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Examining the Impact of Chronic Illnesses on Household Poverty Using Social Selection Theory

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While writing this thesis, I have not witnessed any wrongdoing, nor have I personally violated any conditions of the Skidmore College Honor Code.

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Abstract:

This study will examine the impact of chronic health conditions on a household's poverty level and their propensity to become impoverished, following the implementation of The Patient Protection and Affordable Care Act. This paper will investigate this relationship using social selection theory proposed by Sir Douglas Black in 1980. Using the Medical Expenditure Panel Survey, this analysis will use logistic and ordinary least squares regression models to map causal effects between certain types of chronic health conditions and household poverty levels. Empirical evidence shows that there is no statistically significant effect of chronic health conditions on household poverty levels or their likelihood to become impoverished. However, there were numerous limitations in this study that had the potential to impact the findings.

Introduction:

This paper measures a household's poverty level and the probability to become impoverished for working age individuals with some form of chronic illness. The majority of health expenditures in the United States are concentrated within a small portion of individuals who are diagnosed with one or more chronic health conditions. In the national level, these excessive costs have placed a considerable economic burden on individuals who are not diagnosed with chronic health conditions. These high medical costs have become the foundation for several policies and programs that aim to reduce poverty by improving access to healthcare. Individuals with chronic health conditions are more likely to be impoverished, which ultimately causes severe economic consequences. These consequences can take the form of lowered productively of these diagnosed persons. The Patient Protection and Affordable Care Act was designed to address high medical-related expenditures by establishing near universal health insurance coverage. Our primary research question is, does having a working aged family member influences their household poverty level and likelihood to be impoverished in the context of social selection theory?

I will present a wide variety of literature both theoretical and analytical to provide background into previous research done within the field of healthcare economics. This research will primarily be founded on the theoretical framework presented by Blane (1985). Sir Douglas Black created a report that sought to investigate the persistence of health inequalities despite, the United Kingdom's efforts to expand healthcare access. Within this report, one theory that

explains the persistence of health inequality is social selection theory. This theory will become central to this study as we attempt to answer the primary research question. In addition, I provided a variety of literature that examines the causal effects of the Affordable Care Act on the healthcare system. Researchers found that the Affordable Care Act increased insurance coverage within states that fully implemented the policies in comparison to states that did not. In addition, scholars found that the Affordable Care Act nearly improved all aspects of healthcare outcomes. Finally, I will present literature that sought to understand the effect of chronic illnesses on poverty, expenditures, and personal earnings.

The purpose of this paper is to understand if social selection theory is an appropriate framework to analyze the relationship between chronic conditions and poverty, while also determining the effects of having a chronic illness on household poverty under the regulations of the Affordable Care Act. Using the Medical Expenditure Panel, I have conducted an ordinary least squares and logistic regression analysis to estimate the effects of chronic illnesses on household poverty. Our analysis specifically studies the impact of cardiovascular diseases, respiratory diseases, diabetes, and cancer on the household's distance from the poverty line and the likelihood that they can become impoverished. This analysis is meant to be an expansion of prior literature by analyzing this relationship under Affordable Care Act regulations. Previous studies have primarily been framed to understand the impact of chronic illnesses on expenditures, earnings, and poverty. However, all these studies have been done prior to the implementation of the Affordable Care Act.

Our findings propose that there is no statistically meaningful relationship between chronic health conditions on a household's poverty level or likelihood to become impoverished. Cardiovascular diseases were found to have no effect on the likelihood of the household becoming impoverished. There was no statistically significant effect for other health conditions on this likelihood. As a result, we cannot conclude that chronic health conditions are key determinants of health-related household poverty under the Affordable Care Act. We also cannot conclude that social selection theory is an effective framework for analysis. However, there were several limitations in this study that potentially had an enormous impact on our results. This will be expanded upon further in the paper.

This paper will be segmented into seven distinct sections. Sections 2 reviews a wide variety of theoretical and empirical research on the subject of healthcare. Section 3 will discuss

the Medical Expenditure Panel Survey dataset. Section 4 will dissect our methodology into a discussion of diagnostic and poverty measures, and our empirical approach. Section 5 will present the results of our econometric models. Section 6 will analyze the results of our regression models and present study limitations. Finally, Section 7 concludes with possible areas of future research.

Literature Review:

There has been extensive research examining the impact of policies designed to increase insurance coverage in the effort to reduce medical related poverty. Scholars have devoted a significant amount of time and effort to determine the impact of chronic illnesses on beneficiaries' expenditures, individual earnings or wages, and the influence these diseases have on a household's poverty state. To determine health-related poverty in a household with multiple chronic illnesses following the implementation of the Affordable Care Act, I have surveyed a wide variety of literature in healthcare economics. This literature pertains to the early impacts of the Affordable Care Act on insurance beneficiaries and healthcare utilization, and prior research done with chronic health conditions. This literature review will be divided into three distinct subsections. I will begin by examining the theoretical foundation that I will use to understand individual well-being and health inequality. I will then highlight to what extent the Affordable Care Act has changed healthcare utilization and spending in the United States. Within the same section, I will provide evidence through previous research to justify why health conditions have both microeconomic and macroeconomic consequences. Finally, I will present literature on previous research done to understand to what degree chronic health conditions influence an individual's health-related expenditures, personal wages, and individual and household poverty levels.

Social Selection Theory:

In August of 1980, the United Kingdom Department of Health and Social Security published what would be known as the Black Report. This report was chaired by Sir Douglas Black and was tasked to investigate the persistence of health inequality. Despite, the United Kingdom's attempts to expand access to health care through welfare expansion. The Black report

ultimately concluded that health inequality was an economic issue, and the report provided four distinct theories to model the relationship between health status and inequality.

Blane (1985) identified these four theories to be measurement artefact, social selection, materialist, and cultural differences. Blane (1985) argued that the materialist explanation is the most apt theory to simultaneously account for improving general health and the persistence of health-related inequalities. For the purpose of this research, I have primarily used the social selection theory as the basis of our analysis.

The social selection theory is a type of explanation that cites an individual's health as being a major determinant to their chances of social mobility. This theory suggests that there is a causal relationship between a person's health status and their social class or social position. This theory establishes that social class is a dependent variable. This framework argues that those in better health than their peers are more likely to be upwardly mobile, and those in worse health are prone to be downwardly mobile. Blane, Smith, and Bartly (1993) details a long history of individuals with poor physical health that were occupationally disadvantaged and penalized financially. More specifically, they describe the marginalization of these individuals in the labor market. They describe how the only employment opportunities that were available to sick individuals were either physically demanding or lowly prospects. These career prospects would cause a further decline in their social mobility. Blane (1985) cites a wide range of research in the mid-20th century that examines differences in social mobility for individuals with maternal health problems, chronic bronchitis, and schizophrenia. In all scenarios, the research seems to present a clear relationship that having these health problems negatively impact a person's social mobility for periods that vary from a few weeks to years. Blane (1895) describes that a prominent drive to this phenomenon is socially recognized discrimination against the chronically sick and disabled. This occurrence is specifically true for industries that have a weak unionize presence. However, a clear methodological flaw with this research is that these studies examine a sample that is unrepresentative of the national population.

Social selection theory can be divided into two distinct causes, abet similar, the "social clause" model and the "social selection" model. Vick, Jones, Mitra (2012) describes the "social clause" model as the social class of the individual being the main driver of economic disenfranchisement, which will lead to behaviors that result in poorer health. In this scenario, the health status of the individual is the dependent variable. This contrasts with the "social selection"

model, which was previously described. The majority of scholars use social selection theory as the foundation of their analysis in the relationship between health and social status. Vick, Jones, Mitra (2012) use social selection theory to analyze the impact of psychiatric disorders on poverty. I will use this theory to model the relationship of chronic health conditions on poverty level following the implementation of the Affordable Care Act.

In the next section, I will begin describing how an individual having a chronic health condition has always been an economic issue both in macroeconomics and microeconomics. I will then detail studies that sought to understand how the implementation of the Affordable Care Act has change the United States health care system, and to what degree health inequalities can continued to be an economic problem.

The Economic Impact of Health Inequalities & the ACA:

The prevalence of chronic health conditions has a tremendous influence over the macro economy and on the economic wellbeing of individuals and households. In terms of the macro economy, there has been a significant amount of literature on the topic of chronic diseases and economic development. An individuals' health status is a key factor when it comes to a nation having human capital that will be productive for a firm and subsequently promote economic growth. Schwab (2010) and Sequeria (2011) both investigated the relationship of economic growth and competitiveness in relation to health. They cited health as one of the 12 pillars of economic competitiveness. Economists have treated health indictors as a key resource to understand the macro and microeconomic conditions of a nation. They equate this indicator to others such as, infrastructure, education, and political institutions. The inability to have a healthy workforce limits the growth of industries and the national economy. In the context of social selection theory present by Blane (1985), a sick workforce will not only limit economic growth but reinforce the economic disenfranchisement of sick individuals.

Research done by Rudawska (2014) sought to explore the correlation between health and economic growth while also, seeking to understand the burden of chronic illnesses on the economy. Rudawska conducted this study in the context of the United Kingdom; however, the results are still applicable for the United States. The relationship between health and economic growth that this researcher presents mirrors that of many other scholars. They cite how chronic conditions limits an individual’s abilities that subsequently decreases their productivity and

constrain economic growth. This concept is illustrated through the impact of an employee's health on their predisposition to fully function in the labor market and as previously stated, health factors influence the dynamics of production. They ultimately concluded that the scale of the economic burden is are incredibly large regarding the direct and indirect costs of chronic illnesses. Druss, Marcus, et al., (2001) found a similar outcome as they sought to study the economic burden of five chronic conditions. They studied the burden of having individuals with mood disorders, diabetes, heart disease, asthma, and hypertension. According to their research, they estimated that the total health costs for individuals with one or more of the five conditions reach approximately $270 billion. They also found that individuals with chronic heart conditions like hypertension or ischemic heart disease were a greater economic burden since they had higher per capita and national costs for treatment services.

Scholars have identified how health conditions can result to limiting economic growth and perpetuate the growing economic burden to treat these individuals. All this research is in the context of macroeconomics and only presents a narrative of health conditions based on economic growth and productivity. However, this story does not end with economic growth. According to Blane (1995), health conditions will not only limit economic growth but increase the tendency of ill individuals being downwardly mobile. The propensity of being downwardly mobile will continue to strain economic development and growth in the nation. Inequality based on health was partially addressed under the Patient Protection and Affordable Care Act by attempting to expand health insurance coverage.

The primary goal of the Patient Protection and Affordable Care Act that was implemented in 2010 was to strive for nearly universal health insurance coverage in the United States. The Affordable Care Act (ACA) took the "three-legged stool" approach that was founded on reforms made by Mitt Romney in Massachusetts. This approach created reforms in the non-group insurance market, created an individual mandate to prevent an adverse selection death spiral, provide subsidies to those who cannot afford insurance, and expand Medicaid. These reforms were meant to lower health-related inequality by striving for near universal health insurance coverage and expanding Medicaid. The idea being that by providing appropriate treatments to sick individuals, they will not be constrained by health care costs and condition, ultimately being better equipped to move upward in the social ladder. However, Medicaid

expansion under the ACA became optional for states after a Supreme Court decision of National Federation of Independent Business v. Sebelius in 2012.

Courtemanche, Marton, Ukert, et al., (2016) sought to examine a variety of causal effects of the Affordable Care Act on health insurance coverage in 2014. Specifically, they identified the effects of the "three-legged stool" approach on Medicaid expansion and non-expansion states. Using the data from the American Community Survey and a difference-in-difference-in-difference regression model, they determined that the full implementation of the ACA increased resident coverage by 5.9 percentage points from the baseline pre-ACA uninsured rate. In contrast, they found that in states that only employed other components of the ACA only increased insurance coverage by 2.8 percentage points from the pre-ACA uninsured rate. Regarding coverage expanding under Medicaid, they found that states who employed the full provisions of the ACA with Medicaid expansion had a 3.1 percentage point increase. This significantly differs from establishing ACA without Medicaid expansion that only had a 0.5 percentage point increase. All increases were from the mean pre-ACA uninsured rates. Courtemanche, Marton, Ukert, et al., provided significant insight into the effects of full ACA implementation; however due to data limitation, they were unable to identify any effects or trends over periods of time. Nevertheless, their research provided a necessary background into how insurance coverage and Medicaid coverages was expanded under the ACA in states that chose to expand Medicaid and not to expand.

This is important to understand in the context of our research as its seemingly expected that expanding insurance coverage will play a role in minimizing health-related inequalities. Without insurance or limited insurance coverage, sick individuals are more likely to become impoverished in comparison to the rest of the population. This connects back to and expands on the theory of social selection. As ill individuals are economically disenfranchised due to their illness, it becomes more difficult to manage their disease, especially with limited or no insurance coverage. This will solidify their propensity of downward social mobility. Prior research has yet to fully identify this relationship in the context of the new United States health care system. The next question that would naturally follow is, how did health and access to care change after the ACA for individuals covered by Medicaid and expanded private insurance.

Sommers, Gunja, et al., (2015) investigated national changes in self-reported coverage, access to care, and health following the implementation of the ACA. These researchers used data

from the Gallup-Healthways Well-Being Index and conducted a difference-in-difference regression model. What they found was that in all outcomes, pre-ACA trends were significantly worse. In comparison to pre-ACA trends, Medicaid expansion was associated with reductions in low-income uninsured rates by 5.2 percentage points and increased the likelihood of beneficiaries having a personal physician by 1.8 percentage points. This was also met with a 2.2 percentage point increase in greater access to medicine. These researchers seem to propose that the implementation of the ACA has improved all outcomes regarding access to personal physician, self-reported coverage, and access to medications. However, the most significant critique of this research is the use of time series analysis. Their analysis was based on data gained from 2014 to 2015, which could have led to exogenous factors influencing their results. Most notably, the economic recovery following the financial crisis potentially could have influenced Medicaid recipients access to care and medications. The factors of the Great Recession may have substantially reduced the estimated effects found in their regression. In addition, the Well-Being Index has historically produced estimates of uninsured rates that were lower than federal surveys and government sources. Nevertheless, Sommer, Gunja, et al., provided a significant framework in how the implementation of the ACA and the expansion of Medicaid improved beneficiaries quality of care.

Courtemanche, Marton, Ukert, et al., and Sommer, Gunja, et al., have all presented a depiction of the implementation of the ACA has had overall beneficial results regarding Medicaid beneficiaries both in states that chose to expand and not expand Medicaid. Where Courtemanche, Marton, Ukert, et al., detailed how employing provisions of the ACA and Medicaid expansion has lowered uninsured rates, Sommer, Gunja, et al., looked at how beneficiaries have experienced this improvement. However, these scholars did not examine the relationship of having expanded or non-expanded insurance and their resulting quality of life. They have yet to determine how being an insurance beneficiary or not with an illness influences the likelihood of being impoverished or their poverty level. This is where my research seeks to complement prior work done. I hope to contribute to this field by understanding the effects of an individual having one or multiple chronic conditions on the likelihood of being impoverished or their poverty level under the new healthcare system set by the Affordable Care Act. The implementation of the Affordable Care Act has expanded insurance coverage to many United States citizens. It is now important to understand to what extent has this new health care system

minimized health-related poverty or how having a chronic condition under this system influences household poverty.

In the following section, we will present previous research done in the field of health care economics. Specifically, we will describe scholars who sought to understand in the influence of having chronic conditions on household expenditures and their poverty level. There has been scholarship, which we will discuss, that identifies that the amount households spend on health care costs influences the likelihood of being either upwardly or downwardly mobile. So, it will important to understand this relationship as we try to understand health and poverty in the context of social selection theory.

Chronic Conditions on Health Expenditures & Poverty:

The majority of health expenditures in the United States are concentrated among a small minority of people; however, a significant portion of these people are diagnosed with more or one chronic illnesses. So far, I have presented literature on the current state of the United States healthcare system following the implementation of the Affordable Care Act in relation to insurance beneficiaries. I have also presented scholarship regarding how chronic health conditions are an economic problem in the context of the macro economy and individual households. The following sections will describe research that studies how different chronic conditions influence health related expenditures for households and the propensity for these households to be impoverished.

A few studies have researched the incremental costs of having one or more additional chronic illnesses. Garis, Farmer (2001) primarily sought to investigate the incremental costs of having a combination of other illnesses. Using the Oklahoma Medicaid data in 1995, the researchers created three experimental groups that included a combination of multiple chronic conditions and a control group that had Medicaid beneficiaries with no chronic illness. The researchers chose to investigate the most prevalent conditions at the time, which were anxiety, depression, psychosis, respiratory conditions, diabetes, high blood pressure, and cardiovascular diseases. Their data was analyzed using the parametric methods of ANOVA and MANOVA. What they determined is that an experiment group that had a combination of psychological diseases had the largest incremental costs. The combination of having anxiety, depression, and the additional condition of psychosis had an incremental cost of $4,590. In addition, they found

that there were two significant incremental costs regarding diabetes and cardiovascular diseases. An additional disease state of cardiovascular disease had an incremental cost of $2,642, while the additional disease state of diabetes to hypertension had a cost of $623.

This research was published in 2001 and used state level data on Medicaid beneficiaries in Oklahoma. Due to the period that this research was done, Medicaid services limited the amount of data that would be available. During this time, there were greater limitations on physician visits, inpatient hospital stays, and prescriptions. In addition, the researchers were unable to make casual inferences about the national population due to the sample size and unrepresentative demographics of the sample. Although the sample was representative of the national Medicaid population, the size of the sample was incredibly low. This was because they chose to solely focus on individuals with a chronic illness or a combination of chronic conditions and chose to not include healthy people. As a result, they were unable to make causal inferences since their sample sizes, at times were as low as 17 individuals. This is where my research can contribute to the field of healthcare economics. This research is attempting to investigate the incremental cost of having an additional chronic condition; however, I will be using a national health survey data under the Affordable Care Act in 2015. Although we will not primarily investigate the relationship of chronic conditions and health-related expenditures, it necessary to understand these costs as they play a part in health-related poverty. By using national survey data, our research will have a larger sample size that will include both sick and healthy individuals. This will give us a more representative sample to make casual inferences and estimate an accurate relationship between chronic conditions and poverty.

There has been a significant amount of research done in the field of healthcare economics prior to the implementation of the Affordable Care Act; however, there has currently been little done with household expenditures and chronic conditions. Atherly (2004) explored the impact of asthma on inpatient and outpatient expenditures for Medicaid enrollees, and the effect of voluntary outpatient drug coverage on Medicaid asthma costs. Using the 2001 Medicare Current Beneficiary Survey to Access to Care and multiple logged based OLS regression model, they determined that an individual who self-reported as having asthma had a 30% likelihood of having higher inpatient expenditures. This is in comparison to individuals without asthma. This trend also continued with patient expenditures, where individuals who self-reported themselves as having asthma had greater expenditures of about $2,425. Although this is not directly related

to my own research, it is an interesting note of their research. They found that prescription drug coverage for self-reported asthma patients had no influence the probability of inpatient expenditures for people with and without asthma. They also found that prescription drug coverage decreased out-patient costs for individuals with asthma and increased outpatient expenditures for people without asthma.

Some clear limitations to this study is the use of self-reporting over clinical diagnosis, and the sample exclusions made in the dataset. In the dataset, the variable Asthma was defined as a dummy variable. When this variable is coded as 1, it means that the individual was told by a medical professional that they have asthma. This is a stark contrast to if the variable is defined through a clinical survey where there are definitive clinical diagnoses of patients. This limitation also extends to the severity of the person's asthma. In addition, the sample exclusions enforced in their research limited the generalizability of their results and limited their ability to confidently present causal relationships or inferences. Despite these apparent limitations to this study, it is actually a common practice done by many within this line of research. These limiting assumptions are necessary as it allows for practicality in scholarly research. This has stated by many researchers in the field of economics.

This research conducted by Atherly provided a grounded foundation in how self-reported asthma patients influence their household expenditures when accounting and not accounting for prescription drug coverages. Atherly presents a trend that has relatively been true in other research. Which is that despite being covered by Medicaid, poor income individuals are still facing a significant amount of costs resulting from their chronic condition. This concept continued with research done with Taylor and Begchi (1998).

Taylor and Begchi (1998) oriented their study to estimate annual spending associated with diabetes for individuals covered by the Iowa Medicaid program, while also understanding possible factors that can affect variation in annual expenditures. This study determined that annual spending, which consisted of inpatient and outpatient care, was 44% greater for individuals that treated their diabetes with insulin in comparison to those who didn't. They ultimately concluded that annual Medicaid spending for these recipients was approximately $9,105. Taylor, Begchi (1998) attempted to explore the relationship between annual spending and individual who is diagnosed with diabetes; however, there were a significant amount of limitations to this study and unanticipated results. A significant limitation of this study was the

lack of representativeness in the sample in comparison to the population of Medicaid beneficiaries. In addition, the decision to include individuals that were enrolled for Medicaid for 12 months possibly biased their results. This limited the researchers' ability to generalize their results. In addition, there were some unexpected results in their data such as age having a negative relationship with cost, which does not hold when you consider economic theory. Despite the clear limitations of this study, this literature provided a foundational understanding of the relationship between annual expenditures and a chronic condition.

Erten, Davidoff, et al. (2014) examines whether patient who were recently diagnosed with cancer responds differently to the availability of supplemental coverage in comparison to the national Medicare population. Although this research does not primarily seek to understand the effect of having cancer on medical-related expenditures, it provides a needed framework to understand how cancer can influence individuals, households, and health-related spending. Using the Medical Expenditure Panel survey, they found differences in spending between the cancer and noncancer groups and between insurance coverage. The group that was diagnosed with cancer spent an adjusted $15,605 more than the noncancer comparison group over a two-year period. In addition, without the presence of supplemental health coverage, insurance beneficiaries with employer-sponsored insurance, private prescription drug coverage, and public had higher total spending. This estimated spending was $3,510, $2,823, and $4,065, respectively. However, with the presence of supplemental insurance for beneficiaries with cancer, there were little net effects on health-related spending. This would suggest that Medicare beneficiaries with cancer are not very responsive to the presence of supplemental insurance or in other words, supplemental insurance has a limited effect on reducing health-related expenses. Although this study provides clear insight into the relationship between cancer diagnoses and health-related spending, its applicability to this research is limited. This study primarily focuses on Medicaid beneficiaries who are 65 years old or older. This sample demographic is commonly seen as being more prone to illnesses and more susceptible to major changes in health-related expenditures. This study will focus on individual between the ages of 18 and 64, for reasons that will be described later. So, we will not be able to confidently state that these spending effects will be as present in a younger demographic. I would hypothesize that the effect on cancer on health-related spending for different insurance coverages would be present in a younger demographic; however, the degree to which this effect influences spending would be significantly lower.

The scholarship done by Taylor, Begchi (1998), Atherly (2001), and Garis, Farmer (2001) have presented a clear trend regarding the relationship of chronic conditions and several types of medical expenditures. Garis, Farmer (2001) presented that the incremental cost of each additional chronic condition will substantially affect their medical expenditure. This concept continued to be true in the studies done by Taylor, Begchi (1998) and Atherly (2001). Erten, Davidoff, et al. (2014) found a similar trend when investigating spending effects on an older demographic. As I started this research, these studies provided a necessary understanding that will became the basis of my hypotheses and empirical strategy. So far, I have presented literature discussing health conditions on spending. Now I will attempt to present current studies on the impact of chronic health conditions on personal earnings or wages.

In a similar vein to health conditions and their impact on health-related expenditures, there has been a substantial amount of literature that investigates the impact of health conditions on individual earnings. Kessler, Heeringa, et al. (2008) sought to update previous estimates on the association between mental disorders and individual earnings. This study expands on previous literature and their estimates of predicted personal income by assessing a wider range of disorders, specifying the impact on personal income, and having a nationally representative sample to analyze. Using the National Comorbidity Survey Replication dataset, they conducted an ordinary linear regression model to determine the impact of psychological disorders. These conditions were defined as anxiety disorders, mood disorders, and impulse control disorders. They were able to determine that if a respondent was diagnosed with some serious mental illness 12 months prior to their interview, these individuals would be predicted to earn approximately $14,393 to $16,300 less. This is in contrast to individuals that do not have a mental condition during the same period. This literature is applicable to my investigation on the impact of health conditions and household poverty. Although these researchers use earnings, personal earnings are a key contributor to a person's quality of life and subsequently, their poverty level. Clear limitations to this study is the reliance on self-reported records, which is difficult to address when using survey-based datasets. The researchers relied on self-reports of individual mental condition and earnings. Due to societal stigmas or personal feelings of embarrassment, respondents may not have been willing to state if they have a mental illness or low income. Another critique of this study is that there has been previous research stating that there is an association between low earnings and the probability of having a mental disorder. Specifically,

prior studies have shown that low earnings can cause or increase the chances of having a mental disorder. This limitation is present in other studies and will continue to be an issue unless the study is designed as an experiment. In this study, the researchers are only able to state that there is an association between these variables; however, they cannot state how much of the connection is due to mental illnesses causing low earnings. Another piece of literature that seeks to understand the relationship between chronic illnesses and personal earnings is research done by Daniel Lempert.

Lempert (2014) sought to investigate the dual relationship of obesity influencing personal earnings or wages, and to what degree does low family income and low wages contribute to obesity. In this study, an individual being obese, or overweight is defined as a person having a Body Mass Index (BMI) of greater than or equal to 30 and a BMI greater than or equal to 25, respectively. Using the Third National Health and Nutrition Examination Survey, the researcher conducted a fixed effects model due to the panel nature of the survey and unobserved heterogeneity within individuals. The researcher also performed an ordinary linear regression; however, they acknowledged that this model is not sufficient. This survey was conducted in 1988 through 1994 and had a nationally representative sample of 33,994 individuals aged 2 months or older. Lempert (2014) determined that there is an association between weight and wage penalties. Specifically, Lempert (2014) found that wage penalties increase as the weight of females increases with a higher income level. In addition, the researcher found that there is an opposite effect for black males, wage penalties will increase when the individual is at a lower income level. A unique aspect of this study is that the researcher was able to address the issue of BMI by accounting for difference in body mass. BMI is calculated by dividing an individual's weight by their height. This makes it difficult to understand if an individual with a high BMI is obese or muscular since, muscle mass weights more than fat mass. To address this issue, they were able to control for fat mass and non-fat mass, which is not commonly used in similar research because that data is difficult to find. However, a clear limitation of this study is that this research is based on a survey conducted between 1988 and 1994. This constrains the generalizability of their results since their findings may not translate or be applicable. In the 21st century, the lifestyle choices made by individuals would most likely increase the sample size of people who would be classified as being obese or overweight. In addition, I would hypothesize that weight discrimination would be more prevalent in todays world so, there may be a stronger

effect on wage penalties on both race and gender. Overall, this study provided a necessary framework to understand how a chronic health condition can influence individual wages in regard to weight. Although for this study an individual's body mass is not a condition of interest, it still provides a reason as to why this characteristic is needed to understand health status on poverty.

There has been limited research done to analyze the relationship between an individual's chronic health condition and their propensity to become impoverished. Vick, Jones, and Mitra (2012) sought to investigate the relationship of a household with and without a severe psychiatric disorder on their poverty rate, poverty depth, and poverty severity. Using the Medical Expenditure Panel Survey, they performed a multivariate analysis on a severe psychiatric disorder and their poverty depth. Severe psychiatric disorders are defined through the K6 scale of on specific psychological distress. This scale is used to determine the severity of psychological disorders such as depressive or mood adjustment disorders, anxiety, or other psychotic disorders. These researchers were able to determine that the presence of a household member with a severe psychological disorder predicts a 52-percentage point increase in their poverty depth. It will also increase the odds of being impoverished by a factor of 3.10. This research provides a key finding in the context of the analysis I attend on conducting. Although this research will not investigate the relationship of psychological disorders on poverty, these researchers use the Medical Expenditure Panel Survey and provides a necessary framework to tackle this dataset. In addition, these researchers use a logistic regression model to analyze the association between an adult family member with a severe psychiatric disorder and the probability of a household having income below the poverty threshold. Their interpretation of their results and how they conducted this analysis will become the foundation to our logistic regression analysis. However, a major criticism of this research is that the researcher chose not to investigate how a psychological disorder can be a driver to impoverishment.

The methodology of this research mirrors the core theories of the Black Report that was present by Blane (1985). The four theories presented in the Black Report creates a framework where you are investigating health conditions as a cause or predictor to poverty. Vick, Jones, and Mitra (2012) organized their analysis in a comparable manner. They created models that used severe phycological disorders as a predictor of poverty or in this case, poverty depth while controlling for demographic characteristics of different household groups. Poverty depth is

defined as the amount of income for a household that falls under the poverty line as proportion of the poverty line. This analysis method is similar to the framework presented by Blane (1985); however, they chose to forgo analyzing how having chronic condition is a cause of being impoverished. However, they did acknowledge that their primary goal is to focus on creating an improved poverty measure to provide recommendations for health policies and health care utilization. Nevertheless, this decision seems like a missed opportunity since their research already provides an outline to investigate if a psychological disorder can be a key cause of household poverty in the United States.

Throughout this review of the literature, I have presented literature on the casual effects of Medicaid expansion under the ACA, how exactly are chronic conditions an economic problem, and described how different conditions have unique effects on the expenditures, earnings, and impoverishment. I have also demonstrated how these different conditions can vary according to demographic characteristics and insurance coverage. With this research, I am updating finding found in the literature. Specifically, on the relationship of chronic conditions and health expenditures in a post-Affordable Care Act healthcare system. In addition, I will also compare household poverty levels and their propensity to be impoverished by controlling for differences in insurance coverage. Our sample will allow us to compare the effects of these chronic conditions on sick and healthy individuals. We will now move on to discuss the dataset used for our analysis.

Data Collection:

This research examines the relationship between the poverty level of a household that has an individual with one or more chronic conditions. I primarily drew information from the 2015 Full Year Consolidated Data File of the Medical Expenditure Panel Survey (MEPS). The Medical Expenditure Survey provides nationally representative estimates of health care use, expenditures, health insurance coverage, health status, access to care, demographic, and socio-economic characteristics of the United States population. This panel survey conducted 5 Rounds of interviews over the course of 2 full calendar years. The data was collected in Rounds 1, 2, and 3 for MEPS Panel 20 and Rounds 3, 4, and 5 for MEPS Panel 19. The variables of each Round in Panel 20 convey the same information in the corresponding Rounds in Panel 19. This dataset

contains information associated with 35,427 people who participated in the MEPS Household Component of the Medical Expenditure Panel Survey in 2015.

To incorporate information on individual health condition, I introduced information from the 2015 MEPS Medical Condition File. The MEPS Medical Condition file identified people with specified health conditions by assigning each disease a code. This code was assigned by professional medical coders using the International Classification of Diseases, Ninth Revision, and Clinical Modification (ICD-9 CM). These coded conditions were self-reported and did not always conform to a diagnosis made by a physician; however, the overwhelming majority of cases matched with condition reports made between households and healthcare providers.

Our working sample consisted of 2,630 individuals. I included information of panel 20 and 19 as the variables were limited to one year. This prevented any concern of double counting with the observations. I have chosen to limit the working sample to only include individuals between the ages of 18 and 64. This is meant to clearly examine the influence of chronic conditions on the adult working population. I will now outline our methodology and discuss our variable measures.

Methodology:

Outcome Measures:

To investigate the impact of chronic disease on a household's poverty level, we use regression analysis to model social selection theory as present by Blane (1985). Social selection theory asserts that the dependent variable is the individual's social position. The primary dependent variable for our research is the household's poverty level. This poverty measurement tool is defined as the percentage of dividing family income by the federal poverty in 2015. Family income came from the Common Population Survey conducted by the United States Census Bureau in 2015. A household's poverty level can be better understood in the context of five poverty categories: negative or poor (less than 100%), near poor (100% to less than 125%), low income (125% to less than 200%), middle income (200% to less than 400%), and high income (greater than or equal to 400%). In the regression analysis, we logged Poverty level variable to interpret the coefficients as percentages.

In addition to conducting an ordinary least squares model, we conducted a logistic regression to determine the probability of being in poverty with an individual that has a chronic

condition. Using household's poverty level, we created the binary variable “Poverty State” that was coded as 1 equaling a household being in the middle or high-income bracket and 0 equaling a household being in the low-income bracket or below the poverty line. Atherly (2004) and Erten, Davidoff, et al. (2014) used logistic regression in the context of asthma and cancer on household expenditures; however, this empirical method will be useful in identifying the probability of an individual falling to poverty due to a health condition.

Key Diagnostic Measures:

To test the social selection theory as outlined in Blane, Smith, and Bartly (1993), I use the following variables to measure the impact of health conditions on household poverty. The key variables of interests were if an individual had any of the following chronic health conditions; respiratory conditions, cardiovascular conditions, diabetes, or cancer. Information on individuals with a chronic health condition was gained from the 2015 Medical File of the Medical Expenditure Panel Survey. Within this file, individual diagnoses were reported as procedure codes that were prescribed by the ICD-9CM. The survey received information on individual illnesses by asking respondents to self-report any health condition. According to research done by the Centers of Disease Control and Prevention, these chronic conditions are the most prevalent in the United States. So, I have chosen to analyze these chronic conditions because they can provide real life implications.

A respiratory condition is defined as having one or multiple of the following illnesses; asthma, chronic obstructive pulmonary disease or emphysema, or chronic bronchitis. A cardiovascular condition is defined as having one or multiple illnesses; coronary heart disease, high blood pressure, or high cholesterol. Diabetes is defined as an individual having either Type I or Type II diabetes. Cancer is defined as a person indicating that they have the following forms of cancer; bladder, breast, colon, lung, lymphoma or melanoma, soft tissue, muscle or fat, skin, or any other form of cancer. Cancer of the prostate, cervix, and uterus were removed as they were dependent on the gender of the individual. The Medical Expenditure Panel Survey removed cancer diagnoses variables that had few than 20 observations and classified them as clinically rare. These clinically rare conditions were not readily available thus, they removed from empirical analysis. The illnesses defined under respiratory and cardiovascular were chosen because they are the most common condition of these diseases and were readily available.

Control Variables:

The Medical Expenditure Panel Survey provides a wide variety of control variables that supplies a significant amount of insight into the demographics of the individual and household. In our regression analysis, we controlled for demographic characteristics that were common in previous research. I controlled for age, sex, marital status, race/ethnicity, education, family size, and total family income. This studied also controlled for perceived health status, Body-Mass Index of the individual (BMI). Atherly (2004) and Vick, Jones, and Mitra (2012) have all used the same demographic characteristics such as age, sex, marital status, race/ethnicity, education, and family size. However, within this research, I have chosen to classify the race/ethnicity variable as an individual being non-white. Previous research has found similar effects of being non-white on the propensity to be impoverished. Studies have found that an individual who was either Black, Asian, or Latino/Hispanic had an increased probability to be impoverished or commonly experienced an effect that decreased their poverty level. Since literature like Atherly (2004) and Vick, Jones, and Mitra (2012) presented this effect, there was minimal interest in understanding how specific race or ethnicities can influence household poverty levels. In addition, there is a non-linear relationship between an individual's age and their poverty level or likelihood to be impoverished. As a result, I included a squared aged variable to control for this non-linearity. This differs from other studies where it was not included. No researcher explained why this variable is excluded.

Previous literature like Taylor, Begchi (1998) controlled for the severity of a health condition on its impact on poverty level. However, due to the limitations of the Medical Expenditure Panel Survey, I had to use a different metric to consider condition severity. To control for condition severity, the variable of perceived health status was used. This is a variable is defined as a 1 to 5 index that asked how an individual felt at the end of 2015, where 1 is feeling perfectly healthy and 5 is feeling incredibly ill. This is an appropriate metric because we can assume that if an individual is feeling incredibly ill that means that their health condition is severe. The metric is susceptible to potential biases or inaccurate estimates of condition severity because there are many exogenous factors that an influence how a person feels. For example, if they have other health conditions that may lead to stating that they feel feeling worse even if the condition of interest is not severe. Or if an individual recently took their medications or was just having a good day, that may influence them to say that they feel good even if the condition of

interest is severe. In addition, other studies in this field does not use the variable Body Mass Index or BMI. However, Lempert (2014) demonstrates that BMI has a significant impact on earnings or wage penalties. Due to this, I thought it was appropriate to include with our regression analysis. There were initial concerns for multicollinearity issues since high BMI can determine if an individual has illnesses like diabetes or cardiovascular diseases. However, after conducting robustness checks, there was very little multicollinearity between BMI and the health conditions of interest.

Atherly (2004) controlled for health insurance and the economic characteristics of an individual to determine household expenditure; however, insurance coverage and economic standing plays a significant role in determining family's poverty level. Previous studies have included the unemployment rate to control for differences in economic situations between individuals. A clear limitation of using the Medical Expenditure Panel Survey was this survey did not distinguish survey responders by states or cities. As a result, we could not incorporate the unemployment rate in our analysis. So instead, I used an employment status variable to determine if the individual was employed to control for economic differences between survey responders. The employment status variable is defined as being employed in the final Round of surveying. Our literature review presented studies on how health conditions influence wages or earnings and medical-related expenditures. These variables are important to control for since they can determine a household's poverty level or likelihood to become poor. I control for the hourly wage, where the recipient earnings range from $0-$80. I also control for the hours worked by individual, which is defined as how many hours the recipient worked in a given week. This study also controls for medical expenditures the household paid by the end of 2015, which is a sum of office based, prescription, emergency room, inpatient, and outpatient expenditures. Insurance coverage was considered through four different dummy variables, which are coverage under Medicaid, group private insurance, non-group private insurance, and no insurance coverage. The hourly wage, hours worked, and medical-related expenditure variables brought initial concerns for multicollinearity; however, after conducting robustness checks, there were no VIFs that would suggest multicollinearity. In the following section, I now will go into detail about the empirical approach used to understand the impact of chronic illnesses on a household's poverty level or poverty state.

Empirical Approach:

To understand the impact of chronic health conditions on a household's socio-economic position, we first conducted an ordinary least squares regression model. This allows us to highlight the direct impact of our variables of interest on percentage-point changes on the household's poverty level.

This ordinary least square model is a semi-logarithmic regression that is based on social selection theory and previous literature. This model is a cross-sectional analysis of individuals and households in the year 2015. The coefficients represent the relationship between the independent variables and dependent variables that was previously described. *i* represents the individual respondents of the survey. The variables of interest are labeled as *Resp, Cardio, Diabetes, and Cancer.* H is defined as variables that are included under health status that excludes the chronic health conditions. The vector E represents the economic characteristics of the individual respondent, I is defined as the types of insurance coverages an individual is covered at the final round of surveying. D includes demographic variables that was previously stated. We have also conducted a logistic model on the variable Poverty State to estimate the odds of being impoverished due to have one of these conditions. This model used the same variables as the OLS regression. On the foundation of social selection theory, we created the following models...

$$ln(PovertyLevel)_i = \beta_{0i} + \beta_1(Resp)_i + \beta_2(Cardio)_i + \beta_3(Diabetes)_i + \beta_4(Cancer)_i + \beta_5(H)_i + \beta_6(E)_i + \beta_7(I)_i + \beta_8(D)_i + \varepsilon_i$$

$$PovertyState_i = \beta_{0i} + \beta_1(Resp)_i + \beta_2(Cardio)_i + \beta_3(Diabetes)_i + \beta_4(Cancer)_i + \beta_5(H)_i + \beta_6(E)_i + \beta_7(I)_i + \beta_8(D)_i + \varepsilon_i$$

I performed a variety of robustness checks to verify the validity of the estimated values and remove any vagueness in our regression. The literature suggests that an individual's health related-expenditures is positively skewed and potentially colinear with poverty level. I conducted a sensitivity checks for all variables relating to Poverty Level. Heteroscedasticity was considered and tested for using a Breusch-Pagans test. After checking for heteroscedasticity, all standard errors are presented as robust standard errors. The potential for multicollinearity was checked

through the variance inflation tests, and we found no significant signs of multicollinearity. In addition, all statistical assumptions of the Logit and Ordinary Least squares model were fulfilled. This suggests that these regression models are appropriate in estimating the effects of the parameters. The results of the robustness checks can be found in Table 2 of the Appendix.

Results:

Table 1 in the Appendix presents coefficients and the robust standard errors of the ordinary least squares and logistic regression models. Poverty level (column 1) is a continuous variable ranging from zero, which is a household being at the poverty line to a household being 500% above the poverty line. The poverty level variable was logged in order to estimate a percentage effect on where a household lies from the poverty line. Households with a working-age member with either cardiovascular disease, respiratory diseases, diabetes, or cancer does not seem to have a statistically significant effect on the household's poverty level. Households with a working-age member that is married is predicted increase the household's poverty level by 23 % ($p<0.01$). A working age family member who has an education level greater than high school is predicted to increase the household's poverty level 6% ($p<0.01$). In addition, coefficients for the variables sex, non-white, Medicaid coverage, and perceived health status is associated with a decreased percentage effect in the household's poverty level ($p<0.01$). The variable BMI demonstrates that if a working age family member is considered overweight or obese, the household can experience a 0.4% decrease in their poverty level. The coefficients for hourly wage, total medical-related expenditures, and private group insurance coverage is associated with an increased percentage effect in the household's poverty level ($p<0.01$). This ordinary linear regression model had 2,558 observations and an adjusted R squared of 0.28.

Column 2 of Table 1 in the Appendix provides coefficients and robust standard errors of the logistic regression model. Poverty state is a binary variable that can be 1, which is defined as the household being 200% or greater from the poverty line. Or poverty state can also be coded as 0, which is defined as the household being less than 200% from the poverty line. The coefficient presented in column 2 of table 1 reports coefficients as odds ratios. A household with a working-age member that reported having a cardiovascular disease increases the odds of being impoverished by a factor of 1 ($p<0.05$). The other conditions of interest, respiratory disease, diabetes, and cancer does not have a statistically significant effect on the poverty state of a

household. The coefficients for martial status, hourly wage, and coverage under a private group insurer is associated with increased odds that the household will not impoverished ($p<0.01$). This suggests that these variables are significant determinants of a household's poverty state specifically, having a working age family member under any of these conditions increases the odds of being in the middle class or higher. For the coefficients of sex, non-white, coverage under Medicaid, and perceived health status there is a negative association of households being impoverished ($p<0.05$). This proposes that these variables are significant factors as they decrease the odds of these household being below the middle class or impoverished. The logistic regression model had 2,610 observations and a log-likelihood of -1,297.76. I have previously modeled interactions terms of each chronic condition on economic and insurance characteristics. The estimated coefficients for these interaction terms were not statistically significant so, they were excluded from out final assessment.

Discussion:

Our analysis suggests that chronic health conditions does not have a statistically significant effect on the poverty level of households. In our logistic regression model, cardiovascular diseases are found to increase the odds of a household being impoverished by a factor of 1. This result proposes that a household with a working age family member that is reported to have a cardiovascular disease has no effect on the poverty state of the household. In our ordinary least squares regression model, we find that a household with a working age member that reports having a cardiovascular disease has no statistically significant effect on the poverty level of the household. Taking the regression results at face value suggests that social selection theory does not adequately address the relationship between chronic health conditions and health related inequalities. However, previous studies seem to propose the opposite. This study has three substantial limitations that can be improved upon in future studies.

Our regression analysis contains certain unexpected coefficients for variables in the ordinary linear and logistic model. The sex variable in the linear model proposes that if a working age household member is male, that is associated with 9% decrease in their poverty level. Our hypothesis which was based on previous studies like Kessler, Heeringa, et al. (2008) and Vick, Jones, and Mitra (2012) suggested that if the survey respondent was male, there would be an increased percentage effect on the household's poverty level or personal earnings. This

premise is founded on gender-based discrimination in the United States economy. Discrimination that can commonly take the form of gender-based wage differences, which is also known as the wage gap. However, our empirical analysis does not seem to support this hypothesis and previous findings. The unexpected coefficient for sex infers that family member being male can move the household closer to the poverty line. This effect may be due to changing dynamics in the American household, where men are no longer the sole "bread winner' for the family. However, further research needs to be done to determine if this effect is occurring.

The variable total expenditures also present an unexpected coefficient that suggests a 1% increase in total medical-related expenditures will increase a household's poverty level by 3%. This is contrary to the effect found in Vick, Jones, and Mitra (2012) where medical related expenditures had a negative relationship with a household's poverty depth. I hypothesized that percent increases in an individual's total medical-related expenditures will limit a household's spending budget. Higher total medical-related expenditures will constrain what a household can spend such as limit their spending budget for rent or debt payments, this would ultimately increase the probability of becoming impoverished or lower where they stand from the poverty level. However, this is not reflected in the estimated coefficient. I infer that this variable is proposing that higher health-related expenditures can cause a household to be higher from the poverty level. I predict that this is because the expenditures are defined as what an individual paid in "out of pocket" costs. In this scenario, higher income households will be able to pay for greater "out of pocket" costs in comparison to lower income households. However, further research needs to be done to determine if this effect is occurring or this unexpected coefficient is a result of an unidentified statistical error.

There three significant limitations to this study that have the potential to constrain our ability to model chronic health conditions on a household's poverty level, and confidently state that social selection theory is an appropriate framework for this analysis. The first significant limitation to this study is how we chose to define the chronic health condition variables. In an attempt to increase our sample size, the chronic condition was defined as an individual having at least one of multiple types of health conditions. For example, if an individual is reported as having a respiratory disease that means that they can at least one of the following conditions, chronic bronchitis, asthma, or emphysema. As you would expect, this makes it difficult to distinguish the effects between conditions. All the chronic health conditions are defined in a

comparable way. The decision to have a dummy variable defined as this may have prevented any statistical effect of a specific disease to be captured in the regression analysis. This limitation should be used as a cautionary tale for future research.

A second limitation to this study is the use of poverty level as the primary dependent variable in the empirical analysis. According to Vick, Jones, and Mitra (2012), the poverty rate or poverty level fails to differentiate between families that are close to the poverty line from those who are far below the poverty line. This failure to differentiate between these families prevents us to make policy recommendations to provide assistance to households in different situations. Specifically, we cannot provide effective policy recommendations for families who are extremely below the poverty line and families who are close to the poverty line. This study design is only capable of providing generalized policy recommendations for families that are lower than 200% from the poverty line. In order to distinguish between these lower income families there must be additional poverty measured included within an analysis. Vick, Jones, and Mitra (2012) used additional poverty measures such as poverty headcount, poverty depth, poverty gap, and poverty severity. Future research should consider using these poverty measures if they are attempting to propose effective anti-poverty policies. The third limitation is the heavy reliance on self-reported survey answers. This is a common limitation to survey-based studies. Erten, Davidoff, et al. (2014), Atherly (2004), and Garis and Farmer (2001) are all examples of survey-based studies that have acknowledged this limitation. Ideally, our assessment of chronic conditions on household poverty would be based upon clinical interviews and administrative records. However, this data is not always readily available for scholars.

Concluding Remarks:

This paper is meant to demonstrate if social selection theory is an appropriate framework in which to analyze the relationship of an individual with a chronic condition and their household's poverty level and likelihood to become impoverished. Our analysis is intended to update previous findings of health-related poverty, following the implementation of the Affordable Care Act. Our findings propose that there is no statistically significant effect of a family member's health status on their household's social mobility. Or in the case of cardiovascular diseases, these illnesses do not influence the likelihood of a household moving away from poverty or becoming impoverished. This would lead us to conclude that we cannot

reject the idea that social selection theory is not an appropriate framework for health-related poverty analysis. However, previous literature has presented that social selection theory is effective in measuring the effects of health conditions on household poverty. This study has a number of limitations that may have made our analysis unsuccessful in capturing these causal effects.

Our results point to the need for additional research in several areas. Moving forward, future research in this field should use our study design as a cautionary tale. Future studies should clearly identify chronic health conditions as one specified illness, instead of having an aggregated effect of several illnesses. Additional research can also be done to analyze group differences between families and the effects of cash transfers and benefit programs for individuals with chronic health conditions. Future research can also be done to investigate the association of chronic health conditions on household poverty that is segmented by different industries. Although final findings of this study were disappointing, there are many areas this research can be improved or expanded upon in future studies.

Appendix

Table 1:

Sample	Ordinary Least Squares Model	Logit Model
Dependent Variable:		
	ln(Poverty Level)	Poverty State
Independent Variables:		
Chronic Health Conditions:		
Respiratory Disease	-0.05 (.052)	0.005 (.162)
Cardiovascular Disease	0.18 (.142)	1.00** (.473)
Diabetes	-0.01 (.056)	0.33 (.202)
Cancer	-0.06 (.068)	0.02 (.188)
Demographic Characteristics:		
Age	-0.01 (.01)	-0.01 (.03)
Age Squared	0.0001 (.0001)	0.0002 (.0004)
Sex	-0.09*** (.032)	-0.25** (.102)
Marital Status	0.23*** (.038)	0.69*** (.119)
Education	0.06*** (.035)	0.13 (.115)
Family Size	-0.01 (.011)	-0.01 (.036)
ln(Family Income)	-0.002 (.017)	0 .04 (.05)
Non-White	-0.22*** (.032)	-0.55*** (.10)
Economic Characteristics:		
Hourly Wage	0.01*** (.001)	0.02*** (.005)
Hours Works per Week	0.0003 (.002)	-0.002 (.005)
Employment Status	0.10 (.109)	0.17 (.294)
ln(Total Expenditures)	0.03*** (.009)	0.06* (.028)
Insurance Coverage:		
Covered by Medicaid	-0.77*** (.049)	-1.95*** (.134)
Covered by Private Group Insurance	0.13*** (.038)	0.40*** (.115)
Covered by Private Non-Group Insurance	-0.08 (.27)	-0.07 (.431)
No Health Insurance Coverage	-0.02 (.043)	-0.03 (.15)
Health Status excluding Chronic Conditions:		
Perceived Health Status	-0.12*** (.016)	-0.32***(.049)
Body Mass Index (BMI)	-0.004* (.002)	0.001 (.007)
Observations	2,558	2,610
Log-Likelihood		-1297.76
Adjusted R2	0.28	
Pseudo-R2		0.21

Notes: Standard errors, heteroscedasticity-robust and clustered by region, are in parentheses. *** indicates statistically significant at 1% level, ** indicates statistically significant at 5% level; * indicates statistically significant at 10% level.

Table 2.

Variable Description	Min	Max	Standard Deviation
Dependent Variable:			
Poverty Level	-126.79	2,605.02	304.25
Poverty State	0	1	0.47
Independent Variables:			
Chronic Health Conditions:			
Respiratory Disease	0	1	0.29
Cardiovascular Disease	0	1	0.09
Diabetes	0	1	0.25
Cancer	0	1	0.28
Demographic Characteristics:			
Age	18	64	12.71
Marital Status	0	1	0.50
Sex	0	1	0.50
Education	0	1	0.49
Family Size	1	13	1.64
Family Income	0	454,260	59,074.83
Non-White	0	1	0.50
Economic Characteristics:			
Hourly Wage	1.14	79.79	13.02
Hours Works per Week	1	100	10.91
Employment Status	0	1	0.17
Total Expenditures	0	221,703	10436.05
Insurance Coverage:			
Covered by Medicaid	0	1	0.36
Covered by Private Group Insurance	0	1	0.48
Covered by Private Non-Group Insurance	0	1	0.11
No Health Coverage	0	1	0.35
Health Status excluding Chronic Conditions:			
Perceived Health Status	1	5	1.07
Body Mass Index (BMI)	9.1	93	6.52

Table 3.

Variables	Multicollinearity Test (VIFs)	Heteroscedasticity Test
Respiratory Disease	1.03	
Cardiovascular Disease	1.02	
Diabetes	1.07	
Cancer	1.02	
Age	1.26	
Sex	1.08	
Marital Status	1.44	
Education	1.31	
Family Size	1.26	
Family Income	1.14	
Non-White	1.12	
Hourly Wage	1.45	
Hours Works per Week	1.16	
Employment Status	1.02	
Total Expenditures	1.14	
Covered by Medicaid	1.12	
Covered by Private Group Insurance	1.28	
Covered by Private Non-Group Insurance	1.04	
No Health Insurance Coverage	1.04	
Perceived Health Status	1.19	
Body Mass Index	1.13	
Mean VIF	1.16	
Breusch-Pagan Chi2		50.76
P-Value		0.00

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