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Examining contextual differences in suicide by rural–urban designation and military status, 2009–2019: a cross-sectional analysis of the National Violent Death Reporting System

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Abstract

Objective: To evaluate differences in mental health and substance use circumstances by rurality and military affiliations among suicide decedents.

Methods: Multiyear (2009–2019) cross-sectional study of adult suicide decedents reported to the National Violent Death Reporting System. We classified suicide decedents into a four-level variable by geography (urban/rural) and military status and evaluated the prevalence of current and past alcohol and substance use problems, mental health problem recognition, and mental illness treatment. We estimated prevalence ratios using multiple imputation chain equations to account for missing data and log-binomial regression models and present stratified estimates by military and rural classification.

Findings: There was no significant relationship between rural-military classification and alcohol use problem. Compared to urban civilians, other groups had a lower risk identified of having a substance use problem: urban military (aPR: 0.65; 95%CI: 0.60–0.71), rural military (aPR: 0.57; 95%CI: 0.50–0.66), and rural civilians (aPR: 0.95; 95%CI: 0.90–1.00). Recognition of a mental health problem was lower among both rural military (aPR: 0.88; 95%CI: 0.81–0.96) and rural civilians (aPR: 0.89; 95%CI: 0.86–0.92). The likelihood of current mental treatment was lower in other groups [urban military (aPR: 0.93; 95%CI: 0.89–0.96); rural military (aPR: 0.87; 95%CI:

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0.81–0.94); and rural civilian (aPR: 0.89; 95%CI: 0.85–0.92)]. There was no evidence of effect modification by military and rural classification for any outcome.

Conclusions: Mental health outcomes by military affiliation and urbanicity/rurality may need to be independently assessed as social determinants of health.

Keywords

Suicide; Rural health; Military personnel; Public health surveillance; Social determinants of health

INTRODUCTION

Suicide is among the top 9 leading causes of death in the United States (US) claiming more than 48,000 lives in 2021.[1] Individuals living in rural areas and Veterans/those with military affiliation have a higher suicide rate relative to their civilian and urban counterparts. [2] The rates of suicide in rural America are almost two times higher than the suicide rates in urban America.[3] Additionally, the change in rates over time suggests that the risk of suicide among rural Americans is increasing faster than the national average; rural suicide deaths rose 46% while urban suicide deaths rose 27% from 2000 to 2020.[3] Despite the alarming prevalence of rural suicide, rural areas continue to suffer from limited availability of mental health services.[4] Rural patients with mental health conditions are limited in access to appropriate mental healthcare, which could result in incomplete mental health evaluation, inappropriate transfers, and absence follow-up.[5–7]

Among Veterans, rurality is of particular importance as approximately one-quarter of Veterans returning from active-duty service reside in rural communities.[8] An estimated 44% of these rural Veterans earn less than \$35,000 annually, 27% do not have access to the internet at home, and 58% have at least one service-connected condition.[8] Additionally, there is an estimated 10–20% of homelessness among Veterans. Factors associated with homelessness in this population include pre-military factors (e.g. childhood abuse, trauma), shortage of affordable housing, inadequate livable income, mental health comorbidities including PTSD and substance use dependence (SUD), limited access to healthcare, rurality, and the absence of adequate social support networks.[8–11] Therefore, it is important to evaluate the interconnectedness of military status, rurality, and mental health in understanding the epidemiology of suicide and SUD for prevention and intervention efforts.

There are limited recent studies distinguishing military and non-military suicides while accounting for rurality. One key study identified suicides from 2005–2012 among military members 18–35 years and found that military and Veteran suicides are concentrated in a small number of counties and that mental health was a common precipitating factor in this group. The primary limitation of the previous work is differentiating how suicide risk factors for the military population by urbanicity/rurality[12] Similarly, the National Violent Death Reporting System (NVDRS) data has been used to described Army personnel suicides between 2005–2007 but did not further examine the situational characteristics that may be different across the rural-urban spectrum.[13] The purpose of this study was to evaluate the

association between rurality and military affiliation with mental health conditions, treatment, substance use dependence, and past history of suicide among those who died by suicide.

METHODS

Study Design, Source, Sample

We conducted a cross-sectional study of suicide and undetermined deaths in the US reported to the Centers for Disease Control and Prevention's (CDC) NVDRS between 2009–2019. Data in NVDRS contain circumstances and characteristics from violent deaths (including suicides and homicides) obtained from death certificates, coroner and medical examiner records, and law enforcement reports.[14] State participation in NVDRS has increased over time, with 16 US states participating in NVDRS in 2009 compared to 42 states, the District of Columbia, and Puerto Rico in 2019. A summary of state-level participation by year is presented in **Appendix Figure 1**. We restricted our sample for the primary analysis to include single suicides, those with known zip codes, and known military status [Figure 1]. This study was approved by the University of Iowa Institutional Review Board to be non-human subjects research.

Primary Exposures, Confounders, Covariates

We evaluated a combination of two primary exposures in this study: military status and residence location of the decedent. For military status, we used the military affiliation variable within NVDRS. We used the resident's zip code to classify rurality or urbanicity according to the Rural-Urban Commuting Area Codes. If resident zip was not available, we first used the injury zip code as a proxy measure, followed by the state and county Federal Information Processing System (FIPS) code to identify the most frequently occurring RUCA within the county.[15]RUCA codes classified as urban areas included: 1.0, 1.1, 2.0, 2.1, 3.0, 4.1, 5.1, 7.1, 8.1, and 10.1. All other codes were classified as rural, including those for Large Rural City/Town (4.0, 4.2, 5.0, 5.2, 6.0, 6.1), Small Rural Town (7.0, 7.2, 7.3, 7.4, 8.0, 8.2, 8.3, 8.4, 9.0, 9.1, 9.2), and Isolated Small Rural Town (10.0, 10.2, 10.3, 10.4, 10.5, 10.6).[16] Using the military and rurality variables, we created a four-category classification as our primary exposure: rural civilian, rural military, urban civilian, and urban military.

We included several decedent- and county-level variables as potential confounders and covariates. Decedent-level covariates included sex (male, female), age (18–24, 25–44, 45–64, 65+), education (high school or lower, some college/Associate's degree/Bachelor's degree, and Master's/Doctoral/Professional Degree), ethnicity (Hispanic, Non-Hispanic), homeless status, and marital status (married, never married, divorced/separated/widowed). For the decedent's county-level characteristics, we included the quartile of mental health providers available, primary care providers available, and poor health rankings.[17] The county-level rankings from the County Health Rankings & Roadmaps were linked to the state and county FIPS.

Outcomes

NVDRS contains a primary variable indicating whether circumstance variables surrounding the death are known, and from this we included outcomes corresponding to alcohol,

substance use, and mental health circumstances. We considered current conditions as those with an indicator for an alcohol use problem (has alcohol dependence or alcohol problem) other substance use problem (non-alcohol related substance abuse problem), current mental health problem, and current mental health/substance use treatment. Substance use (whether alcohol or other substances) did not have to contribute to the death directly, but is an indication of an ongoing problem. Current mental health problems and treatment are defined by indications for mental health conditions (e.g., visits, prescriptions). Past circumstances included history of mental health/substance use problem treatment, and history of a suicide attempt (regardless of severity of attempts prior to the fatal incident). NVDRS data classifies these circumstances as “Yes” vs “No, Not available, Unknown”.

Statistical Analysis

We tabulated decedent- and county-level characteristics with outcomes across military/civilian and urban/rural designations. In the primary analysis, we included all single suicide deaths with known circumstances, which removes records that may have inadequate information for abstractors of the records to identify what was occurring around the death from a suicide.[18] For records with no known circumstances identified, we set each circumstance to missing and imputed a response. We used multivariate imputation by chained equations (MICE) to impute all incomplete response variables under the missing at random assumption. Age, sex, ethnicity, education, homelessness, marital status, and county-level characteristics were included in the imputation models. Imputation of circumstance variables was conducted using fully conditional specification, where the missingness within each variable was imputed by a separate model using polytomous regression imputation for the unordered categorical data and logistic regression imputation for the binary data. After that, we fitted log-binomial models to 10 imputed datasets and pooled the results using Rubin’s rules to estimate the prevalence ratios and 95% confidence intervals, which included decedent-level covariates and county-level covariates. The MICE algorithm was applied using the R Statistical Software (v4.2.1) to create the imputed datasets and to pool the results of the models respectively.[19, 20] All other analyses were completed using SAS 9.4 (Cary, North Carolina).

Aside from estimates of each outcome across the four-level military/civilian and rural/urban categorization, we further assessed effect modification in our final models and providing stratum-specific (e.g., rural vs urban within military sub-groups) adjusted prevalence ratios. We included two sensitivity analyses to determine whether there would be variation in the relationship between decedent rurality/military classification and each outcome variable. First, we evaluated a complete case analysis for each outcome whereby we excluded those with no known circumstances (i.e., no imputation as there were no missing values). Second, we included undetermined deaths as deaths from suicide and imputed missing values similar to the main analysis.

RESULTS

Characteristics of Sample.

Of the initial 270,756 suicide-related deaths reported to NVDRS between January 1, 2009, through December 31, 2019, our final primary analytical sample included 219,053 single suicides [Figure 1]. When including the 32,021 deaths of undetermined intent for a sensitivity analysis, the subset included 251,074 deaths. Overall, males accounted for 78% of the single suicides identified, but over 95% of military-affiliated decedents [Table 1]. Among civilian decedents, approximately two-thirds of deaths were among those ages 25–44 and 45–64 yo, while those 65+ accounted for the majority of military-affiliated deaths in both rural (50%) and urban (41%) areas. While the distribution of race varied by military status and rurality, overall, 88% of decedents were white, 6% were Black/African American, and 6% were all other races. The relationships between each demographic characteristic and present and past outcomes are presented in Appendix Table 1.

Alcohol Use Problem.

A problem of alcohol use varied from 12% among rural military decedents to 17% among urban civilians [Figure 2]. There was no significant relationship observed between military status and rural/urban classification and alcohol use problem.

Substance Use Problem.

A problem of substance use varied from 6% among rural military to 17% among urban civilians [Figure 2]. Compared to urban civilians, all other groups had a lower substance use problem prevalence, including urban military (aPR: 0.65; 95%CI: 0.60–0.71), rural military (aPR: 0.57; 95%CI: 0.50–0.66), and rural civilians (aPR: 0.95; 95%CI: 0.90–1.00).

Current Mental Health Problem.

Identification of a current mental health problem ranged from 32.3% in the rural military group to 46.2% in the urban civilian group [Figure 2]. Compared to urban civilians, there was no significant difference in the recognition of a mental health problem among urban military members; however, this was lower among both rural military (aPR: 0.88; 95%CI: 0.81–0.96) and rural civilians (aPR: 0.89; 95%CI 0.86–0.92).

Current Mental Health/Substance Use Treatment.

Current treatment varied from 18% in the rural military to 27% in the urban civilian group [Figure 2]. Compared to urban civilians, the prevalence of current mental treatment was lower in all other groups [urban military (aPR: 0.93; 95%CI: 0.89–0.96); rural military (aPR: 0.87; 95%CI: 0.81–0.94); and rural civilian (aPR: 0.89; 95%CI: 0.85–0.92)].

History of Suicide Attempt.

The prevalence of suicide attempt history was 9% in the rural military group and 21% in the urban civilian group [Figure 3]. Compared to urban civilians, the prevalence of a past suicide attempt was lower in all other groups [urban military (aPR: 0.87; 95%CI: 0.80–0.94); rural military (aPR: 0.71; 95%CI: 0.62–0.82); and rural civilian (aPR: 0.82; 95%CI: 0.75–0.89)].

History of Mental Health/Substance Use Problem Treatment.

Previous mental health and substance use treatment ranged from 22% in the rural military group to 35% in the urban civilian group [Figure 3]. Compared to urban civilians, the prevalence of a past suicide attempt was lower in all other groups [urban military (aPR: 0.93; 95%CI: 0.89–0.97); rural military (aPR: 0.85; 95%CI: 0.78–0.92); and rural civilian (aPR: 0.90; 95%CI: 0.86–0.93)].

Evaluation of Effect Modification.

There was no evidence of multiplicative effect modification between military affiliation status and rural/urban designation observed across all outcomes [Table 2].

Sensitivity Analyses.

Sensitivity analyses (i.e., [1] inclusion of undetermined deaths, [2] complete case analysis) demonstrated similar results when compared with main results for all outcomes [Appendix Table 2]. For substance use problems, inclusion of undetermined deaths demonstrated a stronger relationship between rural and urban status among civilians (aRR: 0.82; 95%CI: 0.77–0.88) compared to the main analysis.

DISCUSSION

In this study, we investigated the relationship between 1) rural and military status and 2) mental health and substance use dependence characteristics among those who died by suicide using NVDRS and found differing rates of outcomes by either rurality or military affiliation but no evidence of effect modification. NVDRS collects information on key situational characteristics preceding death by suicide across the country, allowing us to investigate risk factors as public health metrics, and to understanding the etiology of suicide and contributors including psychosocial and situational conditions such as mental health illness, treatment, physical health, finance, interpersonal, and professional stressors. The strengths of this study include the ability to assess contextual factors contributing to suicide deaths over 10 years, evaluation of sub-group specific variability, and geographical breadth across the country.

Our primary goal was to evaluate the relationship between rurality and military affiliation and mental health and SUD treatment. However, one of the key findings in this study was that across all groups, there was a low prevalence of recognition of a current mental health problem (32%–46%) and mental health treatment for SUD or alcohol (18%–27%). There may be several explanations for this. One theory is that these estimates are closely approximating the truth and represent a high-risk group where recognition of mental health problem and treatment was a missed opportunity for targeted intervention before the suicide. In 2021, mental health treatment in the general US population was relatively low (11%), though it was reported to be higher among those with any mental illness (47%) and those with serious mental illness (65%).[21] Similarly, the prevalence of SUD treatment for those with co-occurring illicit drug or alcohol use was 53% for those with any mental illness and 67% for those with a serious mental illness.[21] If the findings in our study are true, these estimates of the absence of mental health recognition and treatment in those

who died by suicide underscore the need for expanding services and community-based approaches, but also to understand deterrents to seeking treatment. This includes addressing stigma, adequate access to mental health services, perception of treatment effectiveness, and financial concerns.[22, 23]

We additionally found that mental illness recognition and treatment was lower in rural or military decedents when compared to urban civilian decedents. This observation is not new; the scientific literature has consistently identified lower treatment in rural locations or among military members/Veterans, despite similar rates of mental illness between urban and rural areas.[24–28] Rural residents disproportionately have physical and psychosocial barriers that result in unmet mental health needs.[24, 25] Though we did not observe evidence of effect modification by outcomes by these characteristics, rurality and military status remain independently associated with recognition of mental illness and treatment. These risk factors also need to be addressed in tandem due to their potentially synergistic impacts on mental health outcomes.

There are three other findings in this study worth exploring further. First, alcohol use as a problem was not significantly associated with rurality or military affiliation for our sample who died by suicide. A 2021 scoping review reported that 60% of 126 studies included found rural residence compared to urban residence to be associated with an increased likelihood of hazardous alcohol use.[29] Lack of higher alcohol use in rural and military decedents does not necessarily conflict with the findings of prior population-based studies since only people who have already died by suicide are included. Second, compared to urban civilians, SUD prevalence was lower among rural civilians, and even more notably among both urban and rural military-affiliated decedents. Compared to recent reported substance use rates, illicit drug use was slightly lower in rural areas (18.4%) compared to large metro areas (22.5%) and had similar opioid misuse rates (3.2% in both).[30]

Third, past suicide history attempts and mental illness/SUD treatment was less prevalent in all groups compared to urban civilians among those who died by suicide in this sample. Lower prevalence of previous suicide attempts in both military and rural populations are expected as they would be more likely to use firearms and not survive a previous attempt. [31–34] However, as with the other outcomes assessed, previous mental illness and SUD treatment may be a larger challenge in rural areas. Even if rates are similar between urban and rural areas, the consequences of substance use and mental illness may be more concerning for rural areas; behavioral health and detoxification services may not be readily available, patients may have to travel longer and further to get adequate specialty care, rural first responders or emergency room providers may have less experience in providing care, and community-based programs are fewer and sparsely located.[30, 35]

Despite the strengths of using the NVDRS dataset, there are several limitations to this study. Unknown circumstances and contextual factors were likely underreported and may have been more likely to be missing or underreported in rural populations; we observed that missing circumstances was 25% greater in rural decedents compared to urban decedents and found evidence of effect modification of rurality and military status for some outcomes in the complete case analysis. We attempted to overcome this issue by using analytical

approaches that imputed unknown data based on observable characteristics. Ultimately the imputed findings were comparable to the complete case sensitivity analysis for most outcome assessments, but the absence of effect modification in the imputed analyses compared to the complete case analysis suggest missingness (particularly in rural areas) may have biased observed associations if not addressed. Second, within NVDRS, we cannot further define military status or branch of service; thus, active duty, Veteran, and other groups were all captured as one group of decedents with any military affiliation. Though we suspect that the observed findings may have had more variability, the findings are relatively consistent with the literature demonstrating known risk factors of mental health recognition and treatment compared to civilian populations. Finally, as previous literature has indicated, there may be variability in the reporting of suicides and documentation across states.[36] This is particularly important with the variation in reporting between states with coroner reports only compared to states with county coroners and a state medical examiner, and suspect that this may have yielded in a potential underestimate of suicides identified.

Conclusions:

We found variable patterns of past and current mental health outcomes by military affiliation or urbanicity/rurality, but no evidence of effect modification. From a clinical perspective, we need to improve screening and recognition of mental health concerns, treatment, and coordination of care. With a public health lens, future efforts should increase community-based programs and collaborations, ensure adequate resources are available for mental health and substance use dependence recognition, continue to destigmatize mental health care and treatment, and improve data collection and surveillance in higher-risk areas.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Public Health Significance:

There are challenges in timely access, recognition, and treatment for mental health concerns among rural residents and military-affiliated personnel. We identified differences in mental health recognition and treatment outcomes by urban/rural and military/civilian populations by investigating cross-sectional data in the US (2009–2019). Rurality and military affiliation may serve as social determinants of health with inequities in screening and recognition of mental health and suicidality, but public health practitioners should also prioritize improving surveillance efforts in high-risk populations.

WHAT IS ALREADY KNOWN ON THIS TOPIC:

- Rural residents and military-affiliated individuals are at higher risk for suicide compared to their non-rural and civilian counterparts, respectively.

WHAT THIS STUDY ADDS:

- Recognition of mental health illness and current mental health treatment were lower among rural civilians and rural military-affiliated individuals compared to urban civilians among decedents of suicide.
- We did not find evidence that the association between rural residence and or recognition of mental illness and current mental health treatment were modified using a broadly defined definition of military-affiliated personnel.

HOW MIGHT THIS STUDY AFFECT RESEARCH, PRACTICE, OR POLICY:

- From a clinical practice perspective, we need to improve screening and recognition of mental health concerns, treatment, and coordination of care.
- With a public health and policy lens, future efforts should increase community-based programs and collaborations, ensure adequate resources are available for mental health and substance use dependence recognition, continue to destigmatize mental health care and treatment, and improve data collection and surveillance in higher-risk areas.

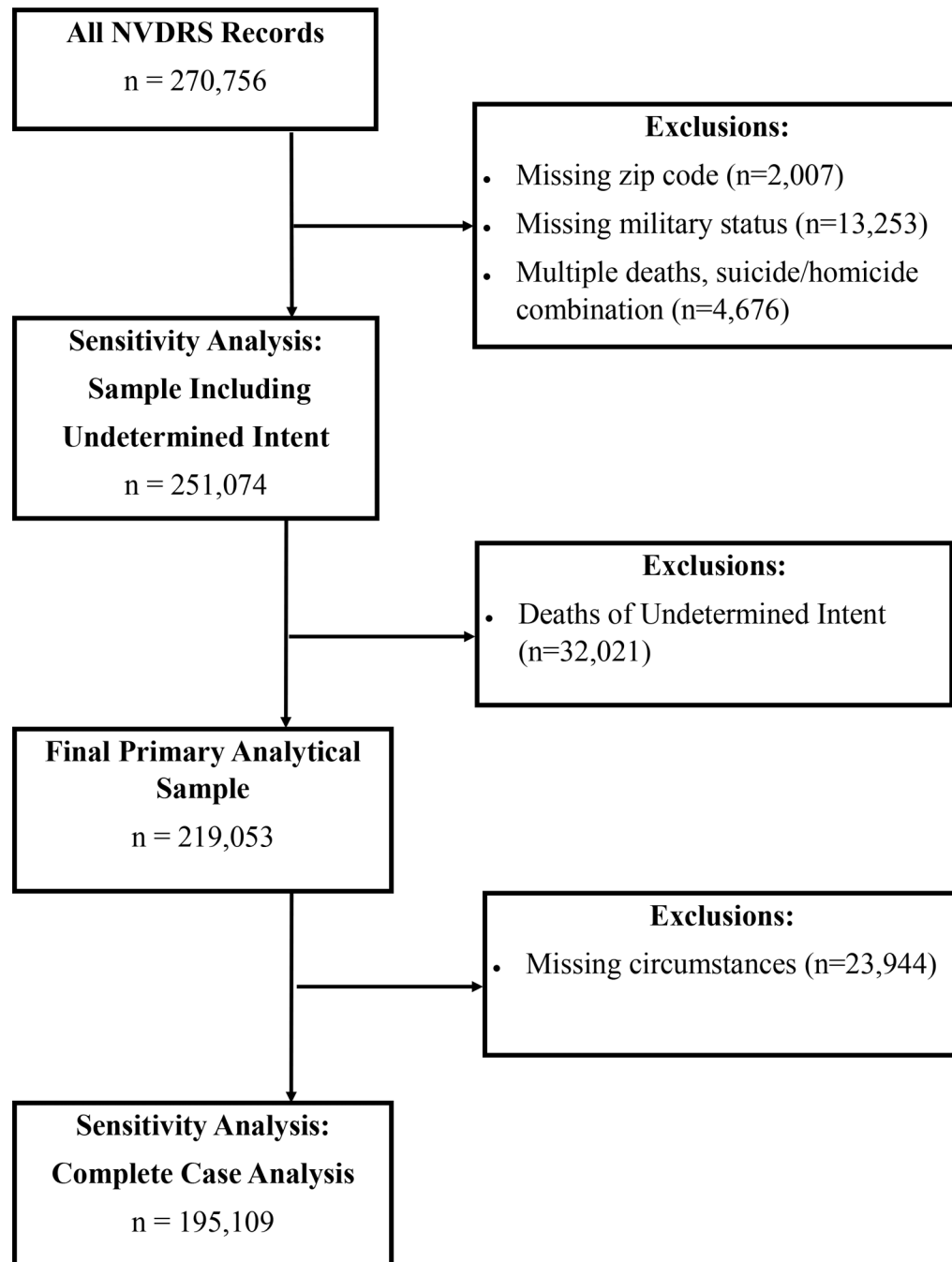


Figure 1. Flow Chart of Analytical Sample Development

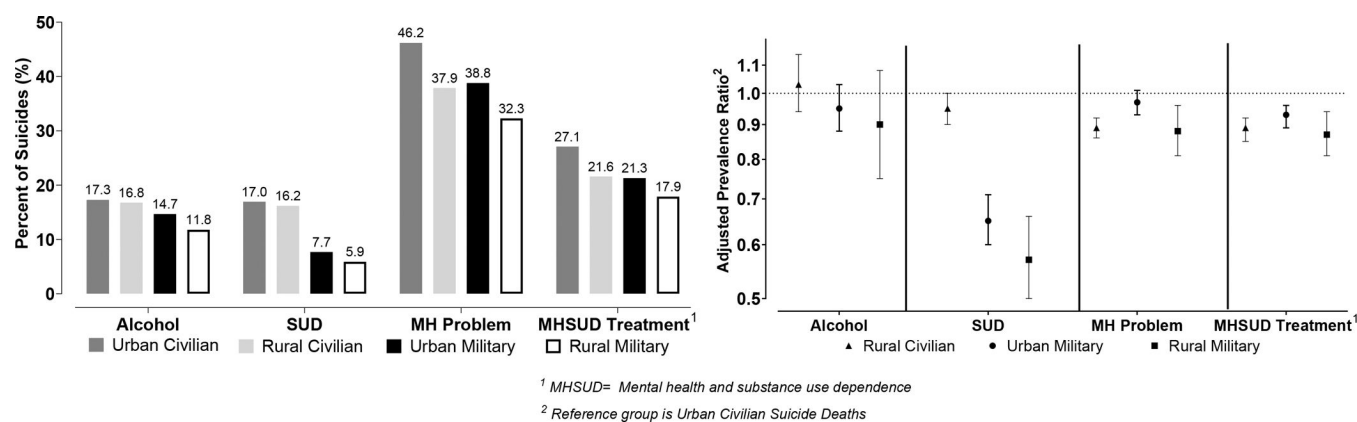


Figure 2. Current Mental Health and Substance Use Circumstances by Urban-Rural and Civilian-Military Status, NVDRS 2009–2019

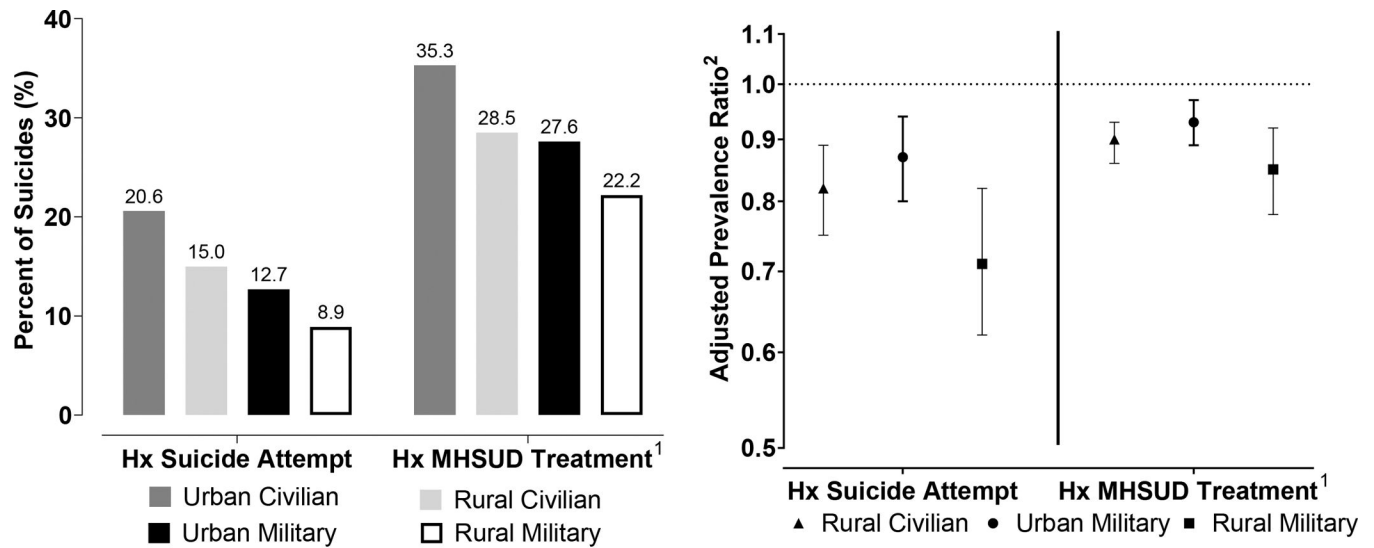


Figure 3. Past Mental Health and Substance Use Circumstances by Urban-Rural and Civilian-Military Status, NVDRS 2009–2019

Table 1.
Victim- and Victim's County-Level Characteristics by Military Status and Rural-Urban, NVDRS 2009–2019

Characteristics ¹	Rural (n=45,477)		Urban (n=173,576)	
	Military (n=8,726)	Civilian (n=36,751)	Military (n=30,316)	Civilian (n=143,260)
	n (%)	n (%)	n (%)	n (%)
Victim-Level Characteristics				
Sex				
Male	8,462 (97.0)	28,264 (76.9)	29,082 (95.9)	104,839 (73.2)
Female	264 (3.0)	8,487 (23.1)	1,234 (4.1)	38,419 (26.8)
Race				
White	8264 (94.7)	33,587 (91.4)	27,602 (91.1)	122,730 (85.7)
Black/African American	216 (2.5)	928 (2.5)	1,910 (6.3)	10,826 (7.6)
Other	246 (2.8)	2,236 (6.1)	804 (2.7)	9,704 (6.8)
Age				
18–24	333 (3.8)	4,343 (11.8)	1,520 (5.0)	18,032 (12.6)
25–44	1,454 (16.7)	13,431 (36.5)	6,760 (22.3)	52,865 (36.9)
45–64	2,573 (29.5)	13,944 (37.9)	9,509 (31.4)	55,924 (39.0)
65+	4,366 (50.0)	5,033 (13.7)	12,527 (41.3)	16,439 (11.5)
Education				
High School or lower	4,827 (55.3)	22,034 (60.0)	13,005 (42.9)	67,512 (47.1)
Some college/Associate's/Bachelor's	2,602 (29.8)	9,734 (26.5)	11,038 (36.4)	50,513 (35.3)
Master's/Doctoral/Professional	386 (4.4)	1,145 (3.1)	1,933 (6.4)	8,844 (6.2)
Missing	911 (10.4)	3,838 (10.4)	4,340 (14.3)	16,391 (11.4)
Ethnicity				
Hispanic	163 (1.9)	1,222 (3.3)	902 (3.0)	9,548 (6.7)
Non-Hispanic	7,214 (82.7)	30,300 (82.4)	25,908 (85.5)	118,484 (82.7)
Missing	61 (0.7)	193 (0.5)	207 (0.7)	907 (0.6)
Homeless	48 (0.6)	323 (0.9)	273 (0.9)	2,165 (1.5)
Marital Status				
Married	3,800 (43.5)	12,231 (33.3)	12,591 (41.5)	43,300 (30.2)
Never Married	1,193 (13.7)	11,741 (31.9)	5,479 (18.1)	57,173 (39.9)
Divorced/Separated/Widowed	3,669 (42.0)	12,515 (34.1)	11,994 (39.6)	41,707 (29.1)
Unknown	64 (0.7)	264 (0.7)	252 (0.8)	1,080 (0.8)
Victim's County-Level Characteristics				
Mental Health Providers Quartile				
1 (Top Quartile)	2,061 (23.6)	8,843 (24.1)	16,789 (55.4)	80,483 (56.2)
2	2,443 (28.0)	10,332 (28.1)	7,299 (24.1)	34,408 (24.0)
3	2,386 (27.3)	8,652 (23.5)	4,202 (13.9)	19,314 (13.5)
4 (Bottom Quartile)	1,812 (20.8)	7,864 (21.4)	2,019 (6.7)	8,989 (6.3)
Unavailable	24 (0.3)	60 (0.2)	7 (<0.1)	66 (<0.1)
Primary Care Provider Quartile				
1 (Top Quartile)	1,950 (22.3)	8,419 (22.9)	15,526 (51.2)	75,971 (53.0)

Characteristics ¹	Rural (n=45,477) Urban (n=173,576)			
	Military (n=8,726)	Civilian (n=36,751)	Military (n=30,316)	Civilian (n=143,260)
	n (%)	n (%)	n (%)	n (%)
2	2,516 (28.8)	10,162 (27.7)	7,551 (24.9)	36,396 (25.4)
3	2,466 (28.3)	10,352 (28.2)	4,772 (15.7)	20,206 (14.1)
4 (Bottom Quartile)	1,770 (20.3)	7,758 (21.1)	2,427 (8.0)	10,506 (7.3)
Unavailable	24 (0.3)	60 (0.2)	40 (0.1)	181 (0.1)
Poor Health Quartile				
1 (Top Quartile)	1,609 (18.4)	6,620 (18.0)	14,685 (48.4)	69,100 (48.2)
2	2,393 (27.4)	9,483 (25.8)	7,757 (25.6)	35,036 (24.5)
3	2,475 (28.4)	10,109 (27.5)	4,862 (16.0)	22,764 (15.9)
4 (Bottom Quartile)	2,225 (25.5)	10,479 (28.5)	2,922 (9.6)	15,781 (11.0)
Unavailable	24 (0.3)	60 (0.2)	90 (0.3)	579 (0.4)

¹Column values may not add up to the column total as counts of less than 5 were suppressed.

Table 2.

Evaluation of Effect Modification between Rural/Urban and Military/Civilian Status on Mental Health and Substance Use Dependence Outcomes, NVDRS 2009–2019

Alcohol Use Problem^{1,2}			
	Urban	Rural	aPR (Rural vs Urban) within civilian/military status
Civilian	Ref (1.0)	1.03 (0.94–1.14)	1.03 (0.94–1.14)
Military	0.95 (0.88–1.03)	0.90 (0.75–1.08)	0.94 (0.76–1.16)
aPR (Military vs Civilian) within urban or rural status	0.95 (0.87–1.03)	0.88 (0.73–1.06)	p-value = 0.39
Substance Use Problem^{1,2}			
	Urban	Rural	aPR (Rural vs Urban) within civilian/military status
Civilian	Ref (1.0)	0.95 (0.90–1.00)	0.95 (0.90–1.00)
Military	0.65 (0.60–0.71)	0.57 (0.50–0.66)	0.88 (0.78–1.00)
aPR (Military vs Civilian) within urban or rural status	0.65 (0.59–0.71)	0.61 (0.54–0.68)	p-value = 0.20
Current Mental Health Problem^{1,2}			
	Urban	Rural	aPR (Rural vs Urban) within civilian/military status
Civilian	Ref (1.0)	0.89 (0.86–0.92)	0.90 (0.87–0.93)
Military	0.97 (0.93–1.01)	0.88 (0.81–0.96)	0.90 (0.84–0.97)
aPR (Military vs Civilian) within urban or rural status	0.97 (0.93–1.01)	0.99 (0.89–1.09)	p-value = 0.61
Current Mental Health/Substance Use Treatment^{1,2}			
	Urban	Rural	aPR (Rural vs Urban) within civilian/military status
Civilian	Ref (1.0)	0.89 (0.85–0.92)	0.89 (0.86–0.93)
Military	0.95 (0.89–0.96)	0.87 (0.81–0.94)	0.92 (0.85–0.99)
aPR (Military vs Civilian) within urban or rural status	0.93 (0.89–0.96)	0.97 (0.89–1.06)	p-value = 0.17
History of Suicide Attempt^{1,2}			
	Urban	Rural	aPR (Rural vs Urban) within civilian/military status
Civilian	Ref (1.0)	0.82 (0.75–0.89)	0.82 (0.75–0.89)
Military	0.87 (0.80–0.94)	0.71 (0.62–0.82)	0.82 (0.72–0.95)
aPR (Military vs Civilian) within urban or rural status	0.86 (0.79–0.93)	0.91 (0.80–1.04)	p-value = 0.96
History of Mental Health/Substance Use Treatment^{1,2}			
	Urban	Rural	aPR (Rural vs Urban) within civilian/military status
Civilian	Ref (1.0)	0.90 (0.86–0.93)	0.90 (0.87–0.94)
Military	0.93 (0.89–0.97)	0.85 (0.78–0.92)	0.89 (0.82–0.97)
aPR (Military vs Civilian) within urban or rural status	0.93 (0.89–0.97)	0.94 (0.85–1.03)	p-value = 0.75

aPR = Adjusted Prevalence Ratio

¹Adjusted for year, sex, race, ethnicity, age, education, homelessness, marital status, and county health ranking quartiles for mental health providers, primary care providers, and poor health.

²
p-values indicate results of interaction test (military and rurality).

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