

The Silent Shortage

How Immigration Can Help Address the Large and Growing Psychiatrist Shortage in the United States



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PART I

Executive Summary

Each year, an estimated one in five Americans—fully 60 million individuals—will experience some form of mental illness.¹ Disturbingly, more than 40 percent of these Americans will go untreated and countless others will never even be diagnosed by a professional.² While the stigma surrounding mental health issues is a powerful obstacle to treatment that has received widespread attention, a more basic—and potentially more easily addressable—obstacle exists as well, namely the severe shortage of qualified mental health professionals such as psychiatrists.

Each year, more than 40% of Americans who experience some form of mental illness—an estimated 60M individuals—will go untreated.

Although individuals suffering from mental illnesses could be served by a variety of different mental health practitioners, psychiatrists play an essential role in treatment, particularly for those with serious mental illnesses such as major depression, bipolar disorder, PTSD, and schizophrenia. Given the primary role of

psychiatrists in mental health care, and how the Department of Health and Human Services focuses on them when deciding mental health care shortage areas, this report focuses in on the large and growing shortage of trained psychiatrists facing many parts of the United States.

To better understand and take stock of the extent of this psychiatrist shortage, this report relies on data from a unique dataset—Burning Glass Technologies’ Labor Insight, an engine that scours millions of job postings on the Internet each day, allowing us to see all psychiatrist job postings between 2007 and 2014. Along with this data, we also rely on the 2015 American Medical Association’s (AMA) Physician Masterfile as well as survey data on mental health from the Behavioral Risk Factor Surveillance System (BRFSS) to further gauge the issue.

Our findings are stark. Americans in nearly 60 percent of all U.S. counties face the grim reality that they live in a county without a single psychiatrist. This echoes the fact that the federal government estimates that almost 2,800 additional psychiatrists are needed to fill critical mental health care shortage areas.³ Equally concerning, the gap between the supply and demand of psychiatrists is expected to only widen as the need for psychiatrists is increasing rapidly. According to one 2015 report, psychiatrists are now the third most in-demand type of physician.⁴

America’s supply of psychiatrists is poised to remain at inadequate levels and even potentially decrease, as increasing numbers of psychiatrists retire without new psychiatry residents coming through the U.S. system to replace them. These opposing trends increase the likelihood of even more dire shortages in as little as five years from now.

KEY FINDINGS

▶ **There is a growing demand for mental health treatment in the United States.**

The number of psychiatrist job postings increased by more than 97 percent between 2010 and 2014.

▶ **Many areas of the United States have little to no access to psychiatrists to meet this demand.**

More than 60 percent of all counties in the United States—including 80 percent of all rural counties—do not have a single psychiatrist. Many others lack a sufficient number of psychiatrists to treat residents with mental illness. In rural counties just 590 psychiatrists serve more than 27 million Americans. Among different states the difference in supply can be striking: While there are more than 612 psychiatrists per 100,000 residents in New York, rural Idaho has less than one psychiatrist for every 100,000 people.

▶ **To maintain our current levels of inadequate mental health care, the United States will need more than 2,100 psychiatrists by 2020 simply to replace physicians slated for retirement.**

One in four U.S. psychiatrists is already over the age of 65. If that group retires in the next five years, as is expected, more than 2,100 new doctors will be needed by 2020 to maintain current levels of care. Less urban areas are expected to suffer disproportionately from this aging of America's psychiatrist workforce.

▶ **The growth in number of psychiatrists is too slow to meet current demand or fill future shortages.**

The number of psychiatrists in the United States has increased by only 12 percent since 1995—a rate that is far outpaced by underlying U.S. population growth. And currently, only about 4 percent of new medical residents go into psychiatry. Given these trends, to reach the minimal guidelines for adequate care—something the United States is not doing now—almost 4,900 new practitioners would be needed by 2020.

▶ **Immigration will be essential to meeting the psychiatrist shortage.**

In 2015, nearly a third of all psychiatrist positions were filled by doctors who graduated from a foreign medical school. In some states like Wisconsin, Florida, Delaware, and New Jersey, close to half of all psychiatrists are foreign-educated. At least in the short term, their role in the mental health care should increase if we are to meet treatment needs.

▶ **The shortage of psychiatrists is tied to an estimated more than 4.2M cumulative lost or less productive workdays each month, a major cost to U.S. employers.**

Studies have estimated that as the ratio of psychiatrists to people decreases, people prone of feeling mentally unwell are likely to suffer two more hours per month of poor mental health. If we assume that these individuals are less productive or largely unable to work during times of mental distress, this would result in more than 4.2 million lost or unproductive work days each month in the country as a whole due to our growing psychiatrist shortage.

*Nearly **60%** of all U.S. counties face the grim reality that they lack even a single psychiatrist.*

These findings are in line with past studies that have examined the mental health care shortage in the United States. The 2013 National Survey on Drug Use and Health found that nearly a quarter of respondents reported that they “did not know where to go for services,”⁵ while the 2015 Substance Abuse and Mental

Health Services Administration reported that among the small subset of young adults, ages 18 to 25 alone, 1.5 million people each year do not receive the mental health care they need.⁶

The obvious long-term solution to the psychiatrist shortage is to train more psychiatrists here in the United States. Unfortunately, with the number of Americans pursuing the field in decline and with the number of residency slots stagnating, this is no small feat. Yet, while America works to improve the U.S. psychiatrist pipeline, there is another important way to help ease the critical psychiatrist shortage—namely, the use of more foreign-born psychiatrists. Immigrant practitioners already make up a third of all psychiatrists nationwide, and in many states, they represent nearly half of the psychiatrist workforce. For the vast majority of counties that currently lack adequate mental health coverage, immigrants may represent an under-tapped resource that would allow them to treat the mental health issues of residents in need.

PART II

The Current Supply of Psychiatrists

According to the American Medical Association (AMA), there were 36,318 psychiatrists in the United States in 2015. This means that, nationwide, there are about 11.5 psychiatrists for every 100,000 people in the country. This statistic, however, does not tell the full story. Much like the U.S. population in general, psychiatrists are not spread out equally throughout the country. Psychiatrists are far more likely to be found in urban areas and are relatively thin on the ground in more rural ones. Aware of this disparity between areas of the country, the U.S. Department of

Health and Human Services (HHS) designates counties or areas of specific facilities or populations, such as correctional facilities, as shortage areas if they have fewer than 3.3 psychiatrists for every 100,000 people.⁷ Today, there are at least 4,000 of these shortage areas in the United States, representing a total need of 2,753 additional psychiatrists.⁸

To get a sense of which areas of the country were experiencing acute shortages of psychiatrists, we take data from the AMA as well as the U.S. Census' 2014

RURAL-URBAN COUNTY CLASSIFICATIONS AND KEY TERMS

- 1 Metro** - Counties in metro areas of 1 million people or more
 - 2 Metro** - Counties in metro areas of 250,000 to 1 million people
 - 3 Metro** - Counties in metro areas of fewer than 25,000 people
 - 4 Nonmetro** - Urban population of 20,000 or more, adjacent to a metro area
 - 5 Nonmetro** - Urban population of 20,000 or more, not adjacent to a metro area
 - 6 Nonmetro** - Urban population of 2,500 to 19,999, adjacent to a metro area
 - 7 Nonmetro** - Urban population of 2,500 to 19,999, not adjacent to a metro area
 - 8 Nonmetro** - Completely rural or less than 2,500 urban population, adjacent to a metro area
 - 9 Nonmetro** - Completely rural or less than 2,500 urban population, not adjacent to a metro area
- **Shortage Area:** We define shortage area as any county where there are less than one psychiatrist for every 30,000 people. This is in line with the definition of mental health care shortage area set by the U.S. Health Resources and Services Administration.
 - **Rural-Urban County Continuum:** We use the U.S. Department of Agriculture Economic Research Centre's Rural-Urban Continuum to categorize every county in the country. This system classifies every county on a 1-9 scale, with 1 being the most heavily urban. Areas are also further broken down based on their relative proximity to metro areas, allowing us to identify more isolated communities.

American Community Survey (ACS) to identify which counties have drastically lower numbers of psychiatrists. The data reveals huge mismatches between the distribution of the U.S. population and the distribution of the U.S. psychiatrist workforce. Almost 8.7 percent of the population—or more than 27.6 million people—lived in rural counties in 2014.⁹ Despite that, we find that just 1.6 percent—or 590—of the nation’s psychiatrists practiced in those same areas. This amounts to more than 46,700 rural residents for each rural psychiatrist, well below the HRSA’s general recommended minimum. Conversely, while only 54 percent of the U.S. population lives in the country’s most urban counties, these counties contain 68 percent of all psychiatrists (Figure 1).

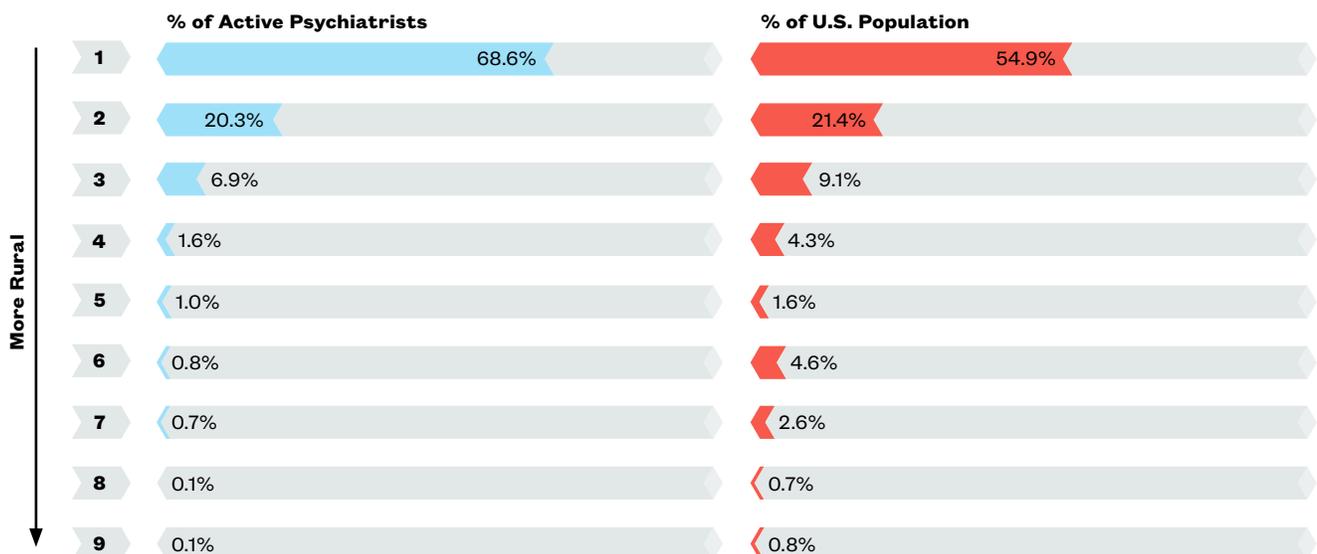
Even more worrying, the data from the AMA reveals that over 1,777 counties—roughly 60 percent of all counties—lack even a single psychiatrist. These counties also tend to be closely clustered together, exacerbating the problem of access to a psychiatrist on short notice. For instance, 185 of the 254 counties in Texas—or 72 percent of all counties in the state—do not have a single psychiatrist.

316.8M Total 2014 U.S. Population

0.01% are Active Psychiatrists

Almost 8.7% of the population lived in rural counties, but just 1.6% of the nation’s psychiatrists practiced in those same areas.

FIGURE 1: SHARE OF U.S. POPULATION AND SHARE OF ACTIVE PSYCHIATRISTS, 2014, BY COUNTY TYPE¹⁰



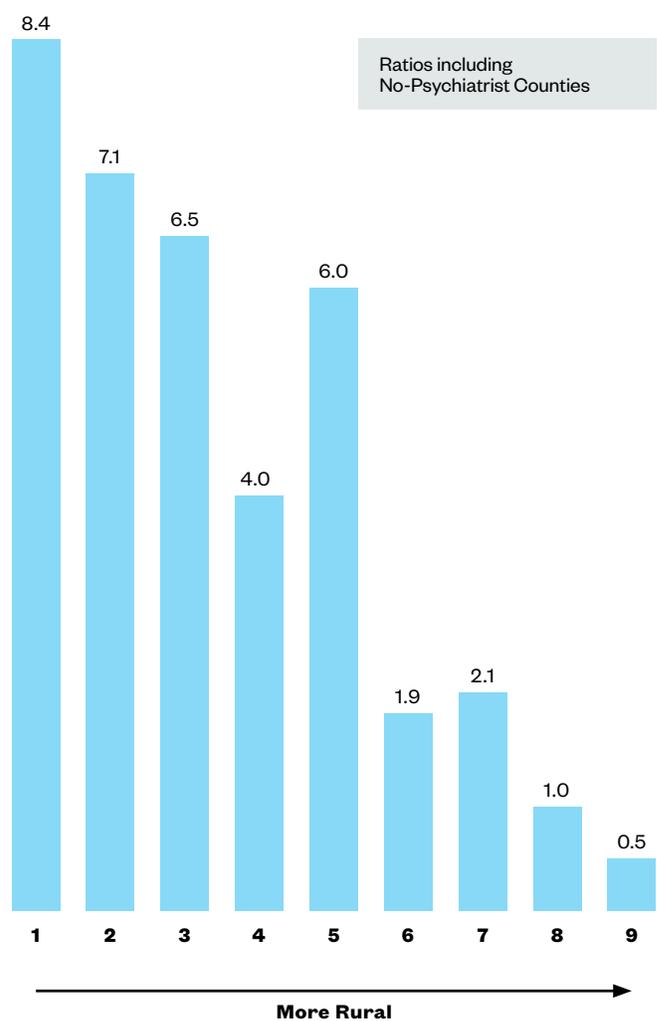
Breaking down the differences between urban and rural counties even further, we see that while only 19 percent of the more urban counties had no psychiatrists, an overwhelming number—80 percent—of rural counties had no psychiatrists to provide critical mental health care. Nationwide, as seen in Figure 1, this trend holds: The more rural the county, the lower the ratio of psychiatrists to population.”

Following this trend, we find that states that are predominantly rural, such as Idaho, Utah, Mississippi, or Wyoming have the lowest overall psychiatrist to population ratios in the country. More urban states, like Massachusetts or New York, meanwhile, tend to have the highest ratios. The range and difference between the urban and rural areas can be staggering: From 47 psychiatrists per 100,000 people in Washington, D.C. to 4.5 per 100,000 people in Idaho. There is also enormous wage discrepancy for psychiatrists by state, with states with fewer psychiatrists showing higher average salaries for psychiatrists. This shows the difficulty in attracting psychiatrists that some states and counties have had in meeting their mental health care needs, possibly necessitating the need to pay higher salaries in order to entice more professional workers to specific areas.

More urban states, like Massachusetts or New York, tended to have the highest ratios of psychiatrists to population.

While annual incomes for psychiatrists range from around \$177,550 in Massachusetts, where there are 27 psychiatrists per 100,000 residents, average psychiatrist salaries are close to \$260,000 in Wyoming, where there are only 5.8 doctors per every 100,000 residents. Overall, the states with the 10 highest ratios of psychiatrists to people had lower average incomes for psychiatrists (\$175,700) than the 10 states with the lowest ratio of psychiatrist to population (\$189,700).

FIGURE 2: PSYCHIATRISTS PER 100,000 PEOPLE BY COUNTY TYPE, 2014



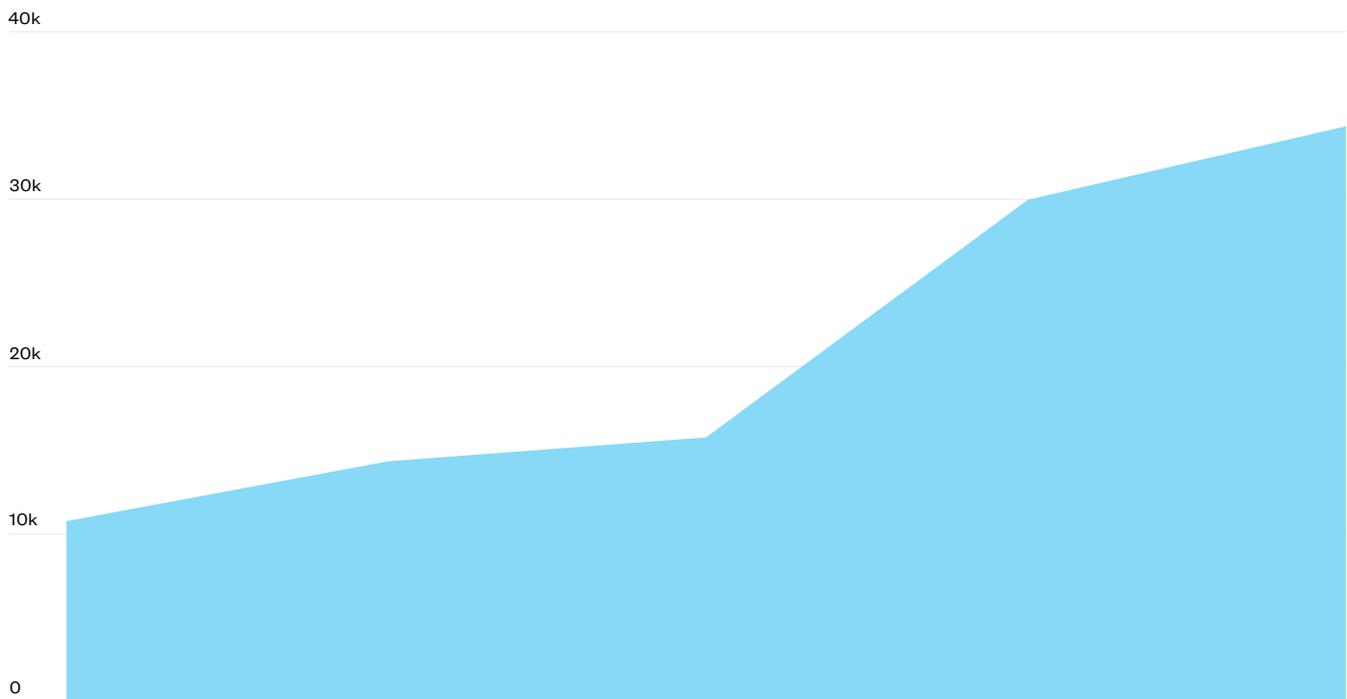
PART III

Increasing Demand for Psychiatrists

The lack of psychiatrists in most parts of the United States is not a result of a lack of demand. In fact, in recent years, demand for psychiatrists has been increasing according to job posting data from Burning Glass.¹² Burning Glass' Labor Insights tool shows that in 2016, there are 34,312 psychiatrist jobs posted online around the country, with the largest recruiters being the U.S. Army and the Department of Veteran Affairs. This annual total represents an increase of nearly twice the number in 2012, when there were just 10,800 online job postings for psychiatrists.

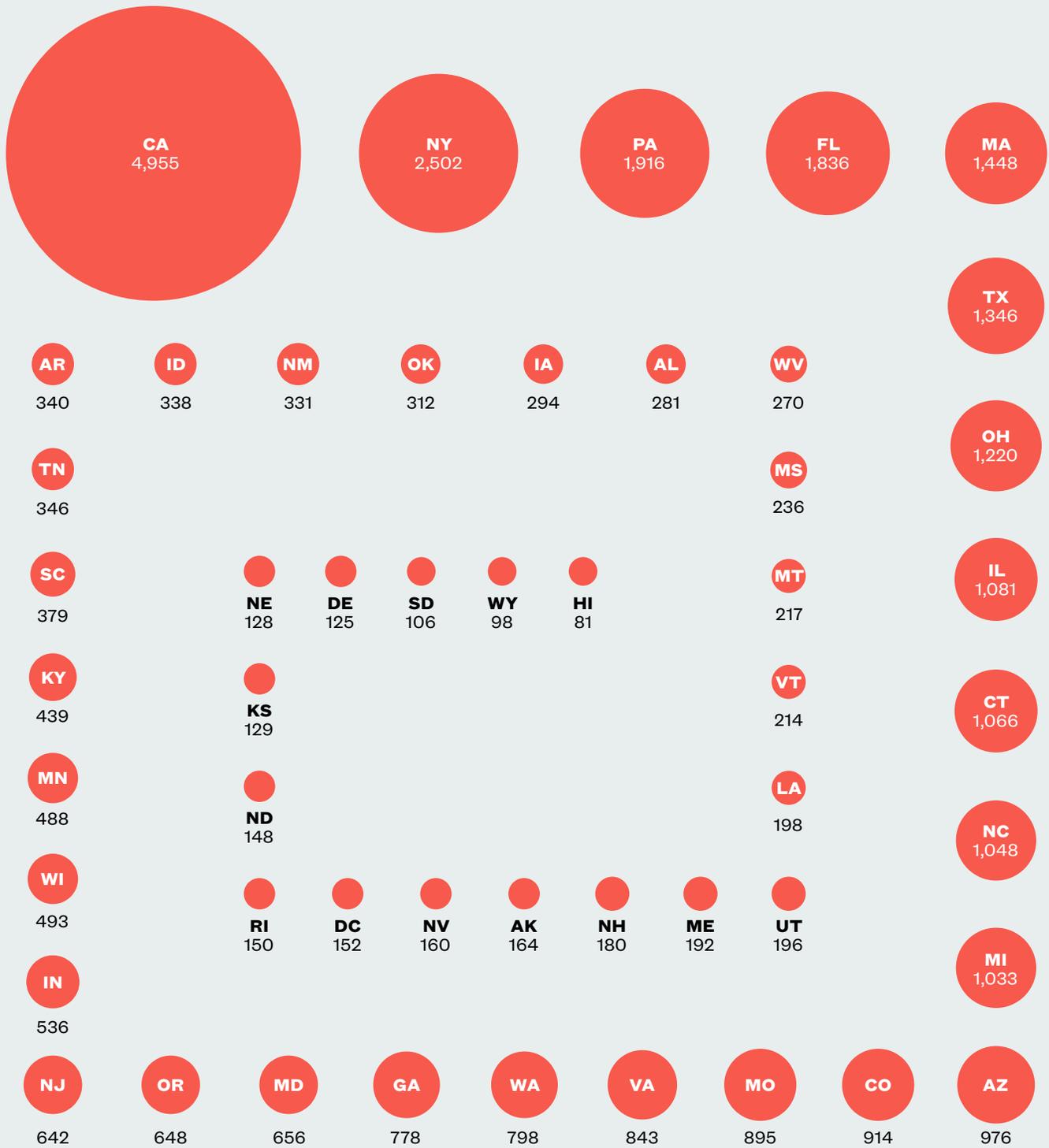
FIGURE 3: NUMBER OF JOB POSTINGS FOR PSYCHIATRISTS, 2012-2016

Year	Job Postings for Psychiatrists
2012	10,800
2013	14,306
2014	15,726
2015	29,915
2016	34,312



Source for Figure 3: Burning Glass/Labor Insight

FIGURE 4: NUMBER OF PSYCHIATRIST JOB POSTINGS, 2016, BY STATE



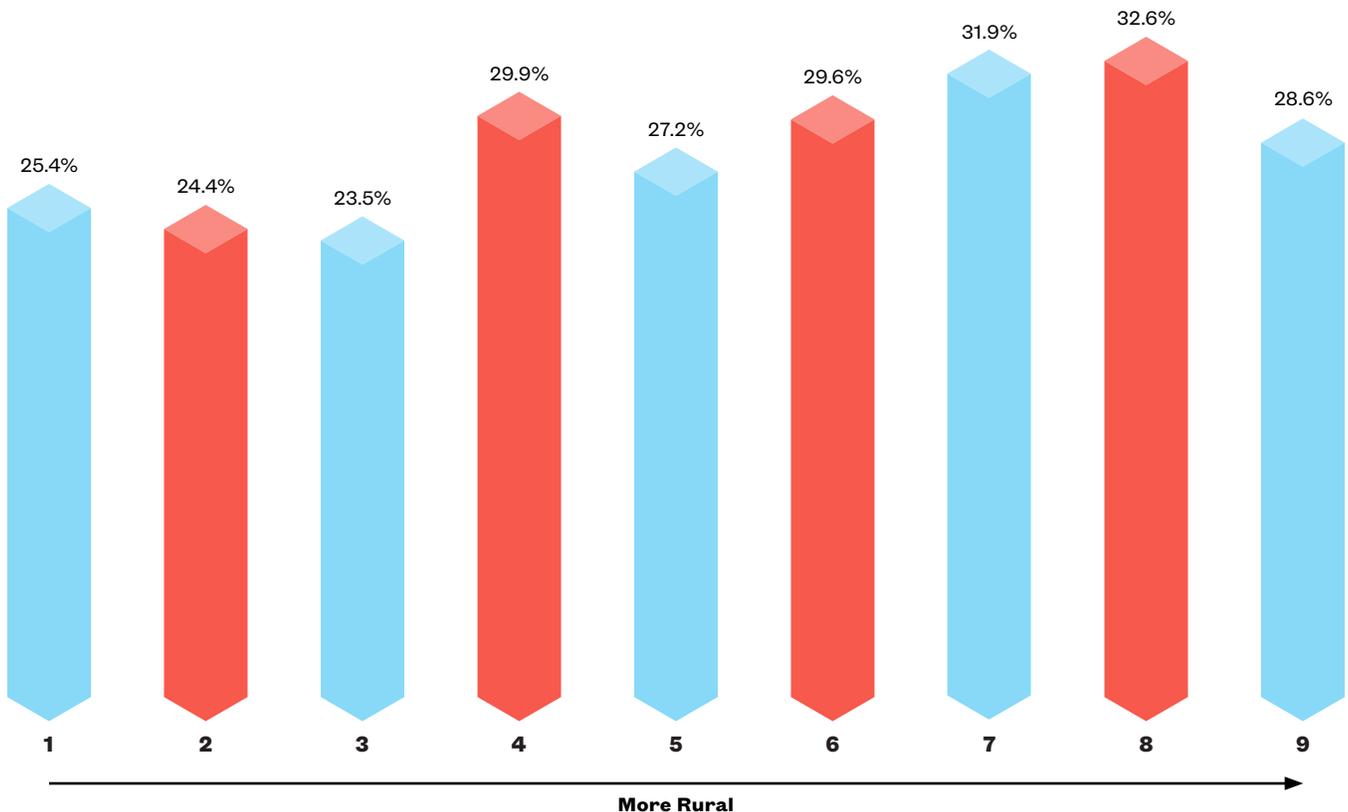
PART IV

An Increasingly Elderly Psychiatrist Workforce

Meanwhile, psychiatry is one of the “oldest” medical fields and a significant portion of the psychiatric workforce is nearing retirement, adding to the prospect of considerably larger practitioner shortages in the future. Data from the AMA show that more than one in four psychiatrists in the United States—or around 9,500 psychiatrists in total—are older than 65 and highly likely to retire in the near future. When we

break down the the psychiatrist population even further by county and by age, we find that the share of elderly psychiatrists is far higher in rural counties, where nearly one-third of all psychiatrists are elderly (Figure 5).¹³ With rural areas already behind in terms of attracting psychiatrists, the prospect of losing so many of their limited psychiatrist workforce should warrant concern.

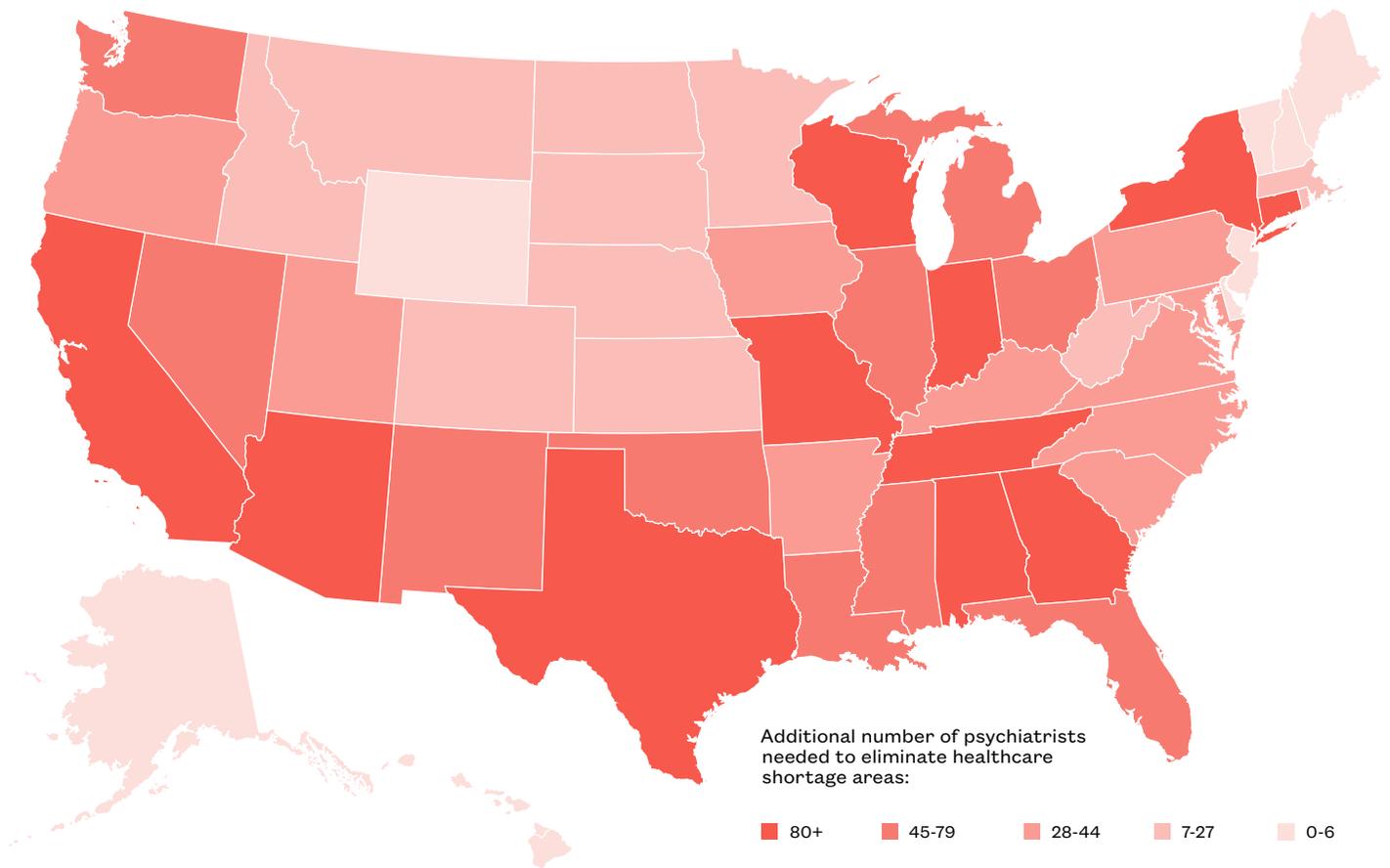
FIGURE 5: PERCENT OF PSYCHIATRISTS AGES 65 OR ABOVE, BY COUNTY CATEGORY, 2014



PART V

A Limited Supply of Psychiatrists

FIGURE 6: SHORTAGE OF PSYCHIATRISTS IN 2015, BY STATE

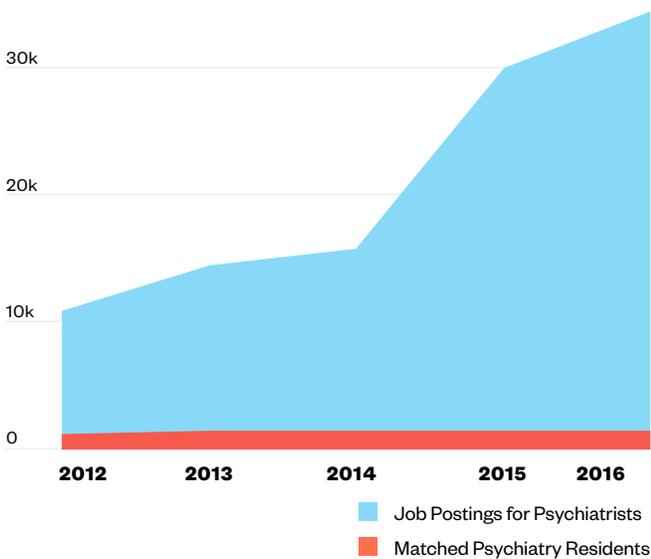


While demand for psychiatrists is increasing—perhaps even more rapidly in the next five years—supply is not keeping pace. The National Institute of Mental Health reports that the psychiatrist shortage is projected to get worse as too few students in medical school decide to specialize in psychiatry.¹⁴ Just 4 percent of medical students decide

to practice psychiatry each year.¹⁵ The number of psychiatrists has only increased by 12 percent since 1995, not enough to keep up with the growing U.S. population. This figure is even more striking when one considers that over the same period of time, the number of all physicians increased by 45 percent.¹⁶

To gauge how future increases in the number of psychiatrists would be able to address rising demand, we used data from the National Resident Matching Program (NRMP). This data shows where every medical resident in the country is placed each year and also what they chose as their specialty. Examining this data, we find that the growth in number of successfully placed psychiatry residents—future psychiatrists—is too slow to meet current demands or fill current shortages, let alone future gaps and shortfalls. Figure 7 shows the number of psychiatry residents from 2012 to 2016 placed in each state.

FIGURE 7: SUPPLY VS DEMAND OF PSYCHIATRISTS, 2012-2016



To get an idea of how the supply of psychiatrists is likely to grow, we look at residency match data from each medical facility in each state from 2012 to 2016 to calculate a straight-line projection for new psychiatry residents—and future psychiatrists—into 2020. Combining this with the AMA data showing where older psychiatrists practice, we are able to estimate what demand for psychiatrists could look like in each state in five years if current trends continue.

The results in Figure 8 show that more than half the states in the country will still have a shortage

of psychiatrists should current trends continue. In total, the aging out of psychiatrists will require 2,117 more psychiatrists by 2020 than we expect to enter the workforce. Worryingly, if the goal is to improve mental health coverage across the United States, and particularly in rural communities, the number of psychiatrists needed to both replace retiring psychiatrists— and eliminate healthcare shortage areas— more than doubles to 4,870. We show how that figure breaks down by state in the figure on page 12. It is important to note that these figures are likely conservative as they do not take into account population growth between now and 2020. (Additional data on the number of psychiatrists projected to retire in each state can be found in the Data Appendix.)

Growth is too slow to meet current demands, let alone future gaps and shortfalls.

FIGURE 8: NUMBER OF ADDITIONAL PSYCHIATRISTS NEEDED TO ELIMINATE SHORTAGE AREAS, 2015 AND 2020

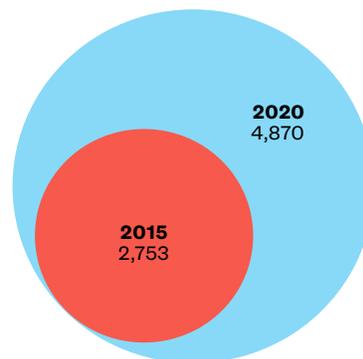
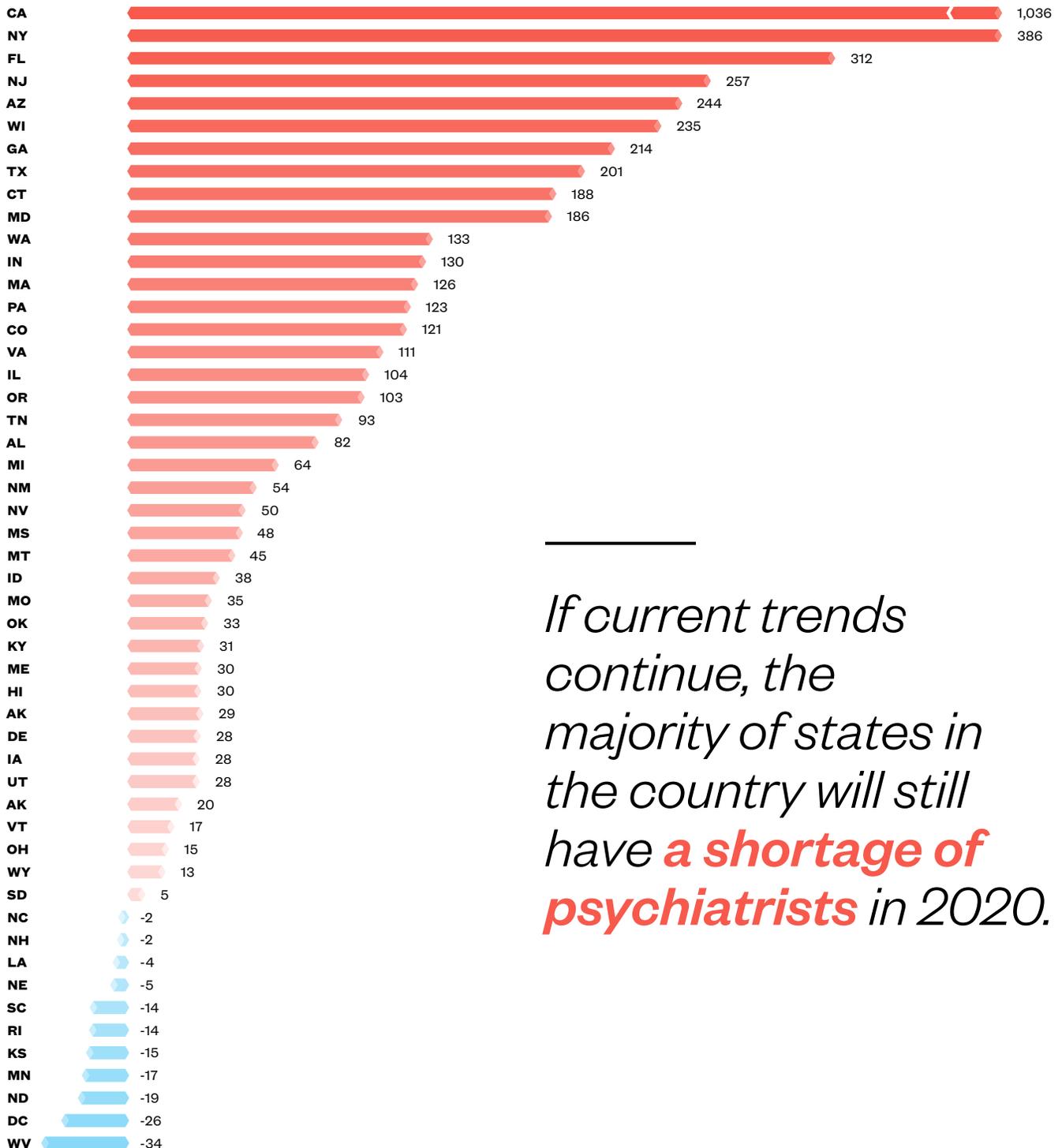


FIGURE 9: PROJECTED NUMBER OF ADDITIONAL PSYCHIATRISTS NEEDED BY 2020 TO ELIMINATE SHORTAGE AREAS



If current trends continue, the majority of states in the country will still have a shortage of psychiatrists in 2020.

PART VI

The Economic Impact of the Psychiatrist Shortage

The effect of such a shortage is very likely to have direct and indirect effects on U.S. society and the country's economy. Past studies have already shown how fewer psychiatrists are leading to decreased access to mental health care. A study by a group of Columbia University professors and health care practitioners found that between 2003 and 2013 the median number of psychiatrists per 100,000 people declined by 10.2 percent while other kinds of physicians, including primary care physicians, saw modest increases in their numbers relative to the local populations. The authors of this report also theorized that this could help explain increases in the number of people reporting poor access to mental health care services.¹⁸

To examine this issue further, we sought to estimate the negative impacts of the psychiatrist shortage. Past research from Harvard University has already tied improved availability of health practitioners to the health of the people in the areas that they serve and found that an inadequate number of doctors results in increases in fragmented or delayed care, more costly services, and poorer health outcomes for patients.¹⁹ Seeking to see whether the same would hold true for psychiatrists, we looked to the Behavioral Risk Factor Surveillance System (BRFSS) to examine the relationship between mental health outcomes and availability of psychiatrists.

The BRFSS allows us to see whether people suffered from periods of time of poor mental health, for example, feeling over stressed, or suffering from depression or anxiety. Taking into account a range of differences between people, such as gender, age, income, race, and ethnicity, we found that the average person was likely to feel mentally unwell 3.2 days each month.

When we compare that to the ratio of psychiatrists per 100,000 people in their area, we find that having more psychiatrists per capita tends to reduce the number of days a person does not feel mentally well. For every one less psychiatrist per 100,000 people, we find that each person prone to mental distress would suffer from an average of 2 additional hours of poor mental health per month. These lost hours can add up to days and weeks of reduced productivity and lost wages, which may also send ripples through the rest of the economy.

For every one less psychiatrist per 100,000 people, each person prone to mental distress would suffer from an average of 2 additional hours of poor mental health per month.

With additional data from the BRFSS on people who suffer from mental health issues, we estimated the total number of people who feel periods of poor mental health each month. Applying our estimates for how many psychiatrists will retire and how many new psychiatrists will join the workforce, we are also able to estimate what the psychiatrist to population ratios would be for each state and nationwide, all other things held constant.

Overall for the entire country, the potential future shortage caused by the aging out and inadequate incoming numbers of psychiatrists—not including the negative effects of the current shortage—is likely to result in more than 4.2 million workdays each month of reduced—or worse, lost—productivity. For further detail, in Figure 10, we show the top 20 states and the total number of workday equivalents that would be lost or compromised due to the projected decrease in psychiatrists-to-people ratio.

Although increasingly high proportions of Americans face dire mental health needs and the demand for psychiatric services is rising, U.S.-born medical students have not increased their enrollment in psychiatric studies and residencies enough to meet these demands. Without an adequate increase in supply of U.S.-trained psychiatrists, graduates of foreign medical schools—who are overwhelmingly likely to be foreign-born themselves—are likely to play an even greater role in alleviating the dire psychiatrist shortage facing the United States than they do today. According to the AMA data, as of 2015, nearly a third of all psychiatrist positions are already filled by doctors who graduated from a foreign medical school. Some states rely particularly strongly on foreign-trained psychiatrists. For example, in New Jersey close to 55 percent of all psychiatrists received their medical training abroad. All in all, foreign-educated professionals make up more than one in three psychiatrists in 16 states, including Kansas, Missouri, and Wisconsin.

FIGURE 10: STATES WITH MOST DAYS OF DECREASED PRODUCTIVITY DUE TO INADEQUATE MENTAL HEALTHCARE

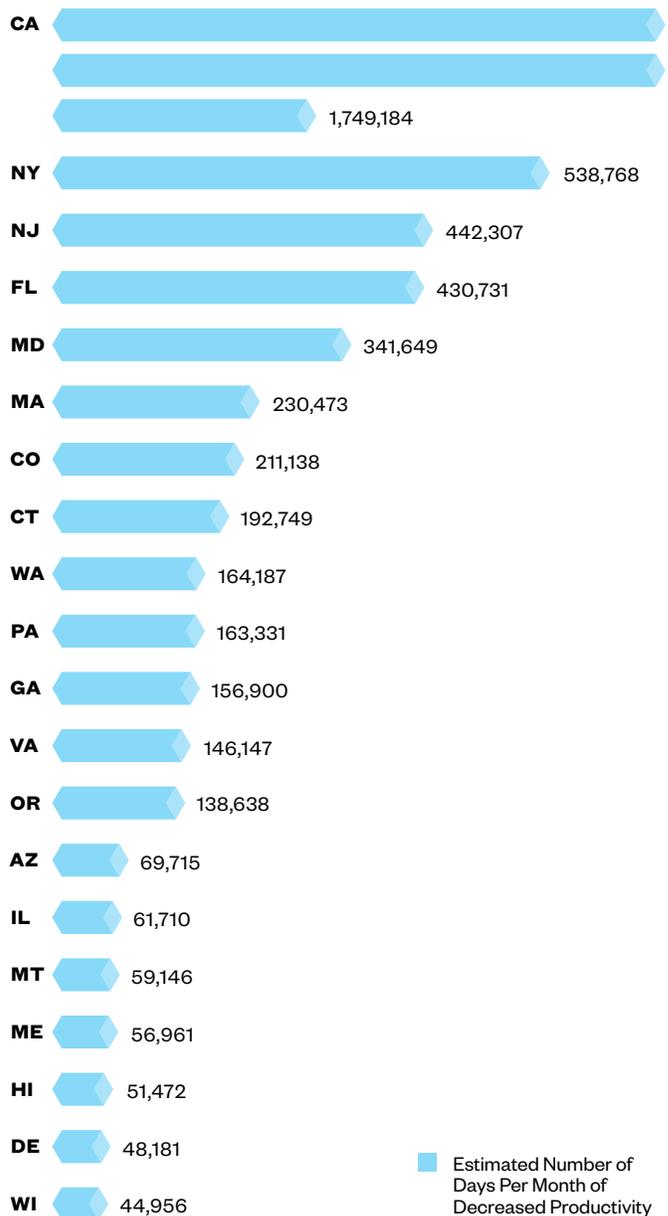
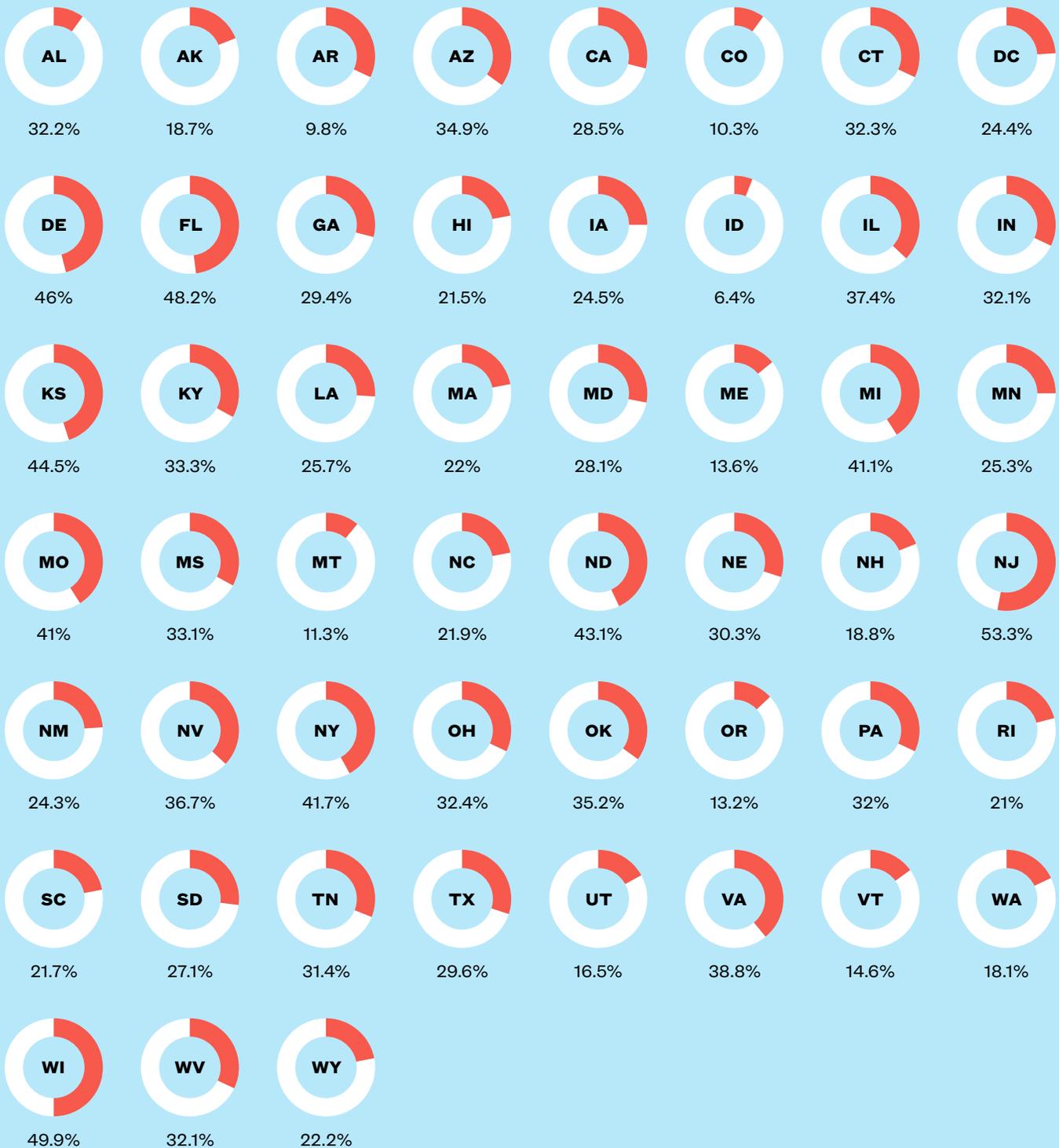


FIGURE 11: SHARE OF ACTIVE PSYCHIATRISTS WITH FOREIGN MEDICAL DEGREE, BY STATE, 2015



Conclusion

Given the economic costs of a workforce that may not be able to seek the mental health care they need to live, work, and be happy, ensuring an adequate supply of psychiatrists for all Americans should be of topic utmost concern to national, state, and local policymakers. While foreign-educated and foreign-born psychiatrists already play a large role in meeting the mental health care needs of a large share of the U.S. population, there remain large gaps in coverage, particularly in rural areas. These problems will only worsen as the large number of psychiatrists age 65 and older retire and leave the workforce altogether.

Of course, immigrants should not be solely depended upon to make up the entire mental health services shortage. Building a robust and adequate workforce of psychiatrists here at home will be essential to ensuring the long-term viability of our mental health care system. There are, however, serious challenges to this. Many claim that anemic growth in the number of residents interested in psychiatry has to do with the lack of lucrative options for psychiatrists when compared to other fields of medicine. A 2011 report from the National Institute of Mental Health found that lower pay than other medical fields was one of the chief obstacles to attracting more students to specialize in psychiatry.²⁰ Others claim that inadequate spending on mental health care facilities and services in general makes the field less attractive to potential recruits— a reality that could be worsened by the repeal of the Affordable Care Act, which required insurers to cover such care. To answer America’s real and pressing psychiatry shortages, more must be done to address these funding challenges and give U.S. students certainty they can thrive in the field.

Regardless any future policy changes, however, unequal access between urban and rural areas —and the growing nationwide demand for psychiatrists— are already

urgent problems. Because of the length of time required to train physicians, our country may need to seek out shorter-term fixes in the near term. Today’s shortage and the looming shortfalls expected in the next five years will require that some of the burden fall upon immigrant psychiatrists. Despite these exigencies, our current immigration system does not make it easy for foreign U.S.-trained psychiatrists to stay and serve communities in need. While the United States currently has dedicated visa programs for both the agriculture and hospitality sectors, two fields that frequently face manpower challenges, no similar visa exists for the health care industry, despite the huge demand anticipated for such workers in the coming years.

*Lower pay than other medical fields was one of the **chief obstacles** to attracting more students to specialize in psychiatry.*

Some of the options that do exist to bring foreign-born medical professionals to underserved areas are also highly limited or problematic. The Conrad Waiver program, which helps foreign doctors who complete residencies in the United States remain

in the country after graduation, is limited to just 30 slots per state per year.²¹ The program also must be regularly reauthorized by Congress, and faces threats of expiration almost every year. Given that over 2,100 additional psychiatrists would be needed by 2020 to simply maintain today's inadequate levels of mental health coverage, this meager number of spots—for which psychiatrists must compete with the entire range of other medical specializations—is unlikely to have any meaningful impact on the crisis at hand. It also is particularly inadequate when we consider how many more doctors would be needed to increase the amount of coverage so it reaches adequate levels. We estimate that more than 4,800 psychiatrists would be needed to reach minimal coverage levels—a challenge that would likely require markedly larger visa programs and more comprehensive immigration reforms to address.

The findings of this brief make it clear our broken immigration system is not meeting the health needs of our population. The development or expansion of visa programs would more easily allow highly in-demand specialists like psychiatrists to practice in the United States would be a step in the right direction. Equally so would be a visa system allowing individual areas, such as states, cities, or towns to sponsor immigrant doctors. However, political gridlock and the polarized politics in Washington have kept meaningful immigration reform and innovative programs off the table. In order to ensure that access to adequate mental health care is made a reality for all Americans, it is imperative that Congress take action on these issues in the near term.

*While the United States currently has **dedicated visa programs** for both the agriculture and hospitality sectors, no similar visa exists for the healthcare industry despite the **huge demand anticipated in the coming years.***

Methodology

Analyzing the Current Supply of Psychiatrists

To examine the number of psychiatrists in the United States as well as where they were distributed, we turned to the American Medical Association's Physician Masterfile. This database, first established in 1906, includes information on the over 1.4 million physicians, residents, and medical students in the United States. Information on each psychiatrist's age, country of degree, area of practice and specialization as well as their addresses was used to determine how many psychiatrists were in each county. Demographic data from the 2014 American Community Survey was used to determine the population of each county, which was then in turn used to determine the psychiatrist-to-population ratio.

Measuring Demand for Psychiatrists

We use online job postings for psychiatrists as a proxy for the demand for psychiatrists in general. Data on online job postings come from the Labor Insight tool from Burning Glass Technologies. Burning Glass scrapes data from job posting sites and recodes the information contained in each into a format that allows for sorting by occupation, industry, location, and other demographic and professional variables. To study trends in demand we looked at the national figures for psychiatrist postings for each calendar year between 2007 and 2014. For state by state figures, we restricted our search to 12-month period between October 2014 and October 2015.

Calculations on Possible Shortages

Taking data from the AMA Masterfile on the age of every psychiatrist in the United States, we estimate the number of those who are likely to retire in the five years by determining which psychiatrists are 65 years or older in 2015. To serve as a proxy for supply, we took data on psychiatry residency matches for medical school graduates in the past five years to generate a straight line projection over the next five years. We take difference between the expected retirements and the incoming new residents as the size of the shortage should current levels of psychiatrist coverage be maintained. To estimate the shortage relative to the benchmarks provided by the HHS, we also add in the number of psychiatrists that would be needed in each county of every state in order to ensure that every American lives in a county with at least 3.3 psychiatrists per 100,000 people.

Analysis of Effect of Psychiatrists on Mental Health Outcomes

Using the Behavioral Risk Factor Surveillance System (BRFSS 2012) we attempt to understand the association between mental health outcomes and psychiatrist scarcity. While this is by no means causal in its relationship, we identify important links between a lack of psychiatrists and mental health problems. BRFSS is a state-based system of annual health surveys (22). Data are collected monthly in all 50 states, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam. More than 300,000 interviews are completed each year, of which we used 227,000 cases. We restricted the analysis to those people that had been to a check-up

in the past year and have been diagnosed with mental health problems.

The Behavioral Risk Factor Surveillance System (BRFSS) questionnaire includes a question related to the respondents' healthy days. This question asks respondents to report the number of days in the previous 30 days when their physical health was not good. We used a Zero-inflated Poisson model (Appendix Table 1), which is used for count data that has an excess of zero counts. Most respondents (65%) reported zero mentally unhealthy days. The distribution was highly skewed (Variance = 56.8, mean = 3.4). Zero-inflated negative binomial regression provided the best-fitting model when compared to Poisson or negative binomial regression. Reports of county of residence were matched to the county-level ratio of psychiatrists per 100,000 people. This data was obtained from the AMA Masterfile data (October, 2015).

Estimating the Economic Cost of the Psychiatrist Shortage

To estimate the economic impact of the shortage in psychiatrists that would result due to the difference between the aging out of psychiatrists and the inadequate supply of new psychiatry residents, we looked at data from the Substance Abuse and Mental Health Services Administration (SAMHSA) on estimates of adult mental illness incidence rates for each state in 2012, taken from the National Surveys on Drug Use and Health.²² Since we are interested in working hours, we further restrict the population to those civilians employed, 18 years or older, taking these totals and applying the incidence rates to them to get estimate of the affected population in each state.

Next, we calculate the change in the psychiatrist-population ratio that would result given our assumptions for the next 5 years and apply it to the affected population along with the results of the regression analysis of the BRFSS data. The finding in particular was that an increase in the psychiatrist per 100,000 people ratio results in a decrease of 1.968 hours of feeling mentally unwell. The total number of hours is then aggregated over all states to arrive at the national number of lost or compromised work day equivalents of more than 4.2 million days per month.

Data Appendix

APPENDIX TABLE 1: EFFECTS OF PSYCHIATRIST TO POPULATION RATIO ON MENTAL HEALTH OUTCOMES

Zero-inflated Poisson Regression Predictors of Individual Mental Health	Coefficient	Standard Error	P> z
Constant	3.244***	0.0136	0.0000
Psychiatrist Population Ratio	-0.082***	0.0002	0.0000
Age	0.000	0.0002	0.0259
Black	-0.037***	0.0066	0.0000
Asian	-0.084***	0.0214	0.0000
Native	-0.004	0.0157	0.0792
Hispanic	-0.171***	0.0074	0.0000
Other Race	0.049***	0.0089	0.0000
High School	-0.047***	0.0066	0.0000
College	-0.070***	0.0068	0.0000
Bachelor	-0.224***	0.0074	0.0000
Income	-0.082***	0.0010	0.0000
One Child	0.072***	0.0063	0.0000
Two Children	0.080***	0.0066	0.0000
More Than Two Children	-0.031**	0.0096	0.0001
Cohabiting	-0.038***	0.0058	0.0000
Separated	-0.006	0.0070	0.0390
Divorced	0.200***	0.0085	0.0000
Widowed	-0.101***	0.0064	0.0000
Never Married	-0.077***	0.0119	0.0000

*** Dependent Variable Mental Health: Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

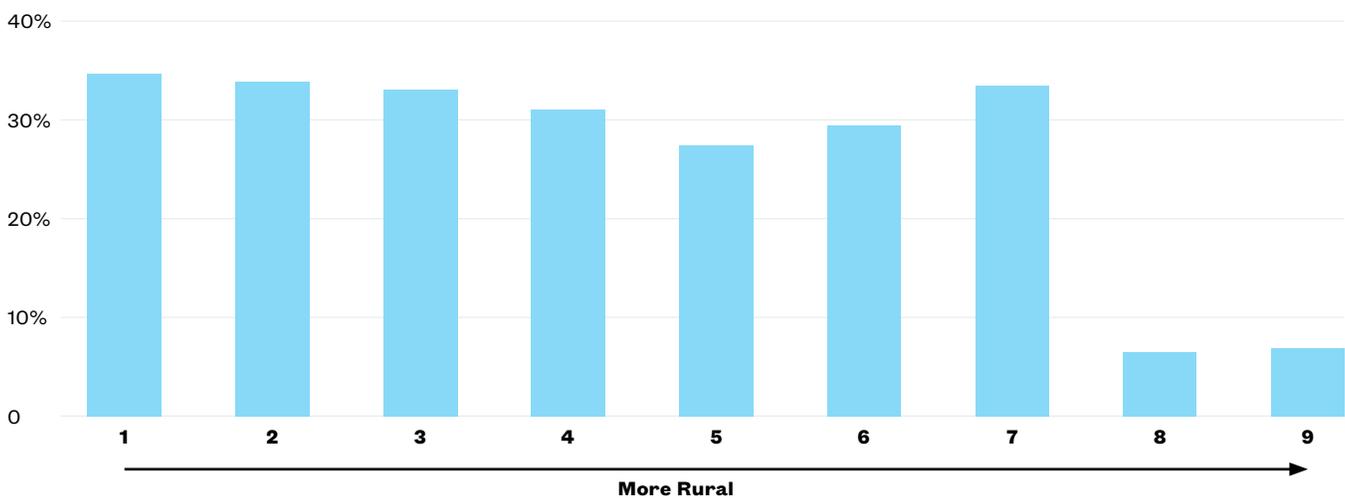
** The sample was restricted to those people that have been diagnosed with having mental health problems and have been to a check-up in the past year.

APPENDIX TABLE 2: NUMBER OF MATCHED PSYCHIATRY RESIDENTS, BY STATE, 2012-2016

State	2012	2013	2014	2015	2016
AL	8	13	13	13	12
AR	22	23	22	23	23
AK	8	8	8	8	8
CA	112	118	127	131	130
CO	13	13	13	13	12
CT	22	37	33	31	31
DC	16	21	21	19	22
FL	31	43	44	43	52
GA	23	19	21	23	24
HI	5	6	7	8	6
IL	47	55	57	56	57
IN	8	8	8	8	13
IA	7	8	9	9	9
KS	5	17	14	14	17
KY	13	17	17	13	17
LA	29	35	31	34	32
ME	5	5	5	5	5
MD	23	35	31	26	28
MA	67	86	82	78	78
MI	30	37	45	46	53
MN	21	23	24	24	24
MS	8	6	6	4	7
MO	21	31	33	33	35
NE	9	10	8	8	8
NV	8	10	10	10	10
NH	6	8	7	7	6
NJ	15	17	20	17	17
NM	8	10	11	11	10
NY	155	206	194	203	203

State	2012	2013	2014	2015	2016
NC	40	44	40	45	46
ND	4	4	4	4	6
OH	42	54	49	54	52
OK	6	14	16	14	15
OR	8	8	7	11	10
PA	52	69	66	72	72
RI	13	14	12	13	12
SC	20	25	26	25	26
SD	4	3	5	5	6
TN	20	22	21	21	22
TX	64	77	85	82	86
UT	8	9	10	9	10
VT	4	4	5	4	5
VA	27	33	31	31	32
WA	14	19	18	19	19
WV	11	11	10	16	15
WI	15	16	17	17	17
TOTAL	1097	1351	1343	1360	1400

APPENDIX FIGURE 1: SHARE OF FOREIGN-EDUCATED PSYCHIATRISTS BY URBAN-RURAL CATEGORY, 2015



APPENDIX TABLE 3: SHARE OF PSYCHIATRISTS THAT ARE 18-35, BY PLACE OF EDUCATION, 2015

State	% 18-35 Year-Olds Among Foreign Graduates	% 18-35 Year-Olds Among U.S. Graduates
Alabama	8.2	13.4
Alaska	0	1.6
Arizona	9.6	13.8
Arkansas	0	19.2
California	3.6	13.3
Colorado	8.9	10.4
Connecticut	8.8	11.7
Delaware	7.5	0
District Of Columbia	29.9	20.1
Florida	3.4	14.0
Georgia	10.4	12.3
Hawaii	4.4	19.6
Idaho	5.3	11.1
Illinois	10.7	17.1
Indiana	5.3	11.1
Iowa	7.6	12.3
Kansas	17.6	7.7
Kentucky	20.3	12.6
Louisiana	16.4	20.6
Maine	0	7.2
Maryland	5.3	12.9
Massachusetts	9.4	17.4
Michigan	11.5	11.6
Minnesota	16.3	14.5
Mississippi	22.8	8.7
Missouri	17.1	18.5
Montana	0	1.4
Nebraska	21.7	21.7
Nevada	4.2	18.6

State	% 18-35 Year-Olds Among Foreign Graduates	% 18-35 Year-Olds Among US Graduates
New Hampshire	2.9	16.3
New Jersey	7.5	9.7
New Mexico	15.0	10.2
New York	11.3	15.6
North Carolina	17.0	13.6
North Dakota	32.3	22.0
Ohio	14.8	17.7
Oklahoma	16.1	17.0
Oregon	6.9	8.1
Pennsylvania	9.7	14.0
Rhode Island	8.7	23.7
South Carolina	10.1	18.5
South Dakota	30.4	30.7
Tennessee	5.4	14.9
Texas	34.5	34.5
Utah	0	7.8
Vermont	4.8	8.9
Virginia	13.5	10.8
Washington	4.8	14.6
West Virginia	13.2	32.1
Wisconsin	10.6	16.1
Wyoming	0	0

APPENDIX TABLE 4: ESTIMATED DEMAND AND SUPPLY OF PSYCHIATRISTS, 2020*

State	Number of Psychiatrists Needed to Eliminate HPSA Shortage Areas, 2015	Psychiatrists over age 65	Projected Increase in Psychiatrists by 2020	Shortage in 2020, To maintain current levels of coverage	Shortage in 2020, To eliminate shortage areas
AL	81	66	65	1	82
AK	6	14	0	14	20
AZ	208	152	116.3	35.8	243.8
AK	32	37	40	-3	29
CA	145	1,563	672.5	890.5	1,035.5
CO	26	154	58.8	95.3	121.25
CT	93	261	166.3	94.8	187.75
DW	5	23	0	23	28
DC	3	89	117.5	-28.5	-25.5
FL	74	524	286.3	237.8	311.75
GA	137	198	121.3	76.8	213.75
IO	30	45	47.5	-2.5	27.5
KS	17	68	100	-32	-15
KY	37	84	90	-6	31
HI	4	57	31.3	25.8	29.75
ID	27	11	0	11	38
IL	71	331	297.5	33.5	104.5
IN	113	88	71.3	16.8	129.8
LA	79	86	168.8	-82.8	-3.8
ME	6	49	25	24	30
MD	30	302	146.3	155.8	185.8
MA	20	510	403.8	106.3	126.3
MI	64	294	293.8	0.3	64.3
MN	18	89	123.8	-34.8	-16.8
MS	54	28	33.8	-5.8	48.3
MO	100	127	192.5	-65.5	34.5
MT	18	27	0	27	45
NE	8	26	38.8	-12.8	-4.8

* Negative values indicate a surplus of psychiatrists over the current levels or shortage area guidelines.

State	Current number of Psychiatrists Needed to Eliminate HPSA Shortage Areas	Psychiatrists over age 65	Projected Increase in Psychiatrists by 2020	Shortage in 2020, To maintain current levels of coverage	Shortage in 2020, To eliminate current shortage areas
NV	52	50	52.5	-2.5	49.5
NH	0	38	40	-2	-2
NJ	4	340	87.5	252.5	256.5
NM	45	62	52.5	9.5	54.5
NY	116	1,355	1085	270	386
NC	41	195	237.5	-42.5	-1.5
ND	7	7	32.5	-25.5	-18.5
OH	55	232	272.5	59.5	14.5
OK	58	61	86.3	-25.3	32.8
OR	43	112	52.5	59.5	102.5
PA	44	464	385	79	123
RI	7	38	58.8	-20.8	-13.4
SC	35	89	137.5	-48.5	-13.5
SD	22	15	32.5	-17.5	4.5
TN	84	121	112.5	8.5	92.5
TX	251	417	467.5	-50.5	200.5
UT	38	42	52.5	-10.5	27.5
VT	0	43	26.3	16.8	16.8
VA	40	237	166.3	70.8	110.8
WA	64	170	101.3	68.8	132.8
WV	22	29	85	-56	-34
WI	214	108	87.5	20.5	234.5
WY	5	8	0	8	13
TOTAL	2,753	9,536	7418.8	2117.3	4,870

* Negative values indicate a surplus of psychiatrists over the current levels or shortage area guidelines.

Endnotes

- 1** Pamela S. Hyde and Paolo Del Vecchio, “Five Point Plan to Improve the Nation’s Mental Health,” Substance Abuse and Mental Health Services Administration, n.d., <http://blog.samhsa.gov/2015/02/18/five-point-plan-to-improve-the-nations-mental-health/#.V1RT9pMrKgQ>.
- 2** Patrick W. Corrigan, Benjamin G. Druss, and Deborah A. Perlick, “The Impact of Mental Illness Stigma on Seeking and Participating in Mental Health Care,” Association for Psychological Science, August 1, 2014, <http://www.psychologicalscience.org/publications/mental-illness-stigma.html>.
- 3** HRSA, “Shortage Designation: Health Professional Shortage Areas & Medically Underserved Areas/Populations, www.hrsa.gov/shortage. Last updated: June 19, 2014.
- 4** Merritt Hawkins. 2015. “2015 Review of Physician and Advanced Practitioner Recruiting Incentives,” AMN Healthcare. http://www.merrithawkins.com/uploaded-Files/MerrittHawkins/Pdf/2015_Merritt_Hawkins_recruiting_Incentive_survey_infographic.pdf
- 5** Results from the 2013 National Survey on Drug Use and Health: Mental Health Findings, Substance Abuse and Mental Health Services Administration <http://www.samhsa.gov/data/sites/default/files/NSDUHmhr2013/NSDUHmhr2013.pdf>
- 6** The CBHSQ Report, Substance Abuse and Mental Health Services Administration, http://www.samhsa.gov/data/sites/default/files/report_1975/Spotlight-1975.pdf
- 7** HRSA, “Shortage Designation: Health Professional Shortage Areas & Medically Underserved Areas/Populations, www.hrsa.gov/shortage. Last updated: June 19, 2014.
- 8** Bureau of Clinician Recruitment and Service, Health Resources and Services Administration (HRSA), U.S. Department of Health & Human Services, HRSA Data Warehouse: Designated Health Professional Shortage Areas Statistics, as of September 9, 2016.
- 9** Categories 6 to 9 in Figure 4.
- 10** In this report, we use the U.S. Department of Agriculture Urban-Rural Continuum Codes as a point of reference when discussing rural and urban counties. This breakdown, created by the USDA’s Economic Research Service in 1974, classifies every county in the country based on a 1-9 scale, with 1 being the most heavily urban.
- 11** We classify rural counties as those that fall into categories 6 through 9 on the Urban-Rural Continuum.
- 12** For this part of the analysis, we use cutting-edge current data by Burning Glass Technologies, who collect millions of online jobs postings and uses text analytics to read and code them since 2007. Therefore, we have access to data on specific skills, location and occupation and industry codes.
- 13** As in our other reports, we use the U.S. Department of Agriculture Urban-Rural Continuum Codes as a point of reference when discussing rural and urban counties. This breakdown, created by the USDA’s Economic Research Service in 1974, classifies every county in the country based on a 1-9 scale, with 1 being the most heavily urban.
- 14** Director’s Blog: Psychiatry: Where are we going? <http://www.nimh.nih.gov/about/director/2011/psychiatry-where-are-we-going.shtml>
- 15** Ibid.

- 16** Sederer, Lloyd. (2015) "Where Have All the Psychiatrists Gone?" U.S. News and World Report, September 15, 2015. Available online: <http://www.usnews.com/opinion/blogs/policy-dose/2015/09/15/the-us-needs-more-psychiatrists-to-meet-mental-health-demands>
- 17** NRMP, "NRMP Program Results 2012-2016, Main Residency Match," 2016.
- 18** Bishop, Tara, et al. (2016) "Population Of US Practicing Psychiatrists Declined, 2003–13, Which May Help Explain Poor Access To Mental Health Care," Health Affairs, 35. No. 7.
- 19** Baicker, Katherine, Chandra, Amitabh, Medicare Spending, The Physician Workforce, and Beneficiaries' Quality of Care, 2004. <http://escholarship.org/uc/item/Ovb1b8gk#page-2>
- 20** Director's Blog: Psychiatry: Where are we going? <http://www.nimh.nih.gov/about/director/2011/psychiatry-where-are-we-going.shtml>
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- 22** SAMHSA, Center for Behavioral Health Statistics and Quality, National Surveys on Drug Use and Health (NSDUHs), 2011 (revised October 2013) and 2012

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