

Suicide Mechanism Trends

Background

In March 2022, the Center for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS) released the data brief "Suicide Mortality in the United States, 2000-2020" which reports various trends in suicide deaths nationwide.¹ This report notes that for the year 2020, the mechanism with the highest rate for females was firearms and this is the first year this mechanism has been the most commonly utilized method for females.

It is of interest to the Kansas Department of Health and Environment to determine if Kansas follows the same mechanism trends as the national report.

Technical Notes

Data Source: Mortality Database, Office of Vital Statistics, Kansas Department of Health and Environment. Suicide deaths are classified using the ICD-10 underlying cause of death codes U03, X60-87.0 and Y87.0. Mechanism of suicide are defined as:

Code	Mechanism Classification
X72-74	Firearm
X60-69	Poisoning or drug overdose
X70	Suffocation or hanging
All other codes	Other – including falls, fire, transportation, or other not previously listed

Data Years: 2011 - 2021

Statistical analyses: Rates and 95% confidence intervals (95% CI) presented in this report are age standardized using the direct method with the standard US population.

References:

1. CDC. (2022). Suicide Mortality in the United States, 2000 – 2020. *NCHS Data Brief*: No. 433. Retrieved from: <https://www.cdc.gov/nchs/data/databriefs/db433.pdf>

Summary of Findings

Mechanism Trends

- Males are statistically more likely to utilize a firearm for suicide, followed by suffocation/hanging, and then poisoning/overdose for all data years in this report
- Females are equally as likely to utilize firearm, suffocation/ hanging, or poisoning/overdose for mechanism of suicide for all data years
- All male suicide rates across all mechanisms increased in 2021 while female suicide rates across all mechanisms decreased in 2021
- Males are statistically more likely to utilize a firearm or suffocation/hanging than are females, but males and females are equally as likely to utilize poisoning/overdose

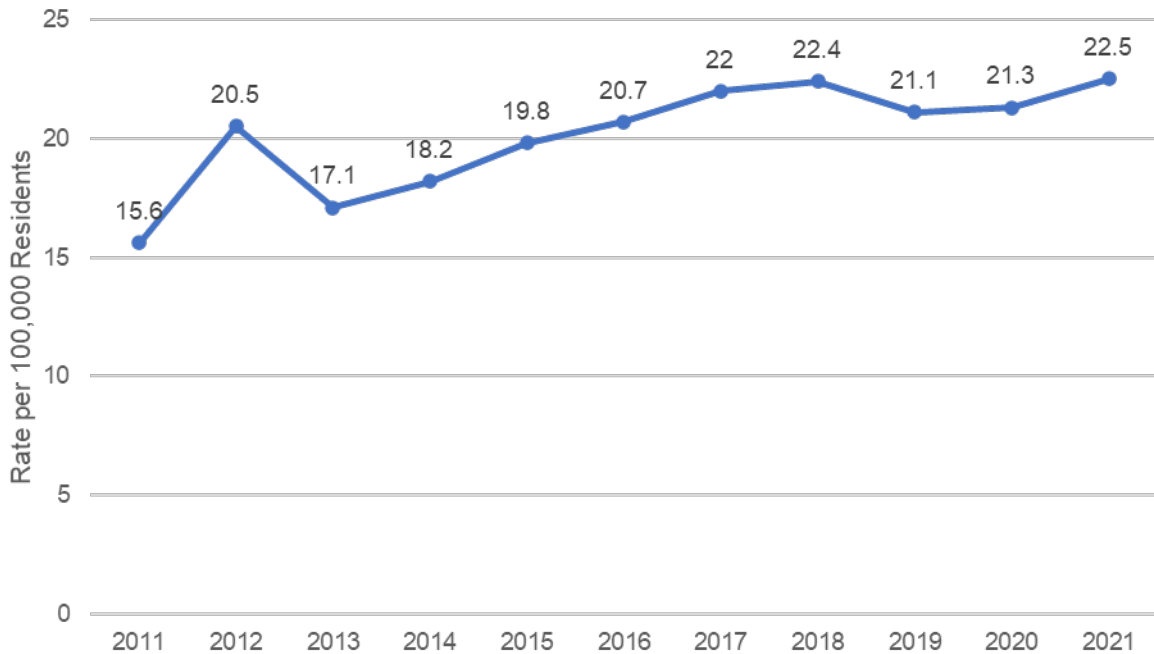
Occupation and Mechanism Trends

- There is no significant association between being in a healthcare occupation and utilizing a specific mechanism of suicide when controlling for sex

Data and Interpretation

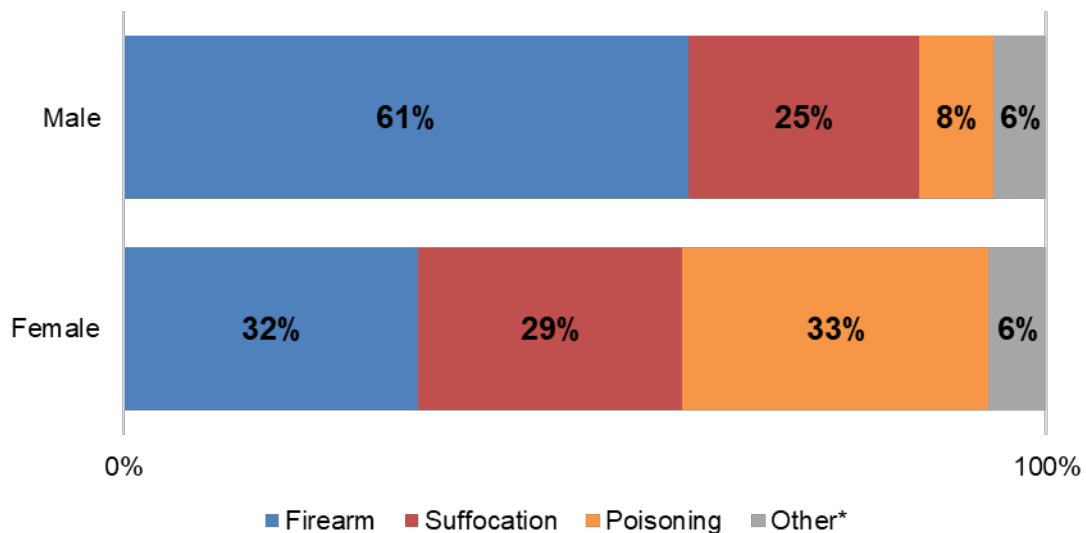
Between the years 2011 and 2020, the state of Kansas saw a 36.5% increase in suicide deaths between the years 2011 and 2020. During this timeframe, suicide deaths peaked in 2018 with a rate of 22.4 per 100,000 residents (Figure 1).

Figure 1. Rates of Suicide (per 100,000 residents), Kansas, 2011-2021



In Kansas, males who died by suicide between 2011 and 2021 were more likely to use a firearm (61%) compared to the other means of suicide while females were split between firearm (32%), suffocation or hanging (29%), and poisoning or overdose (33%) (Figure 2).

Figure 2. Percent of Suicide Means by Sex, Kansas, 2011-2021

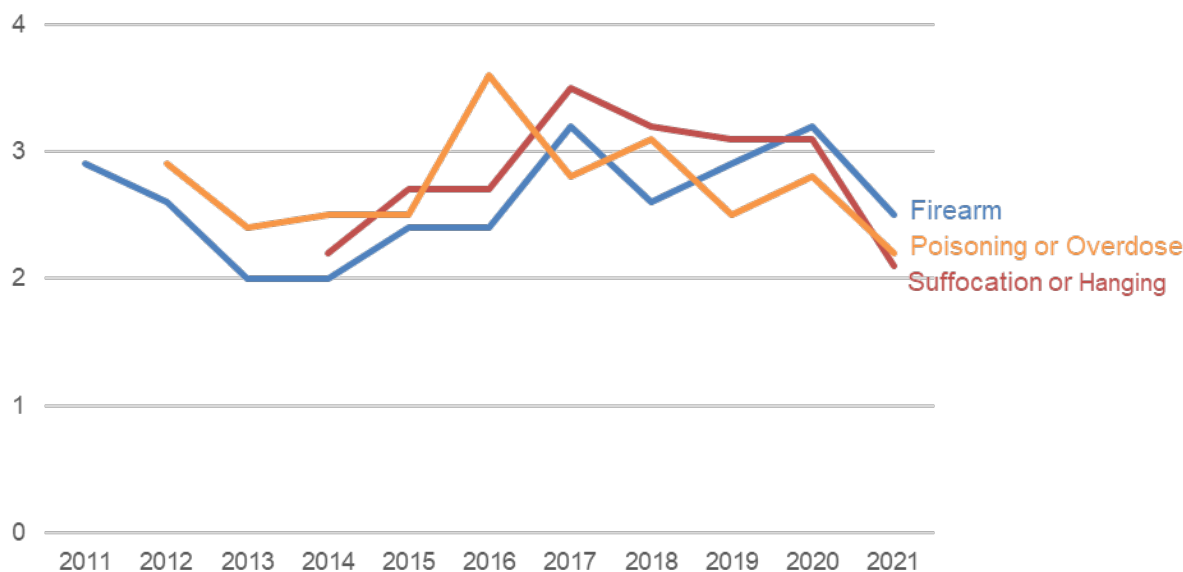


*Other includes cut/pierce, drowning, fall, fire, transportation, or other

For the analyses below, the category “Other” was not included due to such low counts, rates could not be calculated across most years for both sexes.

Female Trends

Figure 3. Age-Adjusted Rates for Female Suicide Deaths by Mechanism of Injury, Kansas, 2011-2021



Rates were too low to calculate and show in this figure for poisonings in 2011, and suffocations for 2011-2013.

There were no significant differences between the mechanisms used for suicide deaths among females across all years (Table 1). The highest reported rate of female suicide deaths for an individual mechanism was poisoning or overdose which occurred in 2016 (3.6 per 100,000 female residents; 95% CI: 2.5-4.6), however it was still not significantly different from other mechanisms or other years. The highest rates for female firearm deaths occurred in 2017 and again in 2020 (3.2 per 100,000 female residents; 95% CI: 2.2-4.2). Similar to the national trend, females who died by suicide in 2020 most often used a firearm, however, as Table 1 shows, the confidence intervals overlap across all years and all mechanisms so there was no significant difference in this trend. The year 2020 had the second highest (n=39) number of female firearm suicides, behind 2017 (n=40). Rates for all three mechanisms decreased for females in 2021.

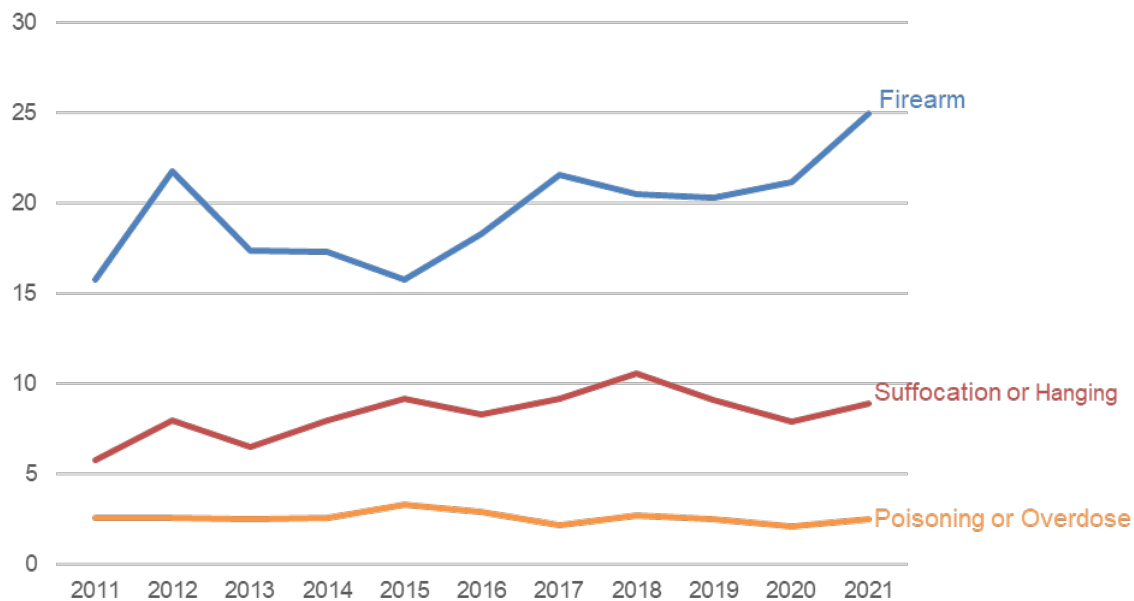
Table 1. Frequency and Age-Adjusted Rates for Female Suicide Deaths by Mechanism of Injury, Kansas, 2011-2021

Year	Firearm		Suffocation or Hanging		Poisoning or Overdose	
	N	Rate per 100,000 residents (95% CI)	N	Rate per 100,000 residents (95% CI)	N	Rate per 100,000 residents (95% CI)
2011	36	2.9 (1.9 – 3.9)	17	-	19	-
2012	31	2.6 (1.7 – 3.6)	16	-	37	2.9 (2.0 – 4.0)
2013	25	2.0 (1.2 – 2.8)	17	-	33	2.4 (1.6 – 3.3)
2014	25	2.0 (1.2 – 2.7)	27	2.2 (1.4 – 3.1)	34	2.5 (1.7 – 3.4)
2015	29	2.4 (1.5 – 3.3)	33	2.7 (1.7 – 3.6)	33	2.5 (1.6 – 3.4)
2016	29	2.4 (1.5 – 3.3)	31	2.7 (1.8 – 3.7)	46	3.6 (2.5 – 4.6)
2017	40	3.2 (2.2 – 4.2)	40	3.5 (2.4 – 4.6)	35	2.8 (1.9 – 3.8)
2018	33	2.6 (1.7 – 3.6)	39	3.2 (2.2 – 4.2)	38	3.1 (2.1 – 4.1)
2019	35	2.9 (1.9 – 3.9)	36	3.1 (2.0 – 4.1)	29	2.5 (1.6 – 3.5)
2020	39	3.2 (2.2 – 4.2)	36	3.1 (2.1 – 4.2)	33	2.8 (1.8 – 3.7)
2021	29	2.5 (1.6 – 3.4)	23	2.1 (1.2 – 3.0)	27	2.2 (1.3 – 3.0)

Rates are suppressed where counts are less than 20.

Male Trends

Figure 4. Age-Adjusted Rates for Male Suicide Deaths by Mechanism of Injury, Kansas, 2011-2021



Rates for the various mechanisms for males are much starker in their difference than that of the female rates. There are significant differences for every year and between all three mechanisms in this analysis of male suicide deaths. In the most recent year, the **firearm** death rate was significantly higher than the other mechanisms (21.2 per 100,000 male residents; 95% CI: 18.7-23.8), followed by **suffocation or hanging** (7.9 per 100,000 male residents; 95% CI: 6.3-9.6), and **poisoning or overdose** (2.1 per 100,000 male residents; 95% CI: 1.3-3.0). The year 2021 saw the most suicide by **firearm** for males across all years (n=315).

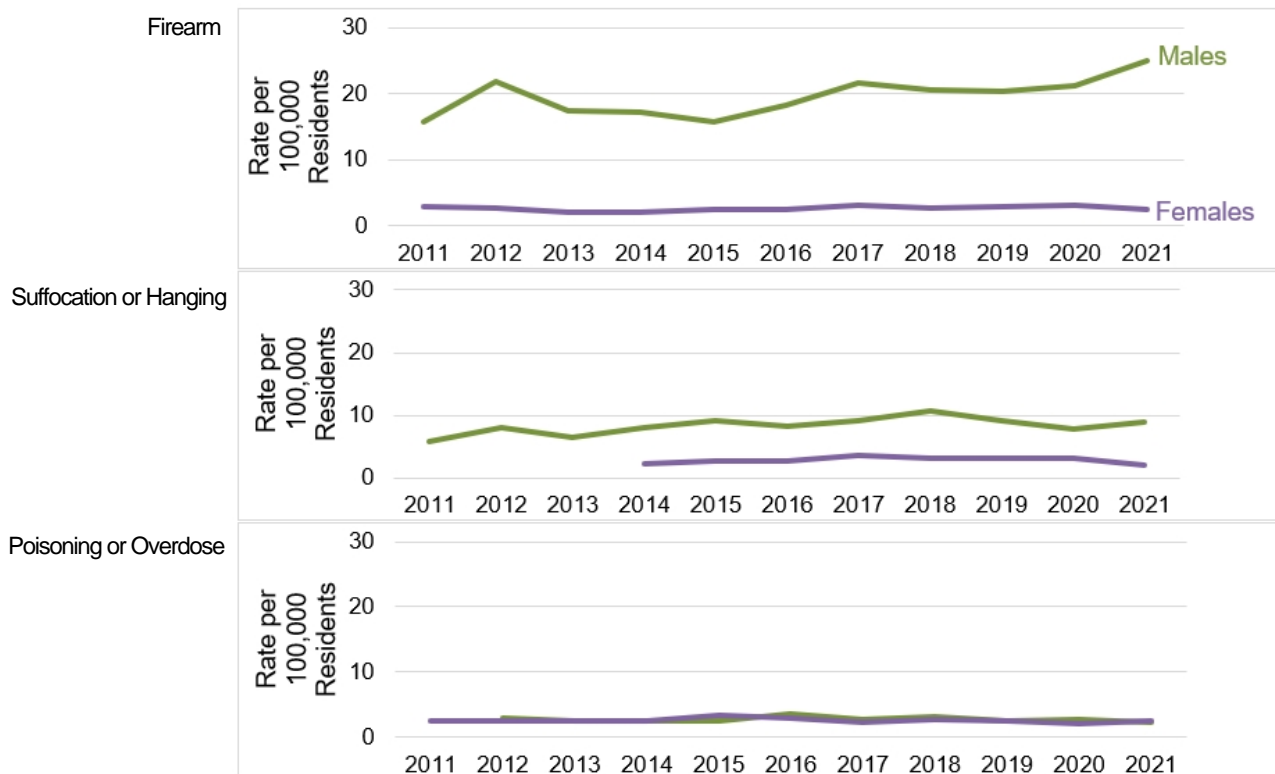
Table 2. Frequency and Age-Adjusted Rates for Male Suicide Deaths by Mechanism of Injury, Kansas, 2011-2021

Year	Firearm		Suffocation or Hanging		Poisoning or Overdose	
	N	Rate per 100,000 residents (95% CI)	N	Rate per 100,000 residents (95% CI)	N	Rate per 100,000 residents (95% CI)
2011	194	15.8 (13.6 – 18.2)	69	5.8 (4.4 – 7.2)	32	2.6 (1.7 – 3.6)
2012	266	21.8 (19.2 – 24.5)	97	8.0 (6.4 – 9.6)	32	2.6 (1.7 – 3.5)
2013	215	17.4 (15.1 – 19.8)	79	6.5 (5.0 – 8.0)	29	2.5 (1.6 – 3.4)
2014	212	17.3 (14.9 – 19.7)	96	8.0 (6.4 – 9.7)	31	2.6 (1.7 – 3.5)
2015	195	15.8 (13.6 – 18.1)	114	9.2 (7.5 – 10.9)	42	3.3 (2.3 – 4.4)
2016	226	18.3 (15.9 – 20.7)	101	8.3 (6.7 – 10.0)	36	2.9 (1.9 – 3.9)
2017	269	21.6 (18.9 – 24.2)	110	9.2 (7.5 – 11.0)	29	2.2 (1.4 – 3.0)
2018	259	20.5 (17.9 – 23.0)	126	10.6 (8.7 – 12.5)	34	2.7 (1.8 – 3.7)
2019	255	20.3 (17.7 – 22.9)	107	9.1 (7.3 – 10.8)	31	2.5 (1.6 – 3.4)
2020	274	21.2 (18.7 – 23.8)	92	7.9 (6.3 – 9.6)	26	2.1 (1.3 – 3.0)
2021	315	25.0 (22.2 – 27.8)	104	8.9 (7.2 – 10.6)	30	2.5 (1.6 – 3.4)

Sex Differences by Mechanism

Finally, it is worth looking at how the mechanisms differ in rate between **males** and **females**. Figure 6, below, shows the rate comparisons (frequencies and rates with confidence intervals shown in table 1 and table 2) across the three mechanisms of interest. Year over year, **males** had significantly higher rates of suicide by firearm and suffocation than did **females**. The rates for poisoning deaths were significantly similar between the sexes.

Figure 6. Age-Adjusted Rates for Mechanisms of Suicide Deaths by Sex, Kansas, 2011-2021



Additional Mechanism Analyses

Healthcare Occupation and Mechanism of Suicide Death

Data Source: Kansas Violent Death Reporting System (KSVDRS), Bureau of Health Promotion, Kansas Department of Health and Environment

Data Years: 2015-2018

Research question: Are healthcare employees (combine healthcare support and healthcare practitioners) more likely to utilize different mechanisms for suicide?

Statistical Methods: Chi-square test of independence was completed to test for association between mechanism types and occupation when controlling for sex. Significant associations are determined by p-values less than 0.05.

Table 3. Association between Mechanism Type and Occupation while Controlling for Sex, 2015-2018

	Male		Female		Chi-Square p-value
	Non-Healthcare N (row %)	Healthcare N (row %)	Non-Healthcare N (row %)	Healthcare N (row %)	
Firearm	924 (58.6)	14 (40.0)	112 (30.4)	20 (28.2)	0.092
Suffocation	439 (27.8)	11 (31.4)	114 (31.0)	19 (26.8)	0.773
Poisoning	123 (7.8)	7 (20.0)	123 (33.4)	28 (39.4)	0.052
Other	92 (5.8)	-	19 (5.2)	-	0.580

Table 3 shows that when controlling for sex, that there is no statistical significance between healthcare occupation status and mechanism of suicide.