

# Rural and Urban Disparities in Health-Related Quality of Life Among Veterans With Psychiatric Disorders

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**Objective:** The authors studied whether rural and urban disparities in health-related quality of life, demonstrated previously among veterans, persist among veterans with common psychiatric disorders. **Methods:** A cohort of 748,216 users or anticipated users of Veterans Affairs services completed the Veterans Short Form Health Survey in 1999. From the survey, the authors determined health-related quality-of-life scores (physical [PCS] and mental [MCS] health component summaries) and used ICD-9-CM codes to identify veterans with six mental health disorders—depression, anxiety, posttraumatic stress disorder, alcohol dependence, schizophrenia, and bipolar disorder. With Rural-Urban Commuting Area codes to determine urban residency, the prevalence of psychiatric illness and health-related quality of life were compared across rural and urban groups. **Results:** All psychiatric disorders except anxiety disorders not related to posttraumatic stress disorder were more prevalent in urban settings. However, rural veterans within mental illness cohorts had worse PCS and MCS scores. Differences in PCS scores were substantial, ranging between 2.27 for schizophrenia and 3.39 for alcohol dependence ( $p < .001$  for all diagnoses). Differences in MCS scores were statistically significant but modest. In regression models, rural-urban disparities within psychiatric disorder cohorts persisted after sociodemographic factors were controlled for. **Conclusions:** Although less likely than their urban counterparts to have mental disorders, rural veterans with mental illness experienced a greater disease burden and were likely to incur greater health care costs. Improving access to mental health care for veterans in rural settings may narrow quality-of-life disparities among rural and urban veterans. (*Psychiatric Services* 57:851–856, 2006)

The Veterans Health Administration (VHA) provides comprehensive mental health services to veterans across the United States through regional delivery networks. Because of its relatively small service population and limited financial resources, many VHA services have been regionalized to reduce administrative costs. Specialty mental health services may be available only in urban referral centers, and access to even routine mental health services may be limited to parent Veterans Affairs (VA) facilities. Travel distances for rural veterans who are remote from referral centers or parent facilities may implicitly restrict veterans' access to mental health services, and restricted access may result in underutilization of services (1–3). Because the veteran population experiences a particularly high incidence of mental illness (4), providing adequate mental health care to rural veterans is especially challenging and important.

We previously demonstrated that rural veterans have lower health-related quality of life than their urban counterparts; these differences in health-related scores were substantial, likely to be clinically significant and to be associated with increased costs of care, and pervasive over a majority of VA's regional service networks (5). However, rural-urban differences in disease incidence were potential explanations for the differences that we found. Therefore, to further explore rural-urban dispari-

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ties, we used *ICD-9-CM* codes to identify veterans with six psychiatric disorders, and we compared health-related quality-of-life scores for rural and urban veterans within these diagnostic categories.

## Methods

We conducted a cross-sectional study of health-related quality-of-life scores using the 1999 Large Health Survey of Veteran Enrollees (6). That survey used a modification of the Medical Outcomes Study 36-item Short Form Health Survey (7) called the Veterans SF-36. The Veterans SF-36 includes a multi-item scale that assesses health limitations in eight domains: physical activities because of health problems; social activities because of physical or emotional problems; usual role activities because of physical health problems; bodily pain; general mental health—psychological distress and well-being; limitations in usual role activities because of emotional problems; vitality—energy and fatigue; and general health perceptions (8). The Veterans SF-36 has been widely used, disseminated, and documented as reliable and valid in the VHA (9).

In late 1999 the survey was administered to a random sample of 1.4 million veteran enrollees who had used VHA services within the prior three years or who had enrolled in VHA in anticipation of using services in the future. Of those, 877,775 responded to the survey and 805,422 responded with usable Veterans SF-36 data. Of these, 136,177 had been diagnosed with one or more of the six common psychiatric disorders of interest—depression, anxiety disorder excluding posttraumatic stress disorder (PTSD), PTSD, alcohol dependence, schizophrenia, and bipolar disorder. From the Veterans SF-36 responses of those with psychiatric diagnoses, we calculated physical (PCS) and mental health (MCS) component summary scores.

For PCS and MCS scores, we used a *t* score transformation for summary scores and normalized them with a mean of 50 and a standard deviation of 10 in a general U.S. population. Lower scores de-

note worse health for the summaries, and differences in Veterans SF-36 scores of 2.5 points have been associated with increased morbidity (10). For example, with the analysis controlling for other diagnoses, depression is associated with an 8-point lower MCS score, and alcohol disorders are associated with a 6.6-point lower score. Lower scores also have been associated with increased resource consumption. For veterans, a 1-point decrease in PCS is associated with an annual \$148.20, or 3.2 percent, increased cost of care over the average cost of \$4,632 per patient. A 1-point decrease in MCS is associated with an independent annual \$86.40, or 1.9 percent, increase in costs of care per patient when age, gender, and *ICD-9-CM*-defined comorbid disorders are controlled for (11,12). Therefore, population differences in Veterans SF-36 scores can be used to anticipate population differences in morbidity, health care needs, and anticipated health care expenditures.

The survey also collected Social Security number, self-reported demographic data (age, gender, race, maximum educational attainment, and employment status), and zip code of residence. We linked respondents' Social Security numbers to VHA databases to determine diagnostic cohorts, dates of death, and VHA priority level.

## Diagnostic cohorts for comparison purposes

We used *ICD-9-CM* codes recorded in outpatient or inpatient treatment for the three years before the survey to categorize veterans into six psychiatric diagnostic categories (13). We also used *ICD-9-CM* codes to calculate comorbidity indices. Mental and physical health comorbidity indices were calculated as the sum of *ICD-9* codes for six mental health and 30 medical diagnoses recorded in outpatient or inpatient treatment for the three years before the survey. The indices range from 0 to 6 for mental health and from 0 to 30 for physical health, and they were previously validated (13). For example, a patient who had *ICD-9* codes for two mental health and four physical health condi-

tions would have a mental health comorbidity index of 2 and a physical health comorbidity index of 4.

## Date of death

The VA's Beneficiary Identification and Records Locator Subsystem is a centralized data set that stores veterans' dates of death. We linked our data to this data set to identify veterans who died between 1999 and 2003.

## Veterans' priority levels

Priority levels range from 1 to 7 (although there are now eight priority levels, at the time of the survey there were seven), are specific to an individual veteran, and are associated with severity of service-related disabilities, special status, and income level. Veterans with priority levels 1 through 6 tend to be more disabled, poorer, and more reliant on VHA for health care services and to have lower mean MCS and PCS scores than veterans with a priority level of 7 (9). Because priority level could confound observed differences in rural-to-urban comparisons, we included priority levels in our regression model.

We used zip code of residence to calculate two variables, residential area and census region.

## Rural or urban residence

To identify veterans as living in a rural or an urban setting, we used Rural-Urban Commuting Area (RUCA) codes developed by the Health Resources and Services Administration's Federal Office of Rural Health Policy, the Department of Agriculture's Economic Research Service, and the WWAMI Rural Health Research Center at the University of Washington School of Medicine (14). We used the Washington State Department of Health's RUCA consolidation system (15) to classify and compare urban veterans (those in areas of 50,000 persons or more, corresponding to U.S. Bureau of the Census's defined urbanized areas; RUCA code 1.0) with rural veterans (those in small towns and isolated rural areas that consist of towns with populations below 10,000, their commuter sheds, and other isolated rural areas; RUCA codes 7.0, 7.3, 7.4, 8.0, 8.3, 8.4, 9.0, 9.1, 9.2, 10.0, 10.3, 10.4, and 10.5).

## Census region

To correct for regional variation across the United States, we used zip code data in our regression analyses to determine the major U.S. census region—northeast, south, midwest, and west—in which each veteran respondent resided. Because census region could confound observed differences in rural-to-urban comparisons, we included census region in our regression model.

Zip code data were not available for 38,313 veterans, or 4.4 percent of respondents. In addition, zip code data did not match RUCA codes for 18,893 veterans, or 2.2 percent of respondents, leaving a total of 748,216 respondents for analysis. Of these, 148,989 lived in rural settings, 421,523 lived in urban settings, and 177,704 lived in suburban settings. Because we were interested in comparing rural with urban veterans, we limited our analysis to only rural and urban groups, of which 128,352 respondents had been diagnosed with one or more of the six psychiatric disorders of interest.

## Statistical analysis

We calculated the incidences of six common psychiatric disorders in the rural and urban veteran population and compared them by using odds ratios. Within each psychiatric diagnostic category, we compared unadjusted mean PCS and MCS scores using analysis of variance. We conducted multivariate analysis using ordinary least-squares regression to examine the association of rural-urban status with the Veterans SF-36 with controls for age, gender, VA priority status, comorbidity indices, and U.S. census region. Multivariate analysis was limited to the 128,352 respondents from urban or rural residence settings with one or more of the six psychiatric diagnoses.

## Results

All psychiatric disorders except non-PTSD anxiety disorders were more prevalent in urban than rural settings; differences were statistically significant for all diagnoses except non-PTSD anxiety disorders (Table 1). However, across all mental disorders examined, veterans who lived in rural

**Table 1**

Prevalence of six psychiatric disorders in rural and urban veteran populations

Disorder	Rural (N=148,989)		Urban (N=421,523)		OR <sup>a</sup>	CI
	N	%	N	%		
Depression	18,300	12.3	57,239	13.6	.90	.89–.92
Anxiety, excluding post-traumatic stress disorder (PTSD)	12,793	8.6	36,704	8.7	.99	.97–1.01
PTSD	9,139	6.1	28,856	6.8	.90	.87–.92
Alcohol dependence	7,017	4.7	28,985	6.9	.68	.67–.70
Schizophrenia	3,481	2.3	17,421	4.1	.57	.54–.59
Bipolar disorder	2,445	1.6	11,345	2.7	.61	.58–.64
Total number of veterans with disorders	31,465 <sup>b</sup>	21.1	96,887 <sup>b</sup>	23.0	.92	.91–.93

<sup>a</sup> Reference group: urban

<sup>b</sup> Overlap in mental disorder prevalence accounts for the sum of each disorder being greater than the total of all vets with psychiatric disorders.

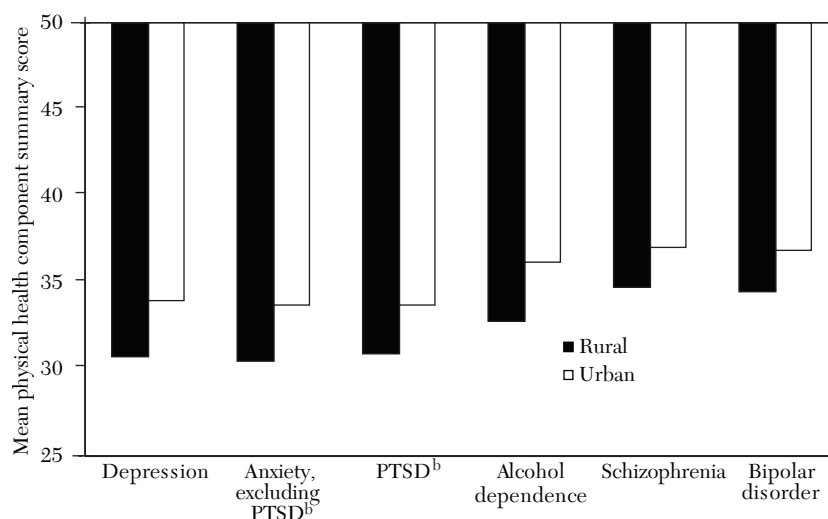
settings had lower PCS and MCS scores, denoting worse physical and mental health–related quality of life. Differences in PCS scores (Figure 1) were substantial, ranging between 2.27 for schizophrenia and 3.39 for alcohol dependence ( $p < .001$  for all categories). These differences were associated with expected additional annual health care costs of between \$336 (or a 7.3 percent increase over the average annual cost) and \$502 (or a 10.9 percent increase over the average annual cost) per veteran.

Differences in MCS scores (Figure 2) were modest, ranging between .74 for schizophrenia and 1.96 for PTSD ( $p < .005$  for all diagnoses). The differences that we found would be associated with anticipated increased annual costs per veteran of between \$64 and \$169 (1.4 to 3.7 percent greater costs).

Rural-urban quality-of-life disparities found in unadjusted data persisted after the multivariate analysis controlled for other factors (Table 2). The mean adjusted PCS score for all

**Figure 1**

Mean unadjusted physical health component scores for rural (N=31,465) and urban (N=96,887) veteran populations, by psychiatric disorder cohort<sup>a</sup>

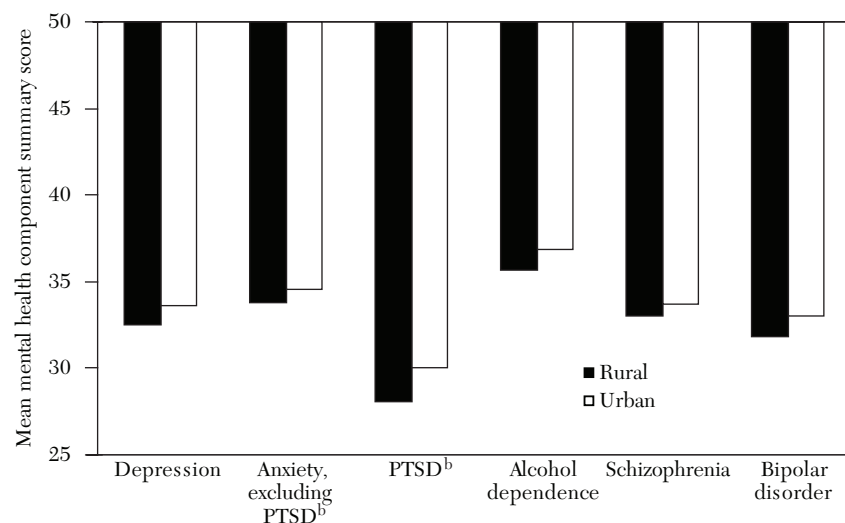


<sup>a</sup> For comparative purposes, the general United States population would have scores of 50 on average. A lower score indicates worse health-related quality of life.

<sup>b</sup> Posttraumatic stress disorder

**Figure 2**

Mean unadjusted mental health component scores for rural (N=31,465) and urban (N=96,887) veteran populations, by psychiatric disorder cohort<sup>a</sup>



<sup>a</sup> For comparative purposes, the general United States population would have scores of 50 on average. A lower score indicates worse health-related quality of life.

<sup>b</sup> Posttraumatic stress disorder

**Table 2**

Differences in summary scores on two components of the Veterans Short Form 36 associated with characteristics of 173,104 rural, urban, and suburban veterans with at least one psychiatric disorder

Variable	Physical health score <sup>a</sup>			Mental health score <sup>b</sup>		
	Difference	SE	p	Difference	SE	p
Demographic characteristic <sup>c</sup>						
Age	-.002	.002	.487	.200	.003	<.001
Female	.559	.106	<.001	2.726	.135	<.001
Black	.111	.075	.141	.573	.096	<.001
Married	-1.349	.051	<.001	-.232	.065	<.001
Employed	6.910	.063	<.001	6.143	.080	<.001
Education 12 years or more	1.216	.051	<.001	1.79	.065	<.001
Census region <sup>d</sup>						
Northeast	.902	.074	<.001	-.011	.094	.907
Southeast	-1.504	.072	<.001	-2.133	.092	<.001
Midwest	.044	.079	.575	-.076	.101	.454
South	-1.303	.077	<.001	-1.399	.098	<.001
Priority status <sup>e</sup>						
1	-2.967	.087	<.001	-3.891	.111	<.001
2	-2.622	.103	<.001	-2.665	.131	<.001
3	-1.816	.098	<.001	-1.148	.124	<.001
4	-4.528	.148	<.001	-2.089	.188	<.001
5	-1.106	.078	<.001	-.806	.100	<.001
6	-1.531	.222	<.001	-2.136	.282	<.001
Urban veterans <sup>f</sup>	1.516	.065	<.001	.73	.083	<.001
Comorbidity index	-.60	.013	<.001	.075	.017	<.001

<sup>a</sup> Mean±SD=37.7, model R<sup>2</sup>=.30. Differences of 2.5 points have been associated with increased morbidity (10).

<sup>b</sup> Mean±SD=28.6, model R<sup>2</sup>=.20. Differences of 2.5 points have been associated with increased morbidity (10).

<sup>c</sup> Reference groups: male, white, unmarried, unemployed, education less than 12 years

<sup>d</sup> Reference group: western census region

<sup>e</sup> Indicates severity of disability, with lower status indicating greater disability. Reference group: priority status 7

<sup>f</sup> Reference group: rural

psychiatrically diagnosed respondents was 37.7, or 1.3 standard deviations lower than U.S. age-adjusted norms; the mean MCS score was 28.6, or 2.4 standard deviations lower than U.S. age-adjusted norms. Veterans who were male, unemployed, lived in the southern or southeastern U.S. census region, and who had fewer than 12 years of education had lower PCS and MCS scores. In comparison with priority 7 status, all other priority levels were associated with lower PCS and MCS scores. Finally, after the analysis corrected for other variables, rural status was associated with a 1.5-point lower PCS score and a .7-point lower MCS score. These variables explained 30 percent of the variance of the physical health component scores and 20 percent of the variance seen in mental health component scores.

## Discussion

We found that although the incidence of six major psychiatric disorders was lower among rural veterans, rural veterans with these disorders had greater disease burden, as demonstrated by lower health-related quality-of-life scores, when compared with their urban counterparts. For PCS summary scores, the differences were substantial; for MCS summary scores, the relationship, although present, was less dramatic. These rural-urban disparities persisted after the analysis corrected for age, gender, employment status, priority level, comorbidity, and the U.S. census region in which the veteran lived.

For rural mental health care providers, these findings offer supportive evidence that living in a rural setting is associated with greater impairment, as defined by poorer quality of life. Various factors contributed to the rural-urban disparities that we found. Although primary care at rural VA centers has been shown to be of equal or better quality than that in urban settings (16), it is possible that quality of mental health care in rural areas may be different from that in urban areas. Alternatively, the differences that we found may be mediated through rural veterans' limited access to care. Others have found that the quality of mental health care, as de-



financed by treatment concordant with clinical guidelines, was compromised for patients with depression in rural areas who had fewer visits because of greater distance to care (17). Likewise, clinical outcomes, as defined by suicide attempt and hospitalization rates, were worse among patients with depression from rural settings compared with urban patients, at least in part because the former group was able to access fewer specialty mental health services (18). We have also demonstrated that rural veterans used fewer VHA and Medicare services than their urban counterparts (19). It seems likely that restricted access to mental health care in rural settings may be a mediating factor for poorer quality of life among veterans with psychiatric disorders.

The smaller rural-urban differences in quality-of-life scores for mental health versus physical health also are not surprising. Others have found that strong social supports serve as positive, moderating factors against depression (20–23) and that rural residents are more likely to have and seek social supports (24,25). The social and emotional advantages of rural living may not be similarly translated into physical quality-of-life advantages. Specifically, in rural areas the lack of municipal services, including public transportation and municipal recreational resources, may worsen the physical health of rural residents compared with urban residents, independent of an individual's socioeconomic status (26–28). However, in our cross-sectional analysis, it was impossible to determine whether those with lower health-related quality of life congregate in more rural settings or whether rural living results in lower health-related quality of life.

### **Implications**

Our findings have important implications for the mental health resource needs of veterans in rural areas. Others have demonstrated that lower health-related quality-of-life scores are associated with greater health care service needs in the general population (29). The differences that we found suggest that rural veterans with psychiatric diagnoses will generate health care costs from 2 to 4 percent

higher than their urban counterparts on the basis of MCS scores and from 7 to 11 percent higher on the basis of PCS scores. The combination of lower scores, greater anticipated service needs, and higher anticipated costs suggests that policy makers should be cautious when comparing costs and utilization of care for those with mental disorders across rural and urban settings.

Increasing the number of mental health care access points may help meet mental health care needs. Within VHA, this balance could be achieved in several ways. First, VHA could dedicate more resources to rural mental health care delivery—through development of additional programs in rural VHA medical centers, augmented reimbursement for rural delivery systems, broader use of distance technology, or collaboration with the community to enhance non-health care issues that might contribute to worse quality of life. VHA has invested heavily in distance technology to improve access to mental health services for rural veterans. Tele-mental health care delivery already takes place at 228 sites, including 120 community-based outpatient clinics (30). Since the survey, VHA has also markedly increased the number of primary care access points for all veterans, including those in rural settings, through the establishment of outpatient clinics. Recently, VHA mandated that 10 percent of the workload in outpatient clinics be dedicated to mental health care.

Indeed, linking mental health and primary care within the same clinics has proven successful in other settings (31). However, mental health providers experience disincentives to rural practice as well, including professional isolation and limited access to supervision (32). Enticing rural mental health clinicians, who are already in high demand (33), to practice in these clinics may be challenging. In addition, VHA might consider the development of a coordinated federal or state health care benefit for veterans who live in rural settings. Veterans are likely to be enrolled in Medicare (34). A coordinated federal benefits package for rural veterans could take advantage of existing non-

VHA infrastructure in rural settings, thereby improving access to care without expanding infrastructure, at least for older veterans with mental health disorders or veterans whose disabilities qualify them for Medicare. In addition, many chronically mentally ill veterans may qualify for community mental health services through state Medicaid programs. Finally, VHA might partner independently with community mental health centers to provide psychiatric services for rural veterans through outsourcing or space- or staff-sharing agreements.

### **Limitations**

Our study has several limitations. First, it used a cross-sectional database that was limited to self-report of functional status, and the survey was conducted seven years ago, in 1999. Therefore, we were not able to examine trends over time. Although the sample was very large and the differences were important, the VA health care delivery system has changed over the past several years. Therefore, studies using more recent, longitudinal cohort data are needed to determine whether our findings persist. Second, our study stratified results by rural setting as defined by RUCA codes. The study compared neither the quality of VHA care in rural and urban settings nor the relationship between access to that care and health-related quality of life. Additional studies are required to address whether rural veterans' health-related quality-of-life scores might be enhanced by access to care.

Third, we were not able to examine environmental, economic, or social factors that may contribute to lower health-related quality-of-life scores that we found in rural settings. For instance, the differences that we found may be facilitated by restricted access to care in rural settings. It is possible that, because of the long distance to care for many veterans in rural settings, only those with the greatest health care needs were enrolled in the VHA system and were therefore part of the survey. Fourth, our study was limited to veterans—a population likely to be older, poorer, and sicker than the general popula-

tion. Because of the paucity of women and absence of children in our data set, generalization of our findings to the entire U.S. population may be limited. Finally, our study may underestimate differences between rural and urban veterans; the “floor effect” (35) that exists at the low score levels that we saw may mitigate the true differences that exist.

## Conclusions

Despite these limitations, the findings shed light on health care–related quality of life in the rural population, highlight potential disparities in health care needs, and underscore challenges of mental health care delivery to rural populations. These results strongly suggest that administrators should anticipate greater health care demands from the mentally ill rural veteran population and pursue innovative strategies, including coordination of federal health benefits, to meet their physical and mental health care needs.

## Acknowledgments

The research reported here was supported by the Veterans’ Rural Health Initiative and by grant REA 03-098 from the Department of Veterans Affairs, Veterans Health Administration (VHA), Health Services Research and Development Service. The authors thank VHA’s Office of Quality and Performance for providing the data for analysis. Dr. Wallace was supported by a VA Health Services Research and Development Advanced Career Development Award.

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