

## Higher altitudes hide deadly problem: Increased suicide risk

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The Intermountain West is renowned for the beauty of its towering mountains and high deserts, but according to new research from an investigator with the University of Utah Brain Institute the region's lofty altitudes significantly influence a deadly problem: the high prevalence of suicides in this part of the country.

In the Sept. 15, 2010, online edition of the [American Journal of Psychiatry](#), Perry F. Renshaw, M.D., Ph.D., MBA, professor of psychiatry at the U School of Medicine and an investigator with Utah Science Technology and Research (USTAR) initiative, and colleagues report that the risk for suicide increases by nearly one-third at an altitude of 2,000 meters, or approximately 6,500 feet above sea level.

The Western states have some of the highest average elevations in the nation and, according to data derived from the National Geospatial Intelligence Agency and the National Aeronautics and Space Administration (NASA), also the highest suicide rates. In 2006, the latest year for which national data was available, Montana, Idaho, Wyoming, Utah, Colorado, Nevada, New Mexico, Arizona, and Oregon accounted for nine of the 10 highest suicide rates in the country. Alaska also was in the top 10 in suicide rates.

Utah's suicide rate was 10th highest in 2006; Nevada had the nation's highest rate.

The high suicide rates in the West prompted Renshaw, the study's senior

author and also an investigator with the Veterans Affairs Rocky Mountain (VISN 19) Mental Illness Research, Education, and Clinical Center (MIRECC), to undertake the research. "We thought it was reasonable to ask if some aspect of high altitude is related to suicide," he said. "Altitude was the strongest factor we could find in our study. But we believe there's also some other factor we can't account for yet."

After analyzing data from a U.S. Centers for Disease Control and Prevention (CDC) database with information on 3,108 counties in the lower 48 states and District of Columbia, Renshaw and his colleagues from the University of Utah Brain Institute, Veteran Affairs Salt Lake City Health System, and Case Western Reserve University concluded that altitude is an independent risk factor for suicide, and that "this association may have arisen from the effects of metabolic stress associated with mild hypoxia (inadequate oxygen intake)" in people with mood disorders. In other words, people with problems such as depression might be at greater risk for suicide if they live at higher altitudes.

The researchers also concluded that the West's higher rates of gun ownership, a well-recognized factor in suicide, and lower population density - suicide is more prevalent in rural areas - may be connected with altitude in influencing suicide rates. The study concludes, however, that gun ownership and low population density cannot sufficiently explain the prevalence of suicides at higher altitudes.

William M. McMahon, M.D., professor and chairman of psychiatry at the University of Utah, believes the study represents an important step in understanding the higher [suicide rates](#) in the Mountain Region.

"Dissecting the many environmental and genetic factors leading to high rates of suicide in Utah and the surrounding mountain states has been a daunting task," he said. "This study is a real milestone."

Deborah A. Yurgelun-Todd, Ph.D., USTAR investigator, U of U professor of psychiatry, and associate director of the VISN 19, , which is based at both the Salt Lake City and Denver Veterans Affairs Medical Centers, stated that "these findings provide a new and important area of investigation for understanding suicide risk."

Utah, which according to the study has the third highest average altitude in the country - 1,940 meters or 6,364 feet above sea level - had a rate of 14.1 suicides per 100,000 people in 2006. New data from the Utah Violent Death Reporting System shows suicides in the state are on the rise, increasing nearly 13 percent from 2008 to 2009.

Colorado, the nation's highest state, with an average elevation of 2,200 meters or approximately 7,217 feet above sea level, had 15.8 suicides per 100,000 people, the seventh highest rate. Nevada had the highest suicide rate - 19.6 per 100,000 people.

To verify the study conclusions, Namkug Kim, Ph.D., the study's first author and a former post-doctoral fellow under Renshaw, conducted a similar data study in South Korea and found that the suicide rate in areas at 2,000 meters increased by 125 percent in that country.

The reasons behind suicide are complex. Research has shown that gun ownership and [mental illness](#), such as depression, are significant factors in suicide. According to the American Foundation for [Suicide Prevention](#), guns are used in 50 percent of all suicides and more than 60 percent of people who take their own lives have major depression when they complete the act.

Provided by University of Utah Health Sciences

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