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Rural-Urban Differences in Depression Care

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ABSTRACT

Objective: To assess the association between rurality and depression care. **Methods:** Data were extracted for 10,319 individuals with self-reported depression in the Medical Expenditure Panel Survey. Pharmacotherapy was defined as an antidepressant prescription fill, and minimally adequate pharmacotherapy was defined as receipt of at least four antidepressant fills. Psychotherapy was defined as an outpatient counseling visit, and minimally adequate psychotherapy was defined as ≥ 8 visits. Rurality was defined using Metropolitan Statistical Areas and Rural Urban Continuum Codes (RUCCs). **Results:** Over the year, two thirds received depression treatment, including almost half with at least one antidepressant prescription fill and a quarter with at least one psychotherapy visit. Among those in treatment, just over half had minimally adequate pharmacotherapy treatment and about a third had minimally adequate psychotherapy treatment. Overall, there were no significant rural-urban differences in receipt of any type of formal depression treatment. However, rural residence was associated with significantly higher odds of receiving pharmacotherapy, and significantly lower odds of receiving psychotherapy. Rural residence was not significantly associated with the adequacy of pharmacotherapy, but it was significantly associated with the adequacy of psychotherapy. Psychiatrists per capita was a mediator in the psychotherapy analyses. **Conclusions:** Rural individuals are more reliant on pharmacotherapy than psychotherapy. This may be a concern if individuals in rural areas turn to pharmacotherapy because psychotherapists are unavailable rather than because they have a preference for pharmacotherapy.

INTRODUCTION

According to the National Comorbidity Study Replication (NCS-R), there are no significant rural-urban differences in the 12-month prevalence of major depressive disorder (MDD) in the US population.¹ NCS-R defined rural as residing in a county with <10,000 population, and results were consistent across bivariate analyses and multivariate analyses that controlled for socio-demographic characteristics.¹ In the larger National Health Interview Survey (NHIS), the 12-month prevalence of MDD was significantly, but not substantially, higher in a bivariate analysis comparing urban and rural respondents (5.2% in urban versus 6.1% in rural, $p=0.017$). The NHIS defined rural as residing in a Non-Metropolitan Statistical Area as specified by the Office of Management and Budget.² In a multivariate analysis that controlled for socio-demographic characteristics, there were no significant rural-urban differences in prevalence.² This finding suggests that any small rural-urban differences in prevalence that may exist are not related to rural residence itself, but with socio-demographic factors that are correlated with both depression and rural residence.

Many individuals in rural areas with depression face barriers to treatment such as long travel times, poverty, stigma, lack of anonymity, culture of self-reliance, and lack of culturally acceptable treatments.³ However, few national studies have examined rural-urban differences in the use and quality of services specifically among individuals with depression. Just over half (56.7%) of individuals with MDD in the NCS-R received any treatment (formal or informal) for depression, and among those receiving any treatment, only 41.7% received minimally adequate treatment.⁴ According to the NCS-R, individuals with a mental health disorder who live in a rural area (defined as living >50 miles from the central city of a metropolitan statistical area) are significantly less likely to receive any treatment (formal or informal) for their disorder.⁵

Similar findings have been reported among other populations with a mental health disorder,⁶ populations with self-reported poor mental health³, and the general adult population.^{3,7} In the NCS-R, individuals with a mental health disorder who received any formal treatment were significantly less likely to receive specialty mental health treatment if they lived in a rural area.⁵ Those receiving specialty mental health care in the NCS-R were significantly more likely to receive minimally adequate treatment (62.3%) compared to those receiving general medical care only (42.4%).⁴ Individuals with depression in rural areas are more likely to rely on general medical providers than mental health specialists compared to individuals living in urban areas.⁸ Consequently, rural individuals may receive lower quality of depression care than urban individuals. Perhaps because of relatively good access to primary care providers in rural areas, rural individuals in the NCS-R with a mental health disorder who receive general medical care are equally as likely to receive minimally adequate care as those living in urban areas.⁵ However, individuals with depression who travel longer distances to seek treatment for depression have lower odds of receiving treatment in concordance with clinical guidelines.⁹

Despite the potential for rural disparities in the use, type and quality of care, there are few studies which have examined these issues among a nationally representative population of individuals with depression. The purpose of the project was to assess the association between rurality and the use, type (pharmacotherapy versus psychotherapy), and quality of care among individuals with self-reported depression. Because primary care providers treat most patients with depression and are typically available in both rural and urban areas, we did not hypothesize that individuals with depression in rural areas would be less likely to receive any treatment compared to individuals with depression in urban areas. However, because mental health specialists are less available in rural areas, we hypothesized that individuals with depression in

rural areas would be less likely to receive psychotherapy compared to their urban counterparts. To compensate for the lack of psychotherapy services in rural areas, we hypothesized that individuals with depression in rural areas would be more likely to receive pharmacotherapy than individuals with depression in urban areas. We also hypothesized that rural individuals receiving pharmacotherapy or psychotherapy would have lower quality of care than urban individuals due to the lack of mental health specialists in rural areas. Finally, we also hypothesized that rural-urban differences in the type and quality of care would be mediated by the local supply of mental health providers (i.e., rural-urban differences would not be significant when controlling for the supply of mental health specialists). Specifically, we hypothesized that the supply of psychiatrists would be positively correlated with use and quality of pharmacotherapy. We also hypothesized that the supply of all types of mental health specialists (i.e., psychiatrists, psychologists and counselors) would be positively correlated with the use and quality of psychotherapy. These hypotheses were tested with several different definitions of rurality to determine the consistency of the findings.

METHODS

Data

This study uses data from the 2000 to 2004 Medical Expenditure Panel Survey (MEPS), a nationally representative survey sponsored by the Agency for Healthcare Research and Quality (AHRQ) that is conducted annually. The MEPS employs an overlapping panel design collecting data for individuals over a two-year period through a baseline interview and four follow-up interviews and can be used for cross-sectional or longitudinal analysis¹⁰. The MEPS Household Component (HC) collects detailed information on health care utilization and expenditures, health

status, health insurance coverage, and demographic information and is designed to produce annual estimates of these measures. The MEPS HC sample is drawn from a subsample of households included in the previous year's National Health Interview Survey. In the 2000, 2001, 2002, 2003, and 2004 MEPS HC, there are a total of 25,096, 33,556, 39,165, 34,215, and 34,403 individuals respectively. The data in the MEPS HC for 2000 to 2004 are described in detail at www.meps.ahrq.gov.

Individuals With Depression

Individuals with depression were identified using the MEPS HC medical conditions file. The medical conditions file contains an observation for each self-reported medical condition the individual experiences during the year. During each interview, respondents were asked about medical conditions that were experienced during the four or five months since the previous interview. Thus, all conditions are self-reported by respondents. Self-reported conditions were mapped onto 3-digit *International Classification for Diseases, 9th Revision* (ICD-9) codes by AHRQ. We classified conditions with ICD-9 codes of 296.2X, 296.3X or 311.xx as depression, excluding bipolar disorder. In this study, the term "depression" is used to identify these individuals. Using this method, 1,293, 1,917, 2,489, 2,270, and 2,350 individuals were identified as having depression in 2000, 2001, 2002, 2003 and 2004 respectively.

Antidepressant Treatment

Antidepressant treatment over a twelve month period was identified using the Prescribed Medicines Event File of each year's MEPS HC. In the 2000, 2001, 2002, 2003, and 2004 Prescribed Medicines Event File, there are 182,677, 277,866, 339,308, 304,324, and 317,065 prescribed medicine records respectively. Each record represents one prescribed medicine purchased or obtained during each year. Antidepressant medications were identified by drug

name. The drugs classified as antidepressants were amitriptyline, amoxapine, bupropion, citalopram, clomipramine, desipramine, doxepin, duloxetine, fluoxetine, fluvoxamine, imipramine, isocarboxazid, maprotiline, mirtazapine, nefazodone, nortriptyline, paroxetine, phenelzine, protriptyline, sertraline, tranylcypromine, trazodone, trimipramine, and venlafaxine.

For the twelve month period, we calculated the daily dosage for each antidepressant prescription using the pill dosage and the number of pills in the prescription. It was assumed that each antidepressant prescription was for 30 days and that if fewer than 30 pills were prescribed, the days supplied in the prescription equaled the number of pills supplied in the medication. From 2000 to 2004, of the 75,201 prescriptions for antidepressants, 16,412 (22%) contained fewer than 30 pills. The daily dosages were then compared to the minimum adequate daily dosage developed by Weilburg and colleagues utilizing consensus of expert opinion and manufacturers' guidelines.¹¹

Psychotherapy Visits

Psychotherapy visits are identified using the MEPS Outpatient Visit File (n=80,148) and MEPS Office-Based Medical Provider Visits File (N=742,154) from 2000 to 2004 which contain one observation for each self-reported visit to a hospital-based outpatient clinic or office-based medical provider during each year. For each visit, the respondent was asked which category best described the care provided during the visit. All visits during the twelve month period described as "Psychotherapy or Mental Health Counseling" were categorized as a psychotherapy visit.

Minimally Adequate Depression Care

Minimally adequate depression treatment over the twelve month period was defined as receiving either: 1) at least 4 antidepressant prescriptions (120 days of medication) at the minimum adequate daily dosage; or 2) at least 8 outpatient/office-based psychotherapy visits.

This definition was based on evidence based treatment guidelines^{12,13} and is similar to that used by Kessler and colleagues in their analysis of depression care using data from the National Comorbidity Survey Replication.¹

Rurality

Rurality is defined dichotomously, categorically, and ordinally. The dichotomous definition is based on the Office of Management and Budget's definition of a Metropolitan Statistical Area (MSA) which include all counties that contain an urbanized area (i.e., population >50,000) or that are adjacent to an MSA county and 25% of the employed population commutes to the urbanized area (or visa versa). The strengths of the MSA definition are that it is stable over time and it is familiar to policy makers. The main weakness is that it does not differentiate well between nonmetropolitan counties. Rurality is measured categorically and ordinally using the Rural Urban Continuum Codes (RUCCs). In the RUCC classification system, urbanized counties (i.e., population >50,000) are categorized into three groups, based on size of the county's population. Nonmetropolitan counties (i.e., population <50,000) are categorized into six groups, based on total urban population of the county and whether it is adjacent or nonadjacent to a metropolitan county. While the RUCC classification scheme better differentiates non-metropolitan counties, it is less familiar to policy makers and counties are more likely to change categories over time.

We specifically chose RUCC over Rural Urban Commuting Area Codes (RUCA) and Urban Influence Codes (UIC) rural-urban classification schemes. The RUCA and UIC systems use commuting data, in addition to population size, to classify geographic areas. Thus, RUCA and UIC account for the improved access of commuting workers to services in metropolitan areas. We did not want to characterize the rurality of individuals with depression based on the

commuting patterns of employed persons because individuals with depression have lower employment rates¹⁴⁻¹⁷, and thus the access to care for individuals with depression is less likely to be impacted by commuting.

To classify an individual using the RUCC system, it is necessary to know their zipcode or county of residence, neither of which is available in the public use MEPS dataset because zipcodes are considered personal identifiers. Therefore, we traveled to the AHRQ Data Center in Rockville MD to merge a cross-walk of RUCC codes to zip codes, which are available in the master MEPS dataset. Zipcodes were then dropped from the analytical dataset and all statistical analyses were conducted on the de-identified analytical dataset.

Supply of Mental Health Specialists

Health system data for 2000 from the Area Resource File (maintained by the Health Resources and Services Administration) was used to determine the number of psychiatrists, psychologists, and social workers per 1000 people in the county.¹⁸ Mental health specialist supply was linked to each individual in the dataset based on their county of residence.

Casemix Measures

Casemix variables were measured from the baseline interview. Race/ethnicity consisted of four mutually exclusive groups: Caucasian, African-American, Latino, and other. Any respondent who identified him/herself as Latino was categorized as Latino, regardless of race. Age was coded as: under 18, 18 to 34, 35 to 64, and 65 and over. Insurance type was categorized as any private insurance, Medicaid, Medicare, both Medicaid and Medicare, and uninsured. Income was measured as a percentage of the poverty level and placed into five categories: poor (<100% of the federal poverty level), near poor (100-124%), low income (125-199%), middle income (200-399%), and high income (>399%). Education was included as a dichotomous

variable coded 1 if the individual had a college education or better, 0 otherwise. Marital status was classified as married, widowed, divorced/separated, and never married. Self-perceived health and mental health status, and functional limitations were derived from responses from the MEPS HC. Respondents rated overall health as excellent, very good, good, fair, or poor at three points during the calendar year. Respondents rated mental health using the same categories. Respondents were also asked about functional limitations using the activities of daily living scale and the instrumental activities of daily living scale. A dummy variable was coded 1 if the individual had at least one limitation on the activities of daily living scale, 0 otherwise. A dummy variable was coded in the same way for the instrumental activities of daily living scale. All health and functional status variables used measures collected during the first interview of the calendar year.

Statistical Analysis

Logistic regression analysis was used to test the hypotheses, as all dependent variables were dichotomous. The first regression examined receipt of formal depression treatment defined as either obtaining at least one antidepressant prescription or attending at least one psychotherapy visit. The second regression examined receipt of at least one antidepressant. The third regression examined the receipt of a minimally adequate course of antidepressants among individuals who had received at least one antidepressant prescription. The fourth regression examined attendance of at least one psychotherapy visit. The fifth regression examined receipt of a minimally adequate course of psychotherapy among individuals who made at least one psychotherapy visit. Models were estimated using the survey procedures of Stata statistical software using weights to account for the complex sampling strategy and to produce nationally representative estimates. The first set of analyses examined the impact of rurality specified

dichotomously as residence in a metropolitan statistical area or not, the second set of analyses specified rurality ordinally (RUCC=1-9), and the third set of analyses specified rurality categorically as a series of dummy variables (RUCC = 1, 2, 3, 4, 5, 6, 7, 8, or 9). However, because some regressions (e.g., receipt of minimally adequate psychotherapy) have relatively few subjects in RUCC categories 7, 8, and 9, we also conducted a sensitivity analyses by combining these three groups into one.

To test whether the local supply mental health specialists is a mediator for rurality, we used the steps outlined by Baron and Kenny.¹⁹ First, we estimated three regression equations with psychiatrists per 1000 population, psychologists per 1000 population and social workers per 1000 populations as the dependent variables and rurality specified ordinally ((RUCC=1-9) as the explanatory variable. If rurality is a significant predictor of supply of psychiatrists, we then added psychiatrists per 1000 population to the pharmacotherapy regressions. If rurality was a significant predictor of psychiatrists per 1000 population, psychologists per 1000 population or social workers per 1000 population, we added these types of mental health specialist supply to the psychotherapy regressions. If mental health specialist supply is found to be a significant predictor and the significance of rurality decreases when mental health specialist supply is added to the regression, we concluded that the supply of mental health specialists is a mediator for rurality.

RESULTS

There were 10,319 individuals with self-reported depression in the 2000-2004 MEPS samples. Similar to the general U.S. population, about one fifth of the sample lived outside a MSA. Consistent with the epidemiology of depression, most were middle aged (age 18-64) and

female. Less than half were married, nearly a third were of minority race/ethnicity, almost half lived below 200% of the federally designated poverty level and three quarters did not have a college education. Over half had private insurance and almost a third had public insurance.

Two thirds received some type of formal depression treatment during the previous year including nearly 60% with at least one antidepressant prescription fill and a quarter with at least one psychotherapy visit. Among those receiving at least one antidepressant prescription, just over half had minimally adequate pharmacotherapy treatment. Among those with at least one psychotherapy visit, about a third had minimally adequate psychotherapy treatment.

Any Formal Treatment

In multivariate analyses, residence in a non-metropolitan statistical area was not significantly associated with receiving any formal depression treatment compared to residence outside a metropolitan statistical area. When rurality is specified ordinally (i.e., RUCC=1-9), it was not associated with significantly different odds of receiving any formal depression treatment. When the RUCC categories were specified categorically as dummy variables in the multivariate analyses, RUCC categories 2, 3, and 5 all had significantly higher odds of receiving any formal depression treatment compared to RUCC category 1 (the most urban area).

Pharmacotherapy

Residence in a non-metropolitan statistical area was associated with significantly higher odds of receiving pharmacotherapy compared to residence in a metropolitan statistical area, but not significantly different odds of receiving minimally adequate pharmacotherapy treatment. Likewise, when RUCC codes are specified ordinally, greater rurality was associated with significantly higher odds of receiving pharmacotherapy, but not significantly different odds of receiving minimally adequate pharmacotherapy. RUCC categories 3, 5, 6 and 8 all had

significantly higher odds of receiving pharmacotherapy treatment relative to RUCC category 1. In the analysis examining receipt of minimally adequate pharmacotherapy treatment, only RUCC category 9 had significantly different odds compared to RUCC 1. When RUCC category 7, 8 and 9 were combined into one category as a sensitivity analysis, this rural group did not have significantly different odds of receiving pharmacotherapy treatment, or receiving minimally adequate pharmacotherapy. Thus, any significant rural-urban differences observed individually in high rural RUCC codes, were likely anomalies resulting from small cell sizes.

Psychotherapy

Residence in a non-metropolitan statistical area was associated with significantly lower odds of receiving psychotherapy, and significantly lower odds of receiving minimally adequate psychotherapy treatment compared to residence in a metropolitan statistical area. Likewise, when RUCC codes are specified ordinally in the multivariate analysis, greater rurality was associated with significantly lower odds of receiving psychotherapy and significantly lower odds of receiving minimally adequate psychotherapy. Significant odds ratios are highlighted in black. RUCC category 4, 6, 7 and 9, had significantly lower odds of receiving psychotherapy relative to RUCC category 1. Only RUCC category 9 had significantly different odds of receiving minimally adequate psychotherapy treatment compared to RUCC category 1. However, this was likely an anomaly resulting from small cell sizes because when RUCC category 7, 8 and 9 were combined into one category as a sensitivity analysis, the most rural areas (RUCC categories 7, 8, and 9) did not collectively have significantly different odds of receiving minimally adequate psychotherapy treatment compared to RUCC category 1. However, the sensitivity analysis did confirm that the most rural areas (RUCC categories 7, 8, and 9) collectively have significantly lower odds of receiving psychotherapy.

Mediators

Rurality specified ordinally ((RUCC=1-9) was a significant predictor of psychiatrists per 1,000 population ($p < 0.001$), psychologists per 1,000 population, and social workers per 1000 population. However, when psychiatrists per capita was added as an independent variable in the multivariate analyses with rurality specified ordinally, it is not a significant predictor of receiving pharmacotherapy, and therefore it cannot be considered a mediator. Likewise, psychiatrists per capita is not a significant predictor of receiving minimally adequate pharmacotherapy. For receipt of psychotherapy, rurality is no longer a significant predictor of receiving psychotherapy or receiving minimally adequate psychotherapy when psychiatrists, psychologists and social workers per capita are added as independent variables in the multivariate analysis with rurality specified ordinally. In these regressions, psychiatrists per capita and social workers per capita are significant predictors of receiving psychotherapy and psychiatrists per capita is a significant predictor of receiving minimally adequate psychotherapy. Thus, the supply of mental health specialists was a mediator for rurality in the analysis of psychotherapy.

Discussion

Two thirds of those with self-reported depression received some type of formal treatment and receipt of formal treatment overall was not associated with rural residence. Over half of individuals with depression received pharmacotherapy and a quarter received psychotherapy. As hypothesized, rural residence was associated with a significantly higher likelihood of receiving pharmacotherapy, and a significantly lower likelihood of receiving psychotherapy. Rural-urban differences in pharmacotherapy were not mediated by the supply of mental health specialists, but rural-urban differences in psychotherapy were mediated by the supply of mental health

specialists. Rates of minimally adequate pharmacotherapy and psychotherapy were poor and similar to previous findings from studies with nationally representative samples.²⁰⁻²² Contrary to our hypothesis, rural residence was not significantly associated with receipt of minimally adequate pharmacotherapy. As hypothesized, rural residence was associated with a significantly lower likelihood of receiving minimally adequate psychotherapy and this difference was again mediated by the supply of mental health specialists. Results were consistent across the different definitions of rurality.

These findings suggest that the lack of access to psychotherapists in rural areas may cause rural individuals with depression to rely more on antidepressant medications than on counseling. If a higher proportion of individuals in rural areas turn to antidepressants due to lack of access to psychotherapists rather than a preference for pharmacotherapy, it may be that pharmacotherapy outcomes are suboptimal in rural areas. Another concern is that when rural individuals do not respond to antidepressant treatment, psychotherapy may not be available as an alternative form of treatment. An additional concern is that, compared to their urban counterparts, individuals in rural areas who do initiate psychotherapy are less likely to receive a minimally adequate number of visits, and thus are likely to experience suboptimal outcomes. These findings underscore the importance of developing and disseminating innovative modalities for delivering evidence-based psychotherapies to remote locations. While evidence-based psychotherapies have been shown to be effective when delivered via telephone,²³ interactive video,^{24,25} and computer/internet²⁶, third party payers frequently do not reimburse for these treatment modalities. Reimbursement for interactive video visits often requires payments to both the off-site psychotherapist and the on-site host organization (e.g., primary care clinic). Psychotherapy is even more accessible (and therefore potentially more effective) when it is

delivered to rural patients in their homes, yet this patient-centered model of care faces even greater barriers in terms of reimbursement from third party payers. Reimbursement policies need to be modified in order to improve the business case for delivering evidence-based psychotherapy to rural patients via telephones, interactive video, and computer/internet.


Our results should be interpreted with several limitations in mind. First, the identification of individuals with depression was based on self-report. It is possible that some individuals with depression were not identified as having depression and that some individuals identified as having depression did not meet diagnostic criteria for depression. It is also possible that the self reporting of depression varies by rural-urban residence, which could bias our findings. It is worth noting that any rural-urban differences in the self reporting of depression are less likely to bias our analysis of adequate treatment because all individuals in this analytical sub-sample were judged by a clinician to have depression severe enough to warrant treatment. With respect to our process measure of minimally adequate care, another limitation is that the number of antidepressant prescriptions does not necessarily reflect medication adherence or appropriate switching/augmenting due to non-response. Likewise, the number of psychotherapy visits does not reflect whether patients completed a course of evidence-based psychotherapy. Thus, rather than representing true quality of care, minimally adequate care represents only the opportunity to have received high quality care. Moreover, because only treatments that were provided during the calendar year were included in the MEPS dataset, some individuals may have initiated a treatment regimen before the beginning of the calendar year and some may have continued treatment after the end of the calendar year. Consequently, similar to other studies^{20-22,27} the rates of minimally adequate treatment should be considered to be overly conservative. However, because we were primarily interested in *differences* in adequacy of treatment across rural and

urban areas rather than the actual prevalence of adequate treatment, these limitations should not affect the findings as long as the measurement errors were distributed randomly among respondents.

Reference List

- (1) Kessler RC, Berglund P, Demler O, Jin R, Koretz D, Merikangas KR et al. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *J Am Med Assoc.* 2003; 289(23):3095-3105.
- (2) Probst JC, Laditka SB, Moore CG, Harun N, Powell MP, Baxley EG. Rural-urban differences in depression prevalence: implications for family medicine. *Fam Med.* 2006; 38:653-660.
- (3) Hauenstein EJ, Petterson S, Rovnyak V, Merwin E, Heise B, Wagner D. Rurality and mental health treatment. *Admin Ment Health.* 2007; 34(3):255-267.
- (4) Kessler RC, Merikangas KR, Wang PS. Prevalence, comorbidity, and service utilization for mood disorders in the United States at the beginning of the twenty-first century. *Annual Review of Clinical Psychology.* 2007; 3:137-158.
- (5) Wang PS, Lane M, Olfson M, Pincus HA, Wells KB, Kessler RC. Twelve-month use of mental health services in the United States: results from the National Comorbidity Survey Replication. *Arch Gen Psychiatry.* 2005; 62:629-640.
- (6) Wang JL. Rural-urban differences in the prevalence of major depression and associated impairment. *Social Psychiatry and Psychiatric Epidemiology.* 2004; 39:19-25.
- (7) Reschovsky JD, Staiti AB. Access and quality: Does rural America lag behind? *Health Aff.* 2005; 24(4):1128-1139.
- (8) Lambert D, Agger M, Hartley D. Service use of rural and urban Medicaid beneficiaries suffering from depression: The role of supply. *J Rural Health.* 1999; 15(3):344-355.
- (9) Fortney J, Rost K, Zhang M, Warren J. The impact of geographic accessibility on the intensity and quality of depression treatment. *Med Care.* 1999; 37(9):884-893.
- (10) Cohen, S. B. and Agency for Healthcare Research and Quality. Sample Design of the 1996 Medical Expenditure Panel Survey Household Component. Methodology Report No. 2. Rockville, MD: Agency for Healthcare Research and Quality; 1997. Report No.: 97-0027.
- (11) Weilburg JB, O'Leary KM, Meigs JB, Hennen J, Stafford RS. Evaluation of the adequacy of outpatient antidepressant treatment. *Psychiatr Serv.* 2003; 54:1233-1239.
- (12) American Psychiatric Association. Practice guideline for major depressive disorder in adults. *Am J Psychiatry.* 1993; 150(4, suppl.):1-26.
- (13) Depression Guideline Panel. *Depression in primary care: Volume 1. Detection and diagnosis. Clinical practice guideline, Number 5. (AHCPR Publication No. 93-0550).* Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, 1993.

- (14) Catalano R, Dooley CD. Economic predictors of depressed mood and stressful life events in a metropolitan community. *J Health Soc Behav.* 1977; 18:292-307.
- (15) Dooley D, Cotalano R. Recent research on the psychological effects of unemployment. *J Soc Issues.* 1988; 44(4):1-12.
- (16) Fergusson DM, Horwood LJ, Lynskey MT. The effects of unemployment on psychiatric illness during young adulthood. *Psychol Med.* 1997; 27(2):371-381.
- (17) Montgomery SM, Cook DG, Bartley MJ, Wadsworth ME. Unemployment pre-dates symptoms of depression and anxiety resulting in medical consultation in young men. *Int J Epidemiol.* 1999; 28(1):95-100.
- (18) Quality Resource Systems Inc. Area Resource File website. Available at <http://www.arfsys.com> Accessed 3/29/2006. 2006.
- (19) Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J Pers Soc Psychol.* 1986; 51(6):1173-1182.
- (20) Young AS, Klap R, Sherbourne CD, Wells KB. The quality of care for depressive and anxiety disorders in the United States. *Arch Gen Psychiatry.* 2001; 58(1):55-61.
- (21) Harman JS, Edlund MJ, Fortney JC. Disparities in the adequacy of depression treatment in the United States. *Psychiatr Serv.* 2004; 55(12):1379-1385.
- (22) Harman JS, Edlund MJ, Fortney JC. Trends in antidepressant utilization from 2001 to 2004. *Psychiatr Serv.* 2009; 60:611-616.
- (23) Mohr DC, Vella L, Hart S, Heckman T, Simon G. The effect of telephone-administered psychotherapy on symptoms of depression and attrition: A meta-analysis. *Clin Psychol.* 2008; 15(3):243-253.
- (24) Bouchard S, Paquin B, Payeur R, Allard M, Rivard V, Fournier T et al. Delivering cognitive-behavior therapy for panic disorder with agoraphobia in videoconference. *Telemedicine Journal & e-Health.* 2004; 10(1):13-25.
- (25) Nelson EL, Barnard M, Cain S. Treating childhood depression over videoconferencing. *Telemedicine Journal and e-Health.* 2003; 9(1):49-55.
- (26) Marks IM, Cavanagh K, Gega L. Computer-aided psychotherapy: revolution or bubble? *Br J Psychiatry.* 2007; 191:471-473.
- (27) Persons JB, Thase ME, Crits-Christoph P, McIntyre JS, Rush AJ, Merriam AE et al. The role of psychotherapy in the treatment of depression: Review of two practice guidelines. *Arch Gen Psychiatry.* 1996; 53:283-304.



The WICHE Center for Rural Mental Health Research was established in 2004 to develop and disseminate scientific knowledge that can be readily applied to improve the use, quality, and outcomes of mental health care provided to rural populations. As a General Rural Health Research Center in the Office of Rural Health Policy, the WICHE center is supported by the Federal Office of Rural Health Policy, Health Resources and Services Administration (HRSA), Public Health Services, grant number U1CRH03713.

The WICHE Center selected mental health as its area of concentration because: (1) although the prevalence and entry into care for mental health problems is generally comparable in rural and urban populations, the care that rural patients receive for mental health problems may be of poorer quality, particularly for residents in outlying rural areas and (2) efforts to ensure that rural patients receive similar quality care to their urban counterparts generally requires restructuring treatment delivery models to address the unique problems rural delivery settings face. Within mental health, the Center proposes to conduct the research development/dissemination efforts needed to ensure rural populations receive high quality depression care.

Within mental health, the Center will concentrate on depression because: (1) depression is one of the most prevalent and impairing mental health conditions in both rural and urban populations, (2) most depressed patients fail to receive high quality care when they enter rural or urban treatment delivery systems, (3) outlying rural patients are more likely to receive poorer quality care than their urban counterparts, (4) urban team settings are adopting new evidence-based care models to assure that depressed patients receive high quality care for the condition that will increase the rural-urban quality chasm even further, and (5) urban care models can and need to be refined for delivery to rural populations.

The WICHE Center is based at the Western Interstate Commission for Higher Education. For more information about the Center and its publications, please contact:

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