# Suicide Among Military Personnel and Veterans Aged 18–35 Years by County—16 States

Joseph E. Logan, PhD,[1] Katherine A. Fowler, PhD,[1] Nimeshkumar P. Patel, MA,[2] Kristin M. Holland, PhD, MPH[1]

**Introduction:** Suicide among military personnel and young Veterans remains a health concern. This study examined stateside distribution of suicides by U.S. county to help focus prevention efforts.

**Methods:** Using 2005–2012 National Violent Death Reporting System data from 16 states (963 counties, or county-equivalent entities), this study mapped the county-level distribution of suicides among current military and Veteran decedents aged 18–35 years. This study also compared incident circumstances of death between decedents in high-density counties (i.e., counties with the highest proportion of deaths) versus those in medium/low-density counties to better understand the precipitators of suicide in counties most affected. Last, this study identified potential military and Veteran Health Administration intervention sites. All analyses were conducted in 2015.

**Results:** Within the National Violent Death Reporting System participating states, an estimated 262 (33%) current military suicides occurred in just ten (1.0%) counties, and 391 (33%) Veteran suicides occurred in 33 (3.4%) counties. Mental health and intimate partner problems were common precipitating circumstances, and some circumstances differed between cases in high- versus those in medium/low-density counties. Multiple potential intervention sites were identified in high-density counties.

**Conclusions:** These findings suggest that military and Veteran suicides are concentrated in a small number of counties. Increased efforts at these locales might be beneficial.
(Am J Prev Med 2016;51(5S3):S197–S208) Published by Elsevier Inc. on behalf of American Journal of Preventive Medicine. 

## Introduction

The suicide rate doubled among active duty military personnel[1,2] during Operations Enduring Freedom and Iraqi Freedom, from 2001 to 2010. Suicide-related morbidity and mortality have become health concerns among current military personnel and young Veterans,[3,4] thereby warranting suicide prevention strategies for these populations.[3,5–11] Surveillance data are critical to locating areas with the greatest burden of these deaths.[12]

Epidemiologic studies compare suicide rates between populations or locales to identify at-risk groups or areas. However, states with high rates do not always account for the greatest proportion of suicides nationally. For example, the 2013 state suicide rates for the general population were highest in Montana (24/100,000 population); Alaska (23/100,000); Wyoming (21/100,000); Utah (21/100,000); and New Mexico (20/100,000). These states accounted for 1,553 deaths or 3.8% of all suicides nationally.[13] The suicide rate in California was roughly half those at 10/100,000 population; however, because of the population size, suicides accounted for 2.5 times more deaths ($n$=4,025) than those five states combined and overall 10% of suicides nationally.[13] As prevention efforts aim to eliminate suicides among current military and Veteran populations, another way surveillance data

From the [1]Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Division of Violence Prevention, Atlanta, Georgia; and [2]Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Division of Analysis, Research and Practice Integration, Atlanta, Georgia.

Address correspondence to: Joseph E. Logan, PhD, Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Division of Violence Prevention, 4770 Buford Highway, MS-F63, Atlanta GA 30341-3724. E-mail: ffa3@cdc.gov.

This article is part of the supplement issue titled National Violent Death Reporting System: Analyses and Commentary.

0749-3797/$36.00

http://dx.doi.org/10.1016/j.amepre.2016.06.001

can focus strategies is by determining which U.S. counties account for the greatest proportion of military and Veteran suicide deaths. Exploring the type of nearby military and Veterans Health Administration (VHA) facilities available within counties bearing the greatest burden of suicides (hereafter referred to as "high-density counties") might inform practitioners and researchers where to implement prevention strategies.

Also, though suicide risk factors vary,[14] decedents in similar environments and in close proximity might have similar factors involved in their deaths.[15] More-descriptive details on circumstances preceding suicide among current military personnel and Veterans in high-density counties might further focus strategies on the needs of communities most affected.

Given these surveillance needs, this study:

1. examines suicides among current military personnel and young Veterans by county in 16 U.S states;
2. identifies high-density counties;
3. compares suicide incidents in high- versus medium/low-density counties for each group; and
4. identifies military and VHA facilities in high-density counties that might serve as intervention sites.

## Methods

This study used National Violent Death Reporting System (NVDRS) data from 16 U.S. states (Alaska, Colorado, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, New Mexico, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, and Wisconsin); therefore, case inclusion was limited to incidents in those states. Data years included 2005–2012. NVDRS captures details on decedent characteristics, the mechanisms/weapons involved, and the precipitating circumstances of violent deaths, including suicides, in multiple U.S. states.[16] NVDRS data sources include law enforcement, coroner/medical examiner, and toxicology reports, as well as death certificates. All sources are linked by incident into a data repository. Coding is conducted by trained abstractors in each NVDRS state.[16]

Suicide decedents aged 18–35 years who "ever served in the military" were initially selected. This study examined young adult cases because young military personnel (enlisted ranks E1–E5) are at greatest risk of suicide within the military[1,12,17] and young Veterans still transitioning to civilian life could be experiencing new life stresses along with potential post-traumatic stress (note: This Veteran sample could have initiated service during the Afghanistan/Iraq war period or during earlier conflicts since the Gulf War). Based on these criteria, this study identified 2,026 current military and Veteran decedents.

The 2,026 decedents were categorized as either "current military" or "Veterans" based on the NVDRS occupation fields provided by death certificates, law enforcement reports, and coroner/medical examiner reports. For these fields, occupation is written as open text with terms like "soldier" and "Army" (a previous NVDRS study discovered that a military occupation was clearly listed in at least one field for 93% of decedents known to currently be in the military).[12] Those with military occupations were categorized as "current military" ($n$=803). Those with different occupations were considered "Veterans" ($n$=1,178). Those with "unknown" occupations were considered to have an unknown discharge status ($n$=45). Three abstractors categorized the decedents ($\kappa$=0.878) and then reconciled differences. This study only presents findings on the current military and Veteran groups.

### Measures

The NVDRS provides details on decedent demographics, incident characteristics (e.g., location of death, weapons/mechanisms involved), and precipitating circumstances of death. Precipitating circumstances come from law enforcement and coroner/medical examiner investigator reports. To gather this information, investigators process forensic evidence and interview family members, friends, and others associated with the decedent as well as witnesses to the death.[18] Precipitating factors included current/recent depressed mood or mental health problem, alcohol dependence or suspected intoxication at the time of death, other substance abuse problems, intimate partner problems, other relationship problems, criminal/civil legal problems, job problems, financial problems, and any recent crisis (within 2 weeks of death). These factors have been cited elsewhere as risk factors for suicide.[19–28] Additionally, other preceding circumstances were examined such as whether decedents disclosed suicide intent or left suicide notes, which suggest premeditation or desire to communicate intentions and motives either pre- or post-event. Circumstance-variable definitions are provided in the Appendix (available online).[16]

### Statistical Analysis

For each study group, counties within the NVDRS states were ranked from high to low according to the total number of suicides; therefore, two lists were generated. According to census records, there were 963 counties and county-equivalent entities in this study. Most NVDRS states initiate records by electronically importing death certificate data within their territories, which minimizes the impact of counties not reporting suicides to NVDRS. For each list, counties were then partitioned into three categories:

1. "high-density," which accounted for the top 33% of the suicides;
2. "medium-density," which accounted for the next 33% of suicides; and
3. "low-density," which accounted for the remaining suicides.

Counties are displayed according to density for each group. This study also used a case comparison design to describe incidents in high- versus those in outside (i.e., medium/low-density) counties for each group to identify incident characteristics associated with concentrated areas where interventions might be focused. Comparisons were made with multivariable logistic regression accounting for all variables. Prevalence AORs and 95% CIs are presented.

Last, the military installations and VHA facilities located in the high-density counties for both groups are presented. Types of