Assesing Health Care Coverage and Access Utilizing the National Health Interview Survey

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The National Health Interview Survey (NHIS) is the nation's largest in-person household health survey. It has been conducted annually since 1957 by the National Center for Health Statistics (NCHS), which is a part of the Centers for Disease Control and Prevention (CDC). A broad range of topics are covered but we will specifically focus on healthcare access and expenditure across a multitude of factors such as employer information, race, and academic background.

Keywords: healthcare, NHIS, ACA, medicaid, medicare

INTRODUCTION

The Patient Protection and Affordable Care Act (PPACA), commonly shortened to the Affordable Care Act (ACA) and nicknamed Obamacare, is one of the most important healthcare legislature, creating a significant impact on the US Health care system. However, with the arrival of President Trump in the Oval Office, and with the ACA repeal now underway, some speculate huge consequences such as increased death rates. In light of these recent events, it is important that we take a look at the current state of our healthcare system and question whether it is failing or not.

The purpose of this paper is to assess healthcare coverage and access across a multitude of factors. We will specifically look at three aspects of health care - the first aspect is the relationship between educational attainment and access to medical insurance, the second is an overall look at the population and health care coverage, and the final exploration covers healthcare expenditure over the years.

METHODOLOGY

To answer the questions we layed out, we use data provided from the NHIS survey. We used various subsets of the survey data, depending on the specific question being analyzed.

Educational Attainment Vs Healthcare Access

To answer the question, *"Does higher educational attainment cause greater chance of acquiring medical insurance?"*, we filtered the dataset, only looking a three specific variables, the *highest educational attainment*, *health insurance coeverage*, and *health insurance offered at workplace*.

Health Care Access

Health Care Expedentiture

To gain a general outlook on the healthcare system, one way of looking at it is through the perspective of expenditures. Specifically the question we wanted to explore is, *"How has the amount of money spent for medical care changed over the years?"* One specific variable that was counted for from the survey was *"Amount family spent for medical care, past 12 months"*. To see this distribution, data from the 2005 to 2015 NHIS surveys was used (N=1,033,155). We then filtered the data further down to those who responded back to the question (N = 994,797). The distribution of health expenditure over the years can be seen in the graph below.

This independent variable only provides a rough estimate on the family's expenditure on medical care, but is still relevant since interviewers directed respondents to exclude the insurance premiums, over-the-counter drugs, and any costs for which they expected to be reimbursed.

To make calculations on the greater population, we used the calculated weight and strata within the provided by those who constructed the NHIS dataset. According to the codebook, the *sample weight* was calculated using "adjustments for age, race/ethnicity, and sex using the Census Bureau's population control totals", while *strata* was represents "the impact of the sample design stratification on the estimates of variance and standard errors." A **stratified random sampling** was implemented to calculate the weighted proportions of people who spend X amount for health insurance, X being multiple levels of range of money spent.

RESULTS

Plots

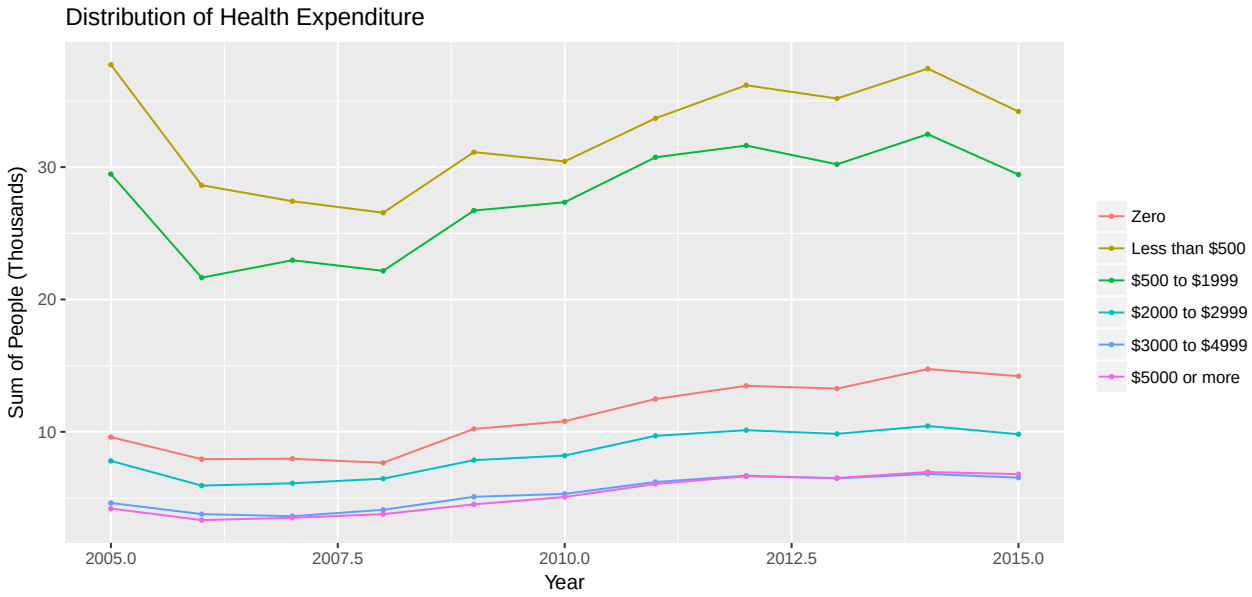

Figure 1. Expenditure Distribution over Time

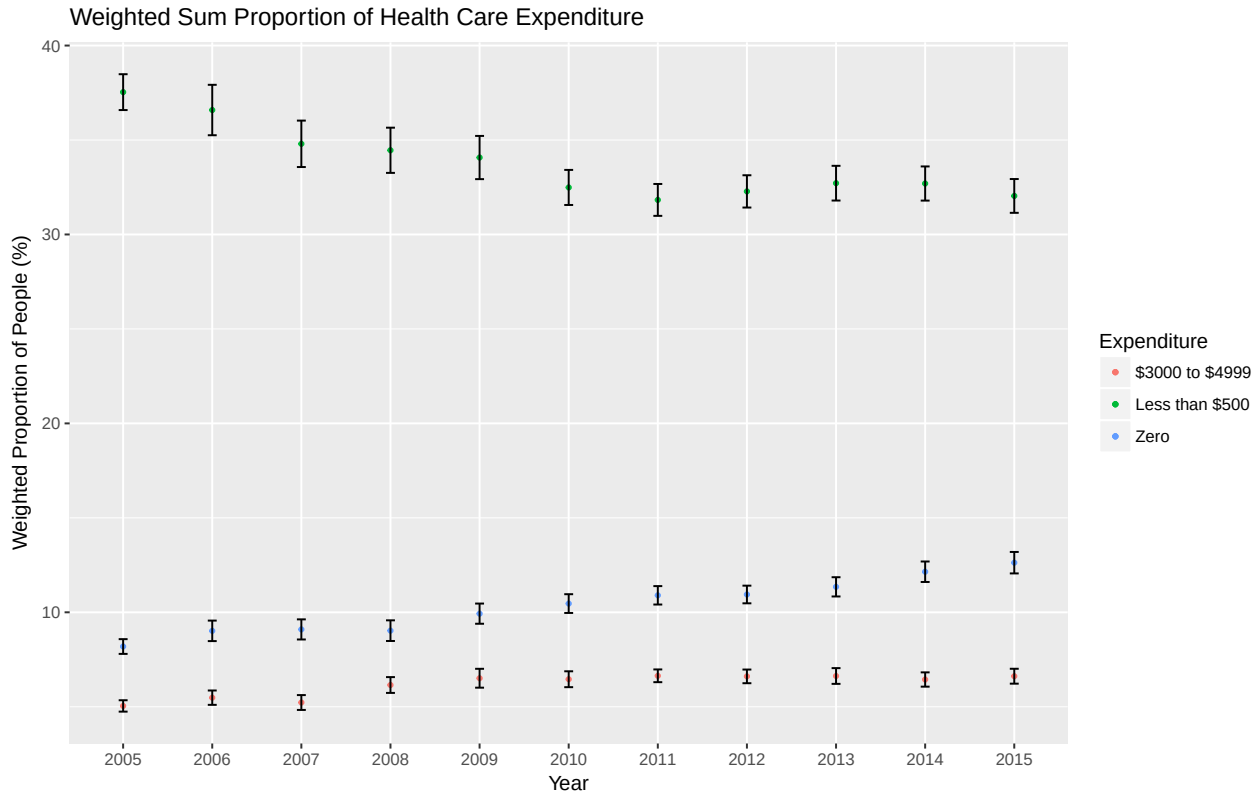

Figure 2. Expenditure Distribution over Time (Weighted)

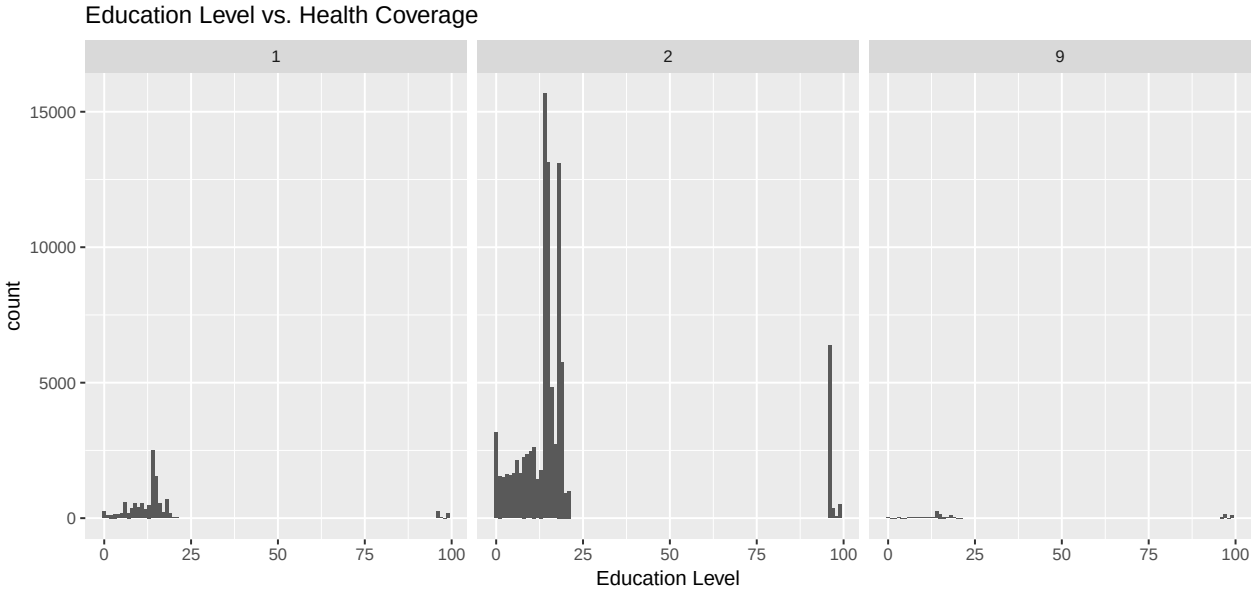

Figure 3. Distribution of Health Coverage per Education Level

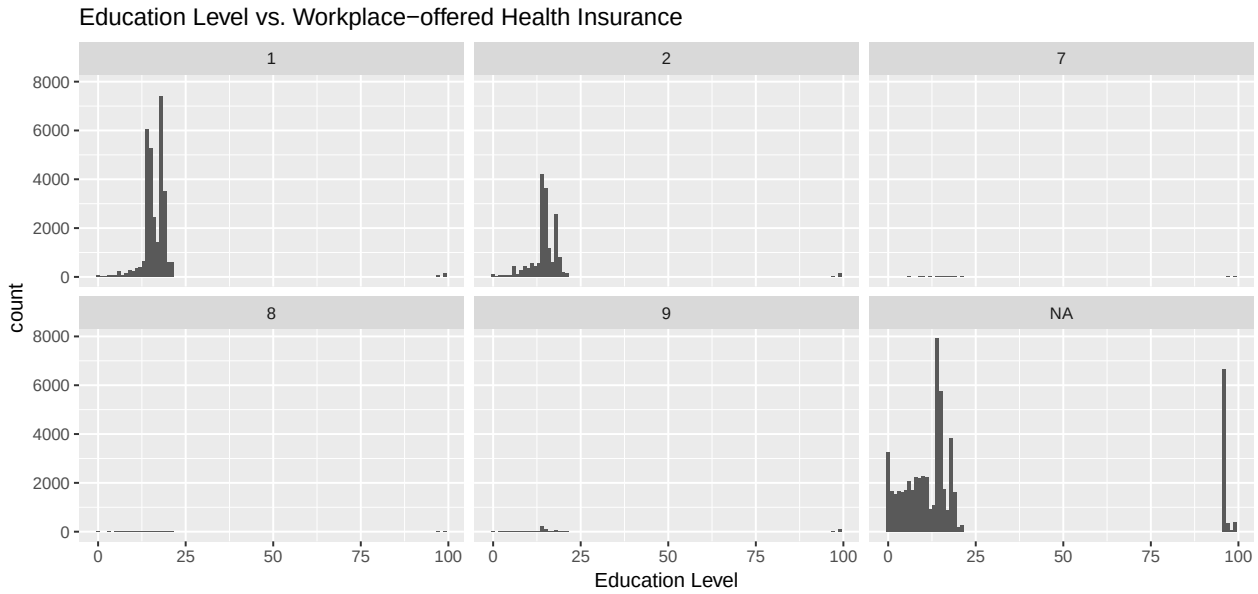

Figure 4. Educational Attainment vs. Workplace-offered Health Insurance

DISCUSSION

Educational Attainment Vs Healthcare Access

The first graph that we see here represents whether or not an individual obtained health coverage based on their education level. Immediately, we see that the number 2 subgraph contains a lot more results than the number 1 subgraph, which indicates that there were more people who received health coverage than did not. Under the number 1 subgraph, we see the varying number of people who did not receive health coverage given their level of education. There appears to be a notable peak at the number 14 which is indicative of those who have completed up to a high school diploma. A second notable peak is at the number 15 which represents those who have attended college but had not received a degree. Such might be the case because most people finish school up until high school and also attend college, so it would make sense that the bulk of the sample surveyed would reside in that educational attainment categories. It would furthermore make sense that they did not receive health coverage because nowadays, people obtain health/medical insurance from their workplaces since getting these plans on an individual basis is a lot more expensive. Those who did not finish college or only obtained a high school diploma might have not been able to get the best occupation due to their lack of education and skills in the workforce, which affected their ability to get health coverage from their employer.

In the number 2 subgraph, we see three notable peaks–one at the x-coordinate values 14, 15, and 18. These peaks correspond to the bulk of those who received health/medical insurance given that they either graduated high school, went to college but did not get a degree, or got a Bachelor's degree. What is interesting about this is that there were a lot of people who did not AND did get health coverage given that they graduated from high school or went to college but did not get a degree. This might reveal to us that even with a high school degree it is possible to get a steady job that includes medical/health insurance coverage. However, analyzing the data further, it makes sense that a lot of people who received health coverage received at least a Bachelor's degree, because that level of education makes it a lot easier to get jobs that pay well and include a lot of benefits such as medical insurance.

The second graph we are looking at compares educational attainment with whether or not a person received health insurance from their workplace. The number 1 subgraph represents the count of people who did *receive health insurance at their workplace* given their highest level of educational attainment, while number 2 subgraph represents the count of people who *did not receive health insurance at work* given their highest level of educational attainment. Again, in both graphs, x-coordinate values 14, 15, and 18, corresponding to having graduated high school, attending college without getting a degree, and getting a bachelor's degree respectively, are the most prominent peaks in the graph. This is due to the fact that most people finish at

least up until high school, attend college at some point and realize that it wasn't for them, or obtain their bachelor's degree. Very *few* people quit grade school in the middle of it and very few people get a higher education such as a master's or doctoral degree, which is why the sample count is so low at those other values. Based on the number 1 subgraph however, we see that the most people who got health insurance from their workplace are those who graduated with a Bachelor's degree. This reveals the importance of obtaining a Bachelor's degree when getting a job. Other interesting points of analysis are that more high school graduates received workplace-offered health insurance than those who attended college but did not get a degree. One reasoning behind this is that those who did not receive a degree from college might have been those who quit in order to pursue their own businesses, and therefore did not work for an existing corporation that would have otherwise offered them health insurance. The number 2 subgraph shows that high school graduates were the least likely to receive health insurance from their workplace, which again points back to the fact that they probably weren't able to get a great enough job that offered them benefits such as health insurance. Most decent jobs nowadays require people to have at least a bachelor's degree. The lowest of the three peaks, though, are those who got a bachelor's degree, and it shows that with a higher level of education, you will have a *better* chance of getting a job with better benefits.

ODDS RATIO: 1.19 / 3.66 = **0.33** The odds of getting coverage being a high school grad is 0.33 times higher than the odds of getting coverage having a bachelor's degree.

Health Care Access

Health Care Expedentiture

For the chart concerning health care expenditure (Figure 2), We can see the proportion of people who spent a specific level of money on health insurance, whether it be zero,less than 500$, or the other levels. For example, we see that the largest proportion of people mostly spent less than 500 dollars through out time, with atleast more than 30% given any year. Specifically, for 2005, 37.5% percent of the population *spent less than 500 dollars*, but for 2015, it went down to 32.04%. For the people *spending no money* on health insurance, this proportion mostly stayed between 8% to 12% over the years, with a positive increase over time. Meanwhile, The proportion of people *spending between 3000 to 4000 dollars* doesn't have a linear change over time like the other levels of expedenture. This proportion stayed between 5% and 6% over time. Showing no linear change for *spending between 3000 to 4000 dollars* can be interpreted as a positive income, since that means the proportion of the population spending money on health insurance are not seeing an increase of expenditure. One would expect that with the introduction of the Affordable Care Act in 2010, which promised reducing health care costs, the amount of money people are spending on health care would decrease. These expectations turned out to be true, since the graph reflects a positive rate of change for people spending no money on health insurance, and negative rate of change for people spending less than 500 dollars.

RELATED WORK

Previous projects have been done that measured trends in health insurance coverage over the course of time. The report was done by the National Center for Health Statistics (NCHS), and presents the selected estimates for health insurance coverage among the civilian noninstitutionalized U.S. population based on data from 2015 National Health Interview Survey (NHIS), as well as comparable estimates from the NHIS 2010-2014 surveys. From their results, they were able to determine that the trends displayed an overall increase in the population that had health insurance coverage in comparison to previous years. They then observe short term trends by age, poverty status, as well as race and ethnicity to provide a deeper insight of health insurance coverages, and what might be influencing access to them.

CONLUSION

Final summary and a description of how your system could be extended.

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