A Silent Wave: Increases in Wisconsin's Alcohol-Related Mortality During the COVID-19 Pandemic

Thomas Bentley, MS; Paul D. Creswell, PhD

ABSTRACT

Background: Alcohol-related mortality is an increasing public health concern in the United States. To date, no study has considered trends in alcohol-related deaths during the full COVID-19 pandemic period.

Methods: We analyzed deaths from Wisconsin vital statistics to explore the relationship between the pandemic period and any changes in alcohol-related mortality.

Results: In Wisconsin, the pandemic period was associated with additional alcohol-related mortality above and beyond a previously reported upward trend.

Discussion: We show that the COVID-19 pandemic was associated with exacerbated alcohol-related mortality in Wisconsin. Alcohol use may need to be considered as an additional public health risk in future pandemic scenarios.

BACKGROUND

Alcohol-related mortality in the United States has increased in recent decades.[1] These increases are in contrast to the experience of European nations where alcohol-related deaths have generally been in decline.[2] Further, new evidence suggests an uptick of alcohol-related mortality at the beginning of the COVID-19 pandemic,[3,4] while findings also show a general increase in the purchasing of alcohol during that period.[5] To our knowledge, however, no study to date has considered trends in alcohol-related mortality over the full pandemic period.

• • •

Author Affiliations: Division of Care and Treatment Services, Wisconsin Department of Health Services, Bureau of Prevention Treatment and Recovery, Madison, Wisconsin (Bentley); University of Wisconsin School of Medicine and Public Health, supporting the Wisconsin Department of Health Services, Bureau of Environmental and Occupational Health, Madison, Wisconsin (Creswell).

Corresponding Author: Paul D. Creswell, PhD, Occupational Health and Safety Surveillance Senior Epidemiologist, University of Wisconsin School of Medicine and Public Health, supporting the Wisconsin Department of Health Services, Bureau of Environmental and Occupational Health, email pdcreswell@wisc.edu; ORCID ID 0000-0001-8432-0017

The COVID-19 pandemic was characterized by a number of factors at the individual and societal levels that may be associated with increased risks for alcohol-related mortality. These include, but are not limited to, higher anxiety and depression,[6,7] increased suicide ideation,[7] and higher levels of substance use.[7] Evidence also shows that the pandemic was associated with decreased access to health services,[8] lowered access to outpatient substance use clinics,[9] and declines in trust in physicians and hospitals.[10] While none of these factors in isolation is likely to constitute a sufficient cause of increased alcohol-related mortality at a population level, they are all components that may be associated with an increased risk of alcohol-related mortality.

Since the late 1970s, Wisconsin consistently has had some of the highest per capita levels of alcohol consumption.[11] America's Health Rankings, using data from the Behavioral Risk Factor Surveillance System, ranks Wisconsin among the 5 worst states with regards to excessive drinking by adults and seniors.[12] The prevalence of alcohol consumption and culture of drinking in Wisconsin makes it a useful case study when considering trends in alcohol-related mortality before, during, and after the pandemic.

A previous study explored alcohol-related mortality in Wisconsin before the COVID-19 pandemic and demonstrated an increasing risk of this outcome across 2 decades (2000-2019).[13] This brief report builds on that prior work and explores the potential relationship between the pandemic and changes in alcohol-related mortality. The present analysis uses Wisconsin vital records data to assess: (1) if the previously reported trends in alcohol-related mortality changed with the onset of the COVID-19 pandemic, (2) if the pandemic period was associated with higher alcohol-related mortality, (3) if demographic characteris-

tics of Wisconsin residents were associated with differences in alcohol-related mortality prior to and during the pandemic, and (4) whether any changes in trends appear poised to continue into the post-pandemic period.

METHODS

Data and Sample

We analyzed data from Wisconsin vital statistics, which are housed at the Vital Records Office in the Wisconsin Department of Health Services (DHS). The sample consisted of decedents who died from January 1, 2015, through December 30, 2023 (N=8267). Alcohol-related deaths were identified using the underlying cause of death field. This field is filled out by the medical examiner or the coroner on the death certificate. We used only deaths that were fully attributable to alcohol, and we retained deaths from both chronic and acute conditions.

Alcohol-related deaths from acute causes included excessive blood alcohol, alcohol poisoning, and alcohol-related suicide. Alcohol-related deaths from chronic causes included chronic liver disease (eg, cirrhosis), mental disorders related to alcohol, and all further health disorders owing to alcohol (ie, pancreatitis, polyneuropathy, gastritis, myopathy, cardiomyopathy, and liver disease). We included the following underlying cause of death codes from the *International Classification of Diseases, Tenth Revision, Clinical Modification* (ICD-10-CM): F10, F10.0, F10.1, F102, G312, G621, G721, I426, K292, K70, K860, O354, P043, Q860, R780, T51, X45, X65, and Y15.

Table. Demographic Characteristics of Wisconsin Residents Who Died from Alcohol-related Causes in the pre-COVID-19 Pandemic Period (January 1, 2015 – December 30, 2019) vs the COVID-19 Pandemic Period (January 1, 2020 – December 30, 2023)

	Alcohol-related Deaths Pre-COVID-19	Proportion of Alcohol-related Deaths: Pre-COVID-19	Alcohol-related Deaths COVID-19 Period	Proportion of of Alcohol-related Deaths: COVID-19 Period	χ^2 test
	N = 3772	100%	N = 4495	100%	
Race and ethnicity					*P* < 0.83
Black, non-Hispanic	249	6.6%	269	6.0%	
Hispanic	138	3.7%	172	3.8%	
Other, non-Hispanic	149	4.0%	186	4.1%	
White, non-Hispanic	3236	85.8%	3868	86.1%	
Age					*P* < 0.01
0–17	103	2.7%	153	3.4%	
18–34	154	4.1%	192	4.3%	
35–44	323	8.6%	502	11.2%	
45–54	923	24.5%	910	20.2%	
55–64	1359	36.0%	1611	35.8%	
65+	910	24.1%	1127	25.1%	
Sex					*P* < 0.12
Female	1068	28.3%	1343	29.9%	
Male	2704	71.7%	3152	70.1%	
DHS region					*P* < 0.29
Northeastern	828	22.0%	1014	22.6%	
Northern	392	10.4%	504	11.2%	
Southeastern	1319	35.0%	1554	34.6%	
Southern	727	19.3%	849	18.9%	
Western	506	13.4%	570	12.7%	
Missing	–	–	4	0.1%	
Education					*P* = 0.05
High school or less	2320	61.5%	2648	58.9%	
College/Undergrad	1259	33.4%	1587	35.3%	
Graduate school	137	3.6%	170	3.8%	
Unknown	56	1.5%	90	2.0%	

Abbreviations: DHS, Department of Health Services.

Column percentages may not always sum to 100% due to rounding.

Analysis

Wisconsin vital records data provide demographic variables for decedents, including age, sex, race, ethnicity, educational attainment, geographic classification (ie, urban vs rural), and DHS region (5 regions throughout the state). For our analysis, we determined rural and urban status using the classifications created by the Wisconsin Office of Rural Health.[13] We used chi-square tests to determine if there were significant differences in deaths by demographic factors comparing the pre-pandemic period (January 1, 2015 – December 30, 2019) with the period that included the COVID-19 pandemic (January 1, 2020– December 30, 2023). We modeled age-adjusted alcohol-related mortality rates per 100 000 population for Wisconsin and the accompanying 95% CIs using a negative-binomial distribution to assess statistical significance of differences across years. For the population denominators, we used the resident population data tables available from Wisconsin Interactive Statistics on Health (WISH).[14] We completed all analyses using SAS version 9.4 (SAS Institute Inc).

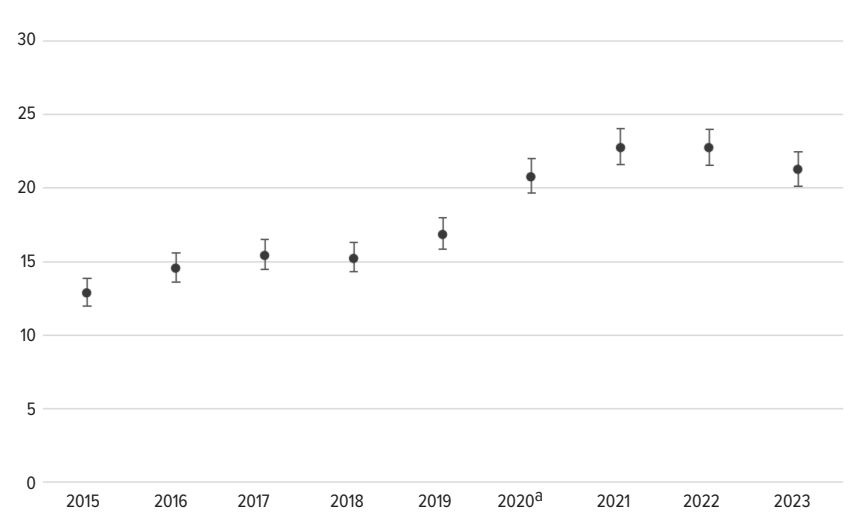
RESULTS

Demographic Analysis

The Table provides the results of the chi-square tests comparing demographics between the pre-COVID-19 pandemic period (2015-2019) and the period containing the pandemic (2020-2023). Only 1 variable had statistically significant differences across these time periods. Age was related to time period such that those aged 35 to 44 were significantly more likely to die from an alcohol-related reason during the pandemic than in the prior period, and those aged 45 to 54 were significantly less likely to die from this cause during the pandemic. Education also showed dif-

ferences, but these did not quite reach the threshold for statistical significance.

Figure. Age-adjusted Alcohol-Related Mortality Rate per 100 000 Population – Wisconsin, 2015-2023 (N = 8267)



[a]Indicates a statistically significant change over the previous year ($P < 0.05$).

Modeled Age-adjusted Mortality Rates

The Figure shows the modeled age-adjusted alcohol-related mortality rates per 100000 population in Wisconsin, with accompanying 95% CIs, from 2015 through 2023. As reported previously, the period prior to the pandemic (2015-2019) was characterized by an increasing trend in alcohol-related mortality.[13] However, our analysis shows that a statistically significant jump in alcohol-related mortality occurred with the COVID-19 pandemic. In 2019, the mortality rate was 16.9 per 100 000 population (95% CI, 15.9-18.0), whereas in 2020, the mortality rate rose to 20.8 (95% CI, 19.7-22.0). This constitutes a 23.2% increase. The rate increased another 9.6% in 2021 to 22.8 (95% CI, 21.6-24.1), though this increase was not statistically significant. The rate remained stable in 2022 and finally decreased somewhat, though not significantly so, in 2023 to 21.28 (95% CI, 20.1-22.5) – a 6.5% decline.

DISCUSSION

The COVID-19 pandemic profoundly affected people in the United States and around the world. By early 2023, COVID-19 was responsible for an estimated 14 469 deaths in Wisconsin alone.[13] Our study shows that in Wisconsin, the pandemic also was associated with higher levels of alcohol-related mortality. Similar to the findings by White et al,[3] we found an increase in alcohol-related mortality in Wisconsin going into the pandemic period from the prior year. In addition, we found that this elevated rate held through the whole pandemic and dropped off somewhat in the final year of that period – although this decrease was not statistically significant. Still, it may be that trends are edging back toward their previous trajectory. If that is the case, however, it is only partially heartening, given the 2-decade increase in alcohol-related mortality in Wisconsin that proceeded the pandemic[13] and the national trends showing increasing alcohol-related deaths overall.[3,4]

We cannot say specifically why alcohol-related mortality increased during the pandemic period in Wisconsin, but there are several factors that may have played a role. The literature shows that the pandemic was clearly stressful for people as indicated by higher reports of anxiety and depression,[6,7] suicide ideation,[7] and substance use.[7] We also know that patients had added difficulty accessing health services[8] – including outpatient substance use treatment[9] – and that trust in physicians and hospitals declined during the pandemic.[10] All of these factors may have amplified or exacerbated substance use and could have increased subsequent mortality risk. If so, this would be in keeping with evidence that shows a general trend in increased alcohol sales during the COVID-19 pandemic.[5]

We found only 1 demographic characteristic significantly associated with alcohol-related mortality during the pandemic period. A higher proportion of those aged 35 to 44 and a lower proportion of those aged 45 to 54 died of an alcohol-related reason during that time. Additional research would be needed to tease apart the underlying factors behind this association. Future work also may seek to look at additional variables that might provide information about other groups with elevated risk profiles. Our previous study indicated differential risks for alcohol-related mortality pre-pandemic by age, race/ethnicity, sex, and educational attainment.[13] However, other social determinants of health – such as decedents' usual occupation – have yet to be explored. Given the changes in work that occurred during the pandemic, this area of inquiry would be timely.

Limitations

While our findings are compelling, there are a few limitations with our analysis. First, our data are cross-sectional and, as such, we cannot say whether or not the COVID-19 pandemic was the cause – indirect or otherwise – of the increased mortality during that period. That said, however, the COVID-19 pandemic affected global society so profoundly it would prove difficult to find another parallel proximal cause. Moreover, while we have shown the association between the pandemic period and increased alcohol-related mortality, it is beyond the ability of our study to assess the multiple potential mechanisms underlying this association. It may have been stress, lack of access to

care, policy decisions (eg, changes in masking policies or stay at home orders), or a combination of factors that drove the association. We leave this for future studies to consider. Additionally, Wisconsin represents only 1 state in the union and has historically higher alcohol use than other states, making it useful to study but not necessarily representative. Future work should consider looking at these trends at a national level. Finally, it may be an additional limitation of our study that we only used fully attributable deaths from alcohol, which may underestimate the true burden.[13]

CONCLUSIONS

Increasing trends in alcohol mortality are an important area of concern for public health and the medical community. Our study shows that the COVID-19 pandemic was associated with a period of exacerbated alcohol mortality in Wisconsin. Our findings suggest that this may be a parallel risk to the public's health that should be considered in a future pandemic scenario.

Funding/Support: None declared.

Financial Disclosures: None declared.

Acknowledgments: The authors would like to acknowledge the following individuals for their assistance with the creation of this manuscript. Nathaniel Keeley, Laura Ninneman, and Xioyan Wang at the Wisconsin Vital Records Office provided invaluable assistance with the vital records data.

REFERENCES

1. White AM, Castle IP, Hingson RW, Powell PA. Using death certificates to explore changes in alcohol-related mortality in the United States, 1999 to 2017. *Alcohol Clin Exp Res.* 2020;44(1):178-187. doi:10.1111/acer.14239

2. Pruckner N, Hinterbuchinger B, Fellinger M, et al. Alcohol-related mortality in the WHO European region: sex-specific trends and predictions. *Alcohol Alcohol.* 2019;54(6):593-598. doi:10.1093/alcalc/agz063

3. White AM, Castle IP, Powell PA, Hingson RW, Koob GF. Alcohol-related deaths during the COVID-19 pandemic. *JAMA*. 2022;327(17):1704-1706. doi:10.1001/jama.2022.4308

4. Esser MB, Sherk A, Liu Y, Naimi TS. Deaths from excessive alcohol use - United States, 2016-2021. *MMWR Morb Mortal Wkly Rep*. 2024;73(8):154-161. doi:10.15585/mmwr.mm7308a1

5. Castaldelli-Maia JM, Segura LE, Martins SS. The concerning increasing trend of alcohol beverage sales in the U.S. during the COVID-19 pandemic. *Alcohol*. 2021;96:37-42. doi:10.1016/j.alcohol.2021.06.004

6. Jewell JS, Farewell CV, Welton-Mitchell C, Lee-Winn A, Walls J, Leiferman JA. Mental health during the COVID-19 pandemic in the United States: online survey. *JMIR Form Res*. 2020;4(10):e22043. doi:10.2196/22043

7. Czeisler MÉ, Lane RI, Petrosky E, et al. Mental health, substance use, and suicidal ideation during the COVID-19 pandemic - United States, June 24-30, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(32):1049-1057. doi:10.15585/mmwr.mm6932a1

8. Pujolar G, Oliver-Anglès A, Vargas I, Vázquez ML. Changes in access to health services during the COVID-19 pandemic: a scoping review. *Int J Environ Res Public Health.* 2022;19(3):1749. doi:10.3390/ijerph19031749

9. Lundahl LH, Cannoy C. COVID-19 and substance use in adolescents. *Pediatr Clin North Am.* 2021;68(5):977-990. doi:10.1016/j.pcl.2021.05.005

10. Perlis RH, Ognyanova K, Uslu A, et al. Trust in physicians and hospitals during the COVID-19 pandemic in a 50-state survey of US adults. *JAMA Netw Open.* 2024;7(7):e2424984. doi:10.1001/jamanetworkopen.2024.24984

11. Slater ME, Alpert HR. Apparent per capita alcohol consumption: national, state, and regional trends, 1977–2019. National Institute on Alcohol Abuse and Alcoholism; April 2021. Surveillance Report #117. Accessed May 7, 2024. https://www.niaaa.nih.gov/sites/default/files/SR-117-Per-Capita-Consumption.pdf

12. United Health Foundation. Excessive drinking in Wisconsin. America's Health Rankings. Updated 2025. Accessed May 7, 2024. https://www.americashealthrankings.org/explore/measures/ExcessDrink/WI

13. Cotter L, Bentley T, Imm P, Creswell PD. Increased alcohol-related mortality in Wisconsin pre-COVID: a two-decade trend. *WMJ*. 2022;121(4):269-273. Accessed July 28, 2025. https://wmjonline.org/wp-content/uploads/2022/121/4/269.pdf

14. WISH: population module. Wisconsin Dept of Health Services. Updated December 27, 2024. Accessed October 28, 2021. https://www.dhs.wisconsin.gov/wish/population/index.htm

advancing the art & science of medicine in the midwest

WMJ

WMJ (ISSN 2379-3961) is published through a collaboration between The Medical College of Wisconsin and The University of Wisconsin School of Medicine and Public Health. The mission of *WMJ* is to provide an opportunity to publish original research, case reports, review articles, and essays about current medical and public health issues.

Visit www.wmjonline.org to learn more.