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Exploring Mental Health by U.S. Regions

*Abstract*

This study is focused on the impact of region on mental health in the United States. Does living in a different state affect people’s mental health? In this study I focus on 4 regions in the United States. The results provide sufficient evidence to reject the null hypothesis and prove that different states have different impact on mental health. Probability models were used to test this theory. The purpose of this study is to contribute to future research on mental health and encourage further research on people’s mental state to be based on regions of residence. Also, can be helpful to individuals who struggle with mental health by providing statistical proof that sometimes moving to another state can be the only medicine you need.

*Introduction*

Mental health has been a serious concern in the United States for many years. On the national level, we have almost 500,000 million adults who suffer from mental health. (MHA, 2022). There are many factors that impact our mental health such as: genetics, traumatic life events, physical problems, abuse. Also, recent mass shootings and crimes in various states, war in Ukraine, inflation and racism are additional factors that add more stress and fear to our lives. The problem with mental health is that every individual will captivate the effect of these events differently. Some people will be able to recover without the need of medical assistance, but some people need professional help. This becomes a problem when we realize the cost of healthcare. A research study on “Barriers to healthcare access among U.S adults with mental health challenges” found that the most prevalent barrier to healthcare access is affordability (Coombs et al., 2021)

Another study by Zeeman and Smith (2022), found that an increase in income improves mental health, whereas the marginal effect is higher when people feel financial insecurity with lower levels of income.

In addition, differences between married and single people are examined in an article on marital status and mental health. The findings show that on average depression is the lowest among married people, whereas for the single group risk factors like self-esteem, emotional support and relationships impact their depression scores (Cotten, 1999).

Since my study is focused on region and mental health, my literature search was limited. There is an insufficient number of primary or even secondary sources on this topic. There are few studies on the correlation between mental health and weather with findings that colder weather leads to seasonal depression and higher risks of mental illness. However, these studies were not statistically significant and varied in their conclusions. But they did contribute to my theory, by making me more knowledgeable on mental health and the main causes of it. Therefore, I am confident that my research paper will provide data that can contribute to the development of better health policies, based on region. In addition to this, I will be able to see if the assumptions on weather are accurate. Variables like income and marital status will be used as my control variables, since their impact on mental health has been proved. And lastly, the results of this paper, if statistically significant, can help individuals realize that there are many options to improve their well-being and moving to another state is one of those options.

That being said, my hypothesis is that there is no relationship between the probability of having mental health and living in different parts of the country. In addition to this, I hypothesize that there is no difference in mental health presence based on regions, between single and married people.

*Data*

The data was collected from the National Health Interview Survey in year 2018. The NHIS monitors the health of the nation by taking cross-sectional household interview survey every year that represents a large, national sample of adults. Information regarding NHIS survey, procedures and questionnaires can be found on the IPUMS Health Survey website (5).

1. Dependent Variable

I am looking at the probability of having mental health, P(mental\_health=1|x) Mental health is a binary variable (1-0), presence or absence. I created this variable based on the article that states:” Depression is the leading cause of mental health-related disease burden globally, affecting an estimated 300 million people worldwide. Depressed people can have many mental symptoms (e.g., feeling hopeless and helpless), disturbed patterns of individual behavior (e.g., problems with sleeping or working), and distorted social interactions (e.g., avoiding contact or creating conflict)” (Van de Vliert & Rentfrowd, 2021). Therefore, I studied NHIS survey participants who answered some, most or all the time when asked if they have felt hopeless, sad, nervous, worthless, and feeling like everything is an effort in the past 30 days to create a binary variable(mental\_health=1). Mental\_health is equal to zero for participants whose answers were zero or a little of the time.

1. Independent Variables

Region is our independent variable of interest. It is a categorical dummy variable that takes on the values: (01 if region is Northeast, 02 if region is North Central/Midwest, 03 if region is South, 04 if region is West). These are all the states included in the data based on region: Northeast: New England Division (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut) and Middle Atlantic Division (New York, New Jersey, and Pennsylvania).

North Central/Midwest: East North Central Division (Michigan, Ohio, Indiana, Illinois,Wisconsin) and West North Central Division (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, and Nebraska)

South: South Atlantic Division (Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida), East South -Central Division (Kentucky, Tennessee, Mississippi, and Alabama), and West South-Central Division (Texas, Arkansas, Oklahoma, and Louisiana)

West: Pacific Division (Washington, Alaska, Oregon, California, and Hawaii) and Mountain Division (Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada).

*Table 1: Presence of Mental Health by Region*



The following control variables are used: age, earnings, education, marital status. Variables that did not contribute to my research were dropped. The following changes to variables were made to match my analysis:

*earnings*: a categorical dummy variable that shows categories of earnings based on a $4,999 increase in earnings.

*age*: continuous variable ranging from 18-56 years old.

*some\_coll*: binary variable equal to one if person has some type of educational degree, 0 otherwise.

*married*: binary variable equal to one if person is married, 0 otherwise.

*Table 2: Total of Single and Married People*

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By changing and characterizing control variables, the impact on region should be higher. I am trying to limit some pre-existing medical conditions and emotional disorders that we can’t control for. I assume that individuals who have some type of educational degree and income are less likely to have pre-existing medical conditions. My group of interest is people between 18-56 years old because I believe that these 3 generations (Generation Z, Millennials, Generation X) represent and influence our country the most.

*Table 3: Summary Statistics of Variables Used*



*Methods*

By using Linear Probability Model and Logit Models I will answer my research question. These models are recommended when working with binary dependent variables. Model 1 is a LPM model that analyses the overall region on mental health in the U.S, controlling for other variables. Control variables will make the overall model significant and provide better predictions.

Model 2 analyses every region in the United States and its relationship to the probability changes in mental health.

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Model 3 is used to compare results and avoid limitations of the Linear Probability Model. I use logit models for the rest of the study. Model 3 analyzes without grouping, while Model 4 predicts based on married people. Model 5 predicts on single people.

Model 4

*\*married==1*

Model 5

*\*married==0*

These models are constructed based on my research question and by looking at the probability of mental health and region, while controlling for other factors I will be able to find the results needed. The models satisfy Gaus-Markov assumptions with some limitations in the data. They are linear in parameter; random sampling and random assignment was used. However, predicting on mental health or any human data is difficult because of sensitive information and accuracy. My concern is omitted variable bias and the strength of my control variables.

**Results**

***Table 4:*** *Linear Probability Model and Logit Models for the Effect of Region on Mental Health*

Model 1 and Model 2 are Linear Probability models. By adding more variables, we checked for robustness. In Column 1, we see that region does not have statistical significance on the probability of mental health presence, controlling for other variables. In Model 2, when we use categorical dummy variables for region, we get different results. A person that lives in the Northcentral/Midwest is expected to lower the chances of having mental health by 0.03 percentage points, compared to the Northeast. Both regiong1 and regiong2 are statistically significant at the 99% confidence level. Due to the limitations of the linear probability model, Models 3,4 and 5 are logit models. In Model 3, there is a small increase in the negative coefficient for regiong2, and the variable for South becomes statistically significant at the 90% level. So, we can reject the null hypothesis and say that there is a difference in the probability of mental health presence based on different regions in the country. Model 4 is based on married people and has two positive coefficients for regions. If they were statistically significant, then we would assume higher presence of mental health in the South and West, compared to the northern parts in the country. It turns out that for married people, location of residence does not impact their mental health. There are other more significant factors that contribute to their mental state. For example, being with their family is more important for their mental health than living in a specific state.

Contrary to this, in Column 5, we look at single people. All the coefficients on region, except the West, are negative and statistically significant for: Northcentral/Midwest(z-score=-3.68) and South(z-score=-.34) with a 95% confidence interval. We expect a percentage point change in the probability of mental health by negative 0.06% for Northcentral/Midwest and negative 0.03% for South, when compared to the Northeast.

Overall, we see a continuous significance for the Northeast and Northcentral/Midwest regions. I assume that an omitted variable bias may impact these results, such as weather. When temperatures decrease, some people suffer from seasonal depression meaning that the probability of having mental health increases. This introduces a positive bias with a true effect lower than -0.03(Column 2) or -0.06(Column 5) when compared to Northeast. There are also variables correlated to mental health that we are not able to control for that may be a reason for a low R squared. Factors like personality or substance use impact mental health. Considering the complexity of mental health, we need to add stronger control variables like weather or migration that may present a better correlation between mental health and region. However, this does not mean that my models are not useful to this study. The research study was looking for a difference between changes in regions and mental health, and these models were able to prove that. So, future studies can look at specific location, by controlling for stronger variables.

*Conclusion*

From the results of this study, we have statistical evidence to say that there is a difference in the probability of having mental health based on region of residence. We can further our research by looking at the affordability of health care in the northern and central parts of our country, where mental health was least likely to be present. Also, by looking at one location, you can find common patterns in psychological and physical behaviors of people. In addition to this, since we saw opposite responses coming from single and married people, I would recommend studying these two groups separately, because of the different factors that impact their mental health.

On the other hand, there are many limitations to this study. The dataset for this study does not provide information on the time of the year this Survey was taken. Results can vary depending on the time period participants submitted their answers. As previously mentioned in the beginning of this study, we can’t control for peoples’ mental strength. Some people are tougher than others, and maybe some people did not even take this Survey seriously which adds to the limitations of this research paper.

Finally, considering all the above, I am certain that research on mental health will keep evolving and there are going to be more studies related to mental health and socioeconomic factors that are specific to a certain region.

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