

Suicide Status in Linn County, IA

Prepared by Amy Hockett, PhD, MPH, CHES

Epidemiologist

Linn County Public Health



Public Health
Prevent. Promote. Protect.

Linn County, Iowa

9/12/2018

Table of Contents

Suicide Status	4
Suicide Trends.....	5
Age	6
Sex.....	8
Race.....	9
Marital Status	10
Education.....	11
Industry Type	12
Method	13
Geographic Location	15
Place of Injury	17
Military Affiliation.....	18
Conclusions.....	19
Recommendations	20
Education and Communication	20
Community Connectedness.....	21
Access, Availability, and Screening.....	21
Protective Environments	22
References	24

Table of Figures

Figure 1. Age-Adjusted Suicide Mortality Rate in Linn County, Iowa, United States: 2009-20165
Figure 2. Suicide Mortality Rate in Linn County, Iowa, United States by Age Category: 2012-2016 7
Figure 3. Suicide-Related Hospitalizations in Linn County by Age Category - 2016 7
Figure 4. Suicide Mortality Rate in Linn County, Iowa, United States by Sex: 2012-2016 8
Figure 5. Suicide Mortality Rate in Linn County by Race Category - 2012-2016..... 9
Figure 6. Suicide Mortality Rate in Linn County by Race Category - 2012-2016..... 10
Figure 7. Percent of suicide-related deaths by level of education attained - 2012-2016..... 11
Figure 8. Top 10 Industry Jobs Associated with Suicide victims in Linn County - 2012-2016... 12
Figure 9. Method of suicide, Linn County - 2012-2016..... 13
Figure 10. Percent of Suicide Deaths by Method and Age of Victim, Linn County – 2016..... 14
Figure 11. Age-Adjusted Suicide Mortality Rate among Males by Suicide Method, Linn County – 2012-2016..... 14
Figure 12. Victim location by general residence, Linn County – 2012-2016..... 15
Figure 13. Suicide Mortality by Location of Residence, Linn County - 2011-2015 16
Figure 14. Location where suicide occurred, Linn County – 2016 17

Table of Tables

Table 1. Distribution of Suicide Cases by Marital Status and Age, Linn County - 2012-2016 ... 10

Suicide Status

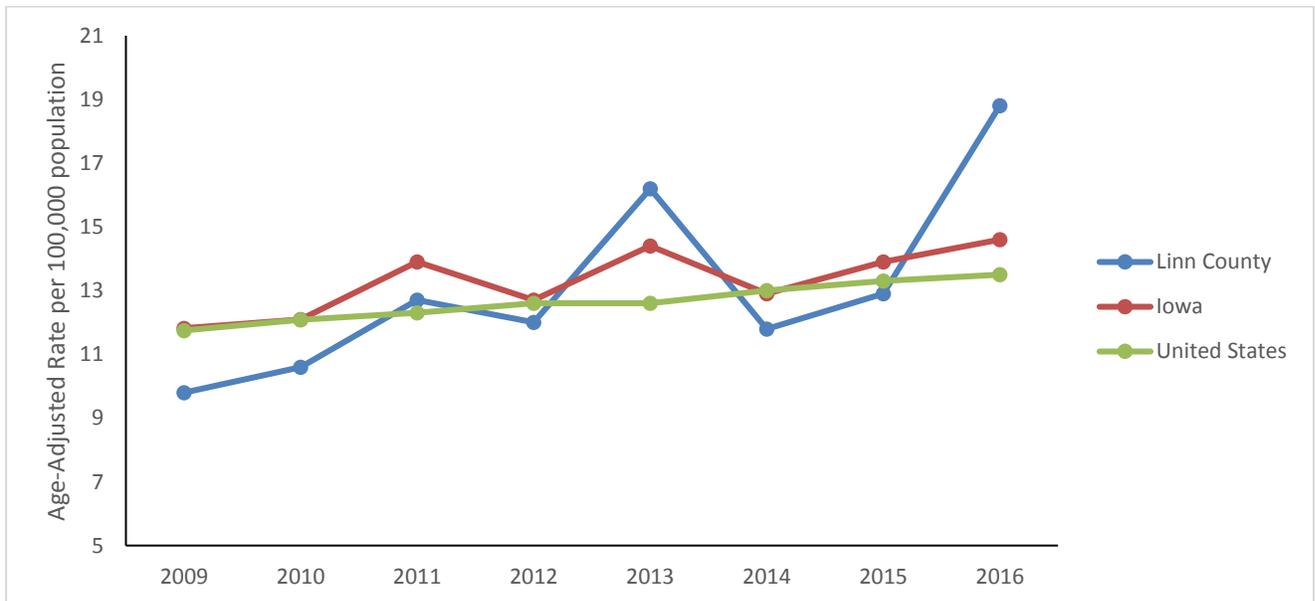
Suicide is an ever-expanding issue for states, counties, and cities across the United States (Centers for Disease Control and Prevention [CDC], 2018). Currently, suicide is the 10th leading cause of death nationwide and is furthermore one of three leading causes of death noted to be on the rise (CDC, 2018). Similarly, in Linn County, IA suicide is the eighth leading cause of death in Linn County, IA. In 2016, the age-adjusted mortality rate for suicide in Linn County was 18.8 deaths per 100,000 population, an increase from the previous year's rate of 12.9 deaths per 100,000 population. In addition, 206 suicide-related hospitalizations occurred in Linn County during this period.

While the number of suicides in Linn County are small in comparison to the United States, the increase in cases over the past couple of years are of great concern. The intent of this report is to investigate the status of suicide in Linn County and the characteristics of victims of suicide, including demographic, social, and geographic characteristics. With a better understanding of the population impacted, Linn County Public Health and its community partners can enhance and direct the work currently being done to combat the increasing rates of suicide and mental health issues in Linn County.

Suicide Trends

In 2016, there were 40 suicides in Linn County for an age-adjusted suicide rate of 18.8 per 100,000 population (Figure 1). Overtime, the rate of suicide in Linn County has increased from 9.8 to 18.8 suicides deaths per 100,000 population between 2009 and 2016. However, while concerning the increase in mortality rate during this period is not statistically significant. Linn County's suicide rate is typically similar to that of Iowa and the United States. However, in 2016 Linn County's rate exceeded the rates of both geographic locations (14.6 and 13.5 deaths per 100,000 population, respectively).

Figure 1. Age-Adjusted Suicide Mortality Rate in Linn County, Iowa, United States: 2009-2016



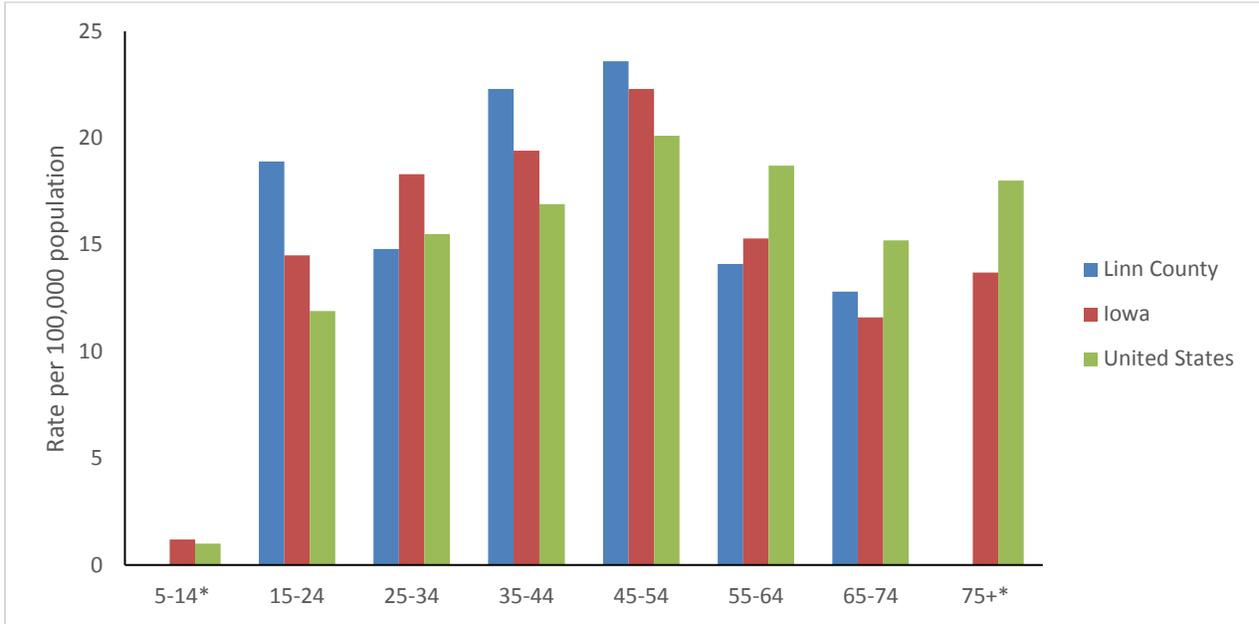
Source: Linn County Death Dataset; CDC WONDER

Age

Between 2012 and 2016, the age of suicide victims in Linn County ranged from 12 to 95 years. However, the largest proportion of individuals fall between 35 and 54 years with a mortality rate of 22.3 deaths per 100,000 population among the 35 to 44 year age group and 23.6 per 100,000 population among the 45 to 54 year age group (Figure 2). Of additional concern is the suicide rate among individuals 15 to 24 years (18.9 per 100,000 population), particularly in comparison to the rate in Iowa (14.5 per 100,000 population) and the United States (11.9 per 100,000 population) during the same period.

Compounding the concerning suicide-related mortality rate among the 15 to 24 year age group is the hospitalization rate among this group (Figure 3). In 2016, the highest suicide-related hospitalization rate was among the 15 to 24 year age group with a rate of 212.6 per 100,000 population, followed by the 25 to 34 (155.0 per 100,000 population) and 35 to 44 (128.2 per 100,000 population) year age groups. As illustrated in Figure 3, the rate of suicide-related hospitalizations appears to decline with increased age.

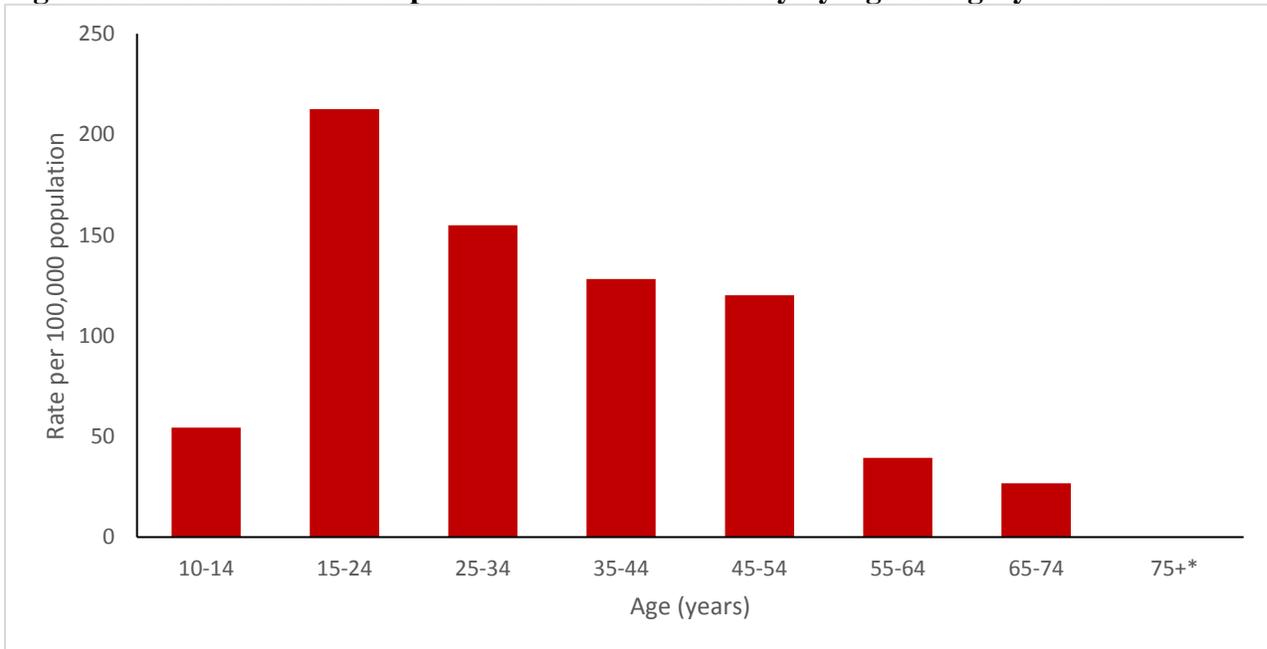
Figure 2. Suicide Mortality Rate in Linn County, Iowa, United States by Age Category: 2012-2016



Source: Linn County Death Dataset; CDC WONDER

*The number of deaths is too small to identify a stable rate for this age-category

Figure 3. Suicide-Related Hospitalizations in Linn County by Age Category - 2016



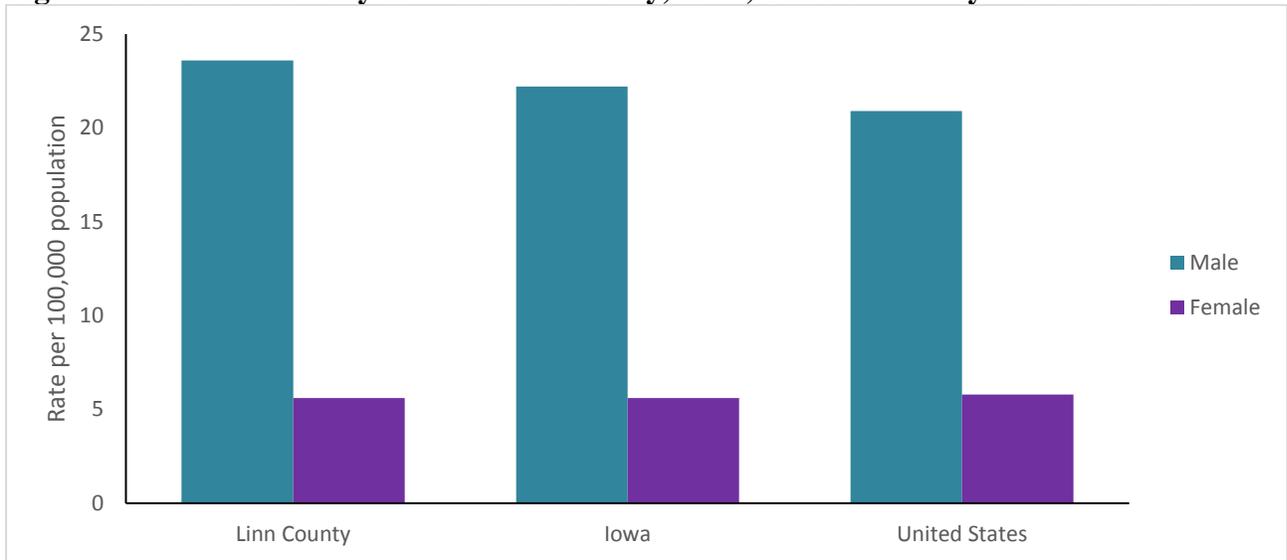
Source: Linn County Death Dataset; CDC WONDER

*The number of deaths is too small to identify a stable rate for this age-category

Sex

Males in Linn County are more likely than their female counterparts are to die from a suicide attempt, with an age-adjusted rate of 23.6 deaths per 100,000 population compared to 5.6 deaths per 100,000 population (Figure 4). This is consistent with the rates found in Iowa and the United States. Alternately, females were more likely to be hospitalized for a suicide-related incident than males. In 2016, females had a suicide-related hospitalization rate of 117.7 per 100,000 population, compared to 67.6 per 100,000 population among males. These rates suggest that males may be more likely to select a more lethal method to commit suicide.

Figure 4. Suicide Mortality Rate in Linn County, Iowa, United States by Sex: 2012-2016

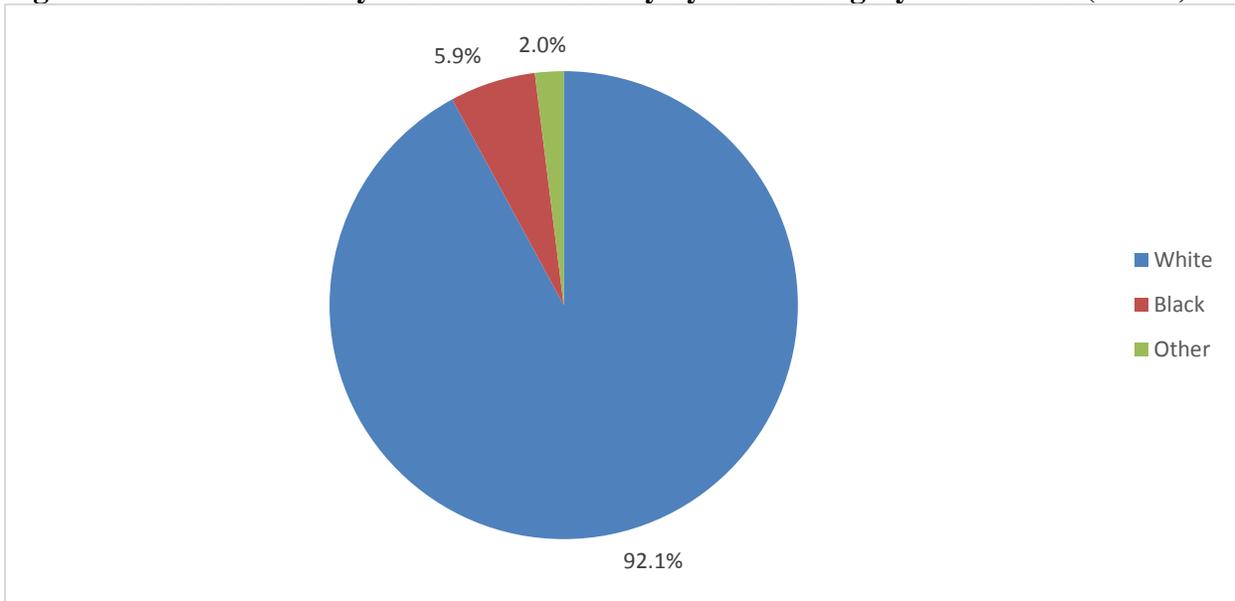


Source: Linn County Death Dataset; CDC WONDER

Race

A majority of individuals who die from suicide are white, comprising 92.1% of the suicide deaths that occurred between 2012 and 2016 (Figure 5). Similarly, 84.5% (n =174) of the 206 individuals who were hospitalized for a suicide attempt in 2016 were white, followed by 8.3% (n = 17) black, 4.9% (n = 10) Two or More races, and 1% (n = 2) Asian.

Figure 5. Suicide Mortality Rate in Linn County by Race Category - 2012-2016 (n=152)

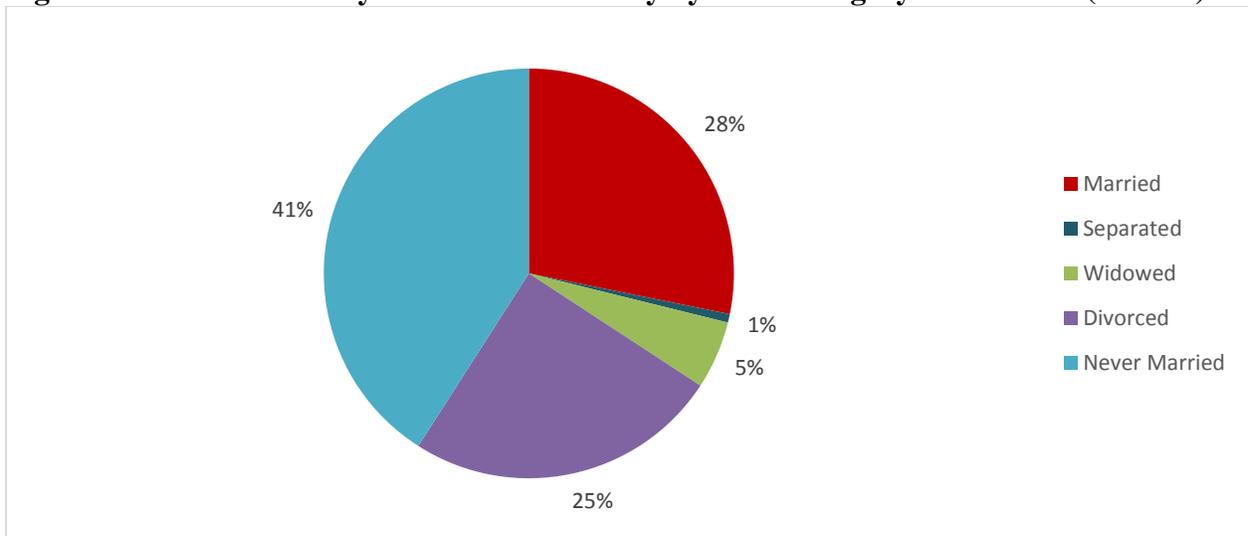


Source: Linn County Death Dataset; CDC WONDER

Marital Status

A majority of suicide victims (41%) tend to never have been married, followed by those who were married (28%) and divorced (25%) at the time of death (Figure 6). As noted in Table 1, age plays a significant factor in the likelihood that an individual is married. Younger victims tend to have a status of “Never Married” compared to their older counterparts. Analytic investigation of the relationship between age and marital status suggests a moderate negative correlation ($r_s(98) = -.527, \rho < .01$) between the two factors. This supports the observation previously stated, that as the age of the suicide victim increases the individual is more likely to be married at the time of death.

Figure 6. Suicide Mortality Rate in Linn County by Race Category - 2012-2016 (n = 152)



Source: Linn County Death Dataset; CDC WONDER

Table 1. Distribution of Suicide Cases by Marital Status and Age, Linn County - 2012-2016

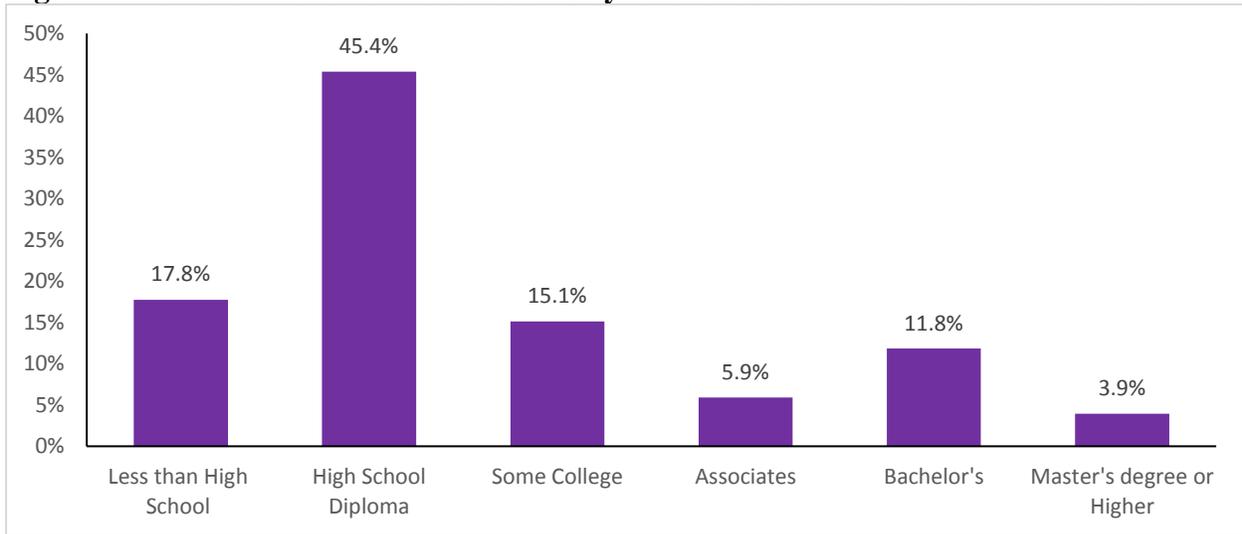
Age Category (years)	Married		Widowed		Divorced		Never Married	
	#	%	#	%	#	%	#	%
10-14	0	0.0	0	0.0	0	0.0	*	9.5
15-24	*	3.2	0	0.0	0	0.0	25	59.5
25-34	*	12.9	0	0.0	*	9.7	12	28.6
35-44	14	45.2	0	0.0	8	25.8	9	21.4
45-54	13	41.9	*	25.0	12	38.7	7	16.7
55-64	*	9.6	*	25.0	10	32.2	*	9.5
65-74	6	19.4	*	12.5	*	9.6	0	0.0
75+	*	6.5	*	37.5	*	3.2	0	0.0
Total	31	-	8	-	31	-	42	-

Source: Linn County Death Dataset; CDC WONDER *Values under 5 are suppressed

Education

A majority of suicide deaths that occurred between 2012 and 2016 were among individuals who achieved a high school diploma or its equivalent making up 45.4% of all deaths related to suicide (Figure 7). Risk tends to decrease with a higher level of education, but is greatest among those who achieve a high school diploma or below.

Figure 7. Percent of suicide-related deaths by level of education attained - 2012-2016

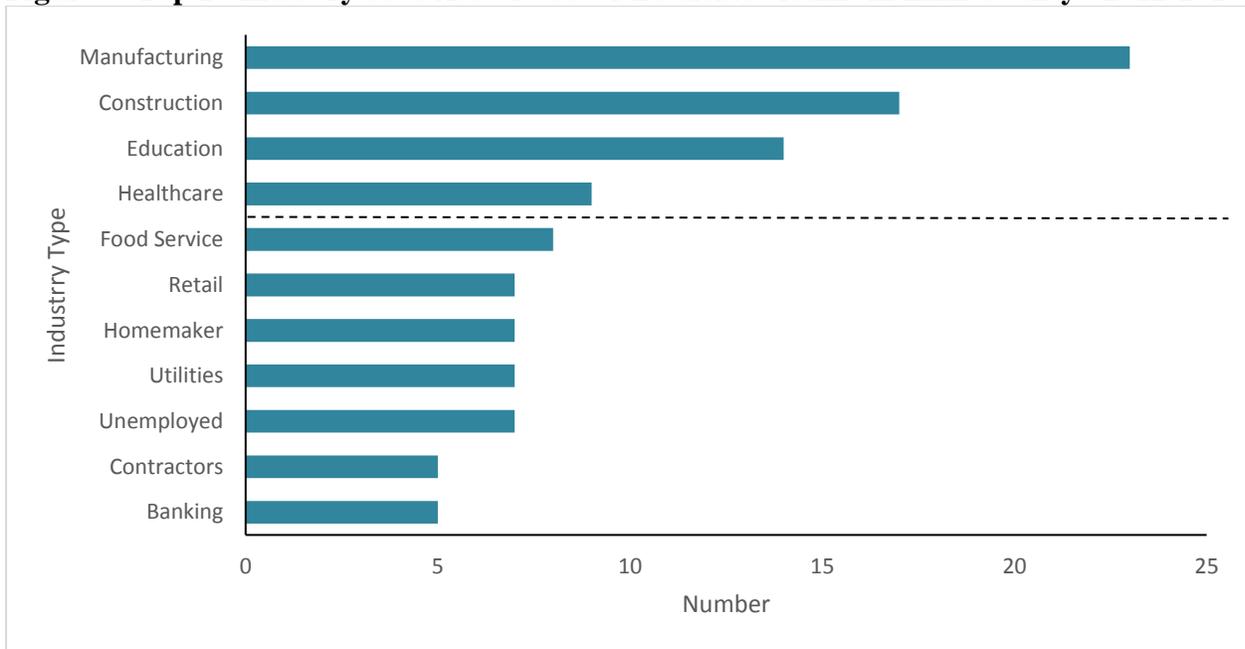


Source: Linn County Death dataset

Industry Type

Of the 152 suicide victims, there were 26 different areas of employment identified for where victims worked in at the time of their death. The most common area of employment for suicide victims was the manufacturing industry (n = 23; 15.1%) followed closely by the construction (n = 17; 11.3%) and education (n = 14; 9.2%) industries (Figure 8). The dotted line in Figure 7 denotes the top five industries associated with the suicide victims, which in addition to those previously mentioned includes the Healthcare and Food Service industries.

Figure 8. Top 10 Industry Jobs Associated with Suicide victims in Linn County - 2012-2016

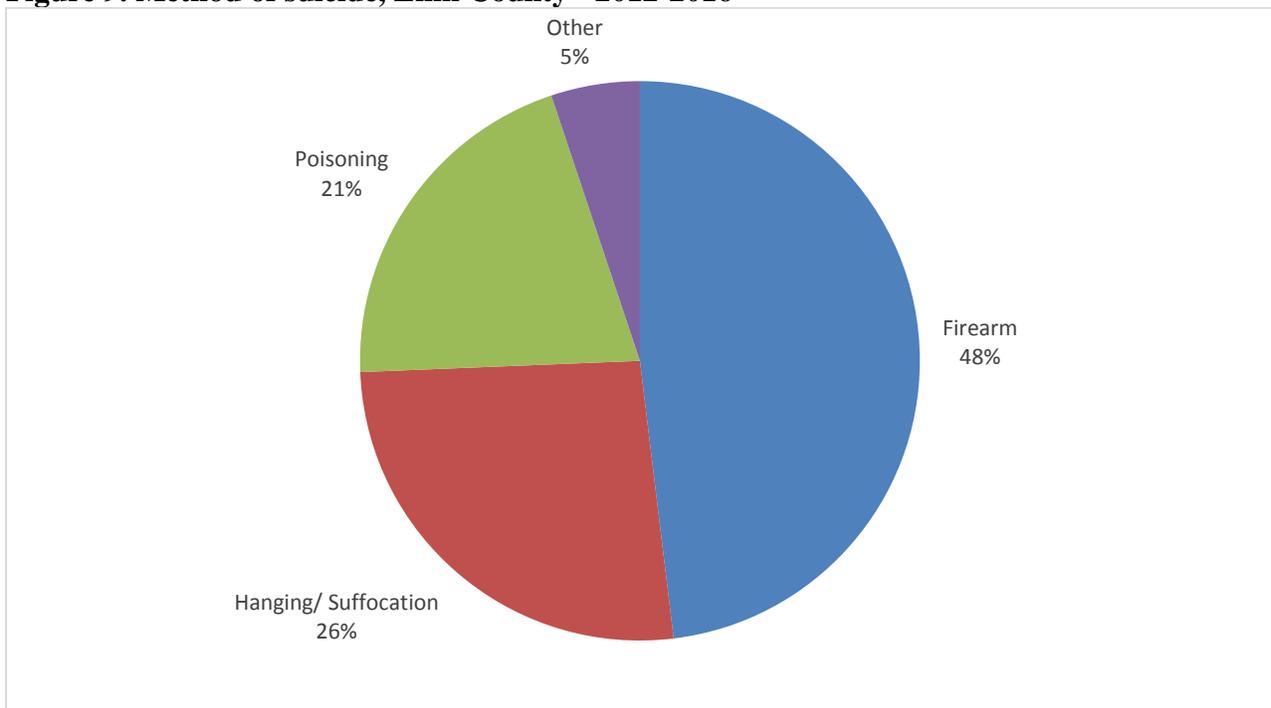


Source: Linn County Death dataset

Method

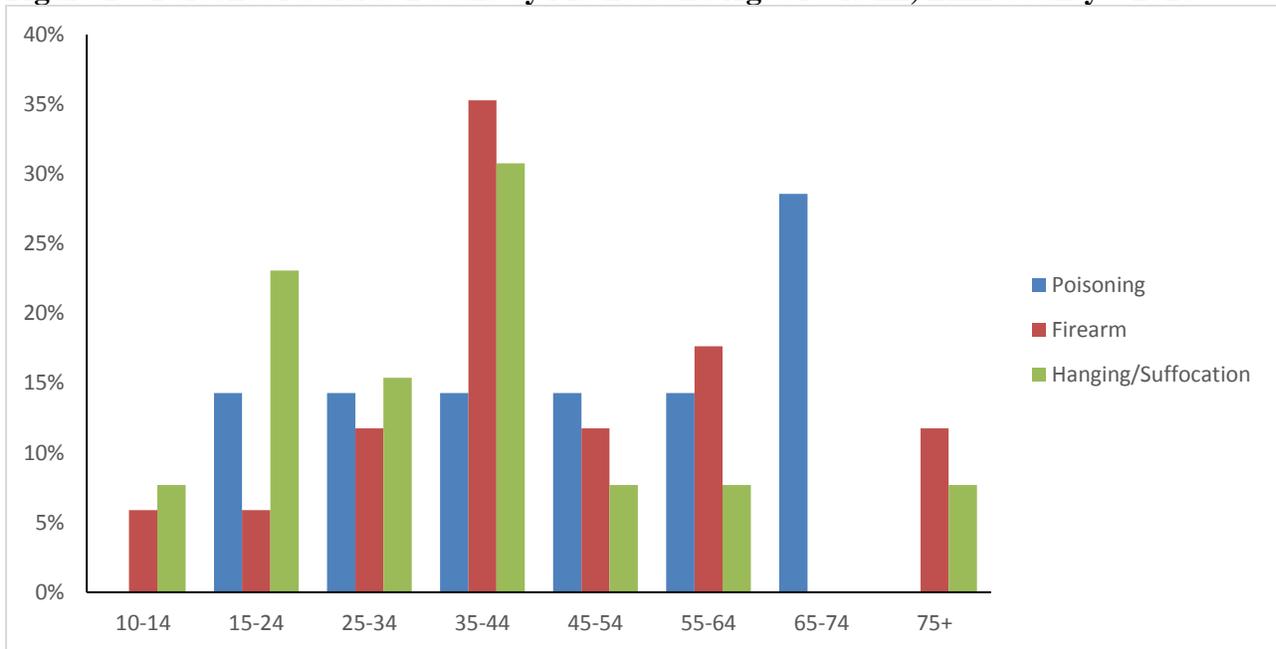
Between 2012 and 2016, the most common method used in suicide-related deaths in Linn County were from the use of firearms; which, accounted for 48% of all suicide deaths during this period (Figure 9). Hanging/Suffocation (26%) and Intentional Poisoning (21%) were the next two most common methods used. In 2016 alone, 17 of the 40 suicide-related deaths in Linn County were attributed to the use of firearms. Method of firearm use was most common among individuals 35 to 44 years, where poisoning and hanging/suffocation did not significantly differ across age-categories (Figure 10). Females are slightly more likely to choose poisoning for their method of suicide (n = 12), but also used firearms (n = 9) and suffocation (n = 8) as their method of suicide. However, males were far more likely to die from the use of firearms than any other method (Figure 11).

Figure 9. Method of suicide, Linn County - 2012-2016



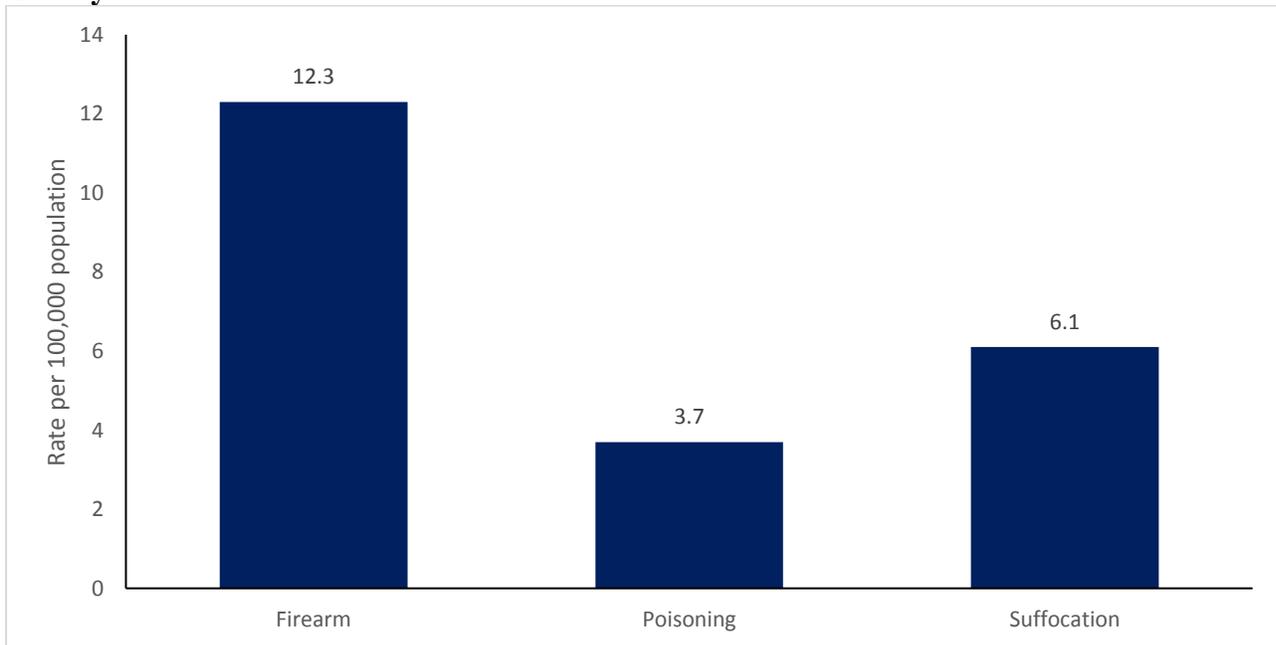
Source: Linn County Death Dataset

Figure 10. Percent of Suicide Deaths by Method and Age of Victim, Linn County – 2016



Source: Linn County Death Dataset

Figure 11. Age-Adjusted Suicide Mortality Rate among Males by Suicide Method, Linn County – 2012-2016

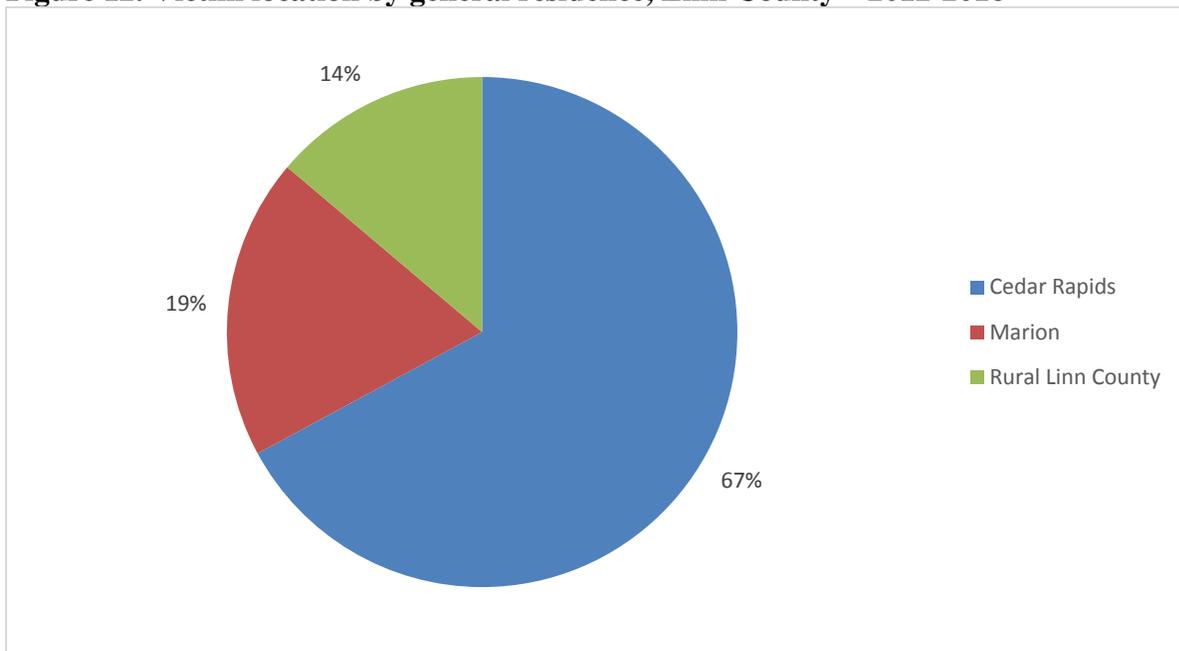


Source: Linn County Death Dataset

Geographic Location

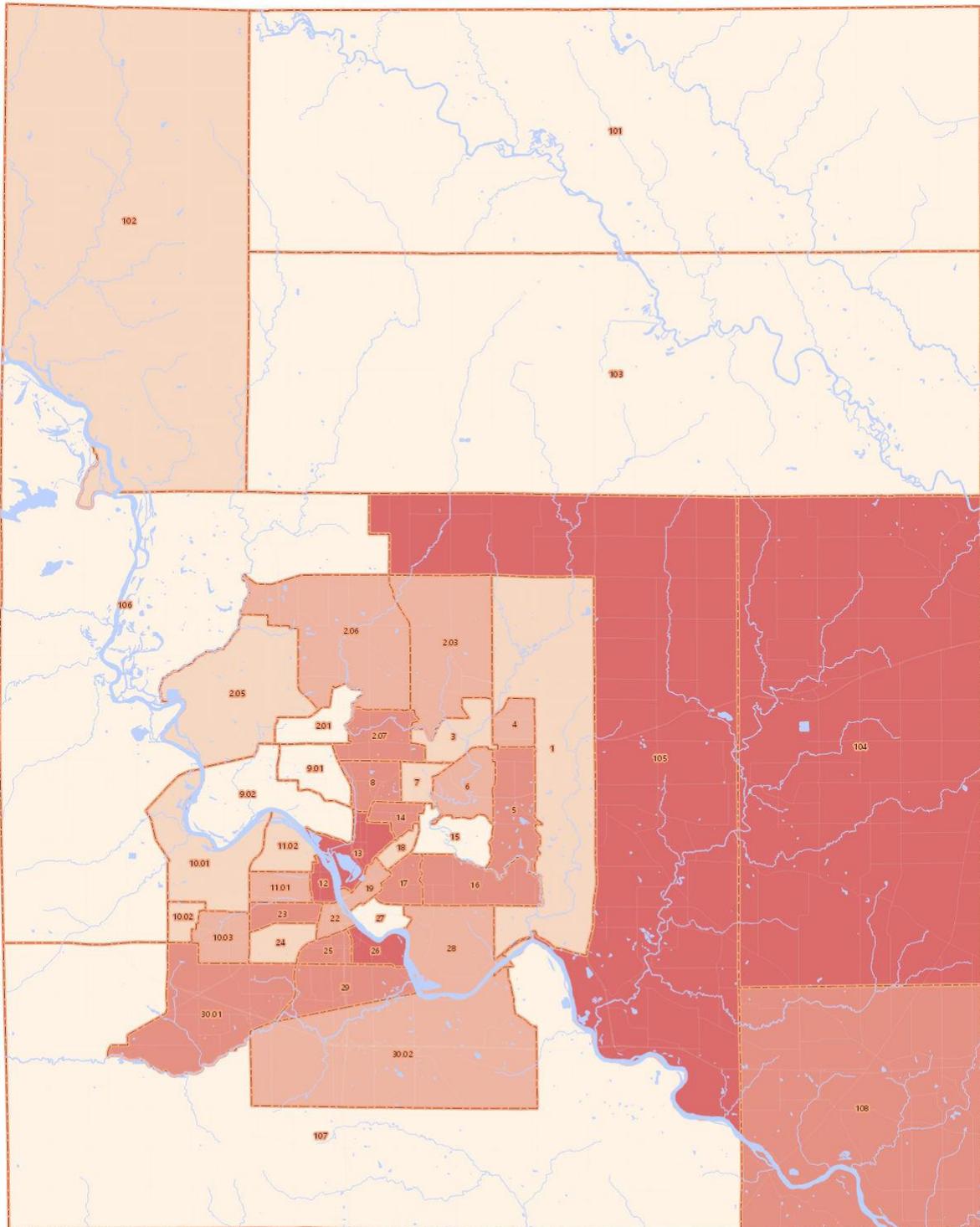
As illustrated in Figure 12, a majority of the suicide related deaths occurred among individuals living within the City of Cedar Rapids (n = 102; 67%) followed by the City of Marion (n = 29; 19%); which is representative of the population distribution in Linn County. However, 14% (n = 21) of deaths occurred throughout rural Linn County. When broken down by census tract, the areas of highest concentration of suicides per 10,000 population were among individuals who reside in downtown Cedar Rapids and on the eastern-central border of Linn County extending east of highway 13 and primarily north of County road 30, particularly in census tracts 12, 13, 26, 104, and 105 (Figure 13). These areas have a suicide mortality rate of 20.7 or more deaths per 10,000 population for the respective census tract.

Figure 12. Victim location by general residence, Linn County – 2012-2016



Source: Linn County Death Dataset

Figure 13. Suicide Mortality by Location of Residence, Linn County - 2011-2015



Suicides in Linn County, Iowa 2011 - 2015

Based on 2010 Census Tract Total Population

Suicides Per 10,000 ≤1.77 ≤4.79 ≤8.19 ≤12.28 ≤20.70 Census Tracts

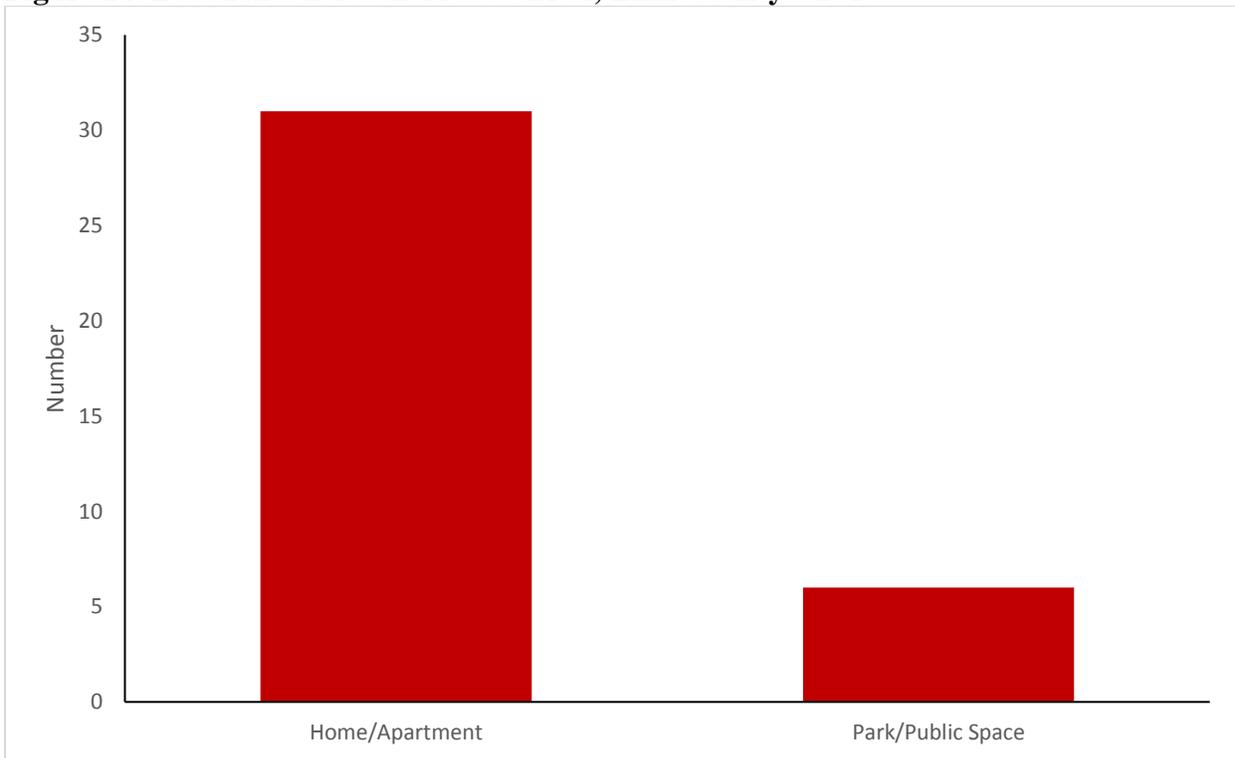
Population counts based on 2010 Census SF1 data. Date Expired: 7/16/2018 1:13 PM

Source: Linn County Death Dataset

Place of Injury

A majority of suicide victims in 2016 (n = 31; 77.5%) committed suicide within their home, apartment, or somewhere on their property (Figure 13). However, an additional 15% (n = 6) did so within a park or public space including public rest stop, high school building, or in a field or pasture.

Figure 14. Location where suicide occurred, Linn County – 2016



Source: Linn County Death Dataset

Military Affiliation

Of the 40 suicide-related deaths that occurred in 2016, eight (20%) were among individuals who had previously served in the armed forces. All eight deaths occurred among males who ranged in age from 31 to 81, with an average age of 52 years. A majority were Caucasian (n = 7), married (n = 5), and held at least a high school diploma (n = 5). Due to exclusion of this variable in previous Linn County death datasets, significance of the relationship overtime between veteran status and suicide cannot be ascertained. However, according to Kang et al. (2015) nationwide, veterans are at a significantly greater risk for suicide than the general population. In Kang et al. risk was found to be particularly high within 3-years after leaving service.

Conclusions

Overtime, suicide has become an increasingly pressing issue that requires immediate public health and community action. While the rate of suicide in the United States and Iowa has steadily increased overtime, the increase in mortality rate for suicide in Linn County has been dramatic, exceeding that of both the United States and Iowa. In Linn County, suicide victims tended to be male and white. However, females demonstrated a higher rate of hospitalization compared to males. The highest suicide mortality rate by age was among individuals 45 to 54 years, closely followed by the 35 to 44 and 15 to 24 year age group. Conversely, hospitalizations were highest among the 15 to 24 year age group. A majority of individuals had never been married and the highest level of education attained was a high school diploma. Suicide victims tended to work in the manufacturing, construction, education, healthcare, or food service industries.

The most common method used to commit suicide was firearm, followed by hanging/suffocation and poisoning. Males were found to be most likely to use firearms as the method of death, where females were slightly more likely to poison themselves. Individuals tended to be located at their own home or property when the suicide attempt was made. Veteran status appears to have significance related to likelihood to commit suicide. However, additional investigation is needed to confirm this assumption.

Recommendations

In order to address the rising suicide issue in Linn County, it is essential that the community work together to address the factors that contribute to suicide. This coordinated effort should target risk factors at multiple levels and within all demographic groups (Substance Abuse and Mental Health Services Administration [SAMHSA], 2017). Some key strategies include education and communication about mental health and suicide; promotion of community connectedness; increase accessibility and availability of mental health services, create protective environments, and identify and support those at risk (CDC, 2014; Stone et al., 2017).

Education and Communication

Schools at all levels should be providing age appropriate information about mental health and suicide. This may include general information about mental health issues and suicide; signs and symptoms of depression, suicide, and self-injury; available resources, and where to seek help for themselves or others (Healthy People 2020, 2012). Comprehensive and consistent education will help reduce stigma, increase awareness of mental health and suicide, and provide the tools necessary to identify and prevent issues before they result in a death or injury. In addition, efforts should be taken to strengthen coping and problem-solving skills across all ages. This may include implementation of social-emotional learning programs and parenting skill and family relationship programs (Stone et al., 2017).

Secondly, awareness of mental health issues and suicide needs to be elevated to the public to achieve the same benefit as school suicide prevention programming (i.e. reduce stigma and provide the tools to recognize warning signs and seek resources). However, it is essential that messaging about suicides be carefully conducted as to avoid what is known as “Suicide Contagion” or the “process by which, exposure to the suicide or suicidal behavior of one or more persons influences others to commit or attempt suicide (O’Carroll & Potter, 1994)”.

Community Connectedness

According to the CDC (2014), establishing social connection and integration are essential in protecting against suicidal thoughts and behaviors. Connectedness encompasses multiple levels including between individuals, connections between individuals and their families with community organizations, and connectedness between the agencies and organizations who provide suicide resources (CDC, 2014). At the individual level, feelings of positive connection to others directly correlates with an individual's ability to cope during times of crisis or need. Connection between individuals and relevant community organizations, such as schools, places of employment, community centers, and spiritual organizations has been hypothesized to increase sense of belonging or personal value, thus providing greater ability of the person to cope in stressful situations as well as connect with needed resources. Strategies for increasing both individual and community connectedness may include development of peer norm programs and community engagement activities (Stone et al., 2017). Finally, connection between service agencies/organizations is essential in providing a robust and supportive resource system that includes a well-connected referral process between agencies (CDC, 2014).

Access, Availability, and Screening

In order to support the increasing mental health need, it is necessary to strengthen access and delivery of mental health and suicide care as well as improve identification of those at risk (Stone et al., 2017). Lack of access to mental health care, including inability to afford services, lack of providers, and timely appointments is one of the leading factors related to underuse of mental health services when needed. According to Stone et al., services are maximized when health and behavioral health systems are set up to effectively and efficiently provide access to timely, affordable, and quality care. When in place, patients are not only receiving needed care services but also support normalization of help-seeking behavior.

In order to strengthen access and delivery of care, state health insurance policies need to be strengthened to ensure coverage of mental health conditions. In addition, provider shortages need to be addressed using innovative strategies, such as financial incentives (ex: loan repayment) and expanding the reach of providers (ex: telehealth or video/web-based services). Strategies for supporting those at-risk may include crisis intervention (Stone et al., 2017), treatment for those at-risk for suicide or to prevent re-attempts, and increased screening within provider offices (SAMHSA, 2017)

Protective Environments

Along with facilitating the opportunity and likelihood an individual will seek help, changes to the environment in which an individual lives, works, and plays may also help in preventing suicide. This may include promotion of local and organizational policy changes (Stone et al., 2017). At the local level, zoning regulations can be established to limit the location and density of alcohol establishments as well as adopt gun control regulations that require safe storage of firearms. In addition to policy level regulations, education around safe storage of firearms, medications, and other household products should be provided, particularly in relation to suicide concerns. As noted in the data, there are higher incidences of suicide-related deaths among specific industries. These organizations have the opportunity to create an environment within the workspace that supports individuals in need. This may include training opportunities to increase awareness of mental health and suicide as well as how to identify individuals at risk and where to seek help. In addition, organizations can offer access to helping services such as mental health, substance abuse treatment, or financial counseling.

Another impactful strategy is placing barriers or methods of intervention at common suicide locations (Stone et al., 2017). Unfortunately, a majority of suicide deaths in Linn County occur within the individual's home, which is difficult to implement a centralized method of

intervention. However, there is an opportunity to target common public spaces such as bridges or parks for intervention. Around common “jump” locations, barriers or some other means could be installed to limit access. In addition, signs and telephones could be placed around these hot spots to encourage individuals to seek help.

References

- Centers for Disease Control and Prevention (2014). *Strategic direction for the prevention of suicidal behavior: Promoting individual, family, and community connectedness to prevent suicidal behavior*. Retrieved from https://www.cdc.gov/ViolencePrevention/pdf/Suicide_Strategic_Direction_Full_Version-a.pdf
- Centers for Disease Control and Prevention. (2018). *Suicide rates rising across the U.S.* Retrieved from <https://www.cdc.gov/media/releases/2018/p0607-suicide-prevention.html>
- Healthy People 2020. (2012). *School-based intervention reduces suicide attempts*. Office of Disease Prevention and Health Promotion. Retrieved from <https://www.healthypeople.gov/2020/healthy-people-in-action/story/school-based-intervention-reduces-suicide-attempts>
- Kang, H. K., Bullman, T. A., Smolenski, D. J., Skopp, N. A., Gahm, G. A., & Reger, M. A. (2015). Suicide risk among 1.3 million veterans who were on active duty during the Iraq and Afghanistan wars. *Annals of Epidemiology*, 25(2), 96-100.
- O'Carroll, P. W. & Potter, L. B. (1994). Suicide contagion and the reporting of suicide: Recommendations from a national workshop. *MMWR*, 43(RR-6), 9-18.
- Stone, D., Holland, K., Bartholow, B., Crosby, A., Davis, S., & Wilkins, N. (2017). *Preventing suicide: A technical package of policy, programs, and practices*. National Center for Injury Prevention and Control: Centers for Disease Control and Prevention. Retrieved from <https://www.cdc.gov/violenceprevention/pdf/suicideTechnicalPackage.pdf>
- Substance Abuse and Mental Health Services Administration. (2017). *Suicide prevention*. Retrieved from <https://www.samhsa.gov/suicide-prevention>