



## Key Findings

- The age-adjusted all-cause mortality rate was significantly higher in rural counties and significantly lower in micropolitan counties compared to the state at large.
- Heart Disease, Cancer, and COVID-19 were the three leading causes of death among residents of Montana in 2020.
- The ten leading causes of death were the same in metropolitan, micropolitan, and rural counties, but the order was slightly different.

**January 2023**

Matthew Ringel, MPH  
Vital Statistics Epidemiologist  
[Office of Epidemiology and Scientific Support](#)  
406-444-1746  
[MRingel@mt.gov](mailto:MRingel@mt.gov)

## Leading Causes of Death among Montana Residents in 2020 by Urban/Rural County Classification

### Introduction

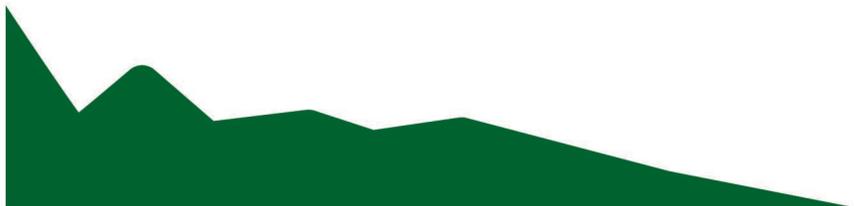
Urban and rural areas each have unique public health challenges. Urban areas tend to have poorer air quality than rural areas, and the large number of people living close together allows for a more rapid spread of infectious diseases.<sup>1,2</sup> Rural areas typically have longer emergency response times and poorer access to healthcare facilities than urban areas.<sup>3,4</sup> Rural areas also have various socioeconomic disadvantages, such as lower incomes and less educational attainment.<sup>5,6</sup> For these reasons, urban counties and rural counties may have differing overall and cause-specific mortality rates. This report describes the leading causes of death in metropolitan, micropolitan, and rural counties within Montana in 2020 and compares them to the leading causes of death statewide.

### Methods

Data used in this report come from Montana death certificates collected by the Montana Office of Vital Records and were limited to Montana residents. Deaths were tabulated by underlying cause using the International Classification of Diseases 10<sup>th</sup> Revision (ICD-10).<sup>7</sup> Leading causes of death are classified according to the National Center for Health Statistics (NCHS) Instruction Manual Part 9 which includes the addition of COVID-19 (U07.1).<sup>8</sup>

Leading causes of death among Montana residents were tabulated and ranked, as were leading causes among Montana residents of metropolitan, micropolitan, and rural counties separately. Counties were designated as metropolitan, micropolitan, or noncore (also referred to as rural) according to the 2013 NCHS Urban-Rural Classification scheme. Carbon, Cascade, Golden Valley, Missoula, and Yellowstone Counties were classified as metropolitan; Flathead, Gallatin, Jefferson, Lewis and Clark, and Silver Bow Counties were classified as micropolitan; and all other counties in Montana were classified as rural.

Age-adjusted death rates with 95% confidence intervals were calculated via the direct method using the 2000 US standard population.<sup>9</sup> A rate was considered to be significantly different than the statewide rate if its confidence interval did not include that statewide rate. The leading causes of death in Montana are displayed in Table 1, and the leading causes of death in metropolitan, micropolitan, and rural counties are displayed in Table 2. In each of these tables, the causes are ranked by the number of deaths that occurred in 2020.





## Results

There were 12,030 deaths among Montana residents in 2020 (Table 1). All but 14 of these decedents had a known county of residence. The ten leading causes of death were the same in metropolitan, micropolitan, and rural counties; but the order was slightly different. The ten leading of causes of death among residents of metropolitan counties were ranked in the same order as the state, and none of the age-adjusted mortality rates were significantly different than the respective statewide rates (Table 2).

The ten leading causes of death in micropolitan counties were ordered similarly to the state (Table 2). The one difference was that diabetes mellitus was the eighth leading cause of death and suicide was the ninth leading cause of death statewide, and these were switched in micropolitan counties. The all-cause age-adjusted mortality rate was significantly lower in micropolitan counties than it was statewide, as were the age-adjusted mortality rates for COVID-19, unintentional injury, and chronic liver disease and cirrhosis. The age-adjusted Alzheimer's disease mortality rate, however, was significantly higher.

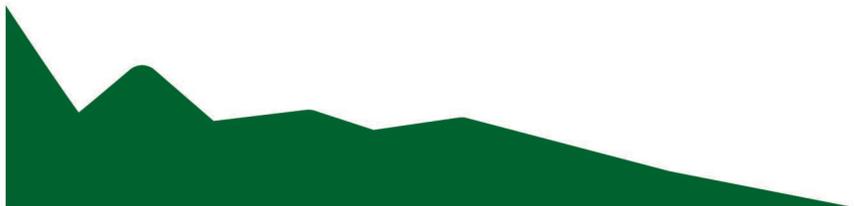
The ten leading causes of death in rural counties were also ordered similarly to the state (Table 2). The one difference was that Alzheimer's disease was the seventh leading cause of death statewide but was the ninth leading cause of death in rural counties. The all-cause age-adjusted mortality rate was significantly higher in rural counties than it was statewide, as were the age-adjusted mortality rates for COVID-19, unintentional injury, diabetes mellitus, and chronic liver disease and cirrhosis. The age-adjusted Alzheimer's disease mortality rate, however, was significantly lower.

## Discussion

Among residents of the United States in 2020, the age-adjusted mortality rate in deaths per hundred thousand person-years (95% CI) was 835.4 (834.5–836.3).<sup>10</sup> Among resident of rural counties within the United States, the age-adjusted mortality rate (95% CI) was 971.7 (967.9–975.6), significantly higher than the national rate. This is similar to what was observed in Montana, where residents of rural counties also had a significantly higher age-adjusted mortality rate than residents of the state as a whole (Table 2). Among residents of micropolitan counties within the United States, the adjusted mortality rate (95% CI) was 952.7 (949.5–956.0), significantly higher than the national rate. This is different than what was observed in Montana, where residents of micropolitan counties had a significantly lower age-adjusted mortality rate than residents of the state as a whole (Table 2).

Due to the COVID-19 pandemic, the age-adjusted mortality rate in Montana was higher in 2020 than in the five years prior.<sup>11</sup> The COVID-19 pandemic also contributed to a higher age-adjusted mortality rate in rural Montana counties than the state as a whole. Micropolitan counties, on the other hand, had a significantly lower all-cause and COVID-19 mortality rate than the general population. This illustrates how COVID-19 contributed to geographical health disparities in Montana. DPHHS encourages all Montana residents and visitors to take precautionary measures to slow the spread of the virus, including vaccination, staying home when not feeling well, and washing hands frequently.

In both Montana and the United States, the age-adjusted mortality rate in 2020 was significantly higher among residents of rural counties than among residents of the entire population.<sup>10</sup> Future research examining this disparity could be useful for improving rural health outcomes.





**Table 1:** Age-adjusted mortality rate among Montana residents by underlying cause of death, 2020.

Rank <sup>^</sup>	Underlying Cause of Death	Number	Rate <sup>†</sup> (95% Confidence Interval)
1	Heart Disease	2,423	162.5 (156.0–169.4)
2	Cancer	2,139	141.6 (135.4–147.9)
3	COVID-19	1,118	75.4 (70.9–80.1)
4	Unintentional Injury	727	61.6 (57.1–66.5)
5	Chronic Lower Respiratory Disease	663	42.4 (39.1–45.8)
6	Cerebrovascular Disease	453	31.0 (28.1–34.1)
7	Alzheimer’s Disease	347	23.7 (21.3–26.5)
8	Diabetes Mellitus	342	23.5 (20.9–26.2)
9	Suicide	300	26.0 (23.0–29.3)
10	Chronic Liver Disease and Cirrhosis	236	18.9 (16.5–21.7)
	Total deaths	12,030	839.5 (824.1–855.1)
<sup>^</sup> Causes of death ranked by number of deaths <sup>†</sup> Age-adjusted rate displayed as deaths per 100,000 person-years			



**Table 2:** Age-adjusted mortality rate among Montana residents by metropolitan, micropolitan, and rural counties and underlying cause of death, 2020.

Underlying Cause of Death	Metropolitan				Micropolitan				Rural			
	Rank <sup>^</sup>	Number	Rate <sup>†</sup> (95% CI)	Comparison to State Rate <sup>*</sup>	Rank <sup>^</sup>	Number	Rate <sup>†</sup> (95% CI)	Comparison to State Rate <sup>*</sup>	Rank <sup>^</sup>	Number	Rate <sup>†</sup> (95% CI)	Comparison to State Rate <sup>*</sup>
Heart Disease	1	813	165.1 (153.7–177.2)	=	1	649	154.8 (142.9–167.7)	=	1	957	166.1 (155.4–177.6)	=
Cancer	2	701	142.3 (131.7–153.6)	=	2	601	140.4 (129.1–152.5)	=	2	836	142.5 (132.6–153.2)	=
COVID-19	3	373	76.2 (68.5–84.7)	=	3	212	51.9 (45.0–59.7)	↓	3	531	93.4 (85.3–102.4)	↑
Unintentional Injury	4	244	59.2 (51.7–67.5)	=	4	174	48 (40.9–56.0)	↓	4	306	78.7 (69.6–88.9)	↑
Chronic Lower Respiratory Disease	5	241	47.2 (41.3–53.8)	=	5	163	36.9 (31.4–43.4)	=	5	258	41.9 (36.9–47.7)	=
Cerebrovascular Disease	6	153	31.0 (26.2–36.6)	=	6	121	30.3 (25.1–36.5)	=	6	179	31.6 (27.0–37.0)	=
Alzheimer’s Disease	7	125	25.4 (21.1–30.5)	=	7	113	29.2 (24.0–35.3)	↑	9	109	18.7 (15.4–22.9)	↓
Diabetes Mellitus	8	99	20.0 (16.1–24.6)	=	9	76	18.8 (14.7–23.9)	=	7	167	30.0 (25.4–35.5)	↑
Suicide	9	95	23.7 (19.0–29.2)	=	8	91	25.2 (20.2–31.3)	=	8	114	29.9 (24.3–36.6)	=
Chronic Liver Disease and Cirrhosis	10	73	16.1 (12.5–20.6)	=	10	54	13.4 (9.9–17.9)	↓	9	109	28.8 (23.2–35.4)	↑
Total deaths		4,103	867.2 (830.6–884.7)	=		3,102	762.8 (735.6–791.0)	↓		4,811	897.2 (870.5–924.8)	↑

<sup>^</sup>Causes of death ranked by number of deaths

<sup>†</sup>Age-adjusted rate displayed as deaths per 100,000 person-years

<sup>\*</sup>↑ significantly higher, ↓ significantly lower, = statistically equal



<sup>1</sup> Strosnider H, Kennedy C, Monti M, Yip F. Rural and Urban Differences in Air Quality, 2008-2012, and Community Drinking Water Quality, 2010–2015 — United States. *MMWR Surveill Summ* 2017;66(No. SS-13):1-10.

<sup>2</sup> Neiderud CJ. How Urbanization Affects the Epidemiology of Emerging Infectious Diseases. *Infection Ecology & Epidemiology* 2015; 5(1): 1-9.

<sup>3</sup> Mell HK, et al. Emergency Medical Services Response Times in Rural, Suburban, and Urban Areas. *JAMA Surgery* 2017; 152(10): 983-984.

<sup>4</sup> Ewing J, Hinkley KN. 2013. Meeting the Primary Care Needs of Rural America: Examining the Role of Non-Physician Providers. The Rural Health Connection. National Conference of State Legislators.

<sup>5</sup> Long AS, Hanlon AL, Pellegrin KL. Socioeconomic Variables Explain Rural Disparities in US Mortality Rates: Implications for Rural Health Research and Policy. *SSM – Population Health* 6 (2018) 72-74.

<sup>6</sup> Gibbs R. 2005. Education as a Rural Development Strategy. *Amber Waves* 3(5): 20-25.

<sup>7</sup> World Health Organization. International Statistical Classification of Diseases and Related Health Problems-10th Revision 5th ed. Geneva, (CH): WHO Press; 2016.

<sup>8</sup> National Center for Health Statistics. List of 113 Selected Causes of Death, Enterocolitis due to *Clostridium difficile*, and COVID-19. In: NCHS Instruction Manual Part 9. 2020.

<sup>9</sup> Klein RJ, Schoenborn CA. 2001. Age Adjustment Using the 2000 Projected U.S. Population. U.S. Dep. Heal. Hum. Serv. Natl. Cent. Heal. Statistics.

<sup>10</sup> Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2020 on CDC WONDER Online Database, released in 2021.

<sup>11</sup> Koch, T. Provisional Leading Causes of Death and Other Select Causes in Montana, 2020 and 2015-2019. Montana Department of Public Health and Human Services. March 2021.