Burden of Falls Surveillance Report

Key Takeaways

Montana has a higher rate of deaths due to falls compared with the US.

One in three adults reported falling at least once in the past year.

People with a disability and people with three or more chronic conditions were more likely to report a fall in the past year.

People who report exercising in the past 30 days were less likely to report a fall in the past year.

Background

Falls are the leading cause of injury death for adults aged 45 and older in Montana. Nonfatal falls are also serious and costly.

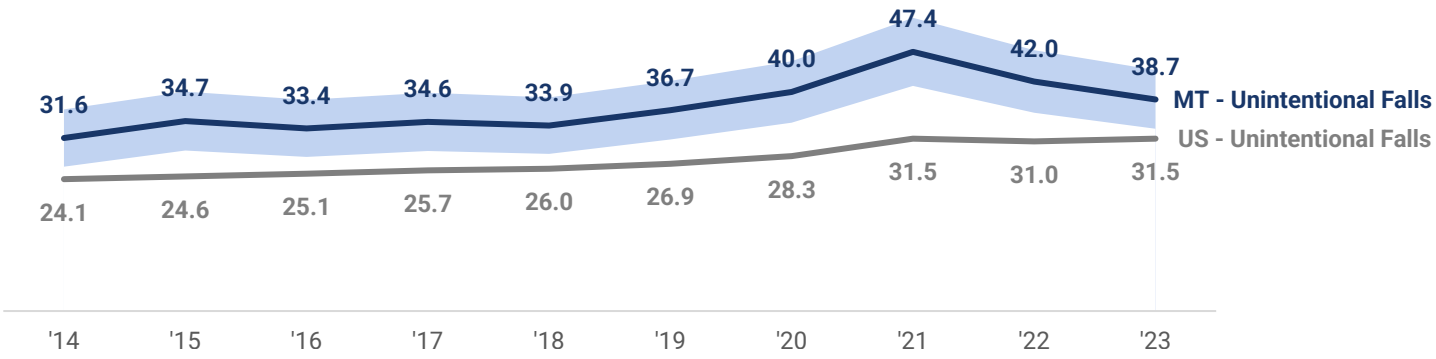
Surveillance is one of the most important and basic elements of fall prevention, helping to determine the burden, the leading causes, and the population groups and behaviors associated with the greatest risk. These data are crucial for deciding prevention priorities and evaluating program effectiveness.

This report describes fall mortality trends in Montana, the prevalence of falls (i.e., the percentage of adults who report falling in the past year), risk factors, fall morbidity (including nonfatal emergency department visits and hospitalizations), and emergency medical services utilization.

Trends in Fatal Falls, 2014-2023

From 2014 to 2023, there were a total of 1,838 deaths due to unintentional falls among Montanans aged 45 years and older - about one death every two days. The 10-year age-adjusted rate (AAR) was 37.3 per 100k residents (95% CI: 35.6-39.0).[1] **Figure 1** shows that older adult deaths due to falls were consistently higher in Montana compared with the U.S.[2] The mortality rate due to unintentional falls increased from 2018 to 2021.

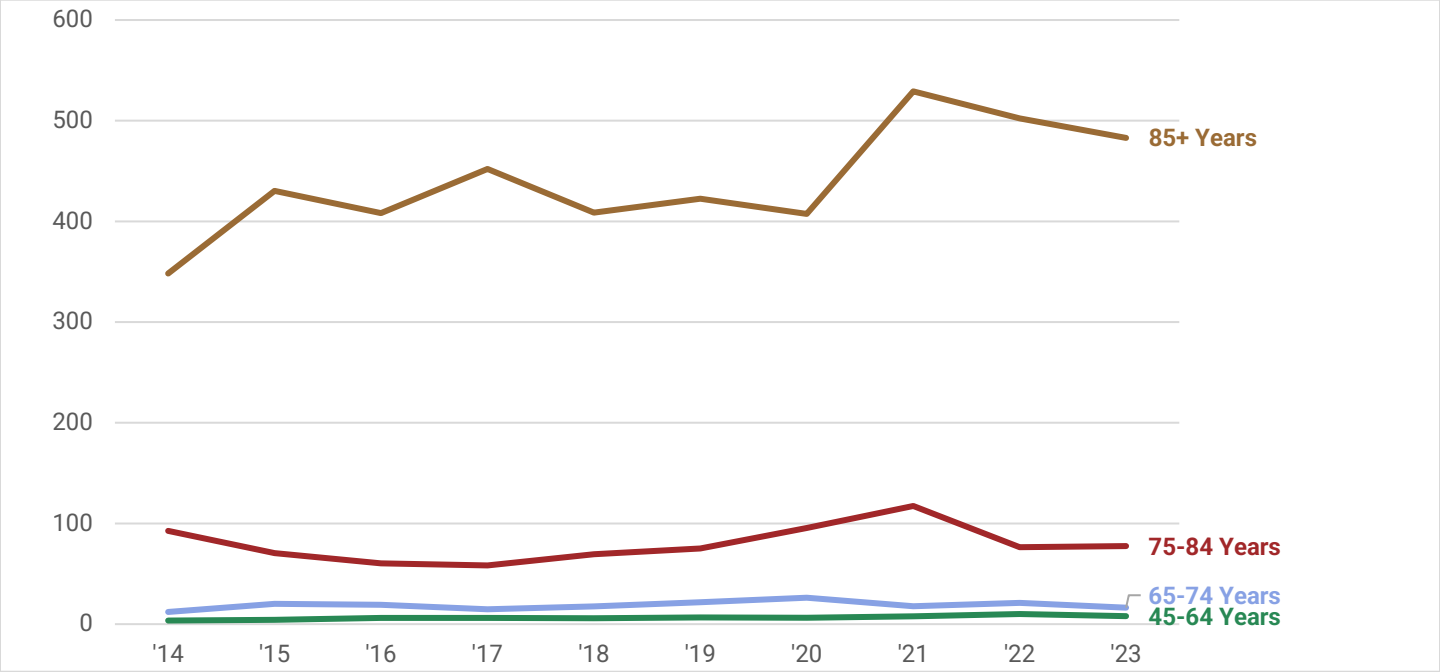
Figure 1. Unintentional falls among adults aged 45-years and older in MT vs US, Age-adjusted death rate per 100,000, 2014-2023



Notes: Shaded areas around the MT estimates represent the 95% confidence intervals. Data source: MT Vital Statistics[1], CDC Wonder[2]

Montanans aged 85 and older had the highest 10-year death rate due to falls (438.0 per 100k), followed by 75-84 years (79.8 per 100k) (Figure 2).

Figure 2. *Death rate due unintentional falls among Montana adults aged 45-years and older by age group, 2014-2023*

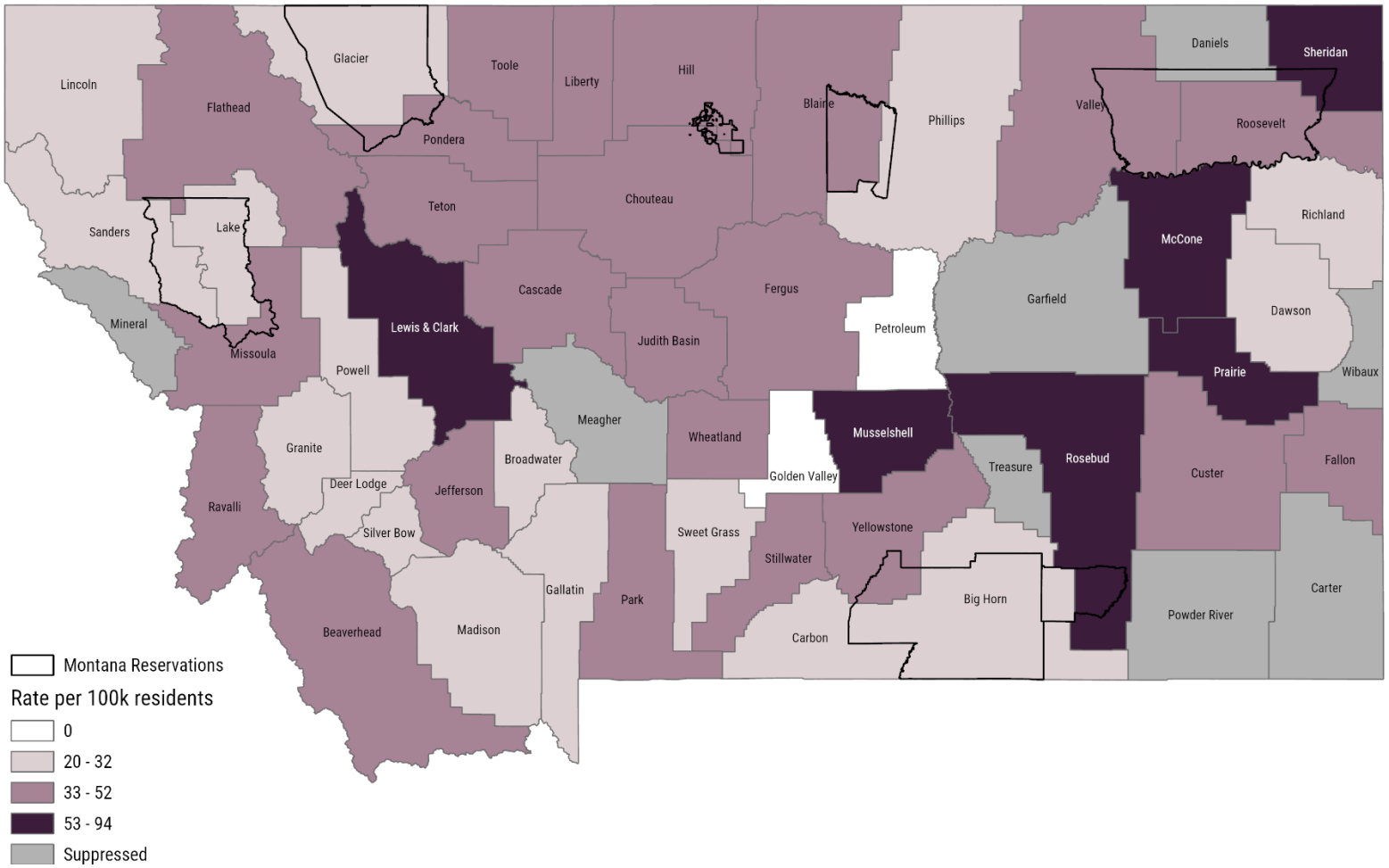


Data source: MT Vital Statistics[1]

Geography of Fatal Falls

Most counties' ten-year AAR due to unintentional falls is statistically similar to the state AAR of 37.3 per 100k. Lewis and Clark is the only county that had a 2014-2023 AAR statistically higher than the state rate (57.8 per 100k, 95% CI 49.2-66.4), although other counties also had AARs that were higher (but not statistically significant). **Figure 3** shows the death rate due to falls by county and **Table 3** also lists these data.[1]

Figure 3. *Age-adjusted death rate due to unintentional falls among Montana adults aged 45-years and older by county, 2014-2023*



Notes: Analysis is based on the decedent's county of residence. All rates are age-adjusted. Golden Valley and Petroleum had zero deaths. Carter, Daniels, Garfield, Meagher, Mineral, Powder River, Treasure, Wibaux County rates are suppressed due to counts <5. Data Source: MT Vital Statistics[1]

Prevalence of Falls, 2023

In 2023, almost one-third (32.2%) of Montana adults aged 45 years and older reported falling at least once in the last year.[3] **Table 1** shows prevalence estimates from the 2023 Behavioral Risk Factor Surveillance System (BRFSS) survey. Men and women equally reported falling. Fall prevalence did not vary by sex, race, or urban-rural residence. Fall prevalence increased with age, due to a combination of age-related changes, health conditions, and environmental factors. People over 75 years had the highest prevalence of falls. People with a disability, people who reported not exercising in the past 30 days, and people with three or more chronic conditions had a higher fall prevalence compared to all adults.

Table 1. *Prevalence of falls among adults aged 45-years and older by selected demographic groups, Montana BRFSS 2023*

Group	%	95% CI
All Adults Age 45+ Years	32.2	30.5-33.8
Sex		
Male	31.5	29.3-33.8
Female	32.8	30.4-35.1
Age		
45-54	25.7	22.0-29.3
55-64	31.8	28.5-35.1
65-74	33.7	30.8-36.5
75-84*	38.0	34.4-41.6
85+	37.6	30.5-44.7
Race/Ethnicity		
White, non-Hispanic	32.3	30.5-34.0
AI/AN	35.9	29.0-42.8
Other	27.5	21.0-34.0
Disability Status		
Not Disabled	24.8	22.9-26.7
Disabled*	45.3	42.3-48.2
Urban/Rural county of residence		
Small Metro	32.3	29.3-35.2
Micropolitan	30.3	27.2-33.4
Rural	33.6	31.1-36.0
Exercise		
No exercise in last 30 days*	41.9	38.3-45.4
Exercised in last 30 days	29.0	27.2-30.8
Chronic Conditions		
Zero conditions^	18.6	15.3-22.0
One condition^	25.6	22.4-28.9
Two conditions	29.2	25.8-32.6
Three or more conditions*	43.5	40.7-46.1

Notes: (*) indicates groups with higher fall prevalence compared to all Montana adults. (^) indicates groups with lower fall prevalence compared to all Montana adults. “Other” race includes Hispanic, Black or African American, Asian or Native Hawaiian or Other Pacific Islander, Multiracial, Other, and refused to answer. Data Source: MT BRFSS 2023[3]

Risk Factors

The odds of reporting a fall was analyzed with logistic regression to examine associations of known risk factors like disability status, exercise, and chronic conditions using BRFSS data. When looking at how each factor related to falls on its own (without accounting for other factors), **older age group**, **disability**, and **chronic conditions** were associated with increased odds of falling compared with not having those characteristics.

An adjusted model was used to understand how various factors affect the odds of falling while also taking other factors into account including sex, age, race, and urban/rural residence status. **People with a disability had nearly twice the odds of falling** compared to people without a disability, even after controlling for other factors. Similarly, **people with three or more chronic conditions reported almost 3.5 times the odds of falling** compared to people who did not have a chronic condition, after adjusting for other factors**. People who reported exercising in the past 30 days had 26% reduced odds** of falling in the past year in the adjusted model. These findings underscore the importance of chronic disease management and physical activity in fall prevention strategies.

Table 2. *Unadjusted and adjusted effects of select risk factors on odds of falling among adults aged 45-years and older, Montana BRFSS 2023*

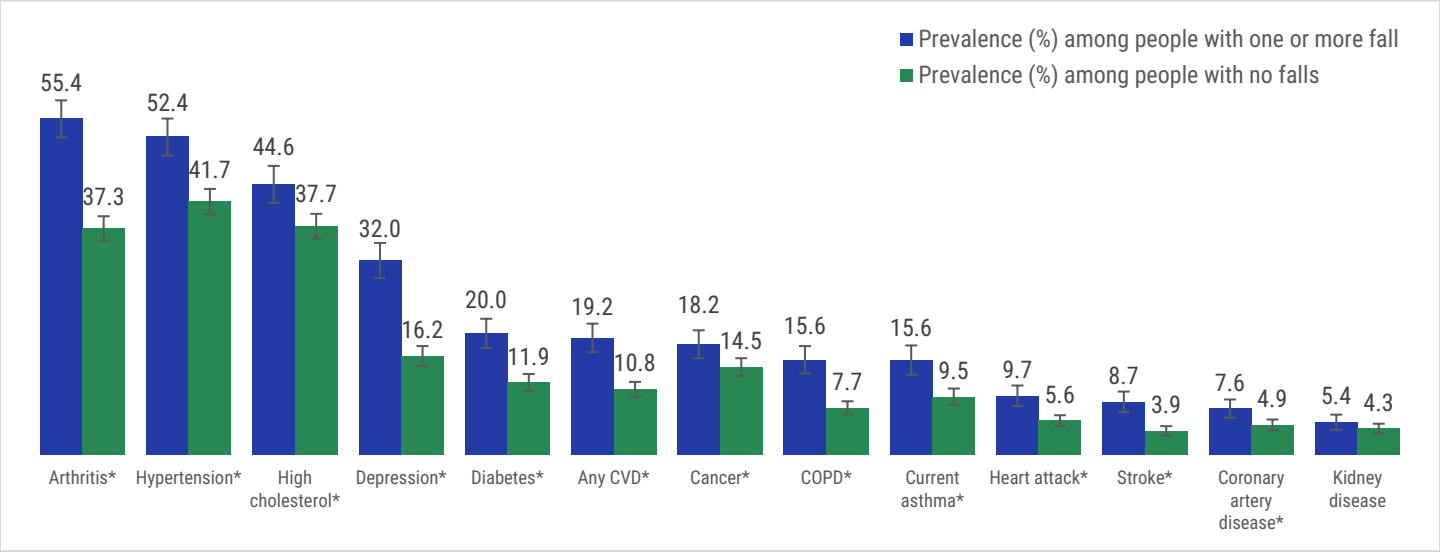
Factor	Unadjusted Odds Ratio	95% CI	Adjusted Odds Ratio	95% CI
Sex				
Male				
Female	1.06	0.90-1.20	1.08	0.90-1.30
Age				
45-54				
55-64	1.35	1.10-1.70	1.23	1.00-1.60
65-74	1.47	1.20-1.80	1.21	0.90-1.50
75-84	1.78	1.40-2.30	1.23	0.90-1.60
85+	1.75	1.20-2.50	1.01	0.70-1.50
Race/Ethnicity				
White, non-Hispanic				
AI/AN	1.18	0.90-1.60	1.01	0.70-1.40
Other	0.80	0.60-1.10	0.75	0.50-1.10
Disability Status				
Not Disabled				
Disabled*	2.50	2.10-2.90	1.93	1.60-2.30
Urban/Rural				
Small Metro				
Micropolitan	0.91	0.70-1.10	0.95	0.80-1.20
Rural	1.06	0.90-1.30	1.07	0.90-1.30
Exercise				
No exercise in last 30 days				
Exercised in last 30 days^	0.57	0.50-0.70	0.74	0.60-0.90
Chronic Conditions				
Zero conditions				
One condition*	1.51	1.10-2.00	1.42	1.10-1.90
Two conditions*	1.81	1.40-2.40	1.50	1.10-2.00
Three or more conditions*	3.35	2.60-4.30	2.40	1.80-3.10

Notes: Includes adults aged 45 and older. Odds ratio of one indicates no association and 95% confidence intervals that overlap one are not statistically significant. (*) indicates factors associated with a statistically significant increase in the odds of falling in the adjusted model. (^) indicates factors associated with a statistically significant decrease in the odds of falling in the adjusted model. Data Source: MT BRFSS 2023[3]

Falls and Chronic Diseases, 2023

Figure 4 shows the prevalence (in percentages) of various chronic conditions among Montana adults who reported falling in the past year versus those who reported not falling. Arthritis was the most commonly reported chronic condition among people who had fallen (55.4%). In comparison, 37.3% of people who had not fallen had arthritis. **Adults who reported one or more falls in the past year had a higher prevalence of every chronic disease (except kidney disease)** compared with those who reported no falls.

Figure 4. Prevalence of chronic conditions among Montana adults aged 45 years and older who fell in the past year compared with those who did not fall, 2023

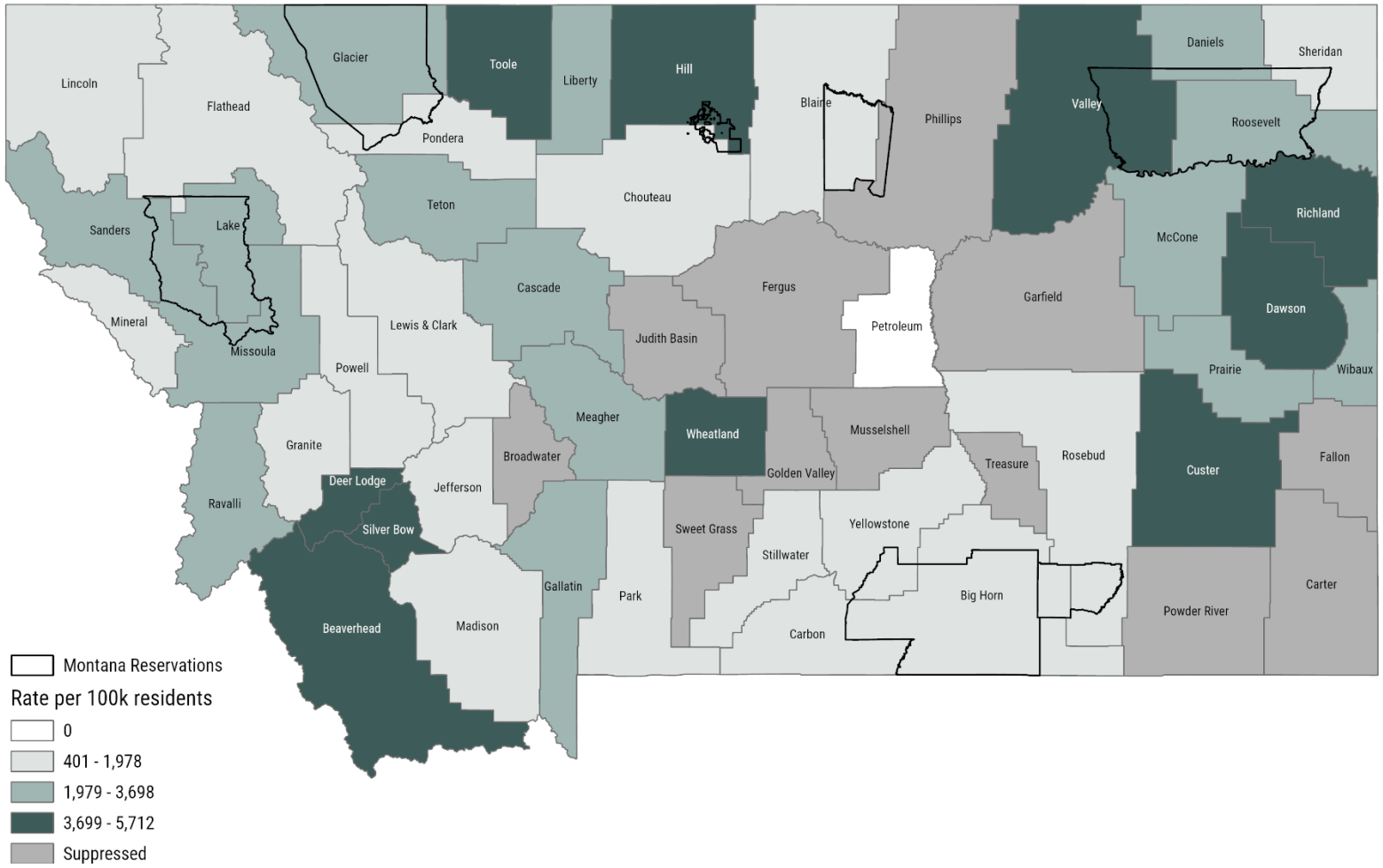


Notes: Includes adults aged 45 and older. (*) indicates conditions with higher prevalence among people with one or more fall compared to people with no falls. "CVD" = cardiovascular disease, "Cancer" excludes skin cancer, "COPD"= chronic obstructive pulmonary disease.
Data Source: MT BRFSS 2023[3]

Montana Hospital Discharge Data (MHDD), 2023

In 2023, there were a total of 12,306 nonfatal emergency department (ED) visits related to falls among adults aged 45 and older and a total of 1,880 nonfatal hospitalizations. The age-adjusted fall-related ED visit rate was 2,323.4 per 100k residents, and the age-adjusted hospitalization rate due to falls was 344.7. **Figure 5** and **Table 4** shows the ED visit rate due to falls by county.[5]

Figure 5. Age-adjusted emergency department visit rate due to adult unintentional falls, 2023



Notes: Ages 45 and older. Analysis is based on the patient's county of residence. All rates are age-adjusted. Petroleum County had zero ED visits. Broadwater, Carter, Fallon, Fergus, Garfield, Golden Valley, Judith Basin, Musselshell, Phillips, Powder River, Sweet Grass, and Treasure County rates are suppressed due to count <16. Data Source: MHDDS[5]

Emergency Medical Services, 2023

In 2023, there were a total of 23,849 911 responses for falls, most (81.3%) of which involved patients 45 or older (N=19,383).[6] This is approximated as 50 911 responses per day for fall patients aged 45 or older. **Table 4** shows that of the 68,657 total 911 responses for adults aged 45 and older (for any reason), 28% were related to falls. This equates to a fall-related 911 response rate of 3,879.3 per 100k residents. The counties with the highest rates of fall-related 911 responses were:

1. Silver Bow
2. Roosevelt
3. Cascade
4. Hill
5. Lewis and Clark

Recommendations for Falls Prevention

Falling is not a normal part of aging.

Falls can often be prevented. Although falling is not a normal part of aging, the risk of falling increases with age, due to a combination of age-related changes, health conditions, and environmental factors. There are actions that older Montanans can take to reduce their risk of falling:

Stay physically active

The most effective way to prevent a fall is to be physically active. Performing strength and balance exercises at least three times per week will reduce the chances of falling.

Some people may feel that if they limit their activity, it will reduce their chances of falling, but this will increase the risk of falling because the muscles become weaker, which helps maintain balance and stability.

Talk with a health care provider

Ask your doctor to evaluate your risk of falling and review your medications to see if any might make you dizzy or sleepy. Some medications may put you at a higher risk for injury.

Check your hearing and vision annually

Scheduling an annual hearing and vision exam can help detect hearing loss and eye diseases, to reduce the risk of falling.

Make your home safer

Be aware of and remove tripping hazards. Make sure your home has adequate lighting by adding more or brighter light bulbs. Consider adding grab bars inside and outside your tub or shower and next to the toilet.

Prevention Resources

The Montana Falls Prevention Program is dedicated to reducing falls and fall-related injuries among older adults by supporting three evidence-based falls prevention programs: Stay Active & Independent for Life (SAIL), Stepping On, and Tai Chi for Arthritis and Falls Prevention.

- **Stay Active & Independent for Life (SAIL)**: The SAIL program is a 12-week strength and balance fitness class designed for older adults (aged 65+). All the exercises can be done seated or standing to accommodate all fitness levels. Participants will receive a falls prevention guide. In addition, Fitness Checks are conducted to track general mobility, arm strength, and leg strength.

- **Stepping On**: Stepping On is a 7-week educational falls prevention workshop designed to reduce the fear of falling by focusing on practical home modifications, reviewing medications, discussing vision health, using safe footwear, and practicing strength and balance exercises.

- **Tai Chi for Arthritis & Falls Prevention**: Eight or 16-week fitness program. Tai Chi for Arthritis and Falls Prevention uses Sun-style; this is a gentle, upright Tai Chi. All movements can be done sitting or standing.

Find a class near you: https://dphhs.mt.gov/publichealth/FallPrevention/FallsPreventionClasses

Falls Free Check Up

The National Council on Aging (NCOA) and the Montana Falls Prevention Program have partnered to bring awareness to older Montanans to identify their risk of falling with the Falls Free Check Up: https://www.ncoa.org/tools/falls-free-checkup/

Appendix A. Analysis Methodology

Death certificate data from the Montana Office of Vital Records (OVR) for 2014-2023 included deaths due to injury among Montana residents aged 45 and older (regardless of death location). Deaths due to unintentional falls were selected having an ICD-10 underlying cause of death code of W00-W19. Decedents with missing age, sex, or county of residence were excluded from the analysis.

MHDD data for 2023 included ED visits and hospitalizations with discharge date between 1/1/23 and 12/31/23 among Montana residents. MHDDS records for unintentional falls were selected from the ED or hospitalization injury subset having any mention of ICD-10-CM codes V00.11-0.89 with 6th character of 1, W00-W15, W17, W19, W16.0-W16.3, and W16.5-W16.8 with 6th character of 2, W16.4 and W16.9 with 5th character of 2, W18.1-W18.3.

EMS data for 2023 included emergency response (eResponse.05= 2205001, 2205003, 2205009) where the record met the Biospatial fall from height or ground level fall syndrome criteria.

Data Table

Table 3. *Deaths due to unintentional falls, Adults aged 45 and older, 2014-2023*

County	Deaths (N)	Age-adjusted death rate per 100k	95% confidence interval
State	1,838	37.3	(35.6-39.0)
Beaverhead	24	43.8	(26.2-61.4)
Big Horn	10	26.8	(10.0-43.6)
Blaine	11	39.5	(16.1-63.0)
Broadwater	12	33.1	(14.0-52.2)
Carbon	17	27.9	(14.1-41.6)
Carter	2	¥	
Cascade	183	43.4	(37.1-49.8)
Chouteau	15	48.6	(23.2-74.0)
Custer	24	37.6	(22.1-53.2)
Daniels	3	¥	
Dawson	11	21.4	(8.5-34.3)
Deer Lodge	17	32.4	(16.7-48.1)
Fallon	5	40.3	(3.5-77.0)
Fergus	33	45.7	(30.1-61.4)
Flathead	160	34.9	(29.4-40.3)
Gallatin	88	26.7	(21.1-32.4)
Garfield	1	¥	
Glacier	12	27.8	(11.8-43.8)
Golden Valley	0	0.0	
Granite	6	30.9	(3.9-57.9)
Hill	33	52.5	(34.2-70.7)
Jefferson	21	42.6	(23.6-61.7)
Judith Basin	5	39.3	(4.7-73.9)
Lake	45	27.0	(19.1-34.9)
Lewis and Clark	178	57.8	(49.2-66.4)
Liberty	5	39.9	(1.1-78.8)
Lincoln	33	27.9	(18.0-37.8)
McCone	8	93.4	(21.1-165.7)
Madison	16	28.0	(14.1-41.8)
Meagher	3	¥	
Mineral	3	¥	
Missoula	155	35.6	(29.9-41.2)
Musselshell	17	61.6	(32.0-91.2)
Park	36	40.2	(26.9-53.5)
Petroleum	0	0.0	

County	Deaths (N)	Age-adjusted death rate per 100k	95% confidence interval
Phillips	7	26.8	(6.8-46.8)
Pondera	18	44.5	(23.2-65.9)
Powder River	3	¥	
Powell	11	30.1	(12.2-48.1)
Prairie	5	54.8	(5.8-103.9)
Ravalli	94	37.6	(29.8-45.3)
Richland	9	20.5	(6.9-34.0)
Roosevelt	14	41.1	(19.0-63.2)
Rosebud	18	57.3	(30.4-84.2)
Sanders	16	20.3	(10.3-30.3)
Sheridan	17	70.4	(36.5-104.4)
Silver Bow	53	31.4	(22.8-39.9)
Stillwater	18	38.1	(19.9-56.3)
Sweet Grass	6	27.5	(3.5-51.6)
Teton	19	45.6	(24.0-67.3)
Toole	11	48.5	(18.5-78.5)
Treasure	1	¥	
Valley	20	36.7	(20.4-53.0)
Wheatland	6	45.4	(8.8-81.9)
Wibaux	3	¥	
Yellowstone	297	40.7	(36.0-45.3)

Notes: "¥" indicates that the rate is suppressed due to count <5. Includes adults aged 45 and older. All rates are age-adjusted. Data Source: MT Vital Statistics[1]

Table 4. *Rates of 911 responses, ED visits, and hospitalizations for falls, Adults aged 45 and older, 2023*

County	911 responses for falls	All 911 responses	% of 911 Responses for Falls	Population	911 Responses Rate per 100k	ED Visits N	ED Visits AAR per 100k (95% CI)	Hospitalizations N	Hospitalizations AAR per 100k (95%CI)
State	19,383	68,657	28%	499,647	3,879.3	12,306	2,323.4 (2,280.9-2,365.9)	1880	344.7 (328.8-360.6)
Beaverhead	152	452	34%	4,721	3,219.7	238	4,696.5 (4,053.1-5,339.9)	19	362.7 (189.8-535.7)
Big Horn	177	817	22%	4,584	3,861.3	44	989.6 (686.5-1,292.8)	10	241.8 (85.8-397.8)
Blaine	82	440	19%	2,705	3,031.4	52	1,850.5 (1,328.2-2,372.7)	15	479.1 (235.5-722.8)
Broadwater	106	240	44%	4,004	2,647.4	7	203.5 (43.2-363.8)	6	112.9 (21.8-204.0)
Carbon	128	461	28%	6,451	1,984.2	34	437.8 (282.6-593.0)	5	65.3 (7.4-123.3)
Carter	10	27	37%	743	1,345.9	1	¥	0	0.00
Cascade	1,973	7,521	26%	35,886	5,498.0	1,272	3,171.2 (2,989.5-3,353.0)	229	539.2 (467.7-610.8)
Chouteau	75	188	40%	2,884	2,600.6	28	815.9 (505.3-1,126.5)	17	529.1 (269.9-788.3)
Custer	244	794	31%	5,542	4,402.7	232	4,024.5 (3,487.1-4,561.9)	24	417.2 (247.2-587.2)
Daniels	22	58	38%	828	2,657.0	37	3,242.9 (2,139.9-4,346.0)	4	¥
Dawson	112	334	34%	4,019	2,786.8	247	5,271.3 (4,597.6-5,944.9)	30	634.5 (406.2-862.8)
Deer Lodge	242	739	33%	5,529	4,376.9	245	3,919.4 (3,408.2-4,430.5)	22	346.9 (198.5-495.4)
Fallon	27	78	35%	1,295	2,084.9	2	¥	3	¥
Fergus	224	676	33%	5,837	3,837.6	9	135.6 (40.6-230.7)	9	124.5 (42.2-206.8)
Flathead	1,923	6,402	30%	52,329	3,674.8	900	1,631.9 (1,521.9-1,742.0)	165	306.7 (258.8-354.5)
Gallatin	1,301	4,351	30%	43,808	2,969.8	1,313	3,128.8 (2,956.1-3,301.5)	140	335.3 (278.4-392.2)
Garfield	5	22	23%	583	857.6	6	1,007.3 (162.7-1,852.0)	0	0.00
Glacier	215	1,086	20%	4,810	4,469.9	136	2,784.4 (2,301.5-3,267.2)	25	544.7 (326.0-763.5)
Golden Valley	4	24	17%	495	808.1	8	940.1 (282.4-1,597.8)	2	¥
Granite	11	46	24%	2,100	523.8	18	884.7 (432.3-1,337.0)	7	256.7 (65.1-448.2)
Hill	292	1,021	29%	6,064	4,815.3	260	4,160.1 (3,637.0-4,683.3)	41	668.0 (457.6-878.3)
Jefferson	228	798	29%	6,718	3,393.9	88	1,359.5 (1,056.2-1,662.8)	12	215.0 (86.3-343.6)
Judith Basin	3	16	19%	1,144	262.2	10	751.5 (233.8-1,269.2)	3	¥
Lake	668	2,092	32%	16,347	4,086.4	624	3,544.3 (3,250.6-3,838.1)	67	365.6 (274.5-456.6)
Lewis and Clark	1,618	5,161	31%	34,081	4,747.5	191	549.3 (467.9-630.6)	39	106.3 (71.7-140.9)
Liberty	16	50	32%	947	1,689.5	33	2,817.1 (1,817.7-3,816.4)	5	340.1 (30.9-649.3)
Lincoln	373	1,244	30%	12,624	2,954.7	143	1,131.6 (927.6-1,335.5)	27	179.6 (107.9-251.4)
McCone	9	20	45%	889	1,012.4	29	2,543.0 (1,515.9-3,570.1)	8	591.1 (178.8-1,003.5)
Madison	143	413	35%	5,383	2,656.5	45	808.1 (550.4-1,065.9)	11	180.7 (64.7-296.6)
Meagher	19	67	28%	1,177	1,614.3	43	3,495.9 (2,277.1-4,714.8)	2	¥
Mineral	133	419	32%	2,820	4,716.3	16	526.7 (237.6-815.7)	7	170.3 (42.9-297.7)

County	911 responses for falls	All 911 responses	% of 911 Responses for Falls	Population	911 Responses Rate per 100k	ED Visits N	ED Visits AAR per 100k (95% CI)	Hospitalizations N	Hospitalizations AAR per 100k (95%CI)
Missoula	1,578	5,915	27%	47,961	3,290.2	1,320	2,643.8 (2,497.1-2,790.4)	219	434.8 (375.9-493.7)
Musselshell	2	27	7%	2,856	70.0	11	291.8 (102.5-481.2)	2	¥
Park	271	1,103	25%	9,233	2,935.1	50	502.4 (356.3-648.5)	4	¥
Petroleum	7	26	27%	328	2,134.1	0	0.00	0	0.00
Phillips	56	135	41%	2,085	2,685.9	14	516.4 (244.7-788.0)	5	194.0 (22.9-365.1)
Pondera	94	345	27%	2,850	3,298.2	65	1,979.1 (1,471.8-2,486.5)	19	539.4 (294.8-783.9)
Powder River	18	82	22%	988	1,821.9	7	841.3 (85.4-1,597.2)	1	¥
Powell	137	504	27%	3,548	3,861.3	31	829.1 (533.0-1,125.2)	22	629.3 (360.0-898.6)
Prairie	14	43	33%	674	2,077.2	19	2,289.2 (1,032.0-3,546.4)	4	¥
Ravalli	983	3,224	30%	25,691	3,826.2	968	3,554.1 (3,315.2-3,793.0)	134	451.5 (372.8-530.2)
Richland	174	469	37%	4,664	3,730.7	265	5,712.0 (5,007.3-6,416.7)	39	833.7 (567.9-1,099.6)
Roosevelt	215	878	24%	3,334	6,448.7	100	3,106.3 (2,471.7-3,740.9)	16	474.1 (232.0-716.1)
Rosebud	103	464	22%	3,296	3,125.0	41	1,270.8 (862.2-1,679.5)	12	329.4 (136.4-522.4)
Sanders	214	866	25%	8,189	2,613.3	273	3,036.7 (2,638.1-3,435.3)	35	323.2 (209.5-436.9)
Sheridan	64	170	38%	1,790	3,575.4	26	1,190.7 (713.3-1,668.2)	15	635.9 (308.8-963.1)
Silver Bow	1,230	4,894	25%	15,932	7,720.3	836	4,962.5 (4,614.1-5,310.8)	118	692.1 (564.7-819.5)
Stillwater	73	318	23%	4,792	1,523.4	22	401.3 (227.8-574.8)	11	207.7 (83.8-331.5)
Sweet Grass	71	208	34%	2,039	3,482.1	7	290.8 (51.1-530.5)	6	202.0 (40.2-363.7)
Teton	83	266	31%	3,001	2,765.7	134	3,698.0 (3,031.0-4,365.0)	20	437.7 (244.2-631.2)
Toole	65	232	28%	2,125	3,058.8	107	5,057.4 (4,066.1-6,048.6)	11	456.3 (176.3-736.4)
Treasure	6	20	30%	392	1,530.6	7	1,061.4 (251.8-1,871.0)	1	¥
Valley	161	394	41%	3,699	4,352.5	178	4,165.8 (3,515.9-4,815.7)	14	278.9 (129.6-428.3)
Wheatland	25	78	32%	987	2,532.9	47	4,266.5 (2,974.5-5,558.5)	1	¥
Wibaux	15	47	32%	462	3,246.8	19	3,677.5 (1,893.2-5,461.9)	4	¥
Yellowstone	3,189	11,892	27%	71,384	4,467.4	1,448	1,921.6 (1,820.0-2,023.3)	213	274.4 (237.0-311.8)

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