Heat Maps of Alzheimer's Diagnosis and its Factors Across the United States

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ABSTRACT

Alzheimer's disease is an ailment that is tightening its grip on global health and more specifically, elderly well being. It affects nearly 5% of Americans aged 65-74, climbing to 13.1% of Americans aged 75-84, and finally rising to 33.2% of Americans aged 85 and older. Despite these rather high percentages of what is now figuratively a household disease, there is no viable cure for it. 1 of 3 seniors die with Alzheimer's, and in 2019, it was the 6th leading cause of death in the United States. With mortality rates rising, the only interventionary measures against Alzheimer's come in the form of prevention and awareness. However, it can be observed that the diagnosis rate varies greatly from one state to another. This paper aims to isolate factors from each state as either advantages or disadvantages toward the Alzheimer's diagnosis rate, further enhance our preventative measures of Alzheimer's, and better our understanding of the disease itself.

Introduction

Alzheimer's is a degenerative disease that occurs when brain cells are damaged. The cells that are affected—neurons—break down and sever connections which slowly harm the brain. It should not be confused with dementia, which is a group of symptoms that are often caused by Alzheimer's itself. According to the Alzheimer's Association in 2019, approximately 60% to 80% of all dementia cases are caused by Alzheimer's. Symptoms of Alzheimer's can include memory loss, confusion, and at later stages, difficulty with communicating and moving.

An Analysis of the Current* Alzheimer's Diagnosis Rate by State

DIAGNOSIS RATE, PER 10,000 PEOPLE, AGES 30-64

4.0 - 5.5   5.6 - 7.1   7.2 - 8.0   8.1 - 9.6   9.7 – 13.0
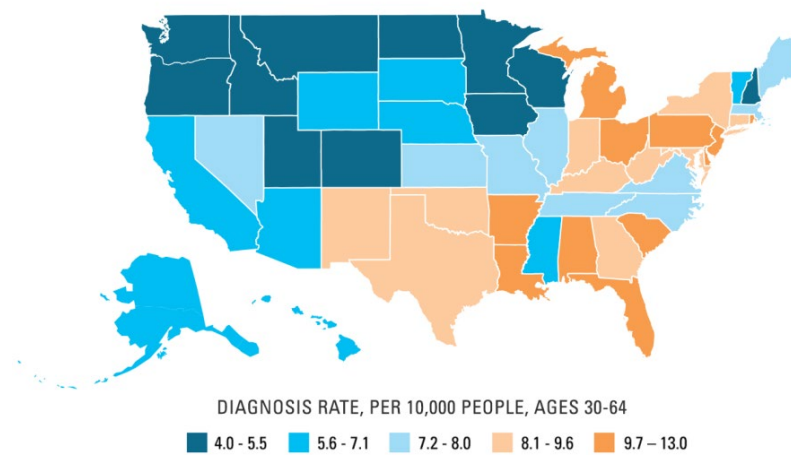
Figure 1: A glimpse into the diagnosis rates of each state which, and helps researchers better visualize common trends and correlations when compared to different by-state heat maps provided by the CDC National Center for Health Statistics.

As seen in **Figure 1**, the southeastern states tend to have a higher Alzheimer's diagnosis rate, and the rate gradually lowers as we go further north on the eastern coast of the United States. Although this gradient is not as apparent on the western coast, it is still worthy to note.
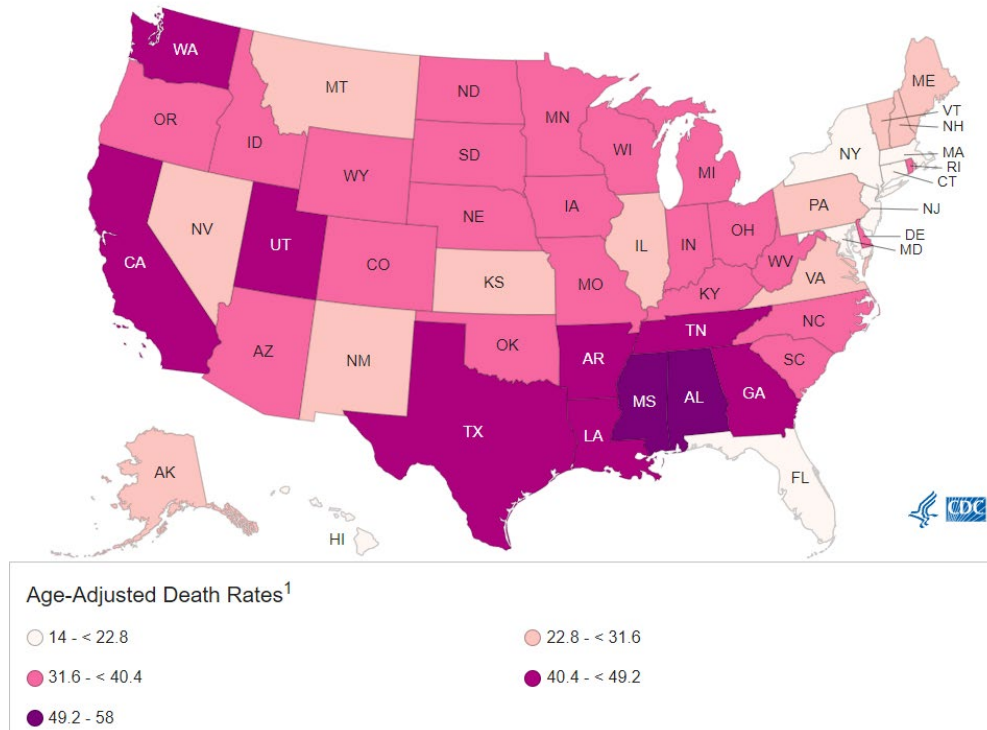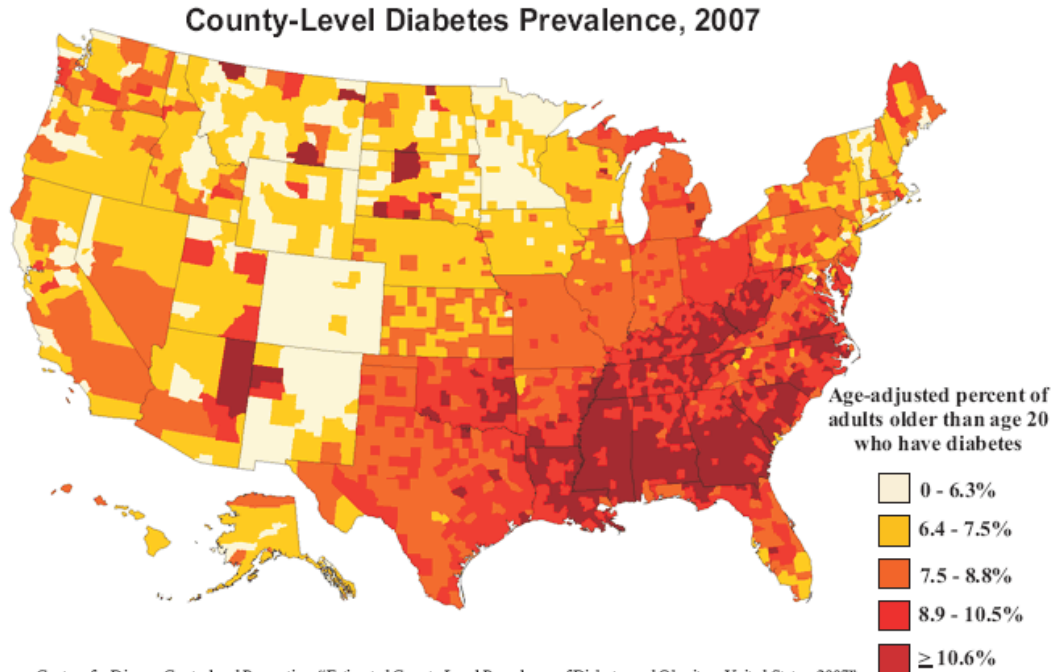

Figure 2: The mortality rate from Alzheimer's from state to state which is a very useful tool to compare with other state-based heatmaps. It displays the number of deaths per 100,000 of the total population.

Diabetes

Several studies have suggested that diabetes raises the risk of Alzheimer's development in adults in the past. According to the Alzheimer's Association in 2021, adults with Type 1 diabetes are 93% more likely to develop dementia. Furthermore, a 2021 study for Kaiser Permanente Northern California showed that, "older adults with Type 1 diabetes who were hospitalized for just one blood sugar extreme were at higher risk for dementia — and those who were hospitalized for both highs and lows were six times more likely to later develop dementia".

Diabetes is a disease where the pancreas is not able to produce enough insulin, a hormone that processes glucose. When there is an excess of glucose in blood, it leads to organ damage including brain damage. Because of this, diabetes has been deemed a major contributor toward Alzheimer's.

County-Level Diabetes Prevalence, 2007

Age-adjusted percent of
adults older than age 20
who have diabetes

	0 - 6.3%
	6.4 - 7.5%
	7.5 - 8.8%
	8.9 - 10.5%
	≥ 10.6%

Sources: Centers for Disease Control and Prevention, "Estimated County Level Prevalence of Diabetes and Obesity—United States, 2007" *Morbidity and Mortality Weekly Report* 58 No. 45 (Nov. 20, 2009):1259-1263.

Figure 3: This figure shows the percent of adults over 20 that have diabetes across every county in the United States, but state lines are shown for observing patterns in states.

In **Figure 3**, we can see that again, the southeastern states have a higher prevalence of diabetes. This matches with the information given by **Figure 1 and 2**, and follows the trend towards the western coast as well. With this evidence, it can be reasonably claimed that diabetes is an immense factor that could contribute toward Alzheimer's and dementia—possibly even larger a link than previously assumed.

Diabetes is commonly caused by a dormant and inactive lifestyle, these states may foster a lifestyle that puts residents at higher risk of diabetes, and as result, Alzheimer's.

Obesity

|	
	<20%
	20%-<25%
	25%-<30%
	30%-<35%
	35%-<40%
	40%-<45%
	45%-<50%
	50% +
	Insufficient data*
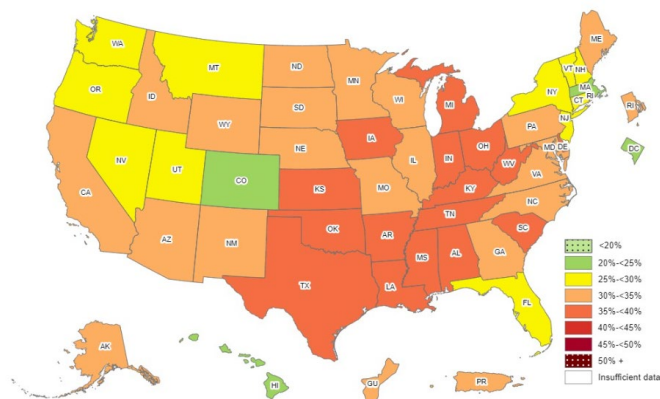
Figure 4: This figure displays the percent of adult obesity in each state across the United States.

It can be seen in **Figure 4** that the southeastern states, albeit slightly shifted toward the mideastern, have higher obesity rates and could potentially be a contributor toward Alzheimer's in that area.

Obesity, again, is commonly caused by an inactive lifestyle and an unhealthy diet, which can put residents at higher risks of both diabetes and Alzheimer's.

Smoking

In addition, cigarettes and other forms of tobacco consumption have also been shown to introduce toxins to the human brain that are inflammatory. As a consequence, it is linked to the development of Alzheimer's.
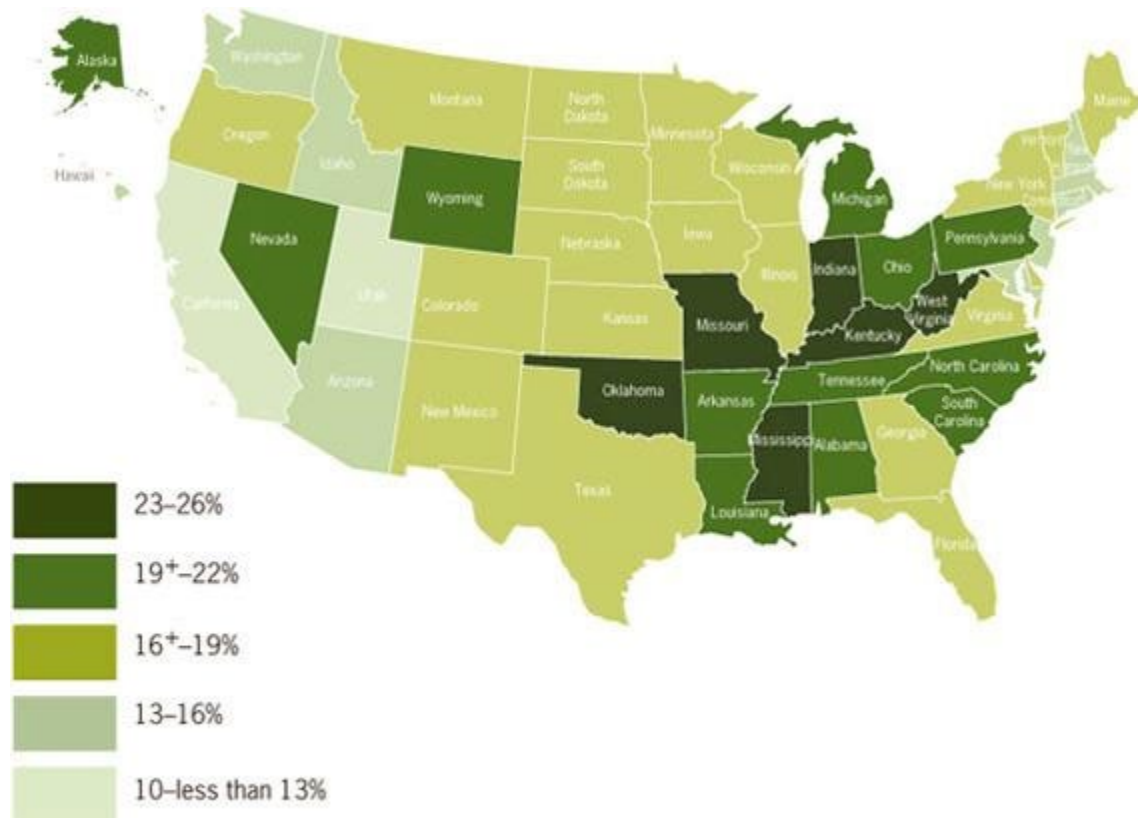
Figure 5: Adult smoking rates across the United States.

The trend, once again, shows the southeastern states being the most prevalent, matching **Figure 1 and 2.** These states not only have a higher prevalence of smoking, but also obesity and diabetes. All 3 of these factors are significant contributors toward Alzheimer's and would explain the higher Alzheimer's diagnosis and mortality rates in those states.

Conclusion

Alzheimer's is a destructive disease which cannot be cured, but through prevention and awareness, the risk of contracting it can definitely be lowered. Smoking, obesity, and diabetes are all factors which greatly contribute toward your risk of contracting Alzheimer's, but these factors themselves can be avoided quite easily, excluding the influence

that genetics has upon the whole situation. By living a healthy and active lifestyle, the risk of Alzheimer's can be reduced to provide a better quality of life for everyone susceptible to the disease.

Acknowledgments

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