Published in final edited form as:

JAMA Psychiatry. 2017 May 01; 74(5): 476–484. doi:10.1001/jamapsychiatry.2017.0303.

Geographic access to specialty mental health care across high- and low-income U.S. communities

Janet R. Cummings, Ph.D.[†], Lindsay Allen, M.A.[†], Julie Clennon, Ph.D.[‡], Xu Ji, M.S.P.H.[†], and Benjamin G. Druss, M.D., M.P.H.[†]

[†]Department of Health Policy and Management, Rollins School of Public Health

[‡]Department of Biostatistics, Rollins School of Public Health

Abstract

Importance—With the future of the Affordable Care Act and Medicaid program unclear, it is critical to examine the geographic availability of specialty mental health (MH) treatment resources that serve low-income populations across local communities.

Objective—To examine the geographic availability of community-based specialty MH treatment resources and how these resources are distributed by community socioeconomic status (SES).

Design—Measures of MH specialty resource availability were derived for 31,836 zip-code tabulation areas (ZCTAs) using national data. Analyses examined the association between community SES (assessed by median household income quartiles) and resource availability using logistic regressions. Models controlled for ZCTA-level demographic characteristics and state indicators.

Main Outcome Measures—Dichotomous indicators for whether a ZCTA had any: (1) outpatient MH treatment facility (more than nine-tenths of which offer payment arrangements for low-income populations); (2) office-based practice of MH specialist physician(s); (3) office-based practice of non-physician MH practitioners (e.g., therapists); and (4) facility or office-based practice (i.e., any resource).

Results—More than four-tenths (42.5%) of communities in the highest income quartile had any community-based MH treatment resource versus 23.1% of communities in the lowest income quartile (Adjusted odds ratio [AOR]=1.74, 95% Confidence Interval [CI]=1.50,2.03).

When examining the distribution of MH specialist providers, 25.3% of the highest income communities had any MH specialist physician practice versus 8.0% of the lowest income communities (AOR=3.04, 95% CI=2.53,3.66). Similarly, 35.1% of the highest income communities had any non-physician MH specialist practice versus 12.9% of the lowest income communities (AOR=2.77, 95% CI=2.35,3.26).

Corresponding Author: Janet R. Cummings, Ph.D., Dept. of Health Policy and Management, Emory University, 1518 Clifton Road NE, Room 650, Atlanta, GA 30322, jrcummi@emory.edu, (p) 404-727-9198, (f) 404-727-9198.

The authors have no conflicts of interest to disclose.

In contrast, MH treatment facilities were less likely to be located in the highest versus lowest income communities (12.9% versus 16.5%, AOR=0.43, 95% CI=0.37,0.51). Over seven-tenths of the lowest income communities with any resource had an outpatient MH treatment facility.

Conclusions and Relevance—MH treatment facilities are more likely to be located in poorer communities, whereas office-based practices of MH specialist providers are more likely to be located in higher income communities. These findings indicate that MH treatment facilities constitute the backbone of the specialty MH treatment infrastructure in low-income communities. Policies are needed to support and expand available resources for this critical infrastructure.

INTRODUCTION

Although more than one in five adults suffer from a mental health (MH) disorder in the United States,¹ over half do not receive any treatment.² Given the chronic nature of many MH disorders, especially moderate to severe MH disorders,^{3–5} access to ongoing outpatient specialty MH treatment is especially important. Penchensky and Thomas identified five dimensions of healthcare access that are important for understanding low rates of MH treatment: affordability, availability (i.e., supply of health care resources in a given area), accessibility, acceptability, and accommodation.⁶

In recent years, federal policies have targeted the affordability of MH services.^{7,8} The Affordable Care Act Medicaid expansion adopted has provided coverage to 15 million low-income adults,⁹ a population with disproportionately high levels of unmet need for MH treatment.^{10,11} However, policy landscapes are shifting, and the future of the ACA and Medicaid programs remain unclear.^{12–15} Therefore, it is crucial to assess another dimension of access – the geographic availability of outpatient MH treatment resources that serve low-income populations.

When examining the geographic availability of outpatient MH treatment resources, it is important to recognize that there may be, in fact, two systems of specialty MH care. One component of the system comprises specialty community MH treatment clinics that have the capacity to treat the most severe mental illnesses and are more accessible to those with limited financial resources. These facilities typically offer a range of services including psychotropic medication management, psychotherapy, and other social services.¹⁶ Moreover, the vast majority provide services to low-income populations – with more than nine-tenths (92.4%) accepting Medicaid and nearly nine-tenths (88.0%) providing payment assistance (e.g., sliding scale fees) for low-income populations.^{16,17} Geographic access to these safety-net facilities may be of particular consequence for low-income populations, many of whom do not have reliable transportation.¹⁸ Therefore, one might anticipate that these facilities are more likely to locate in communities that are accessible to low-income populations.

Another important component of the specialty MH care system comprises solo and small group practices of MH specialists – including psychiatrists and therapists. Compared to other specialist physicians, office-based psychiatrists are the least likely to accept Medicaid (other than dermatologists) or private insurance.¹⁹ Therefore, services from many of these practices may only be accessible to those with the financial resources to pay out-of-pocket or

to cover the out-of-network costs.^{20,21} Consequently, these practices may be more likely to locate in wealthier communities.

Prior research has examined the geographic availability of MH treatment resources across U.S. counties.^{22,23} However, no study has compared the geographic distribution of these two systems of MH care across smaller, socioeconomically diverse communities. On average, counties have a land area of 1124 square miles²⁴ and are comprised of heterogeneous local communities with substantial variation in socioeconomic resources and other demographic characteristics.²⁵ Given the inverse relationship between travel distance and MH care use²⁶ and the reduced likelihood that low-income populations have reliable transportation,¹⁸ an improved understanding of the distribution of these two types of specialty MH care resources across smaller, socioeconomically-diverse communities is needed.

To address this literature gap, we conducted the first national study to achieve two research objectives. First, we describe the geographic availability of specialty MH care resources in the U.S., including specialty outpatient MH treatment clinics and office-based practices, across zip-code tabulation areas (ZCTAs). Second, we examine the distribution of these resources by ZCTA socioeconomic status (SES). The study findings provide a foundation for understanding how different types of MH treatment resources are geographically distributed across local communities in the U.S.

METHODS

Data & Analytic Sample

To measure geographic availability of outpatient specialty MH treatment facilities, we used data from the 2014 Substance Abuse and Mental Health Services Administration (SAMHSA) Behavioral Health Treatment Services Locator,²⁷ an online, searchable database that provides information about specialty MH clinics in the U.S. The data we downloaded in 2014 includes facilities that were surveyed as part of the National Mental Health Services Survey (N-MHSS). The N-MHSS collects information on all known public and private facilities in the U.S. that provide MH services (e.g., psychiatric hospitals, residential treatment centers, outpatient clinics, and multi-setting clinics) and information about the settings in which care is provided (i.e., inpatient, residential, and, outpatient), with a response rate of 90.5% for eligible facilities in 2012.²⁸ The sampling frame excludes facilities that focus primarily on substance abuse treatment or general health, as well as individual and small group practices not licensed as a MH clinic or center. The locator database is updated monthly with new facilities.²⁹ We identified 7,770 specialty MH treatment facilities that provide care in an outpatient setting.

To assess geographic availability of MH specialist practices including small group and solo practices excluded from the SAMHSA survey, we used data from the 2013 ZIP Code Business Patterns database, a subset of the County Business Patterns survey.³⁰ The U.S. Census Bureau extracts these data from the Business Register, its database of all known single and multi-establishment companies in the US.³¹ The data come from several government sources, including annual surveys (i.e., Company Organization Survey, Annual Survey of Manufacturers, and Survey of Current Business) and administrative records (i.e.,

Internal Revenue Service, the Social Security Administration, and the Bureau of Labor Statistics).³¹ For each ZIP code, the database provides the number of office-based establishments of MH physician specialists (e.g., psychiatrists) and of non-physician MH practitioners (e.g., therapists).^{32,33} In this data, there were 11,165 MH specialist physician practices and 20,290 MH specialist non-physician practices; four-fifths of these practices had fewer than five employees.

Using the Missouri Census Data Center 2010 crosswalk file,³⁴ we aggregated the zip code-level measures of MH care resources into ZCTAs. ZIP codes are defined by the U.S. Postal Service to make mail delivery more efficient,^{35,36} while ZCTAs are created by the U.S. Census Bureau to approximate ZIP codes using census blocks for the purposes of presenting statistical data from surveys and censuses.³⁷ In the U.S., there are over 42,000 zip codes that can be mapped onto approximately 33,000 ZCTAs.^{38,39} ZCTAs are considerably smaller than counties, allowing for the examination of how MH treatment resources are distributed across more local areas.

Lastly, we merged ZCTA-level measures of MH treatment resources with ZCTA-level sociodemographic measures from the American Community Survey,⁴⁰ and the U.S. Decennial Census.⁴¹

Of the 32,989 ZCTAs in all 50 U.S. states and the District of Columbia, we excluded those for which the Census Bureau could not calculate median household income (n=1,153). These exclusions yielded an analytic sample of 31,836 ZCTAs.

Measures

Availability of community-based MH treatment resources—We created four dichotomous indicators to assess whether a ZCTA had any: (1) outpatient MH treatment facility; (2) office-based practice for MH specialist physician(s) [North American Industry Classification System (NAICS) code 621112]; (3) office-based practice for non-physician MH practitioners [NAICS code 621330]; and (4) MH treatment facility or office-based practice (i.e., any specialty MH care resource).

Independent Variables—Community-level social and demographic characteristics were assessed using data from the 2013 American Community Survey 5-year estimates (2009–2013), and ZCTA-level measures of urban or suburban (vs rural) location and land area were assessed using 2010 data from the U.S. Census Bureau. To measure community-level SES, we created a categorical measure of median household income using quartiles (<\$38,289, \$38,290–\$47,778, \$47,779–60,688, and \$60,689–238,661) to capture any non-linear associations with MH treatment resource availability. Next, we created an indicator for ZCTAs that were located in metropolitan and micropolitan areas (i.e., urban/suburban areas) versus those that were not (i.e., rural areas) using the measure of core-based statistical areas defined by the Office of Management and Budget (OMB).⁴² In addition, we created several ZCTA-level measures to control for population characteristics potentially related to the need for MH services including racial/ethnic composition, age distribution, gender distribution, and population marital status (See Table 1 for details).⁴³ Because the measures of racial/ethnic composition were so heavily skewed, we created categorical measures for each one to

capture variation in the right tail of the distribution for inclusion in the analyses. Lastly, we created a measure of the total ZCTA population and a measure of the ZCTA land area in square miles.

Analysis

Using ArcGIS software (ESRI, Redlands, CA) we mapped all ZCTAs in the U.S., shading those that contained at least one of each type of MH treatment resource (Figure 1). Next, we summed the population in each of these ZCTAs and calculated the percentage of the U.S. population that lived in a ZCTA with each type of resource (Presented in an Online Appendix). We also created a 10-mile buffer around each ZCTA's centroid to identify those who lived in a ZCTA with a MH treatment resource or close to another ZCTA with a MH treatment resource that intersected this 10-mile buffer. We chose this distance based on prior research reporting that the average distance traveled for medical and/or dental care in the U.S. is 10.2 miles.⁴⁴

Finally, we conducted bivariate and multivariate analyses by estimating logistic regression models to examine the association between each community-level characteristic and whether a ZCTA had a specific type of MH treatment resource. Analyses were performed using Stata software version 13.1.⁴⁵ In the bivariate analyses, we included a single measure of interest (e.g., median household income) to estimate its association with the outcome measure. In the multivariate analyses, we also included state indicators and controlled for urban/suburban (versus rural setting), community sociodemographic measures, total population (logged), and land area. For ease of interpretation, continuous measures were standardized such that a one-unit increase in the measure corresponds to a one-standard deviation increase above the mean value.

RESULTS

Geographic availability of MH Treatment Resources

Figure 1 illustrates the distribution of MH treatment facilities and specialist practices across U.S. ZCTAs. Nearly three-tenths (29.3%) of ZCTA communities had at least one MH treatment facility that offered outpatient treatment or MH specialist practice (Table 2), and seven-tenths (70.3%) of the U.S. population live in a community with one of these resources (See Appendix Table 1).

Distribution by Community SES

More than four-tenths (42.5%) of communities in the highest income quartile had any specialty MH treatment resource versus 23.1% of communities in the lowest income quartile (Table 2). This difference was statistically significant in the unadjusted comparison (Table 2, Unadjusted odds ratio [UOR] = 2.46, 95% CI=2.29, 2.63) as well as in the adjusted comparison that was estimated using multivariate analysis (Adjusted odds ratio [AOR] = 1.74, 95% CI=1.50, 2.03).

There were also notable differences in how specific types of MH treatment resources were distributed by community SES. Office-based practices of MH specialist physicians and non-

physicians were more likely to be located in higher (versus lower) income communities in unadjusted (Table 2) and adjusted comparisons (Table 3). For example, over one-fourth (25.3%) of ZCTA communities in the top quartile of median household income had at least one MH specialist physician practice – more than triple the percentage of ZCTAs in the lowest income quartile (8.0%) that had one of these practices (Table 2, UOR=3.89, 95% CI=3.54, 4.28). After controlling for covariates (Table 3), this difference remained statistically significant (AOR=3.04, 95% CI=2.53, 3.66).

In contrast, MH treatment facilities providing outpatient care were less likely to be located in the highest versus lowest income communities. More specifically, 12.9% of communities in the highest income quartile had at least one MH treatment facility, compared to 16.5% of communities in the lowest income quartile (Table 2). This difference was significant in both the unadjusted (Table 2, UOR=0.75, 95% CI = 0.68, 0.81) and in the adjusted comparisons (Table 3, AOR=0.43, 95% CI = 0.37, 0.51). It is also important to note that more than seven-tenths of communities in the lowest quartile of median household income with any MH care resource had access to an outpatient MH treatment facility (Table 2).

Other Community-Level Correlates

There were also differences in how these resources were distributed across urban/suburban and rural communities (Table 2, Figure 1). Results from the bivariate analyses (Table 2) indicate that all three types of MH treatment resources were more likely to be located in urban communities, although this relationship was much more pronounced for office-based specialist practices than for MH treatment facilities. In addition, more than three-fourths of rural communities with any MH care resource had access to an outpatient MH treatment facility (Table 2). After controlling for other variables (including total population), it is also worth noting that ZCTAs located in urban/suburban areas were significantly less likely to have a MH treatment facility than those located in rural areas (Table 3, AOR=0.37, 95% CI=0.33,0.43).

Supplemental Analysis

In supplemental analyses, generalized ordered logistic regression models were estimated to examine outcome measures for whether a ZCTA has: (1) no MH treatment resource; (2) one MH treatment resource; and (2) two or more MH treatment resources. These categories were determined based on the distribution of the number of MH treatment facilities and office-based practices in each ZCTA. Results from these supplemental analyses were qualitatively similar in direction and significance compared to the main results (See Appendix Table 2 and 3).

COMMENT

This study provides national estimates of the geographic availability of specialty MH treatment facilities that provide outpatient care and office-based practices across U.S. ZCTAs. Nearly three-tenths (29.3%) of ZCTAs had at least one type of resource, and more than seven-tenths of the U.S. population lived in a ZCTA with one of these resources.

However, these overall estimates mask important differences in the distribution of specific types of MH treatment resources by community SES and urban/rural location.

We found that office-based practices of MH specialists (physicians and non-physicians) were more likely to be located in higher (versus lower) income ZCTAs. However, MH treatment facilities were significantly more likely to be located in lower (versus higher) income communities, and they were available in seven-tenths of the poorest communities with any MH treatment resource. We also found that outpatient MH treatment facilities are a critical component of the MH care infrastructure for rural communities, as more than three-fourths of rural communities with any resource had a MH treatment facility.

These findings build on prior workforce research examining the distribution of MH professional shortage areas across U.S. counties.^{22,43,46} Thomas and colleagues (2009) found that lower income counties and rural counties were more likely to have overall shortages of MH providers.⁴⁶ Prior workforce studies, however, typically do not consider the settings in which providers practice. The current study adds depth to our understanding of the distribution of MH treatment resources by examining two MH systems that serve different clientele. Importantly, we find that MH treatment facilities – which are more likely to serve vulnerable populations – are the backbone of the outpatient specialty MH care infrastructure that exists in local low-income and rural areas.

Geographic availability of MH treatment facilities is necessary, but may not be sufficient to translate into service use for vulnerable populations. Other dimensions of access identified by Penchensky, such as the affordability, accommodation, and acceptability of services, are also essential.⁶ More than nine-tenths of MH facilities accept Medicaid, and the recent ACA Medicaid expansions could improve financial accessibility to these facilities for residents of low-income and/or rural communities, which have a greater proportion of adults that may qualify for coverage.⁴⁷ However, the future of the Medicaid program remains uncertain, with ongoing discussion about potentially rolling back expansions, or converting Medicaid to a block grant program.^{12,13,15} If these changes decrease insurance rates, future research will be needed to examine both the geographic availability and capacity of MH treatment facilities that provide services to uninsured individuals with limited financial resources.

These results also indicate that most geographic gaps in the availability of MH treatment facilities in low-income and/or rural communities are not filled by smaller MH specialty office-based practices. In these areas policymakers may consider allocating resources for the expansion of MH services in nearby primary care safety-net settings. Prior research has shown that approximately three-fourths of counties without any outpatient MH treatment facility have at least one federally qualified health center or rural health clinic.²³ In recent years, federal resources have been allocated under the ACA and other initiatives to expand behavioral health services into these settings.⁴⁸ To best leverage these investments, policymakers may consider prioritizing funding for community health centers in low-income and rural communities without any MH facilities or specialty practices that accept Medicaid.

Several study limitations are noted. First, our measure of MH specialist practices may contain measurement error because the classification of office-based physician versus non-

physician practice is based, in part, on self-selected codes by the business, and in part, on other information provided on business surveys.^{32,33} Because of differences in data collection methods, it is also possible that an organization may be captured in the SAMHSA database as well as the ZIP code business patterns database. Third, although we were able to identify the number of MH treatment facilities and practices located in a ZCTA, the available data do not provide information about their treatment capacity or waiting times. A fourth limitation is that some individuals may seek treatment from a MH facility or practice in an adjacent ZCTA. However, the available data for MH specialist practices do not include the business addresses needed to assess the distance to the nearest practice from a specific location. Another limitation is the lack of an explicit measure to control for the MH service need at the population level; however, our models included measures of sociodemographic characteristics associated with MH service need.⁴³

Two final limitations relate to the interpretation of community-level analyses and the choice of the geographic unit of analysis for our study. It is important to note that community-level analyses provide information about how health care resources are distributed across defined geographic areas and for understanding the type of communities in which these resources are most likely to be located. However, when examining the percentage of ZCTAs with any resource, these number should not be conflated with the percentage of individuals that live in a ZCTA with a resource (the latter of which is presented in Appendix Table 1). Finally, the ZCTA is an imperfect proxy for local community in which residents reside. Nevertheless, the ZCTA provides more in-depth information about the distribution of these resources across smaller areas relative to alternative units of analysis that were available (e.g., counties)^{23,49} to achieve the study aims.

CONCLUSION

Despite these limitations, this study provides the first national examination of which local areas have specialty outpatient MH treatment resources – including specialty MH treatment facilities and smaller MH specialist practices – and how these resources are distributed across local U.S. communities. Our findings suggest that these resources locate in different types of communities, with specialty MH treatment facilities constituting an especially important component of the MH care infrastructure in low-income and rural communities. To the extent that gaps in geographic accessibility to MH treatment resources exist in vulnerable communities, policymakers may consider bolstering resources for expanded behavioral health care services in other safety-net facilities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This work was supported by the National Institute of Mental Health (NIMH, K01MH095823). NIMH did not play a direct role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National

Institutes of Health. Janet Cummings and Lindsay Allen had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

References

1. Center for Behavioral Health Statistics and Quality. Behavioral health trends in the United States: Results from the 2014 National Survey on Drug Use and Health. 2015. HHS Publication No. SMA 15-4927, NSDUH Series H-50 <http://www.samhsa.gov/data/>. Accessed July 12, 2016
2. Han, B., Hedden, SL., Lipari, R., Copello, EAP., Kroutil, LA. Receipt of Services for Behavioral Health Problems: Results from the 2014 National Survey on Drug Use and Health. 2015. <http://www.samhsa.gov/data/sites/default/files/NSDUH-DR-FRR3-2014/NSDUH-DR-FRR3-2014.htm>. Accessed July 17, 2016.
3. Mueser KT, McGurk SR. Schizophrenia. *Lancet*. 2004; 363(9426):2063–2072. [PubMed: 15207959]
4. Mueller TI, Leon AC, Keller MB, et al. Recurrence after recovery from major depressive disorder during 15 years of observational follow-up. *American Journal of Psychiatry*. 1999; 156(7):1000–1006. [PubMed: 10401442]
5. Gitlin MJ, Swendsen J, Heller TL, Hammen C. Relapse and impairment in bipolar disorder. *American Journal of Psychiatry*. 1995; 152(11):1635–1640. [PubMed: 7485627]
6. Pechansky R, Thomas JW. The concept of access: definition and relationship to consumer satisfaction. *Medical Care*. 1981; 19(2):127–140. [PubMed: 7206846]
7. Beronio K, Glied S, Frank R. How the Affordable Care Act and Mental Health Parity and Addiction Equity Act greatly expand coverage of behavioral health care. *The Journal of Behavioral Health Services & Research*. 2014; 41(4):410–428. [PubMed: 24833486]
8. Barry CL, Goldman HH, Huskamp HA. Federal parity in the evolving mental health and addiction care landscape. *Health Affairs*. 2016; 35(6):1009–1016. [PubMed: 27269016]
9. Office of the Assistant Secretary for Planning and Evaluation. Impacts of the Affordable Care Act's Medicaid Expansion on Insurance Coverage and Access to Care. Washington, D.C.: U.S. Department of Health & Human Services; 2016 Jun. <https://aspe.hhs.gov/pdf-report/impacts-affordable-care-acts-medicare-expansion-insurance-coverage-aand-access-care>. Accessed January 7, 2017.
10. Garfield RL, Zuvekas SH, Lave JR, Donohue JM. The impact of national health care reform on adults with severe mental disorders. *American Journal of Psychiatry*. 2011; 168(5):486–494. [PubMed: 21285138]
11. Walker ER, Cummings JR, Hockenberry JM, Druss BG. Insurance status, use of mental health services, and unmet need for mental health care in the United States. *Psychiatric Services*. 2015; 66(6):578–584. [PubMed: 25726980]
12. Oberlander J. The End of Obamacare. *New England Journal of Medicine*. 2017; 376(1):1–3. [PubMed: 27959711]
13. Obama BH. Repealing the ACA without a Replacement—The Risks to American Health Care. *New England Journal of Medicine*. 2017; 376(4):297–299. [PubMed: 28058966]
14. Pear, R. Republicans' 4-Step Plan to Repeal the Affordable Care Act. *New York Times*. Jan 4. 2017 http://www.nytimes.com/2017/01/04/us/affordable-care-act-congress-repeal-plan.html?_r=2. Accessed January 7, 2017.
15. Rosenbaum S, Schmucker S, Rothenberg S, Gunsalus R. What Would Block Grants or Limits on Per Capita Spending Mean for Medicaid? Issue brief (Commonwealth Fund). 2016; 39:1–10. [PubMed: 27959479]
16. Substance Abuse and Mental Health Services Administration. National Mental Health Services Survey (N-MHSS): 2010. Data on Mental Health Treatment Facilities. 2014. BHSIS Series S-69, HHS Publication No. (SMA) 14-4837 http://www.samhsa.gov/data/sites/default/files/NMHSS2010_Web/NMHSS2010_Web/NMHSS2010_Web.pdf. Accessed July 18, 2016
17. Smith, K., Kuramoto-Crawford, J., Lynch, S. Availability of Payment Assistance for Mental Health Services in US Mental Health Treatment Facilities. 2013. http://www.samhsa.gov/data/sites/default/files/report_2123/ShortReport-2123.pdf. Accessed July 18, 2016

18. Syed ST, Gerber BS, Sharp LK. Traveling Towards Disease: Transportation Barriers to Health Care Access. *Journal of Community Health*. 2013; 38(5):976–993. [PubMed: 23543372]
19. Bishop TF, Press MJ, Keyhani S, Pincus HA. Acceptance of insurance by psychiatrists and the implications for access to mental health care. *JAMA Psychiatry*. 2014; 71(2):176–181. [PubMed: 24337499]
20. Cummings JR. Declining psychiatrist participation in health insurance networks: Where do we go from here? *JAMA*. 2015; 313(2):190–191. [PubMed: 25585330]
21. Kyanko KA, Busch SH. The out-of-network benefit: problems and policy solutions. *Inquiry*. 2012; 49(4):352–361. [PubMed: 23469678]
22. Ellis AR, Konrad TR, Thomas KC, Morrissey JP. County-level estimates of mental health professional supply in the United States. *Psychiatric Services*. 2009; 60(10):1315–1322. [PubMed: 19797370]
23. Cummings JR, Wen H, Ko M, Druss BG. Geography and the Medicaid mental health care infrastructure: implications for health care reform. *JAMA Psychiatry*. 2013; 70(10):1084–1090. [PubMed: 23965816]
24. United States Census Bureau. QuickFacts: United States. 2016. <http://www.census.gov/quickfacts/dashboard/LND110210/00>. Accessed July 18, 2016
25. Ricketts, TC. Geography and disparity in health. 2002. <https://www.nationalacademies.org/hmd/~media/Files/Activity%20Files/Quality/NHDRGuidance/DisparitiesRicketts.pdf>. Accessed July 18, 2016
26. Fortney J, Rost K, Zhang M, Warren J. The impact of geographic accessibility on the intensity and quality of depression treatment. *Medical Care*. 1999; 37(9):884–893. [PubMed: 10493467]
27. Substance Abuse and Mental Health Services Administration. Behavioral Health Treatment Services Locator. <https://findtreatment.samhsa.gov/>. Accessed March 23, 2015.
28. Substance Abuse and Mental Health Services Administration, U.S. Department of Health and Human Services. National Mental Health Services Survey (N-MHSS): 2012–Data on Mental Health Treatment Facilities. Washington, D.C.: U.S. Department of Health and Human Services; 2016 Feb. https://www.samhsa.gov/data/sites/default/files/2012_National_Mental_Health_Services_Survey.pdf. Accessed January 7, 2017.
29. Substance Abuse and Mental Health Services Administration. Behavioral Health Treatment Services Locator. <https://findtreatment.samhsa.gov/locator/about>. Accessed December 30, 2016.
30. United States Census Bureau. County Business Patterns (CBP). <http://www.census.gov/programs-surveys/cbp.html>. Accessed July 18, 2015.
31. United States Census Bureau. County Business Patterns: What is the source of the data?. <https://ask.census.gov/faq.php?id=5000&faqId=1709>. Accessed July 18, 2015.
32. United States Census Bureau. Economic Census Reference Materials. 2016. http://www2.census.gov/econ2007/Reference_materials/. Accessed July 18, 2016
33. United States Census Bureau. North American Industry Classification System: Frequently Asked Questions (FAQs). 2016. <https://www.census.gov/eos/www/naics/faqs/faqs.html#q2>. Accessed July 18, 2016
34. Missouri Census Data Center. All About ZIP Codes: 2010. 2016. Supplement http://mcdc.missouri.edu/allabout/zipcodes_2010supplement.shtml. Accessed April 27, 2015.
35. Grubesic TH, Matisziw TC. On the use of ZIP codes and ZIP code tabulation areas (ZCTAs) for the spatial analysis of epidemiological data. *International Journal of Health Geographics*. 2006; 5(1):1–15. [PubMed: 16390549]
36. United States Zip Codes.org. About US ZIP Codes. 2014. <http://www.unitedstateszipcodes.org/>. Accessed January 9, 2017.
37. United States Census Bureau. ZIP Code Tabulation Areas (ZCTAs). 2017. <https://www.census.gov/geo/reference/zctas.html>. Accessed January 7, 2017.
38. United States Postal Service. How many ZIP Codes are there?. 2017. <http://faq.usps.com/>. Accessed January 7, 2017.
39. Office of the Assistant Secretary for Planning and Evaluation. Researchers Most Often Define Concentrated Poverty as A Significantly High Proportion of Areas Residents Living Below the Poverty Level. Washington, D.C.: U.S. Department of Health & Human Services; 2014 May.

Overview of Community Characteristics in Areas with Concentrated Poverty. <https://aspe.hhs.gov/report/overview-community-characteristics-areas-concentrated-poverty/researchers-most-often-define-concentrated-poverty-significantly-high-proportion-areas-residents-living-below-poverty-level>. Accessed January 7, 2017.

40. United States Census Bureau. American Community Survey 5-Year Estimates. <http://factfinder.census.gov/faces/nav/jsf/pages/programs.xhtml>. Accessed September 14, 2015.
41. United States Census Bureau. Download 2010 ZIP Code Tabulation Area (ZCTA) Relationship Files. 2017. https://www.census.gov/geo/maps-data/data/zcta_rel_download.html. Accessed December 30, 2016.
42. United States Census Bureau. Metropolitan and Micropolitan Statistical Areas Main. 2015. <http://www.census.gov/population/metro/>. Accessed July 18, 2016
43. Konrad TR, Ellis AR, Thomas KC, Holzer CE, Morrissey JP. County-level estimates of need for mental health professionals in the United States. *Psychiatric Services*. 2009; 60(10):1307–1314. [PubMed: 19797369]
44. Probst JC, Laditka SB, Wang JY, Johnson AO. Effects of residence and race on burden of travel for care: cross sectional analysis of the 2001 US National Household Travel Survey. *BMC Health Serv Res*. 2007; 7:40. [PubMed: 17349050]
45. Stata Statistical Software [computer program]. College Station, TX: 2013. Version 13.1
46. Thomas KC, Ellis AR, Konrad TR, Holzer CE, Morrissey JP. County-level estimates of mental health professional shortage in the United States. *Psychiatric Services*. 2009; 60(10):1323–1328. [PubMed: 19797371]
47. Newkirk, V., Damico, A. The affordable care act and insurance coverage in rural areas. The Henry J. Kaiser Family Foundation; <http://kff.org/uninsured/issue-brief/the-affordable-care-act-and-insurance-coverage-in-rural-areas/>. Accessed August 1, 2016.
48. Bureau of Primary Health Care. Health Center Fact Sheet. 2016. <http://bphc.hrsa.gov/about/healthcenterfactsheet.pdf>. Accessed July 20, 2016.
49. Cummings JR, Case BG, Ji X, Marcus SC. Availability of Youth Services in U.S. Mental Health Treatment Facilities. *Adm Policy Ment Health*. 2016; 43(5):717–727. [PubMed: 26467795]

Figure 1.

Distribution of Zip Code Tabulation Areas (ZCTA) containing any community-based specialty mental health treatment resources

Note: ZCTAs shaded in color have at least one of each type of community-based specialty mental health treatment resource. ZCTAs shaded in gray have no data available. Data for office-based practices of mental health specialists (physicians and non-physicians) are from the 2013 County Business Patterns Survey. Data for mental health treatment facilities that provide outpatient care are from the 2014 SAMHSA Behavioral Health Treatment Services Locator.

Table 1

Summary statistics for U.S. Zip Code Tabulation Area characteristics

	Mean/%	Standard Deviation
Median household income (\$)	52,071	22,042
ZCTA located in rural/urban area		
Rural (%)	22.7	–
Urban/suburban (%)	77.3	–
Percentage residents who are Black		
Less than 1 (%)	51.5	–
1 – 9 (%)	29.1	–
10 – 24 (%)	9.7	–
25 – 49 (%)	5.7	–
50 or more (%)	4.0	–
Percentage residents who are Hispanic		
Less than 1 (%)	31.6	–
1 – 9 (%)	46.5	–
10 – 24 (%)	12.5	–
25 – 49 (%)	5.6	–
50 or more (%)	3.8	–
Percentage residents under age 20	24.8	7.6
Percentage residents over age 64	16.5	8.6
Percentage residents who are female	50.0	5.2
Percentage residents who are married ^a	53.6	12.6
Total population	9,771	13,996
Land area (square miles)	88.7	247.3

Notes: N= 31,836 ZCTAs;

^aPercentage of the population 15 years of age and older that is married (versus widowed, divorced, separated, or never married)

Table 2

Bivariate analyses examining the association between Zip Code Tabulation Area (ZCTA) characteristics and the availability of community-based specialty mental health (MH) treatment resources

	Any MH treatment facility providing outpatient care			Any office-based practice: MH specialist physician			Any office-based practice: MH specialist non-physician			Any community-based MH Treatment Resource		
	%	UOR [±]	[95% CI]	%	UOR [±]	[95% CI]	%	UOR [±]	[95% CI]	%	UOR [±]	[95% CI]
% of ZCTAs with 1 provider	14.9	–	–	13.9	–	–	20.8	–	–	29.3	–	–
Median household income												
First quartile (mean=\$30,534)	16.6		(Ref)	8.0		(Ref)	12.9		(Ref)	23.1		(Ref)
Second quartile (mean=\$42,999)	17.1	1.04	[0.96,1.13]	10.3	1.32	[1.18,1.47]	16.5	1.33	[1.22,1.45]	25.9	1.16	[1.08,1.25]
Third quartile (mean=\$53,542)	12.9	0.75	[0.69,0.82]	12.2	1.59	[1.43,1.77]	18.8	1.56	[1.43,1.70]	25.7	1.15	[1.07,1.23]
Fourth quartile (mean=\$81,207)	12.9	0.75	[0.68,0.81]	25.3	3.89	[3.54,4.28]	35.1	3.64	[3.36,3.94]	42.5	2.46	[2.29,2.63]
Rural status												
Rural	8.8		(Ref)	1.6		(Ref)	4.0		(Ref)	11.3		(Ref)
Urban/Suburban	16.7	2.07	[1.90,2.27]	17.6	13.52	[11.19,16.35]	25.8	8.38	[7.42,9.46]	34.6	4.14	[3.83,4.47]
% of residents that are Black												
Less than 1	6.2		(Ref)	4.0		(Ref)	7.8		(Ref)	12.5		(Ref)
1 – 9	22.4	4.33	[4.00,4.70]	26.4	8.55	[7.81,9.35]	37.1	7.02	[6.54,7.53]	48.4	6.55	[6.16,6.97]
10 – 24	25.8	5.23	[4.72,5.80]	25.4	8.09	[7.23,9.05]	36.4	6.81	[6.20,7.47]	48.6	6.61	[6.08,7.19]
25 – 49	27.1	5.59	[4.96,6.31]	20.1	5.97	[5.20,6.85]	28.7	4.78	[4.25,5.37]	43.7	5.43	[4.89,6.02]
50 or more	27.4	5.68	[4.94,6.53]	13.9	3.84	[3.21,4.59]	20.9	3.14	[2.71,3.64]	38.7	4.41	[3.90,4.98]
% of residents that are Hispanic												
Less than 1	3.9		(Ref)	1.5		(Ref)	3.0		(Ref)	6.6		(Ref)
1 – 9	18.2	5.56	[4.98,6.21]	17.3	13.57	[11.51,16.01]	26.3	11.6	[10.31,13.12]	36.5	8.14	[7.47,8.86]
10 – 24	21.8	6.98	[6.15,7.92]	26.1	22.84	[19.18,27.19]	37.0	19.14	[16.78,21.84]	47.3	12.71	[11.50,14.05]
25 – 49	26.6	9.05	[7.82,10.47]	25.4	22.00	[18.16,26.65]	36.1	18.44	[15.87,21.43]	49.5	13.90	[12.31,15.69]
50 or more	25.2	8.42	[7.14,9.93]	18.7	14.88	[11.99,18.47]	26.5	11.79	[9.92,14.01]	40.8	9.77	[8.50,11.23]

Notes: N= 31,836 ZCTAs;

[±]UOR refers to the unadjusted odds ratio, which was estimated using a logistic regression model that included each measure of interest without any additional covariates.

Table 3

Multiple logistic regression analyses examining the association between Zip Code Tabulation Area (ZCTA) characteristics and the availability of community-based specialty mental health (MH) treatment resources

	Any MH treatment facility providing outpatient care	Any office-based practice: MH specialist physician	Any office-based practice: MH specialist non-physician	Any community-based MH Treatment Resource
	AOR [±]	[95% CI]	AOR [±]	[95% CI]
Median household income				
First quartile	Ref	Ref	Ref	Ref
Second quartile	0.90	[0.80,1.02]	1.09	[0.94,1.26]
Third quartile	0.62***	[0.54, 0.71]	1.34***	[1.14,1.57]
Fourth quartile	0.43***	[0. 37,0.51]	3.04***	[2.53,3.66]
Rural/urban area				
Rural	Ref	Ref	Ref	Ref
Urban/suburban	0.37***	[0.33, 0.43]	1.05	[0.84,1.31]
% of residents that are Black				
Less than 1	Ref	Ref	Ref	Ref
1 – 9	0.99	[0.89,1.11]	1.15*	[1.02,1.31]
10 – 24	0.86	[0.71,1.04]	0.83	[0.67,1.02]
25 – 49	0.65***	[0.50,0.83]	0.44***	[0.33,0.59]
50 or more	0.34***	[0.24,0.47]	0.17***	[0.12,0.25]
% of residents that are Hispanic				
Less than 1	Ref	Ref	Ref	Ref
1 – 9	1.23**	[1.07,1.42]	1.55***	[1.28,1.89]
10 – 24	1.25*	[1.01,1.54]	1.06	[0.82,1.37]
25 – 49	1.27	[0.97,1.67]	0.92	[0.67,1.27]
50 or more	0.63*	[0.43,0.91]	0.68	[0.45,1.04]
% of residents under age 20 ^a	0.86***	[0.79,0.94]	0.56***	[0.51,0.62]
% of residents over age 64 ^a	1.52***	[1.38,1.67]	1.38***	[1.25,1.53]
% of residents who are female ^a	1.03	[0.95,1.11]	1.44***	[1.30,1.60]
% of residents who are married ^a	0.50***	[0.46,0.54]	0.54***	[0.49,0.59]

	Any MH treatment facility providing outpatient care		Any office-based practice: MH specialist physician		Any office-based practice: MH specialist non-physician		Any community-based MH Treatment Resource	
	AOR [±]	[95% CI]	AOR [±]	[95% CI]	AOR [±]	[95% CI]	AOR [±]	[95% CI]
Total population (logged) ^a	4.30***	[4.08,4.54]	4.41***	[4.16,4.68]	4.62***	[4.39,4.86]	5.50***	[5.24,5.76]
Land area ^a	1.29***	[1.24,1.35]	0.71***	[0.63,0.79]	0.96	[0.90,1.02]	1.15***	[1.11,1.21]

Notes: N=31,836 ZCTAs;

[±] AOR refers to the adjusted odds ratio, which was estimated using logistic regression models that included all covariates in the table as well as state indicators.

^a Continuous measure was standardized.