measures to replicate that spread. We further expect monthly excess death percentages to track COVID-19 patterns more broadly in the USA, the average age of death will be higher in 2020 than the baseline, and that excess death rates for men will be higher than excess death rates for women.

Finally, we break down the death data by state. In this paper, we focus on Ohio, which contains the second and fourth largest Amish settlements in the USA (home to approximately 23% of the US Amish population, but contributing 56% of the total obituaries published in the Budget) (Young Center for Anabaptist & Pietist Studies, 2020). T*he Budget* editorial office is located in the Holmes County Ohio settlement, which draws many Ohio scribes to contribute to the newspaper.

[2] Personal communication with Milo Miller, the Publisher of *The Budget* Newspaper.

Table 1 Excess death and average age of death by month and year

	2015	2016	2017	2018	2019	2020	Baseline average 2015–2019	Excess death (%)
Excess death								
January	43	34	33	31	33	41	34.8	17.82
February	33	33	33	41	46	38	37.2	2.15
March	45	30	32	28	38	44	34.6	27.17
April	46	27	26	17	39	47	31.0	51.61
May	33	35	31	32	25	45	31.2	44.23
June	33	30	33	32	29	52	31.4	65.61
July	38	31	27	26	22	42	28.8	45.83
August	30	29	24	26	29	29	27.6	5.07
September	16	24	30	29	25	42	24.8	69.35
October	29	30	27	43	30	60	31.8	88.68
November	32	38	39	34	26	76	33.8	124.85
December	28	24	30	27	39	39	29.6	31.76
	2015	2016	2017	2018	2019	2020	Baseline average 2015–2019	% Difference
Average age of death								
January	70.19	68.50	56.93	62.66	71.58	65.28	65.97	− 1.05
February	65.97	62.27	65.10	67.93	71.46	55.07	66.54	− 17.24
March	71.97	72.40	69.13	77.04	72.16	62.99	72.54	− 13.17
April	71.39	65.29	74.50	69.35	66.76	65.89	69.46	− 5.13
May	65.45	71.14	76.55	62.30	73.68	72.88	69.82	4.38
June	66.91	57.69	67.06	54.31	65.33	73.75	62.26	18.46
July	67.14	70.16	60.30	73.42	59.64	72.64	66.13	9.84
August	71.60	63.76	59.61	81.23	66.28	73.14	68.50	6.78
September	65.63	65.33	64.51	60.55	64.76	72.21	64.16	12.56
October	68.73	70.77	62.55	66.86	75.16	71.24	68.81	3.53
November	68.11	65.44	66.67	69.65	68.17	77.99	67.61	15.35
December	63.96	71.38	53.75	68.04	72.50	73.26	65.92	11.12

Results

COVID-19 spread through the USA in three waves in 2020. The first started at the beginning of the pandemic, accelerated in April, and ended in May. The second began at the beginning of June, spiked in July, and ended at the end of August. The third wave began in September and accelerated in October and November. We see similar patterns in excess deaths among the Amish and Mennonites. Table 1 presents the excess deaths by month for 2020 compared to the baseline or expected number of deaths based on 2015–2019. January 2020 gives a slightly elevated number of deaths than the baseline, which dropped in February 2020.

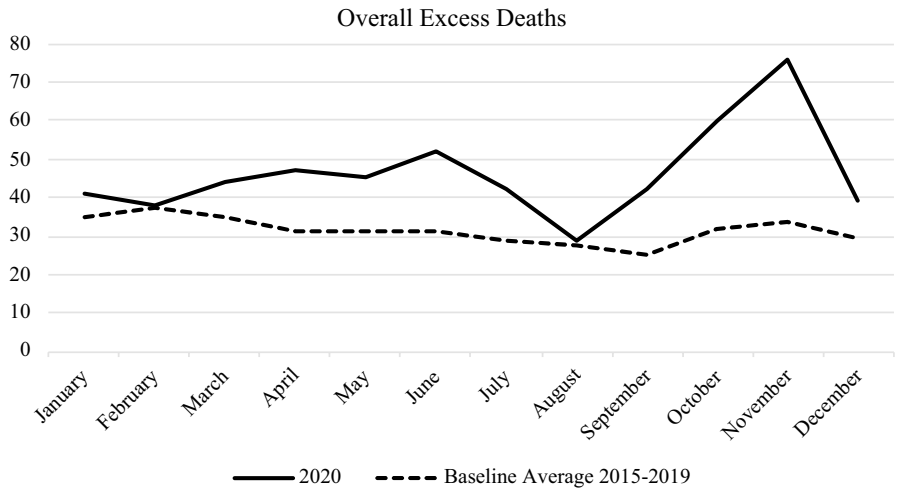

Fig. 1 Number of deaths by month and year

Figure 1 displays the number of deaths by month and year over time. In March 2020, the number of deaths increased to 27% and then jumped to 52% in April, which mirrors the COVID-19 spike in the US population. In May, excess deaths remained high at 44% and then jumped again in June (66%). The percent change in deaths drop to 46% in July and a low 5% in August. Our data are consistent with the second wave ending in August. As the third wave began in the USA, we also see a significant jump in excess deaths with a 69% increase in September, followed by an 89% increase in November, and a 125% increase in November, when the third wave spiked, followed by a drop to 32% in December.

Table 1 also presents the average age of death by month and year. The average age of death from January to April 2020 was slightly lower than the baseline. However, starting in May, the average age of death in 2020 was higher every month for the rest of 2020. In June 2020, the average age of death was 73, 11 years older than the baseline average of death or 18% higher. Similarly, in November 2020, the average age of death was 78 years old, 10 years older than the baseline or 15% higher. The top of Table 2 presents the mortality sex ratio by month and year. Ratios over one indicate that more men died than women. Comparing 2020 to the baseline ratio, in March 2020, the sex ratio was lower than the baseline by 34%, indicating that more women died in 2020 relative to men compared to the baseline. Starting in April 2020 and continuing through August 2020, the mortality sex ratio shifts to over 1, indicating that more men died than women. Comparing these ratios to the baseline, more men died than women in 2020 than the baseline during this time with large differences in May (65%) and June (113%). In September and December 2020, more women died than men, and these ratios were 30 and 38% lower than the baseline ratios for these months, respectively. In October and November 2020, more women died than women, and these ratios were 26 and 20% higher than the baseline ratios for these months, respectively.

Table 2 Overall and Ohio mortality sex ratio by month and year

	2015	2016	2017	2018	2019	2020	Baseline average 2015–2019	% Difference
Overall								
January	1.05	1.62	1.06	0.72	0.65	0.71	1.02	−30.52
February	1.75	0.83	1.06	1.41	1.09	1.71	1.23	39.41
March	0.88	0.88	0.88	1.33	0.81	0.63	0.96	−34.07
April	1.00	1.08	0.63	1.13	0.70	1.14	0.90	25.63
May	0.94	0.84	1.38	0.60	0.79	1.50	0.91	64.70
June	0.83	1.14	1.54	0.68	1.07	2.25	1.05	113.46
July	1.24	0.72	0.93	0.63	1.00	1.33	0.90	47.78
August	0.36	1.23	1.00	1.00	1.64	1.42	1.05	35.42
September	0.78	1.00	0.76	1.42	0.47	0.62	0.89	−30.54
October	1.90	1.14	0.93	1.26	1.14	1.61	1.28	26.12
November	1.67	1.38	0.95	1.43	0.63	1.45	1.21	20.06
December	1.55	1.18	1.50	0.93	1.05	0.77	1.24	−37.77
Ohio								
January	1.25	4.33	1.38	0.50	0.62	0.82	1.61	−49.33
February	2.40	0.58	0.85	1.63	0.92	1.57	1.27	23.32
March	0.57	0.71	0.44	2.17	0.83	0.85	0.95	−10.56
April	0.80	1.00	0.55	2.50	0.58	1.00	1.09	−7.90
May	0.80	0.73	2.00	0.57	0.50	1.70	0.92	84.59
June	0.54	2.25	1.00	0.75	1.00	2.10	1.11	89.58
July	1.00	0.53	1.00	0.78	1.00	1.00	0.86	15.98
August	0.13	1.00	2.00	1.14	2.00	1.50	1.26	19.50
September	0.50	1.14	0.85	1.67	0.60	1.09	0.95	14.70
October	1.14	1.57	0.73	0.80	0.89	1.56	1.03	52.28
November	1.63	1.29	1.11	1.11	0.75	1.58	1.18	34.20
December	1.38	1.00	1.29	0.86	0.79	0.75	1.06	−29.29

Table 3 displays the excess death rates by month and year for Ohio. COVID-19 waves in Ohio follow the same patterns as the USA (Ohio Department of Health, 2020a). Starting in March through the rest of the year, 2020 had a higher number of deaths than the baseline. March and April 2020 had approximately 35% excess deaths than the baseline for those months. This percentage increased to 45% in April and 84% in June. It decreased some in July to 35% and then to 10% in August to climb back up to 49% in September. October and November 2020 had enormous numbers of excess deaths at 113 and 175% compared to their respective baselines. Table 3 also presents the age of death by month and year for Ohio. In March and May, the average age of death was lower in 2020 than the baseline. Still, in April and June through December, the average age of death was higher in 2020 than the baseline—17%, 27%, and 15%

Table 3 Ohio excess death and average age of death by month and year

	2015	2016	2017	2018	2019	2020	Baseline average 2015–2019	Excess death (%)
Excess death								
January	27	16	19	15	21	20	19.6	2.04
February	17	19	24	21	23	18	20.8	− 13.46
March	22	12	13	19	22	24	17.6	36.36
April	27	12	17	7	19	22	16.4	34.15
May	18	26	15	22	12	27	18.6	45.16
June	20	13	16	21	14	31	16.8	84.52
July	24	23	14	16	12	24	17.8	34.83
August	17	12	12	15	12	15	13.6	10.29
September	6	15	24	16	16	23	15.4	49.35
October	15	18	19	27	17	41	19.2	113.54
November	21	16	19	19	14	49	17.8	175.28
December	19	14	16	13	25	21	17.4	20.69
	2015	2016	2017	2018	2019	2020	Baseline average 2015–2019	% Difference
Average age of death								
January	70.41	62.94	59.20	64.07	77.14	67.23	66.75	0.72
February	65.35	62.63	62.22	75.10	73.04	46.65	67.67	− 31.06
March	70.60	67.17	66.38	72.26	71.27	62.25	69.54	− 10.48
April	73.48	69.83	69.24	64.57	69.32	71.32	69.29	2.93
May	78.67	76.31	81.20	59.79	77.58	73.58	74.71	− 1.51
June	64.30	59.77	68.07	52.90	63.04	74.20	61.62	20.42
July	64.92	74.96	59.93	71.88	64.50	78.88	67.24	17.31
August	72.71	58.75	57.17	84.33	63.67	72.93	67.33	8.33
September	68.67	64.87	65.31	51.57	65.88	80.61	63.26	27.43
October	73.47	70.17	66.74	65.48	78.51	71.01	70.87	0.20
November	68.76	69.29	62.79	67.68	71.75	78.57	68.05	15.45
December	65.79	62.43	62.12	64.69	72.78	71.67	65.56	9.31

higher in July, September, and November. The bottom of Table 2 displays the mortality sex ratio for Ohio. Starting in May through November 2020, more men died than women and compared to the baseline at much higher rates—85%, 90%, 20%, 52%, and 34% higher in May, June, August, October, and November, respectively.

Conclusions and Implications

The importance of face-to-face rituals among CRCs indicates the spread of COVID-19 could be especially problematic within these groups, particularly for those that restrict technology. Tracking rates of infection and deaths attributed to COVID-19

within these groups, however, is difficult. People in CRCs are less likely to be tested for COVID-19 (Ali et al., 2020), and death certificates do not indicate whether the decedent belonged to closed religious groups such as the Amish or Mennonites. As such, using obituaries published in an Amish and Mennonite correspondence newspaper allows us to track patterns in the number of deaths during the COVID-19 pandemic and compare to patterns of death over the past five years. We find the number of fatalities among Amish and Mennonites did indeed increase in the 2020 pandemic and followed similar trend lines of deaths in the USA.

The research on excess death indicates COVID-19 disproportionately affects older people (Beaney et al., 2020). Our findings reflect the older Amish and Mennonites' vulnerability in the population, as the average age of death is consistently higher after June 2020. The results indicate the average age of death during the first wave (March through May) was lower than the baseline average, suggesting the initial two waves of COVID-19 may have impacted people in the population with underlying health risks (Beaney et al., 2020). In general, the Amish and the Mennonites were subject to government guidelines in March and April limiting religious gatherings. Many groups complied with the CDC's recommendations to limit contact. However, when restrictions were lifted during the summer of 2020, many of these communities resumed church services. The importance of face-to-face rituals in CRCs and Amish groups' general resistance to mask-wearing and other CDC guidelines makes them especially vulnerable to COVID-19 (Ali et al., 2020). Indeed, we see the number of excess deaths spike in October and November when many governmental restrictions relaxed (Ohio Department of Health, 2020b) and many of the Amish and Mennonite groups were engaging in face-to-face interactions.

The research on sex differences in mortality linked to COVID-19 indicates males have a higher fatality rate than females. Some studies suggest the higher rates of death for males might be caused by a greater number of underlying health conditions for males or may be due to a difference in the male and female immune response to the disease (Gebhard et al., 2020). Other studies indicate social factors may be at play in the sex differences (Bhopal & Bhopal, 2020; Bish & Michie, 2010; Morioka, 2014; YoungHo et al., 2018), while some research indicates sex differences in excess death are minimal (Kontis et al., 2020). The results from the current study indicate that overall, more men died than women in 2020 as compared to the baseline average. Within the Amish and Mennonite communities, men are likely to work outside the home (Corcoran et al., 2020) and are therefore more likely than women to be exposed to other people during the workday. Even so, men who contracted the disease while at work would have brought the disease home to their families. While men would have more opportunities to be exposed, women and children are also at risk, as Amish and Mennonite men who are ill are not likely to quarantine.

The current study has several limitations. First, we cannot track the cause of death through the obituary data. As such, we are limited to calculating excess death rather than deaths specifically due to COVID-19. Even so, our results indicate an increase in the overall number of deaths as compared to the baseline rate that is likely explained either directly or indirectly by COVID-19. Second, this study focuses on Amish and Mennonite CRCs specifically, which have been identified as high-risk sites for the spread of infectious diseases (Ali et al., 2020; Anderson & Potts, 2020;

Gastañaduy et al., 2016). However, the methodology used could be applicable to other religious groups as well. In some countries, such as Egypt and Jordan, Muslim and Christian obituaries are clearly distinguishable (ElShiekh, 2012; Sawalmeh, 2019). Scholars could compare the excess death rates between these religious groups using 2020 and historical obituaries to determine whether there are differences. There are also many Jewish newspapers across the USA and world that report obituaries. Connelly (2020) describes 50 pages worth of obituaries in a Jewish weekly journal in April 2020 to demonstrate how COVID-19 decimated the community.

The large number of excess deaths among the Amish and Mennonite community is concerning, as it indicates not only the presence, but the impact of COVID-19 on this community. While the larger US society focuses on vaccine roll-out as a way to stop the spread of COVID-19, CRCs such as the Amish are not likely to get vaccinated (Scott et al., 2021). Amish and conservative Mennonite groups are generally opposed to preventive health care (Hurst & McConnell, 2010). As such, the efforts needed to curb the impact of COVID-19 need to be explicitly focused on the CRCs' cultural beliefs. Galiatsatos et al. (2020) suggest community conferences between hospital representatives and religious leaders are an effective strategy to transmit information to religious communities. Similarly, Ali et al. (2020) recommend collaborations need to be fostered and built between Amish communities and local health departments. Religious leaders need information channeled through trusted sources to stop the spread of COVID-19 within these CRCs (King, 2014; Olagoke et al., 2021; Stoltzfus, 2021; Wesner, 2021).

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Data Availability Newspaper data are publicly available.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

References

Ali, H., Kondapally, K., Pordell, P., Taylor, B., Medina Martinez, G., Salehi, E., Ramseyer, S., Varnes, S., Hayes, N., de Fijter, S., & LLoyd, S. (2020). COVID-19 outbreak in an Amish community—Ohio, May 2020. *MMWR. Morbidity and Mortality Weekly Report*, *69*. https://doi.org/10.15585/mmwr.mm6945a2

Anderson, C., & Potts, L. (2020). The Amish health culture and culturally sensitive health services: An exhaustive narrative review. *Social Science and Medicine, 265*, 1–13. https://doi.org/10.1016/j.socscimed.2020.113466

Arciuolo, R. J., Brantley, T. R., Asfaw, M. M., Jablonski, R. R., Fu, J., Giancotti, F. R., Rosen, J. B., & Zucker, J. R. (2013). Measles outbreak among members of a religious community—Brooklyn, New York, March–June 2013. *MMWR. Morbidity and Mortality Weekly Report, 62*(36), 752–753.

Armer, J. M., & Radina, M. E. (2006). Definition of health and health promotion behaviors among midwestern old order Amish families. *Journal of Multicultural Nursing and Health, 12*(3), 44–53.

Bainbridge, W. S., & Stark, R. (1980). Sectarian tension. *Review of Religious Research, 22*(2), 105–124. https://doi.org/10.2307/3510654

Baker, J., Perry, S., & Whitehead, A. L. (2020). Crusading for moral authority: Christian nationalism and opposition to science. *Sociological Forum*. https://doi.org/10.31235/osf.io/b7z3u

Beaney, T., Clarke, J. M., Jain, V., Golestaneh, A. K., Lyons, G., Salman, D., & Majeed, A. (2020). Excess mortality: The gold standard in measuring the impact of COVID-19 worldwide? *Journal of the Royal Society of Medicine, 113*(9), 329–334. https://doi.org/10.1177/0141076820956802

Bhopal, S. S., & Bhopal, R. (2020). Sex differential in COVID-19 mortality varies markedly by age. *The Lancet, 396*(10250), 532–533. https://doi.org/10.1016/S0140-6736(20)31748-7

Bilinski, A., & Emanuel, E. J. (2020). COVID-19 and excess all-cause mortality in the US and 18 comparison countries. *JAMA, 324*(20), 2100. https://doi.org/10.1001/jama.2020.20717

Bish, A., & Michie, S. (2010). Demographic and attitudinal determinants of protective behaviours during a pandemic: A review. *British Journal of Health Psychology, 15*(4), 797–824. https://doi.org/10.1348/135910710X485826

Carey, M. C. (2012). *A plain circle: Imagining Amish and Mennonite community through the national edition of The Budget* (MA Thesis, Ohio University). Document number ohiou1337286843.

Centers for Disease Control and Prevention. (2020a). *Excess deaths associated with COVID-19*. Centers for disease control and prevention. https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm

Centers for Disease Control and Prevention. (2020b, March 28). *COVID data tracker*. https://covid.cdc.gov/covid-data-tracker

Connelly, I. K. (2020). *Flatbush Jewish journal publishes 50 pages of obituaries in most recent issue*. The forward. https://forward.com/fast-forward/444924/coronavirus-orthodox-brooklyn-obituary/

Corcoran, K. E., Stein, R. E., Colyer, C. J., & Kowalski, B. M. (2020). Familial ties, location of occupation, and congregational exit in geographically-based congregations: A case study of the Amish. *Review of Religious Research*. https://doi.org/10.1007/s13644-020-00438-7

Dickinson, N., Slesinger, D. P., & Raftery, P. R. (1996). A comparison of the perceived health needs of Amish and non-Amish families in Cashton, Wisc. *Wisconsin Medical Journal, 95*(3), 151–156.

ElShiekh, A. A. A. (2012). The deontic and the epistemic in Egyptian and Jordanian obituaries: A comparative/contrastive study of religious minorities linguistic expression. *Asian Social Science, 8*(2), 135–146. https://doi.org/10.5539/ass.v8n2p135

Faust, J. S., Krumholz, H. M., Du, C., Mayes, K. D., Lin, Z., Gilman, C., & Walensky, R. P. (2021). All-cause excess mortality and COVID-19–related mortality among us adults aged 25–44 years, March–July 2020. *JAMA, 325*(8), 785. https://doi.org/10.1001/jama.2020.24243

Galanter, M. (1999). *Cults: Faith, healing and coercion*. Oxford University Press.

Galiatsatos, P., Monson, K., Oluyinka, M., Negro, D., Hughes, N., Maydan, D., Golden, S. H., Teague, P., & Hale, W. D. (2020). Community calls: Lessons and insights gained from a medical—religious community engagement during the COVID-19 pandemic. *Journal of Religion and Health, 59*(5), 2256–2262. https://doi.org/10.1007/s10943-020-01057-w

Gastañaduy, P. A., Budd, J., Fisher, N., Redd, S. B., Fletcher, J., Miller, J., McFadden, D. J., Rota, J., Rota, P. A., Hickman, C., Fowler, B., Tatham, L., Wallace, G. S., de Fijter, S., Parker Fiebelkorn, A., & DiOrio, M. (2016). A measles outbreak in an underimmunized Amish community in Ohio. *New England Journal of Medicine, 375*(14), 1343–1354. https://doi.org/10.1056/NEJMoa1602295

Gebhard, C., Regitz-Zagrosek, V., Neuhauser, H. K., Morgan, R., & Klein, S. L. (2020). Impact of sex and gender on COVID-19 outcomes in Europe. *Biology of Sex Differences, 11*(1), 29. https://doi.org/10.1186/s13293-020-00304-9

Glassman, L. W. (2018). 'In the Lord's hands': Divine healing and embodiment in a fundamentalist Christian church. *Sociology of Religion, 79*(1), 35–57. https://doi.org/10.1093/socrel/srx046

Greil, A. L., & Rudy, D. R. (1984). Social cocoons: Encapsulation and identity transformation organizations. *Sociological Inquiry, 54*(3), 260–278. https://doi.org/10.1111/j.1475-682X.1984.tb00060.x

Hostetler, J. A. (1993). *Amish society (Fourth)*. Johns Hopkins University Press.

Hurst, C. E., & McConnell, D. L. (2010). *An Amish paradox: Diversity and change in the world's largest Amish community*. Johns Hopkins University Press.

Iannaccone, L. R. (1994). Why strict churches are strong. *American Journal of Sociology, 99*(5), 1180–1211. https://doi.org/10.1086/230409

Kanter, R. M. (1972). Commitment and community: Communes and utopias in sociological perspective. *Harvard University Press*. https://doi.org/10.2307/j.ctv134vmpm

King, M. E. (2014). *Cultural contexts of health and illness among the Lancaster Amish* (Dissertation, University of North Carolina at Chapel Hill). https://cdr.lib.unc.edu/concern/dissertations/qj72p828m

Kontis, V., Bennett, J. E., Rashid, T., Parks, R. M., Pearson-Stuttard, J., Guillot, M., Asaria, P., Zhou, B., Battaglini, M., Corsetti, G., McKee, M., Di Cesare, M., Mathers, C. D., & Ezzati, M. (2020). Magnitude, demographics and dynamics of the effect of the first wave of the COVID-19 pandemic on all-cause mortality in 21 industrialized countries. *Nature Medicine, 26*(12), 1919–1928. https://doi.org/10.1038/s41591-020-1112-0

Kraybill, D. B. (2001). *The riddle of Amish culture*. Johns Hopkins University Press.

Kraybill, D. B. (2010). *Concise encyclopedia of Amish, Brethren, Hutterites, and Mennonites*. Johns Hopkins University Press.

Mavragani, A. (2020). Tracking COVID-19 in Europe: Infodemiology approach. *JMIR Public Health and Surveillance, 6*(2), e18941. https://doi.org/10.2196/18941

Menni, C., Valdes, A. M., Freidin, M. B., Sudre, C. H., Nguyen, L. H., Drew, D. A., Ganesh, S., Varsavsky, T., Cardoso, M. J., El-Sayed Moustafa, J. S., Visconti, A., Hysi, P., Bowyer, R. C. E., Mangino, M., Falchi, M., Wolf, J., Ourselin, S., Chan, A. T., Steves, C. J., & Spector, T. D. (2020). Real-time tracking of self-reported symptoms to predict potential COVID-19. *Nature Medicine, 26*(7), 1037–1040. https://doi.org/10.1038/s41591-020-0916-2

Miller, A. C., & Karkazis, K. (2013). Health beliefs and practices in an isolated polygamist community of southern Utah. *Journal of Religion and Health, 52*(2), 597–609. https://doi.org/10.1007/s10943-012-9593-x

Morioka, R. (2014). Gender difference in the health risk perception of radiation from Fukushima in Japan: The role of hegemonic masculinity. *Social Science and Medicine, 107*, 105–112. https://doi.org/10.1016/j.socscimed.2014.02.014

Nolt, S. M. (2016). *The Amish: A concise introduction*. Johns Hopkins University Press.

Offit, P. (2015). *Bad faith: When religious belief undermines modern medicine*. Basic Books.

Ohio Department of Health. (2020a). *COVID-19 dashboard*. Ohio Department of Health. https://coronavirus.ohio.gov/wps/portal/gov/covid-19/dashboards

Ohio Department of Health. (2020b). *Public health orders*. Ohio Department of Health. https://coronavirus.ohio.gov/wps/portal/gov/covid-19/resources/public-health-orders/public-health-orders

Olagoke, A. A., Olagoke, O. O., & Hughes, A. M. (2021). Intention to vaccinate against the novel 2019 coronavirus disease: The role of health locus of control and religiosity. *Journal of Religion and Health, 60*(1), 65–80. https://doi.org/10.1007/s10943-020-01090-9

Perry, S. L., Whitehead, A. L., & Grubbs, J. B. (2020). Culture wars and COVID-19 conduct: Christian nationalism, religiosity, and Americans' behavior during the coronavirus pandemic. *Journal for the Scientific Study of Religion, 59*, 405–416. https://doi.org/10.1111/jssr.12677

Rocklöv, J., & Sjödin, H. (2020). High population densities catalyse the spread of COVID-19. *Journal of Travel Medicine*, *27*(3), taaa038. https://doi.org/10.1093/jtm/taaa038

Rohrer, K., & Dundes, L. (2016). Sharing the load: Amish healthcare financing. *Healthcare, 4*(4), 92. https://doi.org/10.3390/healthcare4040092

Rossen, L. M., Branum, A. M., Ahmad, F. B., Sutton, P., & Anderson, R. N. (2020). Excess deaths associated with COVID-19, by age and race and ethnicity—United States, January 26–October 3, 2020. *MMWR. Morbidity and Mortality Weekly Report*, *69*(42), 1522–1527. https://doi.org/10.15585/mmwr.mm6942e2

Sawalmeh, M. H. M. (2019). Rhetorical structure and sociocultural analysis of Muslim and Christian obituaries in Jordanian newspapers. *International Journal of Arabic-English Studies*, *19*(2), 317–334. https://doi.org/10.33806/ijaes2000.19.2.5

Schuchat, A. (2020). Public health response to the initiation and spread of pandemic COVID-19 in the United States, February 24–April 21, 2020. *Morbidity and Mortality Weekly Report*, *69*(18), 551–556. https://doi.org/10.15585/mmwr.mm6918e2

Scott, E. M., Stein, R. E., Miraides, F. B., Hershberger, J., Scott, E. M., & Wenger, O. K. (2021). Vaccination patterns of the Northeast Ohio Amish revisited. *Vaccine, 39*(7), 1058–1063. https://doi.org/10.1016/j.vaccine.2021.01.022

Smith, C., & Emerson, M. (1998). American evangelicalism: Embattled and thriving. *University of Chicago Press*. https://doi.org/10.7208/chicago/9780226229225.001.0001

Smith, T. W. (1990). Classifying protestant denominations. *Review of Religious Research*, *31*(3), 225–245. JSTOR. https://doi.org/10.2307/3511614

Stark, R., & Finke, R. (2000). Acts of faith: Explaining the human side of religion. *University of California Press*. https://doi.org/10.1525/9780520924345

Stoltzfus, V. E. (2021). Responses to the COVID-19 pandemic among the Amish of Northern Indiana. *The Journal of Plain Anabaptist Communities*, *1*(2), 126–131. https://doi.org/10.18061/jpac.v1i2.8099

Thompson, K. M., & Kisjes, K. H. (2016). Modeling measles transmission in the North American Amish and options for outbreak response. *Risk Analysis, 36*(7), 1404–1417. https://doi.org/10.1111/risa.12440

Unwin, H. J. T., Mishra, S., Bradley, V. C., Gandy, A., Mellan, T. A., Coupland, H., Ish-Horowicz, J., Vollmer, M. A. C., Whittaker, C., Filippi, S. L., Xi, X., Monod, M., Ratmann, O., Hutchinson, M., Valka, F., Zhu, H., Hawryluk, I., Milton, P., Ainslie, K. E. C., & Flaxman, S. (2020). State-level tracking of COVID-19 in the United States. *Nature Communications, 11*(1), 6189. https://doi.org/10.1038/s41467-020-19652-6

Wellman, J. K., Jr., & Corcoran, K. E. (2013). Religion and regional culture: Embedding religious commitment within place. *Sociology of Religion, 74*(4), 496–520. https://doi.org/10.1093/socrel/srt046

Wesner, E. (2021). The Amish and COVID-19: A media survey. *The Journal of Plain Anabaptist Communities*, *1*(2), 57–81. https://doi.org/10.18061/jpac.v1i2.8022

Woolf, S. H., Chapman, D. A., Sabo, R. T., Weinberger, D. M., Hill, L., & Taylor, D. D. (2020). Excess deaths from COVID-19 and other causes, March-July 2020. *JAMA, 324*(15), 1562–1564. https://doi.org/10.1001/jama.2020.19545

World Health Organization. (2020). *Infodemic management of WHO information net work for epidemics*. https://www.who.int/teams/risk-communication/infodemic-management

World Health Organization. (2021). *Contact tracing in the context of COVID-19*. https://www.who.int/publications/i/item/contact-tracing-in-the-context-of-covid-19

Young Center for Anabaptist and Pietist Studies. (2020). *Twelve largest settlements, 2020 | Amish studies*. http://groups.etown.edu/amishstudies/statistics/twelve-largest-settlements-2020/

YoungHo, K., Park, I., & Kang, S. (2018). Age and gender differences in health risk perception. *Central European Journal of Public Health*, *26*(1), 54–59. https://doi.org/10.21101/cejph.a4920