Research paper

A community health case for psychiatric care: A cross-sectional study of county health rankings

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A R T I C L E   I N F O

A B S T R A C T

Objectives: To determine if there is an association between the provision of mental health services and county health rankings in the United States.
Methods: We used retrospective population-based, 2016 U.S. county level cross-sectional analysis to determine the association of mental health services provision on U.S. counties health rankings. The key dependent variables in this study were the county health factor rankings (CHR). The presence of inpatient, outpatient and other facilities which may provide mental health services are identified for each county. Multilevel mixed effects ordinal logistic regression models were used to account for nesting effects utilizing two levels of data which include hospital- and county-level data.
Results: Better county health rankings were associated with the presence of Outpatient services (OR = 0.69, 95% CI: 0.55–0.85) and Psychiatric hospital (OR = 0.55, 95% CI: 0.40–0.74).
Conclusion: These findings suggest a significant association between psychiatric care and community health. Access to psychiatric services is associated with improved population health.

1. Introduction

The United States (U.S.) has the greatest lifetime prevalence of mental health diseases according to the World Health Organization's World Mental Health Survey [1]. On average, 47% of adults experience mental health illness in their lifetime, and annually, approximately 25% of the adult population is diagnosed with one or more mental health disorders. The Patient Protection and Affordable Care Act, or ACA (2010), contributed multiple significant improvements to the health care system, including decreasing the number of uninsured individuals [2]. In addition, the Mental Health Parity and Addiction Equity Act (2008) expanded insurance coverage for mental health and substance use services. However, increased access to health insurance coverage does not equate to increased access to quality or affordable care. High patient cost-sharing continues to make health insurance unaffordable,

especially for individuals with mental health disabilities who have a low socioeconomic status [3]. As a result, individuals often rely on hospital emergency departments (EDs) to initiate treatment and seek mental health care [4]. Patients who live in rural areas and have low socioeconomic status rely heavily on safety net providers and critical care access hospitals to receive needed treatment for their mental health disorders [5]. Comorbid mental illnesses adversely affect outcomes of a variety of medical illnesses and thus presumably may affect overall community health outcomes [6]. However, it is not clear to what degree the availability of facilities capable of treating mental health needs influences health outcomes within the community. The objective of this study is to determine the association of mental health services provision on county health rankings in the U.S. As such, our hypothesis is that there is an association between the ability for patients to receive needed mental health treatments through mental health care

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facilities and a community's health rankings.

Several mental health diseases have consistently been shown to increase hospitalization rates and can be addressed at the community level. This list includes dementia, [7] depression [8], and schizophrenia or bipolar disorder [9]. These mental health disorders are frequently associated with higher mortality, disability, and adverse labor market consequences [10]. A 2008 study estimates that serious mental illness costs the U.S. economy $193.2 billion in lost earning per year [11]. Furthermore, as of 2017, there are only enough mental health providers available to serve 32.5% of those needing care, a significant decline from 51% in 2014 [12]. Thus, engaging communities to address mental health-related social, economic, clinical and behavioral factors is important for improving overall population health.

A common methodology that is used to assess the relationship of the health care system and the surrounding community is to use an ecological perspective that considers various factors. Specifically, the ecological perspective of health explores the interdependency between individual healthcare needs and the broader structural and contextual factors that have the potential to influence health [13]. For example, previous studies have examined, on a county level, the relationship between socioeconomic status, physician characteristics, rurality, and mental health utilization and quality of care [14]. However, to our knowledge, no study has examined the association of the availability of mental health facilities and safety net hospitals on health at the county level. Therefore, we use the County Health Rankings (CHR), a project developed by the University of Wisconsin Population Health Institute and the Robert Wood Johnson Foundation, which explored the result of county location on health outcomes and population health, to examine how mental health services provision affects CHR.

2. Methods

2.1. Data sources

This study utilized data from the 2016 U.S. CHR National Database, the Area Health Resource File (AHRF), and the American Hospital Association Dataset (AHA). The U.S. CHR database is a national dataset that ranks the counties of each State by four major factors: Health Behaviors, Clinical Care, Social and Economic Factors, and Physical Environment to assess health outcomes [15]. Multiple studies have provided support to the associations and measures provided by the county rankings database [16–18]. The AHRF database provides additional county level health resources and also includes demographic and socioeconomic indicators [19]. Finally, the AHA database includes information on hospital characteristics, demographics, services, and expenses from over 6000 hospitals in the U.S [20].

2.2. Dependent variables

In this study, a community is geographically defined by county lines. Thus, the dependent variables are the county health factor rankings provided by the U.S. CHR database. The overall health factor ranking is an aggregated measure composed of a county's scores on Health Behaviors (30%), Clinical Care (20%), Social and Economic Factors (40%), and Physical Environment (10%) [15]. The elements that define each of these components are listed in Table 1, along with their weightings. Since the CHR are calculated on a State by State basis, CHRs within each State were divided into thirds, and the resulting high, middle, and low scores were combined to adjust for the differences in the number of counties in each state, which allows for comparison across States.

2.3. Independent variables

The key independent variables include the presence of 1) a psychiatric hospital 2) the number of hospitals within a county offering outpatient psychiatric services as identified by the AHA dataset, and 3) any psychiatric services offered by a hospital. Psychiatric hospitals were identified via hospital responses to the AHA annual survey indicating the primary service of the hospital was to provide diagnostic and therapeutic services to patients with mental or emotional disorders. Outpatient psychiatric services were identified by hospitals indicating that provision of medical care, including diagnosis and treatment, of psychiatric outpatients occurred at the facility [21]. Psychiatric services were identified through the AHA survey and can include the following hospital services: child-adolescent, consultation-liaison, education, emergency, geriatric, outpatient, partial hospitalization, residential.

In addition, the presence of critical access, and safety net hospitals at the county level were evaluated. Critical access hospitals are identified by CMS and indicate small rural hospital settings that are 15 miles away from other facilities in mountainous areas and 35 miles away from other facility in other areas. As a result, they are responsible for caring for a wide range of acute and mental care needs of the surrounding populations and are likely important to county health rankings associated with clinical care, SES, and health behaviors [22]. Safety net hospitals are hospitals which provide a substantial portion of care to patients who are uninsured, enrolled in Medicaid, or are considered to be a vulnerable patient. Often safety net hospitals are the primary providers of inpatient behavioral health [23]. In order to define safety net hospitals, we first calculated the mean hospital admissions utilizing Medicaid insurance for each state. Safety net designation was assigned to hospitals within each state that had a hospital Medicaid insurance rate greater than the mean plus one standard deviation [24].

2.4. Control variables

To control for differing county characteristics, we used variables previously identified as important for health outcomes. First, we included the number of federally qualified healthcare centers (FQHCs) in the county to define primary care burden in underserved areas. FQHCs provide primary healthcare services to underserved populations and also help manage chronic conditions and general behavioral health conditions [25,26]. In addition, FQHCs are often the sole mental and primary care providers to large portions of the population, and are likely to influence overall CHR. In addition, we included the number of inpatient hospital beds per thousand population to help define inpatient healthcare services access within the county. The percent of hospitals that are not-for-profit provides indication as to the ownership distribution of the hospitals within the county. A greater number of not-for profit hospitals may provide indication concerning the outreach and community benefits perspective the hospital pursues, and due to the community-orientated mission of the organization, may also provide indications to the needs of the community. Next, the Herfindahl-Hirschman Index (HHI) is a continuous variable that provides indication of the amount of hospital competition within the county. HHI was calculated by taking the sum of squared market shares of inpatient days from hospitals in each county. Market share is defined by the sum of inpatient days by hospital system divided by the total number of inpatient days in the county [27]. The closer this number is to 1, the more monopolistic the market.

Additionally, racial and ethnic minority populations have been identified to have disparities in access and utilization of health services. Thus, we utilize an entropy index score, which defines the amount of diversity within the county [28]. To calculate this variable, the county sum of the log proportions of each of the following racial groups was included: African Americans, American Indians or Alaskan Natives, Asians, Native Hawaiians or other Pacific Islanders, Hispanics, and non-Hispanic Whites. The larger the score, the more diverse the population [29].

Food insecurity was also included as a covariate since it has the potential to influence both the exposure and outcome. Specifically, food insecurity has been shown to be associated with poor mental health

Table 1
Community health ranking dimensions and weights.

Focus area	Measure	Description
Health behaviors (30%)		
Tobacco use (10%)	Adult smoking	% of adults who are current smokers
Diet and exercise (10%)	Adult obesity	% of adults that report a BMI of 30 or more
	Food environment index	Index of factors that contribute to a healthy food environment, 0 (worst) to 10 (best)
	Physical inactivity	% of adults aged 20 and over reporting no leisure-time physical activity
	Access to exercise opportunities	% of population with adequate access to locations for physical activity
Alcohol and drug use (5%)	Excessive drinking	% of adults reporting binge or heavy drinking
	Alcohol-impaired driving deaths	% of driving deaths with alcohol involvement
Sexual activity (5%)	Sexually transmitted infections	Number of newly diagnosed chlamydia cases per 100,000 population
	Teen births	Teen birth rate per 1000 female population, ages 15–19
Clinical care (20%)		
Access to care (10%)	Uninsured	% of population under age 65 without health insurance
	Primary care physicians	Ratio of population to primary care physicians
	Dentists	Ratio of population to dentists
	Mental health providers	Ratio of population to mental health providers
Quality of care (10%)	Preventable hospital stays	Number of hospital stays for ambulatory-care sensitive conditions per 1000 Medicare enrollees
	Diabetic monitoring	% of diabetic Medicare enrollees ages 65–75 that receive HbA1c monitoring
	Mammography screening	% of female Medicare enrollees ages 67–69 that receive mammography screening
Social and economic environment (40%)		
Education (10%)	High school graduation	% of ninth-grade cohort that graduates in four years
	Some college	% of adults ages 25–44 years with some post-secondary education
Employment (10%)	Unemployment	% of population ages 16 and older unemployed but seeking work
Income (10%)	Children in poverty	% of children under age 18 in poverty
	Income inequality	Ratio of household income at the 80th percentile to income at the 20th percentile
Family and social support (5%)	Children in single-parent households	% of children that live in a household headed by single parent
	Social associations	Number of membership associations per 10,000 population
Community safety (5%)	Violent crime	Number of reported violent crime offenses per 100,000 population
	Injury deaths	Number of deaths due to injury per 100,000 population
Physical environment (10%)		
Air and water quality (5%)	Air pollution - particulate matter	Average daily density of fine particulate matter in micrograms per cubic meter (PM2.5)
	Drinking water violations	% of population potentially exposed to water exceeding a violation limit during the past year
Housing and transit (5%)	Severe housing problems	% of households with at least 1: overcrowding, high housing costs, or lack of kitchen or plumbing facilities
	Driving alone to work	% of the workforce that drives alone to work
	Long commute - driving alone	Among workers who commute in their car alone, the percentage that commute more than 30 min

*Adapted from University of Wisconsin Population Health Institute and Robert Wood Johnson Foundation County Health Rankings: http://www.countyhealthrankings.org/rankings/data

Table 2
County ranking descriptive statistics.

	County ranking		
	Best	Middle	Poor
Categorical variables		Frequency	
Psychiatric services present in county			
No	473	551	561
Yes	362	266	208
Psychiatric hospital present in county			
No	660	709	704
Yes	175	108	65
Outpatient psychiatry offered in county			
No	507	599	594
Yes	328	218	175
Critical access hospital present in county			
No	535	418	391
Yes	300	399	378
Safety net hospital present in county			
No	693	651	26
Yes	142	166	143
Continuous variables		Mean (SD)	
Number of FQHC in county	2.16 (5.34)	1.92 (5.98)	2.43 (6.76)
Number of hospital beds per thousand population	3.41 (3.59)	3.84 (4.64)	3.54 (3.59)
% hospitals which are not for profit status	0.27 (1.34)	0.18 (1.14)	0.13 (0.56)
Herfindahl Hirschman Index (HHI) closer to 1 more monopolistic	0.66 (0.4)	0.73 (0.38)	0.77 (0.36)
County population diversity - greater the score the more diverse	0.62 (0.29)	0.61 (0.28)	0.64 (0.3)
% population with food insecurities	13.22 (3.01)	14.57 (3.15)	16.61 (4.18)
% of rural area in county	41.68 (28.83)	54.13 (28.31)	58.35 (27.88)
Median age	39.02 (5.08)	40.35 (4.71)	39.87 (4.66)

Table 3
Multilevel mixed effects ordinal logistic regression.

County health factors rank (lower is better)	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	OR	LCI	UCI	OR	LCI	UCI	OR	LCI	UCI	OR	LCI	UCI	OR	LCI	UCI	OR	LCI	UCI
Any psychiatric care in county																		
No																		
Yes													0.69	0.56	0.9			
Psychiatric hospital present in county																		
No																		
Yes										0.52	0.38	0.71				0.55	0.40	0.74
Outpatient psychiatry offered in county																		
No																		
Yes							0.66	0.53	0.82							0.69	0.55	0.85
Critical access hospital present in county																		
No																		
Yes				1.22	0.99	1.51										1.18	0.95	1.46
Safety net hospital present in county																		
No																		
Yes	1.02	0.82	1.27													1.00	0.80	1.26
Number of FQHCs in county	1.01	0.99	1.02	1.01	0.99	1.02	1.01	0.99	1.03	1.01	1.00	1.03	1.01	0.99	1.03	1.01	1.00	1.03
Hospital beds per thousand population	0.97	0.95	0.99	0.97	0.95	1.00	0.98	0.95	1.00	0.98	0.96	1.00	0.98	0.95	1.00	0.98	0.96	1.01
% hospitals which are not for profit status	0.93	0.85	1.01	0.92	0.85	1.01	0.93	0.86	1.02	0.93	0.85	1.01	0.92	0.85	1.01	0.93	0.85	1.01
Herfindahl Hirschman Index (HHI)	1.48	1.13	1.95	1.51	1.15	1.98	1.32	1.00	1.74	1.20	0.90	1.59	1.30	0.98	1.73	1.12	0.83	1.50
County population diversity	2.71	1.56	4.70	2.69	1.55	4.67	2.81	1.61	4.88	2.90	1.67	5.06	2.88	1.65	5.02	2.97	1.70	5.18
% population with food insecurities	1.88	1.78	1.98	1.88	1.78	1.98	1.88	1.79	1.98	1.88	1.78	1.98	1.88	1.78	1.98	1.89	1.79	1.99
Median age	1.04	1.02	1.07	1.04	1.02	1.07	1.04	1.02	1.07	1.04	1.02	1.07	1.04	1.02	1.07	1.04	1.02	1.07
% of the county rural	1.03	1.02	1.03	1.03	1.02	1.03	1.03	1.02	1.03	1.03	1.02	1.03	1.03	1.02	1.03	1.02	1.02	1.03
Pseudo log likelihood	−2119.08			−2117.36			−2112.23			−2110.17			−2110.23			−2103.10		
Prop > chi²	0.00			0.00			0.00			0.00			0.00			0.00		
AIC	4262.17			4258.71			4248.46			4244.35			4248.47			4236.21		
BIC	4331.65			4328.19			4317.93			4313.83			4328.52			4323.06		

outcomes independent of socioeconomic status [30]. In addition, household food insecurity has been shown to be associated with adult health status [31]. Food insecurity was operationalized within the CHR data as the percent of the county population who did not have access to a reliable source of food during the past year. In addition, the median age of the population is included as a continuous variable to further define potential healthcare needs as population age is associated with increased healthcare utilization. Finally, the percent of the population in rural areas is included to help define resource availability and additional potential healthcare needs.

2.5. Analysis

To analyze the question of interest, we restricted the analysis to counties that had a hospital present. In addition, we excluded counties that were missing data related to diversity or competition, which reduced the overall population by 30 counties throughout the U.S. Multilevel mixed effects ordinal logistic regression models were utilized as the dependent variable is an ordinal rank (high, middle, low), and we included two levels of data: County and State. Six different models were analyzed to define variables of influence. Akaike information criterion (AIC), Bayesian information criterion (BIC) and likelihood ratio tests were utilized for model evaluation. STATA 15 was used to conduct all analyses, and models were estimated through maximum likelihood. Odds ratios and 95% Confidence Intervals are reported. In each case, an odds ratio less than 1 indicates a positive association with better CHR ranking; that is, the CHR ranking is closer to a value of 1.

3. Results

3.1. Descriptive analysis

A total of 2421 counties were included in the analysis. As displayed in Table 2, counties with psychiatric services present had a greater frequency of scoring in the best tertile for the CHR. Specifically, 362 (43%) counties with the best CHR rankings had hospitals which offered

psychiatric services, compared to 266 (33%) counties in the middle CHR ranking, and 208 (27%) counties in the lowest ranking. Additionally, 175 (21%) counties with the best CHR ranking had a psychiatric hospital present, compared to 108 (13%) counties in the middle CHR ranking and 65 (8%) counties in the lowest CHR ranking. Similarly, 328 (39%) counties with the best CHR ranking had outpatient psychiatry services, compared to 218 (27%) counties with the middle CHR ranking and 175 (23%) counties with the lowest CHR ranking.

In contrast, counties with the presence of a critical access hospital had a greater frequency of scoring in the lower tertiles for CHR. For example, 300 (36%) counties with the best CHR ranking had a critical access hospital present, compared to 398 (49%) counties with the middle CHR ranking, and 378 (49%) counties with the lowest CHR ranking. Analogous findings were observed for the presence of safety net hospitals; specifically, counties with a greater frequency of safety net hospitals resulted in a greater number of counties scoring in the lower CHR tertiles.

For all control variables, means were roughly similar across CHR categories. The greatest differences were observed in the percent of not-for-profit hospitals, which was 27% for counties with the highest CHR compared to 18% for counties in the middle CHR, and 13% for counties with the lowest CHR. Additionally, counties with the highest CHR ranking had a mean HHI score of 0.66 (least monopolistic), compared to middle and low CHR ranking counties, with means of 0.73 and 0.77 respectively, indicating a higher tendency toward monopolistic activity. Counties with the best CHR ranking also had the lowest percentage of population with food insecurities, the lowest percentage population in a rural location, and the lowest median age.

3.2. Multivariable analysis

Table 3 shows that the presence of a psychiatric service was positively associated with better CHRs (OR = 0.69; 95% CI: 0.56, 090). Similarly, presence of a psychiatric hospital and outpatient psychiatry was positively associated with better CHRs (psychiatric hospital: OR = 0.52; 95% CI: 0.38, 0.71; outpatient psychiatry: OR = 0.66; 95%

CI: 0.53, 0.82). In contrast, the presence of a critical access hospital (OR = 1.22; 95% CI: 0.99, 1.51) or a safety net hospital (OR = 1.02; 95% CI: 0.82, 1.27) was not associated with better CHR, although neither were statistically significant.

When all these factors were analyzed in a single model (Model 6), findings were consistent, wherein having a psychiatric hospital present in the county (OR = 0.55; 95% CI: 0.40, 0.74) or having outpatient psychiatry services available (OR = 0.69; 95% CI: 0.55, 0.85) was associated with better CHR. Again, the presence of a critical access hospital (OR = 1.18; 95% CI: 0.95, 1.46) or the presence of a safety net hospital (OR = 1.00; 95% CI: 0.80, 1.26) was not associated with better CHR, although these were not statistically significant. Across all models, the county with more diverse population, larger population with food insecurities, more rurality, and greater median age were associated with lower CHR. Model 6 was the best fit for the data as indicated by the likelihood ratio test.

4. Discussion

The purpose of this study was to determine if availability of mental health services is associated with community health as defined by CHRs. Mental health disorders persist among the U.S. population; therefore, increased provision of mental health services will be needed to improve community health throughout the nation. Discouragingly, past research has shown that there are marked service gaps in psychiatric care. For example, a study of 3000 U.S. counties found that the majority (77%) experienced a severe shortage of psychiatric care mental health prescribers [32]. Our investigation is more comprehensive and extends upon such studies by accounting for the presence of various hospital types (critical access, safety net, federally qualified health centers and psychiatric hospitals). Furthermore, our study found that the presence of psychological services, particularly inpatient psychiatric hospitals and outpatient services in a county were associated with better CHR. In addition, our study found that counties without psychiatric hospitals were found to have worse CHR compared to their peers. The net result is that absence of mental health treatment facilities likely adversely affects the overall health of a population in communities. Thus, these results highlight the beneficial effects of availability of mental health services on CHR that, in turn, provides a holistic view of population health.

Furthermore, our study revealed that population diversity, greater food insecurity, more rurality, as well as the presence of a population with greater median age had an attenuated effect on the CHR of a county. These findings are congruent with past research demonstrating that such population characteristics are associated with poorer outcomes [33]. Despite these associations, it is worth noting that the mere availability of mental health services does not mean that all those who need mental health treatment receive it.

Several cultural and contextual factors can act as barriers in accessing mental health services [34]. Previous research has demonstrated that African Americans have a greater stigma associated with utilizing mental health services than other racial groups in the U.S. [35]. In addition, discriminatory and beliefs of prejudiced practices have reduced some communities' willingness to receive mental health treatment [36]. As a result, efforts to provide mental health services have increasingly been provided by African American churches due to this stigma and other access-related issues [37]. While the provision of services to these populations via alternative settings does increase access, it does call into question whether these populations are receiving the optimal level of services needed, and whether these settings provide the opportunity for more beneficial integration of services.

Additionally, there are well-documented physical and developmental issues which occur within areas in which there is food insecurity [38]. Previous inquiry has indicated an association between food insecurity and increased risk of anxiety, depression, and poor coping behaviors among youth and women [38]. Associations between maternal depression and subsequent reductions in early childhood development further reinforce the need to provide mental health services for these groups in order to improve overall health [39].

Rural area residents face several additional unique challenges in receiving needed healthcare services [40]. Distance to medical facilities, including mental healthcare providers, is often a barrier for individuals in rural areas [36]. Previous research has demonstrated there are barriers associated with mental health care stigma particularly in gender and sexual minority groups residing in rural areas [41]. Furthermore, the absence of facilities provides an obvious barrier, leading to under or undiagnosed mental disorders and challenges in accessing much needed care [42]. As a result, costs to acquire needed services based upon travel, missed work, or limited income are potentially prohibitive, and add to the numerous barriers to accessing care in rural populations [36]. Finally, the associations between mental health issues and substance abuse within rural areas continue to increase [42].

Ultimately, the provision of psychological services could help better manage existing mental health needs, as well as help manage other needs which are relevant to special populations within a community. Studies with special populations, such as military veterans, have shown that integrated healthcare models that include both inpatient and outpatient mental health care improve quality of health care and physical and mental health status [43]. Moreover, benefits of integration of services also can make service provision more efficient [44]. Previous inquiry has described the issues of siloed mental health and general health services [45]. In short, patients with severe mental illness also tend to have poorer health and less access to general healthcare services than people without severe mental illness. The fragmentation present between mental health and general health services provide substantial barriers to overall health improvements within U.S. communities.

Finally, there is likely some association between counties that rank better with regard to CHR and greater advocacy or greater amount of income spent on psychiatric services. Counties that rank better, which also indicates a higher SES based upon the methods for calculating the CHR factor ranking, are also likely to have more resources to deploy for mental and behavioral health services. With greater resources to deploy, a wider set of population needs can be met and influenced positively. While this would seem to argue against the influence of psychiatric services on the health of the population, the relationship is most likely bi-directional [46]. Counties that can afford to spend additional resources on these services do so based on need, and in return reap benefits associated with improved health behaviors and increased access to clinical care.

4.1. Limitations

There are potential limitations in this study that should be addressed. While the findings add to the case for better mental healthcare to improve community health, we cannot make conclusions of causality due to the cross-sectional nature of our investigation. Future research with longitudinal data would be helpful to bring better understanding of how the provision of psychiatric services and presence of mental health facilities are related to community health outcomes over time. Additionally, the CHR does not account for all the dimensions that make-up community health factors; therefore, we can only base our conclusions on the constructs included in the CHR factor measures. Furthermore, it is likely that neighboring county's health rankings or presence of mental health and other healthcare providers influences healthcare factors in certain counties. However, due to data limitations and abilities to accurately define population movements between counties, we are unable to adjust for these potential issues.

5. Conclusion

Despite these limitations, our study represents one of the first studies to demonstrate the need for psychiatric services for improvement

of overall health outcomes using the CHR data. Findings from this study help illustrate the increasing need for a variety of mental health services and facilities to support a healthy community population. Results from this study also may guide policy makers to understand that focusing on these often-neglected services can lead to creating an overall healthier population.

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Disclosures

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References

[1] Kessler RC, Angermeyer M, Anthony JC, R DEG, Demyttenaere K, Gasquet I, et al. Lifetime prevalence and age-of-onset distributions of mental disorders in the World Health Organization's World Mental Health Survey Initiative. World Psychiatry 2007;6:168–76.

[2] Jost TS. An Affordable Care Act at year 5: key issues for improvement. JAMA 2015;313:1709–10.

[3] Hudson CG. Socioeconomic status and mental illness: tests of the social causation and selection hypotheses. Am J Orthopsychiatry 2005;75:3–18.

[4] Cunningham P, McKenzie K, Taylor EF. The struggle to provide community-based care to low-income people with serious mental illnesses. Health Aff (Millwood) 2006;25:694–705.

[5] Hoopes MJ, Angier H, Gold R, Bailey SR, Huguet N, Marino M, et al. Utilization of community health centers in Medicaid expansion and nonexpansion states, 2013–2014. J Ambul Care Manage 2016;39:290–8.

[6] Insel T. No health without mental health. Health NIoM. National Institute of Mental Health: National Institute of Mental Health; 2011. editor Post by Former NIMH Director Thomas Insel.

[7] Phelan EA, Borson S, Grothaus L, Balch S, Larson EB. Association of incident dementia with hospitalizations. JAMA 2012;307:165–72.

[8] Davydow DS, Katon WJ, Lin EH, Ciechanowski P, Ludman E, Oliver M, et al. Depression and risk of hospitalizations for ambulatory care-sensitive conditions in patients with diabetes. J Gen Intern Med 2013;28:921–9.

[9] Lin HC, Huang CC, Chen SF, Chen YH. Increased risk of avoidable hospitalization among patients with schizophrenia. Can J Psychiatry 2011;56:171–8.

[10] Trautmann S, Rehm J, Wittchen HU. The economic costs of mental disorders: do our societies react appropriately to the burden of mental disorders? EMBO Rep 2016;17:1245–9.

[11] Insel TR. Assessing the economic costs of serious mental illness. Am J Psychiatry 2008;165:663–5.

[12] Kaiser Family Foundation. Mental health care health professional shortage areas (HPSAs). 2017.

[13] McLaren L, Hawe P. Ecological perspectives in health research. J Epidemiol Community Health 2005;59:6–14.

[14] Edlund MJ, Belin TR, Tang L. Geographic variation in alcohol, drug, and mental health services utilization: what are the sources of the variation? J Ment Health Policy Econ 2006;9:123–32.

[15] County Health Rankings. The ranking methods. 2017.

[16] Hood CM, Gennuso KP, Swain GR, Catlin BB. County health rankings: relationships between determinant factors and health outcomes. Am J Prev Med 2016;50:129–35.

[17] Remington PL, Catlin BB, Gennuso KP. The county health rankings: rationale and methods. Popul Health Metrics 2015;13:11.

[18] Rohan AM, Booske BC, Remington PL. Using the Wisconsin County Health Rankings to catalyze community health improvement. J Public Health Manag Pract 2009;15.

[19] HHS. Area health resource files (AHRF). Services USDoHaH; 2016.

[20] AHA. Association AHeditor. About. American Hospital Association; 2016.

[21] American Hospital Association. Hospital statistics. American Hospital Association; 2016.

[22] Lipsky MS, Glasser M. Critical access hospitals and the challenges to quality care. JAMA 2011;306:96–7.

[23] Chokshi DA, Chang JE, Wilson RM. Health reform and the changing safety net in the United States. Mass Medical Soc; 2016.

[24] Herrin J, St Andre J, Kenward K, Joshi MS, Audet AMJ, Hines SC. Community factors and hospital readmission rates. Health Serv Res 2015;50:20–39.

[25] Administration HRS. Federally qualified health centers. HRSA; 2018.

[26] CMS. Federally qualified health center. CMS; 2018.

[27] Hsieh H-M, Bazzoli GJ, Chen H-F, Stratton LS, Clement DG. Did budget cuts in Medicaid disproportionate share hospital payment affect hospital quality of care? Med Care 2014;52:415–21.

[28] Iceland J. The multigroup entropy index (also known as Theil's H or the information theory index). US Census Bureau; 2006. p. 31. [Retrieved July 2004].

[29] Parisi D, Lichter DT, Taquino MC. The buffering hypothesis: growing diversity and declining black-white segregation in America's cities, suburbs, and small towns? Soc Sci 2015;2:125.

[30] Jones AD. Food insecurity and mental health status: a global analysis of 149 countries. Am J Prev Med 2017;53:264–73.

[31] Stuff JE, Casey PH, Szeto KL, Gossett JM, Robbins JM, Simpson PM, et al. Household food insecurity is associated with adult health status. J Nutr 2004;134:2330–5.

[32] Thomas KC, Ellis AR, Konrad TR, Holzer CE, Morrissey JP. County-level estimates of mental health professional shortage in the United States. Psychiatr Serv 2009;60:1323–8.

[33] Anderson TJ, Saman DM, Lipsky MS, Lutfiyya MN. A cross-sectional study on health differences between rural and non-rural U.S. counties using the County Health Rankings. BMC Health Serv Res 2015;15:441.

[34] Forbes MK, Crome E, Sunderland M, Wuthrich VM. Perceived needs for mental health care and barriers to treatment across age groups. Aging Ment Health 2017;21:1072–8.

[35] Turner EA, Jensen-Doss A, Heffer RW. Ethnicity as a moderator of how parents' attitudes and perceived stigma influence intentions to seek child mental health services. Cultur Divers Ethnic Minor Psychol 2015;21:613.

[36] Douthit N, Kiv S, Dwolatzky T, Biswas S. Exposing some important barriers to health care access in the rural USA. Public Health 2015;129:611–20.

[37] Hankerson SH, Svob C, Jones MK. Partnering with Black churches to increase access to care. Psychiatr Serv 2018;69:125.

[38] Ivers LC, Cullen KA. Food insecurity: special considerations for women. Am J Clin Nutr 2011;94:1740S–4S.

[39] Liu Y, Kaaya S, Chai J, McCoy D, Surkan P, Black M, et al. Maternal depressive symptoms and early childhood cognitive development: a meta-analysis. Psychol Med 2017;47:680–9.

[40] Ziller EC, Anderson NJ, Coburn AF. Access to rural mental health services: service use and out-of-pocket costs. J Rural Health 2010;26:214–24.

[41] Cathleen E, Willging PD, Melina Salvador MA, Miria Kano MA. Pragmatic help seeking: how sexual and gender minority groups access mental health care in a rural state. Psychiatr Serv 2006;57:871–4.

[42] Priester MA, Browne T, Iachini A, Clone S, DeHart D, Seay KD. Treatment access barriers and disparities among individuals with co-occurring mental health and substance use disorders: an integrative literature review. J Subst Abuse Treat 2016;61:47–59.

[43] Druss BG, Rohrbaugh RM, Levinson CM, Rosenheck RA. Integrated medical care for patients with serious psychiatric illness: a randomized trial. Arch Gen Psychiatry 2001;58:861–8.

[44] Pomerantz A, Cole BH, Watts BV, Weeks WB. Improving efficiency and access to mental health care: combining integrated care and advanced access. Gen Hosp Psychiatry 2008;30:546–51.

[45] Horvitz-Lennon Marcela, Kilbourne Amy M, Pincus HA. From silos to bridges: meeting the general health care needs of adults with severe mental illnesses. Health Aff 2006;25:659–69.

[46] Ohrnberger J, Fichera E, Sutton M. The relationship between physical and mental health: a mediation analysis. Soc Sci Med 2017;195:42–9.