

# RURAL SUICIDE RATES AND AVAILABILITY OF HEALTH CARE PROVIDERS

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*Suicide rates are higher in rural than in urban areas in the United States. One explanation that is frequently offered is scarcity of health and mental health treatment providers in rural areas. The current study tested whether number of providers per capita would explain differences in urban and rural suicide rates within the counties of California, using data from 1993–2001. Results indicate suicide rates were higher in more rural counties, entirely due to higher rural rates among European Americans. Findings also confirmed that there were fewer physicians and mental health care providers per capita in rural areas. Nonetheless, number of providers per capita was not related to suicide rates and thus could not explain the rural–urban differential in suicide rates. © 2005 Wiley Periodicals, Inc.*

Suicide is an important public health problem. It claims the lives of nearly 30,000 Americans each year, accounting for more deaths than homicide. The problem appears to be particularly acute in rural areas. Although older studies show more mixed findings, some suggesting that urban stresses potentiate suicide, the balance of the evidence from recent investigations clearly points to higher suicide rates in more rural areas (Singh & Siahpush, 2002).

The reason for this rural differential is not well established, but one possibility is a lack of professionals to provide proper mental health care services. Depression is a well established risk factor for completed suicide (e.g., Waern et al., 2002). Although the prevalence of depression does not appear to differ between urban and rural areas

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(Kessler et al., 1994), it is clear that there are fewer health and mental health providers in rural areas to treat depression (reviewed by Murray & Keller, 1991). The President's New Freedom Commission indicated that virtually all rural counties in the United States are considered to have a shortage of mental health professionals and implied that action to remedy this situation may be one way to reduce the high rates of rural suicide (U.S. Department of Health and Human Services, 2003). There has been very little research, however, on the relationship between availability of health care or mental health care providers and risk of suicide, and from the studies done, findings have been inconsistent. Two studies lend support to the general notion that availability of mental health treatment may reduce rates of suicide. Rihmer and colleagues (Rihmer, Barsi, Veg, & Katona, 1990; Rihmer, Rutz, & Barsi, 1993) compared regions in Hungary and found that a higher prevalence of physicians was associated with a higher rate of diagnosed depression and a lower rate of suicide. In a related study, Williams, De Salvia, and Tansella (1986) found that regions in Italy in which more psychiatric hospital beds became available had greater decreases (or smaller increases) in suicide rates than regions with fewer beds. In contrast, Glasser, Amdur, and Backstrand (1985) found no drop in suicide rates in a rural area of Connecticut over a 20-year period despite a nearly 500% increase in the number of mental health providers. Further, Rost, Mingliang, Fortney, Smith, and Smith (1998) found that rural residents who were depressed were no less likely than their urban counterparts to receive treatment, although the rural residents were less likely to receive mental health specialty care.

Thus, suicide rates are higher in rural than in urban areas and conventional wisdom attributes this problem, in part, to lack of health care and mental health care providers. To date, however, there has been little research evidence to examine this supposition.

We examined this question using data from California. The counties of California include the full spectrum of urbanicity, from densely urban counties to remote rural ones. We tested whether suicide rates were higher in the more rural counties and whether number of physicians or mental health care providers per capita would account for the relationship.

## **METHOD**

### *Sources of Data*

Information on completed suicides in California counties, including age, gender, ethnicity, and method, was obtained from the California Department of Health Services, Center for Health Statistics. We used data for five alternate years for the period from 1993 through 2001, the last year for which data were available. Since rates based on small numbers of suicides can be unstable (see, e.g., Curtin & Klein, 1995), we calculated aggregated rates by pooling suicides across these years. Aggregation entailed summing the number of suicides for all years, dividing by the mean population, dividing the result by five, and multiplying by 100,000 to yield an annualized suicide rate per 100,000 residents. Population estimates for each county for each year, by age, gender, and ethnicity, were obtained from the California Department of Finance. Suicide rates were age-adjusted to allow comparisons over time and between groups varying in age composition. Age-adjusted suicide rates were computed using the direct method and were standardized to the 1940 U.S. population (Curtin & Klein; Seitz & Jonas, 1998).

We obtained urbanicity data for each county from the U.S. Census Bureau, Public Information Sharing Project. We calculated urbanicity of each county as the proportion of residents residing in an urbanized area or town with a population of 2,500 or more (U.S. Census Bureau definition of *urban*).

Numbers of health and mental health providers in 1997 (the midpoint of the period over which data were aggregated) in each county were obtained from the California Department of Consumer Affairs, Office of Information Services. *Health providers* are licensed physicians. *Mental health providers* include licensed psychologists; licensed clinical social workers; and licensed marriage, family, and child counselors.

### **County Clusters**

To improve reliability of suicide statistics, we grouped counties with populations under 100,000 together with neighboring counties and analyzed them as a unit. Counties were grouped according to proximity and by similarity of ethnicity, urbanicity, and income. In this way, we converted the 58 California counties into 41 county clusters. For simplicity of presentation, we refer to county clusters as *counties* within this paper.

The ethnic composition of the state as of 1997 included 52% European American, 29% Latino, 11% Asian American, 7% African American and less than 1% American Indian residents. California counties vary widely in their ethnic makeup. For example, the proportion of European Americans within a county ranged from 24% to 93% and the proportion of Latinos ranged from 4% to 70%. Urban areas have higher proportions of Asian American and African American residents, and lower proportions of European American and American Indian residents.

California counties vary widely in level of urbanicity, ranging from 36% urban in the Sierra Nevada mountains to 100% urban in San Francisco, with a median in the state of 87% urban. The most rural counties are characterized by either agriculture or forestry and mining industries.

California counties also differ with regard to availability of physicians. The lowest rate of physicians, 69 per 100,000 residents, is recorded in the cluster of rural northern counties of Glenn, Tehama, and Colusa. The highest rate, 561 per 100,000, is found in the state's most urbanized county, San Francisco.

The distribution of mental health care providers in California is similar to that of physicians. The county with the fewest mental health care providers, 20 per 100,000, is Imperial, a county on the U.S.–Mexico border with a large Latino population. The highest rate of mental health care providers, 625 per 100,000, is found in Marin, an urbanized county in the San Francisco Bay Area with a high proportion of European American residents.

To correct for skewed distributions, we rank-transformed the data for urbanicity, availability of physicians, and availability of mental health care providers.

### **Analyses**

To begin, we examined zero-order Spearman correlations between aggregated suicide rates (1993–2001) and urbanicity and between suicide rates and rates of physicians and mental health providers. We then used multivariate linear regression to test whether urbanicity would moderate the relationship between number of care providers per capita and suicide rate. Separate analyses used mental health care providers and physicians to predict suicide rates. Analyses were conducted for overall suicide rates and by ethnic group, with additional analyses by age group and gender.

## RESULTS

Table 1 shows statewide suicide rates for 1993–2001 (alternate years), by gender, age group, and ethnicity. The highest rates are found among men, individuals aged 65 and older, and European Americans, consistent with existing literature.

An examination of the zero-order correlations reveals that more rural counties (i.e., lower level of urbanicity) have higher overall suicide rates, as hypothesized (Table 2). The effect varied by ethnic group and was significant only among European Americans.

We next tested whether lack of providers in rural areas explained differences between rural and urban suicide rates. As expected, there were fewer physicians ( $r = .57, n = 41, p < .0001$ ) and mental health care providers ( $r = .33, n = 41, p < .05$ ) per 100,000 residents in the more rural counties. The number of physicians and number of mental health practitioners in a county were highly correlated ( $r = .84, n = 41, p < .0001$ ). However, overall suicide rate was not associated with number of physicians or number of mental health care providers per capita (Table 2). The suicide rates for African Americans and for women were actually higher in counties with greater numbers of providers, although an examination of the data by county showed that these effects could be attributed to anomalously high rates in several counties rather than a linear relationship. None of the other ethnicity-specific suicide rates was significantly correlated with number of providers, nor was the male suicide rate.

We next used multivariate regression to test for an interaction between urbanicity and number of providers, considering both overall suicide rate and ethnicity-specific rates. No significant interactions were found, either for physicians or for mental health care providers.

## DISCUSSION

The major findings of this study are that suicide rates are higher in rural compared to urban counties, but that numbers of physicians and mental health care providers per capita are not associated with rates of suicide and, therefore, cannot explain the urban–rural differential in suicide rates.

Although high suicide rates in rural areas cannot be explained by lack of providers, it is possible that other factors related to mental health care play a role. Geographic barriers to accessing care (e.g., travel distance to clinic), normative beliefs proscribing help-seeking, and poor quality of services offered have each been suggested as barriers to mental health care in rural communities (Human & Wasem, 1991). Our data do not permit testing quality and accessibility of care.

Another explanation that has been proposed for the high rates of suicide in the rural United States is greater availability and accessibility of firearms (U.S. Department of Justice, 1997). We examined this possibility in our data. Logistic regression analyses of individual-level suicide data reveal that the use of guns rather than another means of suicide was more likely with decreasing urbanicity, after accounting for the effects of gender and ethnicity, Wald (1 *df*) = 73.5,  $p < .0001$ , OR = 1.76, 95% confidence interval 1.55, 2.00. In the most rural counties, 57% of suicides were completed using a gun, compared to 49% in the most urban counties. Thus, the availability and accessibility of firearms would be an appropriate focus of future studies designed to explain high rates of suicide in rural areas.

Table 1. California Suicide Rates by Gender, Age Group, and Ethnicity 1993–2001

Year	Overall*	Male*	Female*	Aged 0–14	Aged 15–19	Aged 20–34	Aged 35–64	Aged 65+	Euro-Am.*	Latino*	Asian Am.*	African Am.*	Am. Indian*
1993	11.3	18.0	4.8	0.4	10.0	13.4	15.6	24.9	14.0	5.8	8.0	9.4	5.3
1995	11.3	17.9	4.8	0.5	8.8	14.0	15.8	21.9	14.3	6.0	6.8	9.2	10.6
1997	9.6	15.1	4.3	0.3	7.1	11.4	14.0	20.6	12.4	5.0	7.2	6.4	7.8
1999	8.2	13.1	3.5	0.3	4.6	9.9	12.3	17.7	10.7	4.5	5.8	5.9	5.7
2001	8.5	13.5	3.6	0.3	5.1	10.3	12.8	17.4	11.2	4.9	5.1	5.6	5.6

Note. Rates are per 100,000 residents.

\*Age-adjusted rate.

**Table 2. Spearman Rank Order Correlations Between Suicide Rates and Urbanicity, Mental Health Providers and Physicians**

<i>Rate</i>	<i>% Urban</i>	<i>Mental health providers<sup>a</sup></i>	<i>Physicians<sup>a</sup></i>
Suicide <sup>b</sup>	-.59***	.15	.01
Male suicide	-.59***	.09	-.05
Female suicide	-.39*	.41**	.26
Euro-American suicide	-.46**	.13	.01
Latino suicide	.04	-.21	-.08
Asian American suicide	-.12	-.24	-.15
African American suicide	.25	.30	.39*
American Indian suicide	.01	.03	.06
Suicide for ages:			
0-14	-.45**	-.21	-.30
15-19	-.10	.19	.20
20-34	-.44**	.12	-.02
35-64	-.58***	.13	-.01
65+	-.59***	.16	.08

<sup>a</sup>Providers per 100,000 population.

<sup>b</sup>Suicide rates represent number of suicides per 100,000 population. All suicide rates (except those for specific age groups) are age-adjusted.

*N* = 41 county clusters.

Like other studies of completed suicides, this one is limited by the use of official death certification statistics. There is some indication from other studies that urban-rural differences may have been due to differential use of the category of undetermined death (Saunderson, Haynes, & Langford, 1998). We conducted additional analyses to test for this possibility in our data. Logistic regression analyses of individual-level data for all suicidal and undetermined deaths show that urbanicity is not related to classification of a death as undetermined,  $\chi^2(1) = 0.06$ , *ns*. This result suggests that use of suicide statistics in the urbanicity analyses was appropriate. Furthermore, our use of rates specific to age, gender, and ethnicity groupings reduces the concern related to possible systematic biases.

The current study does not support the widely held notion that high rates of suicide in rural areas can be attributed to lack of physicians and mental health treatment providers. Treatment providers are underrepresented in rural areas—a problem that merits attention in its own right. In addition, suicide rates are clearly higher in rural areas. Nonetheless, future investigators would do well to seek other explanations for this major public health problem.

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