

Rurality and Mental Health Treatment

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Abstract Diversity within rural areas renders rural–urban comparisons difficult. The association of mental health treatment rates with levels of rurality is investigated here using Rural–Urban Continuum Codes. Data from the 1996–1999 panels of the Medical Expenditure Panel Survey are aggregated to provide annual treatment rates for respondents reporting mental health problems. Data show that residents of the most rural areas receive less mental health treatment than those residing in metropolitan areas. The adjusted odds of receiving any mental health treatment are 47% higher for metropolitan residents than for those living in the most rural settings, and the adjusted odds for receiving specialized mental health treatment

are 72% higher. Findings suggest rural community size and adjacency to metropolitan areas influence treatment rates.

Keywords Mental health · Health services · Rurality · Health disparities

Introduction

Mental health problems are both common and costly, yet they remain largely untreated. The under-treatment of mental health disorders is not new, as evidenced by years of documentation (Hirschfeld et al., 1997; Kessler et al., 1994; Kohn, Saxena, Levav, & Saraceno, 2004; Regier et al., 1993; Weilburg, O’Leary, Meigs, Hennen, & Stafford, 2003). More recent research shows that fewer than half the people with mental health problems receive treatment for their mental health conditions, and a much smaller proportion receive treatment that meets minimally acceptable standards (New Freedom Commission, 2003; U.S. Department of Health and Human Services (USDHHS), 2004; Kessler et al., 2003; Wang et al., 2005). What is still more discouraging is that effective treatment for many of these disorders is available so the failure to deliver these services results in unnecessary personal distress and cost to the economy. There also is evidence that the treatment of mental disorders has shifted to the general health sector, where both detection and treatment of mental health problems is less likely to meet acceptable minimal standards (Hartley, Britain, & Sulzbacher, 2002; Olfson et al., 2002; Wang, Berglund, & Kessler, 2000; Wang et al., 2005, 2006).

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Rurality and the Use of Mental Health Services

Unmet need for care and shifting patterns of mental health treatment may be particularly prevalent in rural America. Rural areas present distinctive and substantial barriers to mental health treatment (Bischoff, Hollist, Smith, & Flack, 2004; Fortney, Thill, Zhang, Duan, & Rost, 2001; Fox, Blank, Rovnyak, & Barnett, 2001; Fox, Merwin, & Blank, 1995; Reschovsky & Staiti, 2005). While each rural community is unique, common barriers include distance and topographical challenges, insufficient population base to support services, population instability, limited number, training and isolation of rural providers, rural culture including attitudes such as individualism, the lack of anonymity afforded rural citizens who seek mental health care and stigma (Bachrach, 1983; Philo, Parr, & Burns, 2003). Given these challenges in obtaining treatment, it is not surprising that many investigators have documented diminished mental health treatment rates in rural areas (Freiman & Zuvekas, 2000; Li, Proctor, & Morrow-Howell, 2005; Reschovsky & Staiti, 2005; Wang et al., 2005). Careful examination of these studies, however, reveals significant methodological differences in population studied, sample size, characterization of mental health treatment, and definition of rurality, making it difficult to discern true differences in treatment rates and patterns of use between urban and rural areas and variation within discreet rural areas.

Five well-designed studies examining rural–urban mental health treatment disparities using large nationally representative databases illustrate this point. Two of these studies used refined measures of rurality. Data from the National Co-Morbidity Replication Study (NCS-R) based on retrospective respondent reports showed that rural residents had a substantially lowered probability of receiving treatment for a mental health problem when compared to residents in cities, suburbs, and rural areas adjacent to metropolitan areas (Wang et al., 2005). These investigators used 2000 Census bureau definitions to classify residence along six rural–urban dimensions and probability estimates were adjusted for sampling design. Rurality was captured as being adjacent to a metropolitan area or rural. While the investigators do not report sample size for these two dimensions and publicly available data from the NCS-R website does not provide information about sample size within these dimensions, at least one analysis is reported as not reportable due to inadequate sample size in the most rural dimension. In another study patient reports of a mental health visit were used to estimate treatment rates using data from the 2000–2001

Community Tracking Study Physician and Household Surveys (Reschovsky & Staiti, 2005). Place of residence was divided into metropolitan and non-metropolitan areas and non-metropolitan areas were further subdivided into rural areas adjacent ($N = 4812$) and non-adjacent ($N = 2,239$) to metropolitan areas; the non-metropolitan sample in this study is only marginally larger than that on which the findings of the present study are based. Residents of non-metropolitan areas reported fewer visits but there were no within rural differences found using these data.

The remaining studies reported here used the dichotomous measure of rurality—living in a metropolitan statistical area or not. For example, non-metropolitan respondents in the 1987 National Medical Expenditure Survey reported fewer specialty mental health visits than did metropolitan residents (Freiman & Zuvekas, 2000). Treatment rates were adjusted for self-reported mental health and treatment attitudes. Another study used 1992 Medicare Part B data to show that Medicare recipients living in non-metropolitan nursing home facilities received fewer mental health treatment visits than did those in metropolitan areas; these are unadjusted rates (Shea, Russo, & Smyer, 2000). A fifth study using adjusted rates of self-reported mental health visits in the 1996 Medical Expenditure Panel Survey (MEPS) also showed fewer mental health visits in non-metropolitan areas (Shea et al., 2000).

Research Objectives

Despite differences in how rurality is defined and treatment rates estimated, rural–urban disparities in receipt of mental health treatment seem evident. Methodological differences revealed above, however, are not insignificant and represent some of the difficulties inherent in conducting rural research, especially using publicly available datasets. These include difficulty obtaining refined measures of rurality due to confidentiality restrictions and obtaining a sufficient sample size on which to base estimates in the most rural places. In the study reported here disparities in receiving any mental health treatment and in receiving specialty mental health treatment are investigated using the Rural–Urban Continuum Codes (RUCC) (Butler & Beale, 1994). This typology defines nine levels of rurality/urbanicity and thus may be a better measure of the effects of rural diversity on mental health treatment rates. These codes classify metropolitan counties into three levels based on population size, and classify non-metropolitan counties

into six levels, based on adjacency to an urbanized area and the population of the county's largest urban area (See Table 1). The use of the RUCC typology is made possible by linking publicly available data from the MEPS in our data set to encrypted geocodes available only at the data center at the Agency for Healthcare Research Quality (AHRQ) in Rockville, MD. Data is pooled from four panels of the MEPS to create a sample that permits examination of mental health treatment in the most rural areas, something that previous studies have not reported. The treatment rates reported here are adjusted for sample characteristics, weighted to reflect the complex sampling design of the MEPS and broken down by self-reported mental health. It is expected that mental health treatment rates will be the lowest in the most rural areas, and across all levels of rurality self-reported mental health will affect the use of these services.

Methods

Data Source and Sample

The sample was derived by pooling four panels (1996–1999) of the household component of the Medical Expenditure Panel Survey (MEPS), a national survey designed to provide estimates of health services use, medical expenditures, and sources of payment, including insurance coverage for the civilian non-institutionalized population residing in the United States (Cohen, 2000, 2003). A new household MEPS sample is selected annually from a nationally representative sub-sample of the households participating in the National Health Interview Survey (NHIS) (Botman, Moore, Moriarity, & Parsons, 2000) of the preceding year. Data collected in the household survey include

demographic characteristics, use of medical care services, payments, access to care, income, and employment. Interviews are conducted with one member of each household, who reports on the health care experiences for the entire household. The sample or “panel” for each year is interviewed 5 times at roughly 6-month intervals during a 2.5-year period. Part of each interview (“round”) asks about the current status of each household member, and part of it asks about medical events during a period preceding the interview (the “reference period”). The reference periods, which in most cases run from the previous interview to the current interview, cover two calendar years in five non-overlapping intervals. So for each household member, there is a medical event history that covers 2 calendar years, plus information on status at each of the five interviews. Since a new panel is formed each year, the panels overlap, increasing the effective sample size at any given point in time. The overall response rate, combining the NHIS response rate and the response rate for Round 1 of the MEPS, varies between 73% and 78% for the 1996–1999 panels.

The MEPS has a complex multistage sample design that uses stratification, cluster sampling, and oversampling of certain population groups. The aggregated 1996–1999 panel data use stratum and primary sampling unit variables that are consistent across years. The weights are based on longitudinal panel weights provided by MEPS. Our analyses used as many as three separate observations from a single respondent, and the weights and design variables are adjusted to take this into account.

For a simple calculation of treatment rates in a 1-year period (Table 3), we used the data from the first and second years of each person's participation in the MEPS, treating the 2 years as separate observations (“person-year” observations). There were 108,983

Table 1 Rural–Urban Continuum Codes

Codes	Description	N (persons)
<i>Metropolitan counties (MSA)</i>		
1	Counties in metropolitan areas with a population of 1 million or more	14,320
2	Counties in metropolitan areas with a population of 250,000–1 million	6,328
3	Counties in metropolitan areas with a population of less than 250,000	2,170
<i>Non-metropolitan counties (Non-MSA)</i>		
Least rural		
4	Urban population of 20,000 or more, adjacent to a metropolitan area	12,271
5	Urban population of 20,000 or more, not adjacent to a metropolitan area	1,166
6	Urban population of 2,500–19,999, adjacent to a metropolitan area	1,879
Most rural		
7	Urban population of 2,500–19,999, not adjacent to a metropolitan area	1,557
8	Completely rural or with an urban population of less than 2,500, adjacent to a metropolitan area	287
9	Completely rural or with an urban population of less than 2,500, not adjacent to a metropolitan area	501

person-year observations with positive sample weights and interviews covering the full year, coming from 55,976 persons. From the 108,983, we excluded 32,791 with age below 18 and another 28,043 in which the person's mental health report was given by a proxy (i.e., someone other than the person), leaving 48,149 person-year observations coming from 27,391 persons.

We also examined treatment outcomes in the 4-month period subsequent to each interview, relating them to the person's state at the time of the interview (Tables 4, 5), and allowing for up to three observation periods for each respondent¹ (after the first, second, and third rounds). We treated the responses for each round as separate observations, again taking this into account in the analysis. Of the 172,591 person-round interviews with positive sample weights, from 58,938 persons, we excluded 51,566 interviews with age below 18 years, another 45,140 in which the person's mental health report was given by a proxy, and an additional 2,283 cases that were missing information on at least one variable used in our analyses. This left 73,602 person-round observations from 29,435 persons.

Geographic detail in the public use files for the MEPS is limited in order to prevent identification of respondents—the files provide only the metro–non-metro classification of the residence and the geographic region in the U.S. (only four provided) in which it lies. In order to access more detailed geographic information, we traveled to the AHRQ data center in Maryland to carry out our analyses, where we could link our aggregated data to encrypted geocodes.

Unadjusted annual rates of mental health treatment for each of the two categories of treatment were calculated using data from interviews complete for the calendar year under consideration and for each of the first and second years of each person's participation in the MEPS, treating the 2 years as separate observations (Table 3). This is possible because the survey weights and design variables take multiple observations of an individual into account. This procedure resulted in 108,983 person-year observations with positive sample weights based on responses from 55,976 persons. Observations from 32,791 respondents below the age of 18 and another 28,043 observations in which the person's mental health report was given by a proxy (i.e., someone other than the person) were

excluded resulting in a final sample of 48,149 person-year observations from 27,391 respondents.

Adjusted treatment rates for each of the two categories of treatment are calculated using data from observations obtained in the 4-month period subsequent to each interview, relating them to the person's state at the time of a given interview (Tables 4, 5), and allowing for up to three observation periods for each respondent² (after the first, second, and third rounds). We treated the responses for each round as separate observations, again taking this into account in the analysis. Of the 172,591 person-round interviews with positive sample weights from 58,938 persons, we excluded 51,566 interviews with age below 18 years, another 45,140 where the person's mental health status was reported by a proxy, and an additional 2,283 cases that had missing information on at least one variable used in our analyses. Our final sample for these analyses consisted of 73,602 person-round observations from 29,435 respondents.

Rurality

The Rural–Urban Continuum Codes (RUCC) developed by the Department of Agriculture (Butler & Beale, 1994) were used to discriminate levels of rurality. As shown in Table 1, all counties in the United States are grouped on a roughly ordinal scale by the population size of their metropolitan area and by the degree of urbanization and adjacency to a metropolitan area or areas (<http://www.ers.usda.gov/Briefing/Rurality/RuralUrbCon/>), downloaded 9/9/2006). Three metropolitan and six non-metropolitan areas are defined in this typology. Non-metropolitan counties are further classified by the aggregate size of their urban population and adjacency to one or more metropolitan areas. An adjacent county is one where the area physically adjoins one or more metropolitan areas and has at least 2 percent of its employed labor force commuting to central metropolitan counties. The advantage of using this typology when examining mental health services use is that counties that have sizeable populations and those adjacent to larger metropolitan areas may be more likely to have mental health and other economic resources (Merwin, Snyder & Katz, 2006). Table 1 also shows that non-metropolitan areas are additionally classified for the purposes of our logistic regressions (Tables 4, 5). For those

¹ The reference period following the fourth interview ends on Dec. 31 of a respondent's 2-calendar-year observation period in the MEPS. For most respondents, this period is less than 4 months long.

² We restrict our observation period to the first three rounds because provider event histories only cover a 2-year period. Thus, it is not possible to obtain a complete 4 months of data for most respondents after the fourth and fifth interviews.

analyses we collapsed the nine rural–urban levels into three distinct categories: metropolitan or MSA (Rural–Urban Continuum Codes 1–3), Least Rural Non-MSA (Codes 4–6), and Most Rural Non-MSA (Codes 7–9), in order to provide robust estimates.

Covariates

To examine the influence of perceived health status on mental health services, two measures, reported mental and physical health, were used. These were obtained by asking, “How would you rate your overall mental (physical) health?” and were rated on a 5-point scale whose responses ranged from “excellent” to “poor.” These two measures have been used in a number of studies for similar purposes (Freiman & Zuvekas, 2000; Green & Pope, 1999; Larson & Fleishman, 2003; Rucci et al., 2003). To increase the reliability of the reported mental health responses, we omitted all observations in which the response for the mental health question was contributed by a proxy respondent and not by the person in question. As a consequence, 37% of the adult observations were excluded from the analyses.

Several sociodemographic factors are used as controls in the logistic regression analyses including gender, race/ethnicity, age, education, employment status, and marital status. Gender is coded 1 for female and 0 for male. Ethnic racial origin is self-identified and coded into two Hispanic groups (Mexican-American and other Hispanic) and three non-Hispanic groups (white, African American, and other).] Age (in years) is divided into four categories: 18–24, 25–44, 45–64, and 65 and older. Education (in years of schooling completed) is divided into three categories: 0–11, 12, more than 12. Not employed is coded as 0 if the respondent was employed and 1 otherwise (including “retired”). To minimize problems of endogeneity, all of these control variables were measured prior to the 4-month period we used to determine whether or not a person received mental health treatment.

The income-to-needs ratio is calculated by dividing family income during the calendar year by the family’s poverty status (based on family size and composition). These ratios include values imputed for cases with missing income. The resulting percentages are grouped into five categories: poor (<100% of the poverty line), near poor (100–124% of the poverty line), low (125–199% of the poverty line), middle (200–399% of the poverty line) and high (400% of the poverty line or higher) 2. Health insurance is classified into five categories: not insured, privately insured, Medicaid, Medicare, and other public. Individuals are considered privately insured if they are covered by any private

insurance plan, including Medigap. Uninsured are individuals without public or private insurance.

Statistical Analysis

All analyses were done using the survey (svy) commands in Stata 8.2, which take into account the complex survey design of the MEPS. Stata uses linearization-based variance estimators which are appropriate for the design variables provided with the MEPS data. Table 2 presents population estimates of health status and demographic variables over the nine RUCC levels and includes the results of tests of independence of each variable against the RUCC. Estimates of mental health treatment rates for the nine RUCC levels are provided in Table 3 for the full population of adults as well as for the population represented by respondents reporting fair or poor mental health. Table 3 also includes the results of tests that the rates are constant over the nine RUCC levels. We then carried out logistic regressions of treatment rates on four nested sets of explanatory variables to see if the urbanicity/rurality differences observed in Table 3 were explained by covariates (Tables 4, 5). As noted earlier, we collapsed the nine RUCC categories into three for these regressions, because of small sample sizes from the most rural counties, which, by definition, have sparse populations. We also used person-round observations for the regressions, so that values recorded at a given MEPS interview are used to explain whether a person had a mental health visit in the 4 months immediately following the interview. Since several variables change from interview to interview, including mental and physical health status, marital and employment status, and insurance, their values should be and are proximate to the outcomes of treatment or no treatment. Stata provides a *t*-test for each odds ratio to test whether it is equal to 1 or not. For multidimensional tests, such as the tests of equality of rates across levels of rurality in Table 3 and the significance tests of the models in Table 4, Stata uses adjusted Wald tests (StataCorp, 2003).

Results

Population Differences

We used population estimates to describe residents in the nine RUCC categories (Table 2). The tendency reported in other research for rural residents to be older, impoverished, more poorly educated and uninsured is also evident among rural respondents in

Table 2 Estimated descriptive statistics for the adult civilian non-institutionalized U.S. population

Variable	Rural–Urban Continuum Category									
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)	
Age										**
18–24	9.6	11.3	13.8	10.6	11.2	8.9	10.0	11.8	6.5	
25–44	45.7	43.2	39.5	39.5	41.6	37.8	37.0	37.7	32.3	
45–64	28.0	28.3	26.5	28.5	27.6	31.7	32.6	33.9	32.6	
65 and older	16.8	17.3	20.1	21.4	19.5	21.7	20.5	16.6	28.5	
Female	60.1	61.6	60.1	60.3	61.9	65.8	59.6	67.8	65.6	**
Race/ethnicity										**
White, non-Hispanic	68.3	79.8	85.0	89.9	76.0	88.2	84.5	84.1	94.9	
Black, non-Hispanic	13.9	10.0	6.5	4.2	9.3	7.2	11.7	12.6	2.6	
Other, non-Hispanic	5.3	2.3	1.1	2.5	3.7	1.0	1.6	1.1	1.9	
Mexican-American	6.5	5.3	6.0	1.9	9.8	2.9	1.6	2.2	0.3	
Other Hispanic	5.9	2.5	1.4	1.6	1.2	0.7	0.6	0.0	0.3	
Region										**
North east	24.0	19.8	10.3	28.5	3.5	5.8	13.4	0.4	1.9	
Midwest	20.8	19.7	32.6	31.6	26.0	31.6	27.4	33.7	44.1	
South	26.3	44.5	42.1	20.5	31.6	55.9	47.7	63.8	47.3	
West	28.9	16.0	15.0	19.4	38.9	6.6	11.5	2.1	6.7	
Schooling (years)										**
0–11	17.9	21.4	19.6	20.8	26.7	32.8	27.8	30.1	32.5	
12	30.9	33.1	37.4	39.8	35.0	37.4	38.2	45.2	37.8	
13+	51.2	45.5	43.0	39.4	38.4	29.8	33.9	24.7	29.6	
Married	50.9	55.4	54.3	57.4	56.7	58.3	59.5	56.0	59.4	**
Income-to-needs ratio										**
Below poverty line (<100%)	11.2	12.5	13.0	10.9	16.4	15.5	16.3	16.3	19.8	
Near poor (100–124% of line)	3.9	4.5	5.6	4.9	6.4	5.1	5.3	8.2	7.8	
Low (125–199% of line)	12.5	12.9	16.9	15.6	15.4	17.9	18.4	19.5	17.3	
Middle (200–399% of line)	30.6	32.8	31.8	33.3	34.6	35.7	34.3	29.2	33.6	
High (400% or greater)	41.8	37.3	32.7	35.2	27.2	25.8	25.8	26.7	21.5	
Not employed at the interview	33.0	34.7	36.4	37.2	37.0	40.1	38.4	41.0	50.8	**
Insurance type										**
Not insured	16.0	15.3	16.7	14.4	19.1	17.5	19.2	19.8	17.1	
Private	59.1	57.7	54.2	56.7	51.2	51.5	49.9	53.7	43.0	
Medicaid	5.1	5.0	3.8	4.2	6.0	4.0	5.6	4.7	6.3	
Medicare	18.3	19.4	22.5	23.4	21.1	24.8	23.1	20.3	32.7	
Other public	1.6	2.7	2.7	1.2	2.6	2.2	2.1	1.4	1.0	
Reported mental health										**
Excellent	43.4	41.1	41.0	41.9	39.0	34.0	37.2	34.3	33.3	
Very good	30.5	30.8	29.9	32.9	28.9	29.8	28.6	31.5	29.5	
Good	21.0	22.5	23.0	20.6	25.5	28.3	27.4	28.8	26.7	
Fair	4.3	4.8	5.0	3.6	5.2	6.1	5.7	4.4	8.4	
Poor	0.9	0.8	1.1	1.0	1.4	1.8	1.2	1.1	2.1	
Reported physical health										**
Excellent	28.9	27.2	25.5	24.8	28.0	22.8	25.0	19.4	23.7	
Very good	33.0	33.1	33.1	33.6	28.2	29.7	28.8	31.1	27.0	
Good	25.5	26.1	27.0	27.8	28.2	29.0	29.3	29.9	27.4	
Fair	9.4	9.7	11.0	10.5	11.0	12.0	12.0	13.7	13.9	
Poor	3.3	3.9	3.3	3.3	4.6	6.5	5.0	5.9	8.1	
N = # person-round observations	35,620	15,874	5,476	3,109	2,902	4,744	3,882	715	1,280	
# Persons contributing observations	14,320	6,328	2,170	1,227	1,166	1,879	1,557	287	501	

The last column gives the results of tests of independence of each variable (age, female, race/ethnicity, etc.) against the Rural–Urban Continuum; ***P* < .01

Observations with proxy reports for reported mental health were omitted from all calculations

Survey weights were adjusted to take into account multiple person-round observations (usually three) contributed by respondents

The number of individuals contributing observations is provided in the last line

our sample. Residents of the most rural counties are also more likely to be non-Hispanic white than are MSA residents. In particular, while non-Hispanic

whites constitute an estimated 68.3% of the most metropolitan subpopulation, they constitute 94.9% of the areas with the greatest degree of rurality.

Table 3 Rates for receipt of mental health treatment within a 1-year period, by level of rurality and reported mental health

	MSA			Rural–Urban Continuum by Code Least Rural Non-MSA			Most Rural Non-MSA			(a)
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)	
<i>Any type of mental health visit</i>										
All adults (age ≥18)	9.3	9.6	9.5	8.7	8.9	10.7	8.9	5.1	7.1	**
95% Confidence Interval	8.6–9.9	8.6–10.6	8.3–10.7	6.9–10.4	6.6–11.2	9.3–12	7.9–9.9	3.2–7.0	3.3–10.9	
N = # person-year observations	23,291	10,337	3,586	2,041	1,916	3,113	2,557	472	836	
All adults (age ≥18), fair–poor reported mental health	40.8	38.7	44.1	39.7	33.7	32.4	26.1	14.5	23.7	**
95% Confidence Interval	36.8–44.7	34.1–43.3	36.1–52.2	29.0–50.5	27.0–40.5	25.8–38.9	16.5–35.8	0.1–28.9	11.3–36.2	
N = # person-year observations	1,403	702	248	120	154	296	225	47	96	
<i>Specialized mental health visit</i>										
Adults (age ≥18)	5.9	5.4	5.1	4.0	4.2	4.8	4.5	1.3	3.0	**
95% Confidence Interval	5.4–6.5	4.8–6.1	4.1–6.1	2.8–5.2	2.7–5.6	3.6–6.0	3.3–5.7	0.2–2.3	1.0–5.1	
N = # person-year observations	23,291	10,337	3,586	2,041	1,916	3,113	2,557	472	836	
All adults (age ≥18), fair–poor reported mental health	28.8	26.0	26.3	24.4	22.2	20.3	16.4	8.5	16.1	*
95% Confidence Interval	25.5–32.2	21.8–30.3	18.6–34.0	14.1–34.6	13.8–30.5	13.8–26.7	10.0–22.9	0.0–21.6	6.2–26.0	
N = # person-year observations	1,403	702	248	120	154	296	225	47	96	

(a) Level of significance for a test that the rates across all 9 categories are equal: * $P < .05$; ** $P < .01$

Observations with proxy reports for Reported Mental Health were omitted from all calculations

Survey weights were adjusted to take into account multiple person-year observations (usually two) contributed by respondents

Proportionately more Mexican-Americans reside in metropolitan counties than in the most rural counties. Respondents in the most rural counties reside

primarily in the South and Midwest while the most urban population is relatively evenly divided among the North East, Midwest, South, and West. Reports

Table 4 Urbanicity/rurality odds ratios from logistic models: four models each for any type of mental health treatment and for specialty mental health treatment occurring within the 4-month period following an interview

Model	(1) OR	(2) OR	(3) OR	(4) OR
<i>Any type of mental health visit in 4-month period</i>				
MSA vs. Most Rural Non-MSA	1.272 (1.87)	1.537* (2.98)	1.477* (2.77)	1.465* (2.63)
Least Rural Non-MSA vs. Most Rural Non-MSA	1.201 (1.36)	1.284 (1.66)	1.268 (1.64)	1.276 (1.63)
Model	(1') OR	(2') OR	(3') OR	(4') OR
<i>Specialized mental health treatment in 4-month period</i>				
MSA vs. Most Rural Non-MSA	1.755* (2.69)	2.159* (3.52)	1.750* (2.80)	1.719* (2.63)
Least Rural Non-MSA vs. Most Rural Non-MSA	1.173 (0.71)	1.247 (0.93)	1.172 (0.74)	1.176 (0.74)

Rural–Urban Groups: The nine RUCC were collapsed into three groups: MSA: Rural–Urban Continuum Codes 1–3; Least Rural Non-MSA: Codes 4–6; Most Rural Non-MSA: Codes 7–9

Models: All models include the indicator variables for MSA and Least Rural Non-MSA, with Most Rural Non-MSA being the omitted group. Models 1,1': No controls. Models 2,2': Self-reported mental health added. Models 3,3': Demographic characteristics added on: reported physical health, gender, age, race–ethnicity, marital status, region, schooling. Models 4,4': Access to care measures added on: income/needs ratio, employment status, type of insurance

The odds ratios for the control variables are omitted. (The full set of odds ratios for Models 4 and 4' appears in Table 5.)

Tests: All models except Model 1 were significant at $P < .05$. Absolute values of t -statistics for tests that individual odds ratios are equal to 1 are in parentheses; *significant at $P < .01$

Sample: The sample size is 73,602 person-round observations from adults. Observations with proxy reports for Reported Mental Health were omitted from all calculations

Table 5 Determinants of any type of mental health treatment and specialty mental health treatment within the 4-month period following an interview, for the adult civilian non-institutionalized U.S. population

Variable	Any type OR	Specialty OR
MSA vs. Most Rural Non-MSA	1.465**	1.719**
Least Rural vs. Most Rural Non-MSA	1.276	1.176
Reported mental health at the interview		
Very good vs. excellent	2.347**	3.175**
Good vs. excellent	5.018**	7.554**
Fair vs. excellent	14.431**	24.830**
Poor vs. excellent	23.244**	46.068**
Reported physical health at the interview		
Very good vs. excellent	0.961	0.837
Good vs. excellent	0.977	0.807
Fair vs. excellent	1.187	0.906
Poor vs. excellent	1.430*	0.874
Female	1.513**	1.503**
Age		
25–44 vs. 18–24	1.992**	2.096**
45–64 vs. 18–24	1.682**	1.367
65 and over vs. 18–24	0.695*	0.246**
Race/ethnicity		
Mexican vs. white	0.533**	0.536**
Other Hispanic vs. white	0.724*	0.725*
Non-Hispanic African American vs. white	0.377**	0.386**
Other Non-Hispanic vs. white	0.388**	0.323**
Married	0.645**	0.579**
Region		
Northeast vs. south	1.166	1.469**
Midwest vs. south	1.087	1.127
West vs. south	1.021	1.229
Schooling (years)		
0–11 vs. 12	0.832*	0.754*
13+ vs. 12	1.557**	1.949**
Income-to-needs ratio		
100–124% vs. <100%	0.869	0.801
125–199% vs. <100%	1.004	0.911
200–399% vs. <100%	0.997	1.005
>400% vs. <100%	1.223*	1.307
Not employed at the interview	1.446**	1.499**
Insurance type		
Not insured vs. private	0.785**	0.862
Medicaid vs. private	1.609**	1.669**
Medicare vs. private	1.660**	1.734**
Other public vs. private	1.779**	1.673
Panel		
Panel 2 vs. Panel 1	0.920	0.890
Panel 3 vs. Panel 1	0.940	0.780*
Panel 4 vs. Panel 1	0.896	0.804*

The table gives the full set of odds ratios for the logistic models (4) and (4') from Table 4

Rural–Urban Groups: MSA: Rural–Urban Continuum Codes 1–3; Least Rural Non-MSA: Codes 4–6; Most Rural Non-MSA: Codes 7–9

*Significant at $P < .05$; **significant at $P < .01$

of gender and employment are skewed as a consequence of dropping proxy respondents. For example, the proportion of the analyzed sample that is female

range from 59.6% to 67.8% when only those who self-reported mental health status are included. Similarly, since those who self-reported were necessarily at home during the MEPS interview, unemployment rates range from 33% to 50.8%, since the unemployed and retirees are more likely to have had the opportunity to self-report. It is important to note, however, that unemployment rates, even accounting for these factors, are considerably higher in rural areas.

Table 2 also shows that reported mental health significantly deteriorates as rurality increases ($P < .01$). For instance, an estimated 43.4% of the most urban metropolitan residents report “excellent” mental health, compared to 33.3% of residents in the counties with the greatest degree of rurality. The reverse trend occurs at the low end of the scale; only 5.2% of residents in the most urban counties report fair or poor mental health, compared to 10.5% of residents in the counties with the greatest degree of rurality. In our person-round data, reports of perceived physical and mental health have an unweighted correlation of $r = .56$ and we see a similar pattern for reported physical health. In the most urban counties only 12.7% of residents report fair or poor physical health, compared to 22.0% of residents in the counties with the greatest degree of rurality.

Treatment Disparities

Our main findings are presented in Table 3. Annual unadjusted mental health treatment rates for “any treatment” vary considerably and significantly across levels of rurality, generally dropping as rurality increases. For instance, in metropolitan counties the average treatment rates are 9.3% or more, while residents of those living in the most rural counties have treatment rates of 5.1% (RUCC 8) and 7.1% (RUCC 9) respectively. Rural–urban treatment disparities are wider still for those reporting fair to poor mental health. For that population, metropolitan counties have average treatment rates ranging from 38.7% to 44.1%, but the two most rural designations have mental health treatment rates of 14.5% and 23.7%. A similar pattern is evident for specialty treatment rates, which range from 5.9% in RUCC 1 down to 1.3% and 3.0% in RUCC = 8 and 9 counties, respectively. For those with fair or poor self-reported mental health, the specialty treatment rates drop from 28.8% in RUCC = 1 counties down to 8.5% and 16.1% in RUCC = 8 and 9 counties, respectively. Figure 1 displays the Table 3 rates in graphic form. The differences across levels of rurality

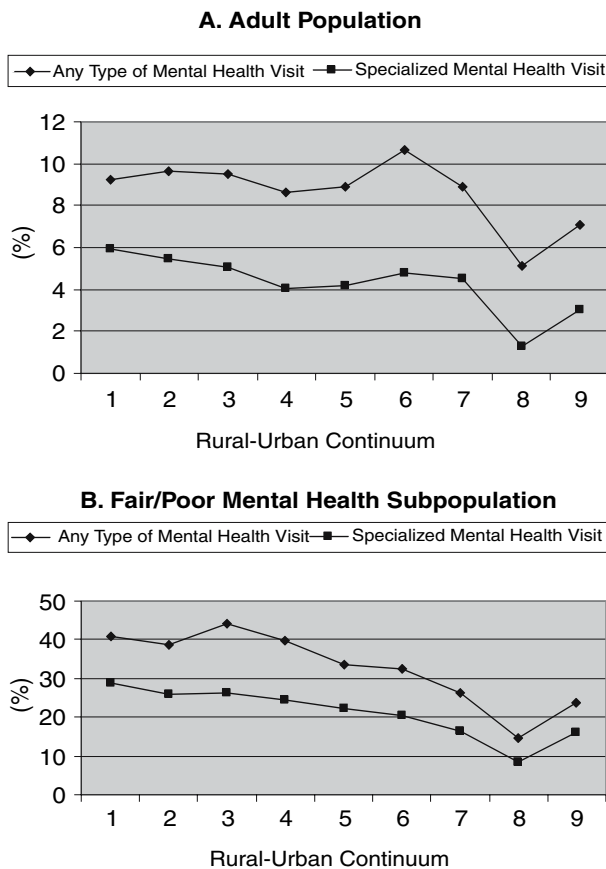


Fig. 1 Mental health treatment rates by level of rurality. The rates are estimated mental health treatment rates within a 1-year period for the adult civilian non-institutionalized U.S. population and for the subpopulation with fair or poor self-reported mental health. Data source: Table 3

are significant for rates unadjusted and adjusted for self-reported mental health status.

When the nine RUCC levels are collapsed to three, (see Table 1), the unadjusted treatment rate patterns across the three levels follow those reported earlier for the nine. Any-treatment rates are highest in the metropolitan and least rural counties (9.4%, 9.6%) and lowest in the most rural counties (8.0%); corresponding rates for adults with fair or poor reported mental health are 40.5%, 34.3% and 24.2%. Mental health specialty treatment rates are similar: 5.7%, 4.4% and 3.8% for all adults, and 27.7%, 21.6% and 15.5% for adults with fair or poor reported mental health. Combining RUCC = 8 and 9 counties with RUCC = 7 counties partially obscures the differences between the Code 8 and 9 counties and the MSA counties, so when only 3 rural–urban levels are used, the difference across those levels for “any type” of mental health visit, for all adults, is not significant ($P = .07$). However, for the other three sets of rates given just above,

the differences across the three urban–rural levels are significant ($P < .01$)

Table 4 shows the odds ratios comparing 4-month treatment/no treatment outcomes in MSA counties and in Least Rural Non-MSA counties to treatment outcomes in Most Rural Non-MSA counties. Four nested models are used, starting with two rurality-level indicator variables in Models 1 and 1', and adding increasingly larger sets of control variables in three increments: self-reported mental health added in Models 2,2', demographic variables added in Models 3,3', and access variables added in Models 4,4'. [Only the odds ratios for the rurality indicators are shown in Table 4.]

It is clear in Table 4 that the addition of control variables does not diminish the differences in treatment rates between the three urban–rural levels, and, in fact, for “Any Type” of mental health treatment, the addition of controls substantially increases the differences between MSA counties and Most Rural Non-MSA counties. When all controls are included, the estimated odds of a metropolitan resident having “Any Type” of visit are 46.5% greater than the odds for a resident in the Most Rural Non-MSA counties ($P < .01$). The estimated odds ratios for specialty visits show even greater disparity across levels of rurality. All else equal, the odds that MSA residents have a mental health specialty treatment visit are 71.9% greater than the odds for Most Rural Non-MSA residents.

Treatment Determinants

Self-reported mental health, demographic, and access parameters also influence treatment rates. The full set of odds ratio estimates obtained from logistic regression Models 4 and 4' in Table 4 is presented in Table 5. Women are substantially more likely to obtain both “any type” of mental health treatment and specialty treatment than are men. Non-Hispanic whites are significantly more likely to obtain either type of treatment than members of other racial/ethnic groups. There is also a strong positive association between schooling and mental health treatment, but almost no effect of income-to-needs on treatment. Married persons are significantly less likely to obtain treatment than the unmarried. The unemployed are much more likely to receive “any treatment” and specialty treatment than are employed persons. Individuals with public insurance are significantly more likely to obtain “any type” of treatment and specialty treatment than the privately insured; at the same time, the privately insured are more likely than the uninsured to obtain either type of treatment.

Discussion

Treatment Disparities

The findings of this research show that rural residents receive less mental health treatment of any kind, despite reports of poorer mental health. Treatment disparities between metropolitan areas and the most rural areas remain after factors known to affect mental health services use are controlled. While in concert with other studies of mental health treatment, these results indicate that not all rural communities are the same with regard to obtaining mental health care (Reschovsky & Staiti, 2005; Wang et al., 2005). Treatment rates in non-metropolitan areas with greater population density and proximity to urban areas were similar to those in metropolitan areas for both “any” and specialty treatment. Residents of rural communities with less than 20,000 residents and non-adjacent to metropolitan areas, however, were less likely to report “any treatment,” but more striking were the treatment disparities for mental health specialty care. Even when reporting fair to poor mental health, residents of the smallest rural communities received less of “any” mental health and specialty mental health treatment than those living in more urbanized areas.

The relatively better treatment rates in more populated rural areas and areas adjacent to metropolitan areas suggests that these counties have more resources directly within the counties or readily accessible to them than those with fewer residents or those which are more remotely located. The evidence for treatment disparities after controlling for the effects of population characteristics such as age, income and education, factors known to affect mental health services use, provides additional credence to the idea that mental health services are unavailable to rural residents living in small and remote rural communities. Research has shown that access issues like transportation, distance to care, and the availability of professionals and facilities all affect mental health services use (Arcury, Preisser, Gesler, & Powers, 2005; Anderson & Gitler, 2005; Fortney, Thill, Zhang, Duan, & Rost, 2001; Merwin et al., 2006). Still, other barriers to receipt of mental health services including the challenges of topography, lack of autonomy, and stigma, that can not be measured using our dataset but also could be operating to inhibit obtaining treatment. For example, the movement of a more educated population from urban to adjacent rural areas may increase the acceptability of mental health treatment in these rural communities. The mechanisms and patterns of mental health services

use within diverse rural communities remains an area for future research.

Like the five studies that were described earlier, our results provide further evidence of rural–urban treatment disparities. Wang et al. (2005), reported that respondents living in rural areas not adjacent to a metropolitan area were least likely to receive mental health treatment for a specific mental health problem, a finding comparable to that of the current study. Results of the present study are similar to that reported by Reschovsky & Staiti (2005) demonstrating no differences in adjusted treatment rates for respondents living in the most and least rural areas. The results are not directly comparable; Reschovsky and Staiti (2005) use the dimension of adjacency to differentiate rural areas while the RUCC codes differentiate rurality by both size and adjacency. Careful inspection of the treatment rates in the present sample show that treatment rates drop off in rural areas that are least densely populated regardless of adjacency to a metropolitan area. It may be that combining the last three RUCC codes in our logistic models may have obscured differences in mental health treatment rates between the more and least rural areas.

Rural Mental Health Services Research

The methods used in this research illustrate some of the unique exigencies of conducting mental health services research with rural populations. The strategy of aggregating several panels of the MEPS to increase the sample of rural respondents permitted an examination of mental health services use along six levels of rurality so that variability within rural places could be detected. Even so, the numbers of respondents for the last two RUCC codes, 8 and 9, were 287 and 501, respectively. These samples are sufficiently small that to ensure robust estimators in multivariate analyses, logistic analyses were conducted using two, rather than six levels of rurality. The consequent loss of variation between levels may have contributed to the lack of differences in mental health treatment rates between the least rural and most rural counties in the multivariate models.

The Rural–Urban Continuum Codes were used to define rurality in this report. While use of this refined scale is part of the innovation of this research it also has its limitations. The RUCC categorizes counties using population size and adjacency to metropolitan areas. An underlying assumption of the use of these codes is that size and adjacency afford certain resources that more remote rural communities may not enjoy. Even if this is true, there are numerous other factors that define rural counties that are not captured

by the RUCC. The newer Rural Urban Commuting Codes, for example, use Census tracts rather than counties as the unit of analysis (Hart, Larson, & Lishner, 2005). While this holds the promise of understanding more dimensions of variation within rural communities, the difficulties in obtaining a sufficient sample size to capture that variation remain.

A final comment with regard to mental health services research with rural populations is warranted. Another difficulty in conducting rural mental health services research encountered in this study is the inability to easily obtain geocodes in publicly available national databases to permit more refined rural analyses. Strict protection of zipcodes or other geographically identifying parameters is crucial to maintain the confidentiality of respondents to national surveys that contain data that is personally sensitive. The procedures of AHRQ and other governmental agencies are necessary to safeguard participant privacy; however, it is important to note that these same procedures make it difficult to obtain data that will inform a coherent mental health policy for rural places.

These four issues in rural mental health services research are not inconsequential and contribute to limitations in this and other previous studies that have tackled the problem of rural mental health research. Governmental and other agencies that support the conduct of large national surveys that inform mental health policy need to consider obtaining both a large and diverse enough rural sample to conduct complex analyses that will further the understanding of unmet need in rural communities. Further, agencies that support the conduct of these surveys specifically, and rural mental health services research generally, must provide sufficient funding to obtain needed samples, and to ensure that the extra costs associated with maintaining respondent privacy can be built into research methods. Finally, although the definition of rurality has captured the attention of rural mental health researchers and policymakers alike, the decision by rural researchers to use one typology versus another can affect the outcomes of the research. Future research must address how best to capture the multiple dimensions of rurality that are critical to informing the distribution of scarce mental health resources in rural areas.

Limitations

While some of the limitations of the current research are described above, there are additional considerations that limit the generalizability of the research findings. The MEPS surveys only the non-institutionalized civilian population of the United States. As a consequence

populations that also have a stake in the condition of mental health services in rural areas are not represented. This includes residents of nursing homes, the military, and the homeless. Research using other databases have shown that rural residents of nursing homes are less likely to obtain out-patient mental health services (Shea et al., 2000), a finding that could not be detected using the household data from the MEPS. Second, the MEPS uses self-reports of mental health conditions which may result in underreporting of mental health conditions and inaccuracies in those reports (Zuvekas, 2001). Underreporting of mental health conditions may be especially true of rural populations where stigma is particularly prevalent (New Freedom Commission, 2003; Wrigley, Jackson, Judd, & Komiti, 2005). To the extent that this is true, underreporting by rural residents may also have constrained the rural sample available for analysis in our research.

A third limitation is the lack of differentiation between psychiatrists and other physicians in the MEPS. This characteristic of the MEPS database resulted almost certainly in underestimation of the rates of specialty mental health treatment. Findings of this research would be strengthened by the ability to determine the sector of care in which rural residents obtained mental health treatment. Data from other research has shown that rural residents have a greater likelihood of obtaining mental health treatment in the general health care sector and that such treatment in these settings are less likely to meet minimal standards of care (Hartley et al., 2002; Wang et al., 2005). The inability to detect the predominant source of mental health treatment in diverse rural areas limits the ability to which the present research can inform mental health policy. AHRQ has been responsive to this concern and starting in the 2002 MEPS survey physician specialty is now available.

The household component of the MEPS samples one respondent from each household who reports on the health status for each member. As a consequence reported mental health may be a proxy report. To ensure that reports of mental health were indeed those of the respondent, all proxy reports were eliminated from the analyses in this research. The resulting sample was overrepresented by women and the unemployed, especially among rural respondents. Interpretation of the findings should be made with that limitation in mind.

Conclusions

Findings from this research demonstrate that residents of rural areas restricted in size and adjacency to

metropolitan areas receive less of “any type” of treatment for mental health conditions and less specialty mental health care. These findings extend knowledge in this area by demonstrating that rural communities are diverse and rural communities with more human and other resources may have an advantage with regard to receipt of mental health services. The analyses also revealed that health care surveys can inadvertently limit understanding of health services use by sampling methods that limit the size and variation of rural samples. Future research should be directed to understanding the mechanisms that underlie the pattern of mental health services use reported in this study.

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