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# Preventive Healthcare Usage in the United States: Does Health Insurance Matter

Diane Rodriguez
*University of the Incarnate Word*, dirodri1@student.uiwtx.edu

# PREVENTIVE HEALTHCARE USAGE IN THE UNITED STATES: DOES HEALTH INSURANCE MATTER

by

DIANE RODRIGUEZ

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Diane Rodriguez

# PREVENTIVE HEALTHCARE USAGE IN THE UNITED STATES: DOES HEALTH INSURANCE MATTER?

Diane Rodriguez

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The Centers for Disease Control and Prevention in the United States has maintained that adults who avoid preventive care services more likely will suffer from long term chronic diseases because they are not addressed or treated in a timely manner. Examining the effects of providing health care access to uninsured adults and increasing preventive services can help in reducing chronic diseases and enable adults to live longer, healthier lives. The purpose of this study was to identify the relationship between the utilization of preventive health services and socioeconomic factors, such as insurance status, race/ethnicity, household income, marital status, education, gender, age, source of usual care, and perceived health status in the United States. Using Medical Expenditure Panel Survey data from the year 2015, this study presents logistic regression estimates of the odds ratios for each independent variable in the context of utilization of four different types of preventive care services: cancer screenings, hypertension screenings, cholesterol screenings, and physical checkups. Separate estimates of these models are also obtained for the insured and uninsured sub samples to identify if there are statistical variations based on access to health insurance. These estimates offer insights into the association between lack of health insurance and the influences of other socioeconomic characteristics with utilization of various preventive health care services. The intent of this research is to present a comprehensive analysis of usage of preventive care services and to identify which

socioeconomic characteristics should be targeted by policies to ensure improved access to and use of preventive care services in the population. We found that targeted policies that improve access to preventive care by lowering costs of preventive care services and improving access to health insurance would allow for early diagnosis and possible prevention of chronic diseases among more people and lead to better health outcomes for the whole nation.

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# Chronic Disease

The United States accounts for more than 133 million Americans, representing 40% of the total population, having at least one chronic condition (NHC, 2014). A chronic disease is defined as a condition that lasts 12 months or longer and meets one or both of the following tests: (a) it places limitations on self-care, independent living, and social interactions; and (b) it results in the need for ongoing intervention with medical products, services, and special equipment (Goodman, Posner, Huang, Parekh, & Koh, 2013). Because of their prolonged course, chronic diseases have profound health impact on the quality of life of those affected. These diseases do not resolve spontaneously; therefore, a complete cure is rarely achieved, even with treatment. A 2018 report published by the National Center for Chronic Disease Prevention and Health (NCCDPHP, 2018a) revealed that chronic diseases accounted as the leading driver of the nation's 3.3 trillion dollar annual health care cost. This implies that the burden of preventable chronic diseases is straining our nations's health and economy, but can be reduced through early intervention and prevention. Research has demonstrated that preventive health services can save lives and improve health by identifying illnesses earlier, managing them more effectively, and treating them before they develop into complicated, debilitating conditions that are known as chronic diseases (Pagán & Pauly, 2016). This dissertation looks at what impacts an individual's willingness to seek preventive care services.

One of the leading causes of all deaths is chronic disease, which is the most common, costly, and preventable of all health problems in the United States. Heart disease and cancer alone account for nearly half of all lives lost each year (NCCDPHP, 2019b). A study conducted at Harvard Medical School and Cambridge Alliance found that about 45,000 deaths per year are linked to lack of health coverage (Cecere, 2009). Uninsured working-age Americans have 40%

higher death risk than privately insured counterparts. In this study, the uninsured had a higher risk of death when compared to the privately insured, even when considering socioeconomics, health, behaviors, and baseline health. To prevent deaths from hypertension, diabetes, and heart disease, patients must have access to a doctor's office and afford their medications (Cecere, 2009). Many of those deaths, as well as those from stroke, diabetes, and other chronic illnesses could have been delayed, and quality of life could have been improved, through the promotion of and timely access to preventive health services. According to the NCCDPHP (2018b), one in two adults in the United States has at least one chronic disease and one in four has multiple chronic diseases (comorbidity) that require ongoing medical attention and can limit the daily activity of those individuals. Having multiple chronic conditions is associated with substantial health care costs. Approximately 71% of the total health care spending in the United States is associated with care for Americans with more than one chronic condition (NCCDPHP, 2018b).

The burden of chronic disease encompasses a much broader spectrum of negative health consequences than death alone. People living with one or more chronic disease often experience a diminished quality of life and reflect a prolonged period of decline and disability associated with their disease (NCCDPHP, 2018b). While the risk of chronic disease increases with age, growing older does not mean living with a chronic disease. Effective programs, such as preventive health care services and engagement in a healthy lifestyle, can help prevent or manage chronic disease and prevent or delay associated conditions. In the United States, some of the national health priorities are to prevent the development and improve early detection of chronic diseases, decelerate disease progression, mitigate complications to optimize quality of life, and decrease the demand on the health care system (Bauer, Briss, Goodman, & Bowman, 2014).

However, costs for obtaining medical insurance do detract many individuals from obtaining preventive care services. These uninsured adults are those who are forced into patterns of visiting hospitals late in the stages of their disease process, after they suffer from debilitating signs and symptoms, at which point, the disease has already set in and cannot be prevented anymore. Rocovich and Patel (2012) estimated that one third of all emergency department visits may be "inappropriate." Hospitals are required to provide care even to the uninsured by screening and stabalizing a patient in the emergency room and trauma units because a patient's inability to pay cannot be used to deny emergency department care. Factors that have been associated with non-emergent use of emergency department services include low socioeconomic status and the lack of medical insurance.

Bauer, Briss, Goodman, and Bowman (2014) stated that in the United States, the burden of chronic disease is not distributed equitably. For instance, people with lower educations or incomes, people of specific race or ethnic backgrounds, and people in specific geographic locations, among other factors, are disproportionately affected by chronic diseases, often as a result of social disadvantages and vulnerability. To some extent this highlights that a higher level of income directly supports better health because wealthier people can afford the resources that can help protect and improve their wellbeing.

Thus, there is a likely correlation between the total national health care costs and the medically uninsured population in the nation. A high rate of uninsured individuals can have an adverse impact on the national wellbeing. Therefore, the assumption that the lack of insurance options harms only those who are uninsured, might be a misconception (Hall & Lord, 2014). As the population ages, the burden of chronic disease is expected to escalate. The World Health Organization (WHO, 2019) determined that if nothing is done to reduce the risk of chronic

diseases, an estimated 84 billion dollars of economic production will be lost because of heart disease, stroke, and diabetes. Although the Affordable Care Act is expected to provide expanding health insurance coverage to 30 million additional people by 2022, 30 million others are expected to remain uninsured (Kominski, Nonzee, & Sorensen, 2016).

The Affordable Care Act is known as the Protection and Affordable Care Act (Public Law. 111-148, Stat. 119) hereafter rendered as Affordable Care Act (ACA). It was signed into law by President Barack Obama in March 2010. The ACA, known as Obamacare by most, extends coverage for preventive care services without co-payment, co-insurance, or deductible for persons who purchased a new health policy health insurance plan (Abrams et al., 2015). The policy intent of the law was to expand health insurance coverage and health services for eligible Americans. Yet, there is a huge gap in the use of those services due to lack of health insurance. Given the promise and opportunities that the ACA holds for the uninsured, it is important to address adult people with no health insurance and no access to preventive health services, and the impact of the uninsured gap (Abrams et al., 2015). ACA has reduced the number of uninsured individuals through dependent coverage provision, Medicaid expansion, health insurance exchanges, availability of subsidies, and other policy changes. The number of insured people in the United States since the implementation of the ACA has increased by approximately 19 million (Rosenbaum, 2011). ACA increased coverage through these programs by covering everyone near the poverty line and by subsidizing private insurance for people who are not poor but who do not have workplace coverage (Hall & Lord, 2014). Individuals without employer-sponsored insurance were required to purchase insurance on their own or pay a penalty. In 2017, the penalty for Americans without insurance was either a $695.00 fine or 2.5% of their income, whichever was greater (Lalangas, Kroll, & Carlson 2018).

Starting in 2019, however, the Tax Cut and Jobs Act of 2017 has repealed the individual mandate created by the Patient Protection and Affordable Care Act by removing the insurance penalty for not carrying health insurance. Although the results of this change are unknown, this decision is expected to increase the uninsured population by 4 million in 2019, according to the Congressional Budget Office. Given this change, adults could potentially plan to drop their health insurance in 2019. Thus, any rules, regulations, or laws that discourage comprehensive insurance coverage will lead the uninsured to put off routine medical care and to seek assistance in emergency rooms and hospitals, which are the most expensive locations for care.

The largest medical insurance coverage gains were among low-income people, people of color, and young adults (Nguyen & Sommers, 2016). Gains in coverage were pronounced for men, unmarried individuals, and nonstudents. Despite the gains under the ACA among low-income adults, gaps in levels of health insurance coverage and health care access and affordability persisted in 2017 (Long, Bart, Karpman, Schartzer, & Zuckerman, 2017). Non-use of preventive health services was due to lack of knowledge that these services were free. Other limiting factors included high cost of coverage and out of pocket expenses (Busch, Golberstein, & Meara, 2014). Under the Internal Revenue Service rules, high deductible plans set up to health saving accounts can only cover preventive services until patients buy enough services on their own to pay their deductible. In 2016, those deductibles were $1,300.00 for individuals and $2,600.00 for families (Lahm, 2015). Large employers were required to offer affordable insurance to full-time employees, creating rising costs to employers and shifting premium costs sharing to employees (Rowland & Shartzer, 2008). The growing trend toward higher deductibles, copayments, and coinsurance puts even insured adults, especially those with lower or moderate income, at risk of forgoing needed care because of cost (Collins, Gunja, Doty, & Beutel, 2015).

The NCCDPHP disclosed in a 2015 study that approximately 6% of insured persons of all ages in the United States delayed medical care during the preceding year because they worried about the cost, and 4.5% of the insured population could not afford and did not receive needed medical care (CDC, 2017). Taken together, the costs of health insurance and medical care were weighed against equally essential needs, like housing, food, and transportation to work. Many adults reported financial stress beyond health care (Liu, 2016). These hardships decreased the chance of individuals utilizing health insurance despite having medical insurance. Thus, while the ACA might have intended to reduce the incidence of avoiding preventative care, in reality, the costs of obtaining care, despite being insured, have escalated and lead to a lower number of people who sought preventative care. However, this study focuses on the preventative care service utilization among the uninsured to identify how preventive care can be made more accessible to a larger number of people.

**Statement of the Problem**

Providing affordable health care access to the uninsured through preventive health care services could contribute to improving early detection for better health outcomes while also minimizing the nation's overall health care costs. The purpose of this study is to analyze the barriers of preventive care services utilization among the uninsured to enable better use of preventive health services to the uninsured.

The CDC suggests that reducing chronic illnesses in the 21st century requires addressing a range of community-based prevention strategies that deal with the root cause of chronic conditions. This idea, according to Bauer et al. (2014), is to address down streaming indicators by measuring burden of chronic diseases and intensify the urgent need for upstreaming by considering the social, economic, and environmental origins of health problems that manifest at

the population level, not just the symptoms or the end effect. Dealing with root causes of chronic diseases allows community conditions that support health to help prevent chronic diseases. These prevention strategies are organized in four domains described by the CDC, they include: (a) epidemiology and surveillance to monitor trends, (b) environmental approaches that promote health services and support healthy behaviors, (c) health system interventions to improve effective delivery and use of clinical and preventive care services, and (d) community resources linked to clinical services to improve and sustain management of chronic diseases. This study focuses only on health system interventions to improve effective use of clinical and preventive health services.

To analyze how characteristics of the uninsured impact their utilization of preventive care services, using the Andersen behavioral model (Andersen, 1995), we will aim to estimate the relationship between the use of preventive health services and socioeconomic and demographic variables for adults. This model presents the relationship between predisposing (independent) factors, such as age, race, and ethnicity; enabling factors, such as income and education; and need factors, such as health status and disease, which are associated with preventive care utilization. Predisposing factors show the tendency of individuals to use services. ACA specifies a range of 15 covered preventive services for adults. This study selects six of those preventive services as the primary dependent variables: three cancer screening procedures (colon, breast, and cervix), hypertension screening, blood cholesterol screening, and routine physical check. This process, in part, is to understand and determine factors that enable or impede use of health service utilization, with particular focus on the uninsured population in the United States.

**Research Question and Hypotheses**

This study hypothesizes that the number of adults with chronic diseases is directly related to lack of health insurance, which would otherwise enable them to get timely preventive care. If early prevention care services to those identified as uninsured were provided early, health detection could bring better health outcomes and could reduce the chronic disease epidemic. This dissertation aims to test the following questions:

- What is the relationship between obtaining preventive care, such as regular cancer screening (colon, breast, and cervix), hypertension screening, cholesterol screening, and physical checkups and socioeconomic variables, such as race/ethnicity, household income, marital status, education, gender, age, source of usual care, health status and insurance status for individuals in the United States?
- What are the differences in the preventive care usage between insured and uninsured population in the United States and do socioeconomic variables impact each population differently?

**Significance of Dissertation**

As discussed earlier, current trends in the population, such as aging adults and uninsured adults, forebode an increase in the number of adults suffering from chronic diseases. The trends include a growing population of older adults living with one or more chronic disease and requiring years of ongoing medical attention. These conditions result in many adverse health outcomes, increased health care needs, and higher medical costs. Although the ACA has reduced the number of uninsured to a historic low, insurance coverage disparity remains. Racial and ethnic minorities and low-income families are represented disproportionately among the uninsured population. Thus, people with lower income and education, specific races or

ethnicities, or located in certain geographic areas more likely will be affected by chronic diseases as a result of social disadvantages, vulnerability, and lack of access to timely preventive care.

Efforts to repeal and replace the ACA remain under consideration to date and could roll back these historic gains of the number of uninsured. Under many of the repeal and replace scenarios, which often include changes to the financing of Medicaid program, millions of Americans would be at risk of losing their health insurance coverage. This effort would wipe out the coverage gains made since the ACA was enacted in 2010 (Obama, 2016). It is important to note here that having insurance with high deductible out-of-pocket costs, an unforeseen impact of the ACA, also could have resulted in a larger number of people who avoid preventive care services despite being insured. Since this occurrence is new, the data and the literature on this issue is very limited and has not been weighted heavily in this dissertation.

The purpose of this study is to find associations between sociodemographic factors and health insurance coverage to identify which factors contribute to barriers and use of preventive health services, with particular focus on the uninsured population in the United States. This will attempt to explain the burden of chronic disease, why uninsured adults show late presentation to seeking care, and the resulting lack of timely treatment. These trends, if persistent, could increase the future health care costs for the entire nation as the baby boomers age, resulting in an increase in the percentage of adults living with chronic conditions throughout the country.

**Key Terms Used in the Dissertation**

Preventive health services: Preventive health services is the starting point for accessing these services through a visit to one's primary care physician. In particular, the ACA specifies a range of 15 covered preventive services for adults; 22 for women, including pregnant women; and 26 for children. This study touches on six

of the covered services for adults and women: cancer screening procedures (breast, colon, and cervix) hypertension, blood cholesterol screening, and routine physical checkup.

Preventive service utilization: Preventive service utilization addresses patterns and barriers, cost and health outcomes associated with prevention, and activities designed to improve preventive services and outcomes. Some of those factors, such as race/ethnicity and household income, are the independent variables in this study. Other independent variables include marital status, education, primary language, and age.

Uninsured: Uninsured represents those not covered by private or public health insurance plans.

Mortality: Mortality addresses deaths due to chronic disease.

Comorbidity: Comorbidity addresses the simultaneous presence of two chronic diseases or conditions in a patient.

Andersen behavioral model**:** Anderson behavioral model explains the differences in use and access to health care as a function of an individual's (1) predisposition to use services (e.g., depending on gender, age, and race), (2) ability to secure services (e.g., insurance and financial status), and (3) need for service (e.g., health status ).

**Summary**

This chapter provided a brief overview of the statement of the problem, significance of the dissertation, research questions and hypothesis, and background of the study. The next chapter, Literature Review, presents and discusses the outcomes from existing literature on preventive care and health insurance with specific focus on the importance of preventive health

care services and their utilization, factors contributing to chronic diseases, the economic consequences of chronic and potentially preventable diseases, and the implications of individuals having health insurance coverage. The Andersen behavior model is also discussed in this chapter because it presents the theoretical framework required to investigate the link between use of preventive health services and sociodemographic factors.

In Chapter 3, Methodology and Data, we present the research design and the construction of a quantitative model using the relevant variables identified from the literature. Chapter 3 also presents the summary and details for the Medical Expenditure Panel Survey (AHRQ, 2018) dataset to be used for testing the research questions through a set of logistic regression estimates that derive the change in log odds and odds ratio of utilization of four different types of preventive care services, placing specific focus on the uninsured population.

Chapter 4, Results, discusses the results of estimates of the models identified in Chapter 3 and identifies the differences between the insured and uninsured population in terms of utilization of preventive care services. Studying what factors make significant contributions to the utilization of preventive care services among the insured, uninsured, and general population can help determine which policy instruments would result in reducing the proportion of chronic diseases in the United States.

Chapter 5, Conclusion and Future Scope presents the conclusions from the results and discusses the future scope of this type of study. While this dissertation focuses on a large sample size taken from the entire U.S. population, we anticipate that the model and method can be applied to smaller, more specific geographically narrower samples. For instance, the model can be applied to a sample of residents who live in South Texas to identify which specific variables can be targeted for improvement through public policy. We are choosing South Texas as our

example because the literature review from the Kaiser Family Foundation (2018) identified South Texas as one of the regions having the highest number of uninsured rates and low-income population. Obtaining a sample from South Texas could help include and identify the differences among citizens, legal residents, and undocumented immigrants in terms of obtaining and accessing preventive care. According to the Kaiser Family Foundation (2018), undocumented immigrants in the United States constitute close to 25% of the population of people who qualify for subsidies in the Marketplace and those who are eligible for Medicaid. Since these are undocumented workers, finding this information in standardized data collection surveys like the MEPS is almost impossible and would require a primary dataset to be created. In addition, adding an independent variable of geographic locations (urban and rural locations) to the study could help determine if rural areas have higher uninsured rates, identify target populations, and provide efficient ways to prevent chronic disease and apply better ways to enable the use of preventive care services to the uninsured.

# Literature Review

This chapter focuses on the documented literature relevant to this dissertation discussing the importance of preventive care services and their utilization by first considering what entails a chronic disease, the economic consequences of these diseases, and the factors that contribute towards susceptibility to these chronic diseases beyond just the genetic predisposition to them. Furthermore, this chapter attempts to analyzes why lower use of preventive care service is connected with social and demographic factors and the economic factors that impact health outcomes as in the three sets of the Andersen behavioral model. In addition, the chapter will cover the related disparities and the importance of ACA expanding and increasing coverage to the uninsured to provide recommended preventive services.

The benefits of many preventive health care services are well-established in the medical literature. According to the theory of health economics, investment in health capital, such as preventive health care services, can reduce the incidence of illness and death (Tian, 2016). Musich, Wang, Hawkins, and Klemes (2016) also found that the use of preventive health care services reduced the probability of subsequent hospitalization. In the case of immunizations, for instance, those who receive the recommended services were likely to avoid a variety of life-threatening diseases. Those appropriately screened for cancer of all types were likely to receive more timely diagnosis and treatment which ultimately lead to better health outcomes.

## Chronic Diseases

In the United States, chronic diseases not only affect the quality of life but also increase health care costs and limit health care affordability (Raghupathi & Raghupathi, 2017). The profile of these chronic conditions (e.g., cancer, diabetes, cardiovascular disease) has changed, and cases are occurring at younger ages. Chronic illnesses afflict people of all ages, and although

a majority of individuals living with chronic illnesses are not elderly, the likelihood of having a chronic illness increases dramatically with advancing age (Schraeder & Shelton, 2011). In the United States, the number of people with chronic conditions has escalated over time.

The number of people with a chronic condition by year are represented in Table 1 (Raghupathi & Raghupathi, 2017). This upward trend of individuals with chronic conditions has increased rapidly to nearly 8 million each year from years 2000 to 2015. This trend is noteworthy, considering that chronic diseases account for the majority of health care spending. The increasing trends in the prevalence and costs of chronic diseases in the United States are projected to continue well into the future. By the year 2020, the number is expected to increase to 157 million dollars and by 2030 to 171 million dollars. In terms of population percentages, the numbers represent an increase from 46.2% in 2005 to 49.2% in 2030 (Raghupathi & Raghupathi, 2017). According to Cohen (2016), the projected per person medical and productivity cost of chronic diseases would amount to $8,600 per person if current trends continue.

Table 1

*Number of People in the United States With Chronic Conditions*

| Year | Number of people with chronic condition |
|---|---|
| 2000 | 125 million |
| 2005 | 133 million |
| 2010 | 141 million |
| 2015 | 149 million |

With the increase in the occurrence of chronic diseases, the focus of health care has shifted from treating acute illnesses to helping chronic patients manage the work of living with debilitating conditions. There is a large body of data that supports the use of screening tests for chronic disease and shows the changing focus of health care from treatment towards prevention

(AHRQ, 2018). Examples of actual or proposed screening tests include the pap smear for cervical cancer, mammography for breast cancer, PSA (and/or digital rectal exam) for prostate cancer, and cholesterol level for heart disease. A major objective of most screening tests is to reduce morbidity or mortality in the population group being screened for the disease by early detection, when treatment may be more successful (AHRQ, 2018).

Uninsured adults were less likely to have regular source of care than any other group (65%). A majority of these adults visited their doctors at least yearly (88%); almost all adults 65 years and older (more than 95%) visited their doctor once in the past year (Schraeder & Shelton, 2011). The following sub-sections cover these aspects in more detail with reference to the available literature on these issues.

**Economic consequences of chronic disease.** The aging of the U.S. population, the frequency of chronic disease, and the rising costs of treatment, and medical expenses are expected to continue increasing (Raghupathi & Ragupathi, 2018). Chronic diseases, including cancer, respiratory disease, and diabetes have been the main causes of both disability and death worldwide (Rudawska, 2014). The burden of chronic diseases and the multiple effects on productivity and demography plays an important role in the performance of the national economy (WHO, 2019). It is difficult not to recognize how chronic disease and the demand for health care drives up the costs for health care when people with these chronic conditions are the most frequent users of health care in the United States. They account for frequent hospital admissions, prescription filled, and physician visits all associated with greater demand for and use of health care services (Longman, Passey, Ewald, Rix, & Morgan, 2015).

According to Rudawska (2014), health becomes an economic commodity, the possession of which creates development opportunities for a given individual or community and society.

Furthermore, Rudawska stated that health is a principal factor in shaping human capital, which in turn affects an individual's productivity and economic growth. An illness, particularly a chronic disease, constitutes a significant limitation to such development, preventing partly or entirely, an individual's activity in the workforce. Thus, the burden of chronic disease constitutes a significant element that limits the abilities of individuals and entire populations to generate economic growth whereas the specificity of chronic disease causes temporary or permanent exclusion of an individual from personal life, resulting not only in the need for ongoing health care attention, but also in the decrease of the individual income of a chronically ill person because of their permanent or temporary absence of work (Rudawska, 2014).

When good health determines economic growth as well as influences the health condition of societies, enforcing the availability of quality health care through preventive health care services makes sense. Most research can confirm that chronic illness is associated with the substantial health care costs to our economy. Clarke, Bourn, Skoufalos, Beck, and Castillo (2017) presented multiple estimates of these costs based on surveys, past literature, and observations of the health care usage in the United States and we will discuss those briefly in this paragraph. In a recent Gallup survey, 42% of Americans named either the cost of health care or access to health care as the top U.S. health issue. According to one projection, estimates that up to one third of the more than 2.8 trillion dollars will be spent on health in the United States each year may be classified as waste that is related largely to failures of care delivery, care coordination, and overuse. For example, there are significant differences between acute and chronic disease that require different approaches to care. Chronic care problems are slower to develop, longer in duration, and have multiple causes, some of which occur years before the onset of symptoms. These differences limit the current system's ability to deal effectively with a

number of unique challenges in managing chronic disease. Another recent forecast determined the size of the chronic disease population, in particular with patients with multiple comorbidities that require more health care resources is projected to grow and reach 157 million Americans by 2020 (Clarke et al., 2017).

Some studies, however, fail to provide evidence emphasizing that the treatment of acute conditions through preventive care is less expensive (Rudawska, 2014). Unlike the pessimistic attitude of the World Health Organization that nothing can be done about chronic disease prevention, the reality is different. The major causes of chronic diseases are known, so if these risk factors were eliminated, at least 80% of all heart disease, stroke and diabetes and more than 40% of cancers would be prevented (WHO, 2019). The major challenge would be to show that chronic diseases can be controlled in a cost-effective manner with existing interventions. These leading causes of death and disability are neglected and underestimated leaving preventive care as the responsibility of the individual, thereby making it difficult to pursue a more optimistic stance in a feasible manner (Beaglehole, Ebrahim, Reddy, Voute, & Leeder, 2007).

**Characteristics of the uninsured.** How much difference between the rates of insured populations can be attributed to socio-economic characteristics including the differences in race or ethnicity? Health and health disparities refer to the differences in health and health care between population groups (KFF, 2018). Comparisons of these disparities include race/ethnicity, age, income, location, and gender to name a few. These characteristics give a distinct picture of the influences of one or more appearances of the uninsured. The uninsured population is a diverse group, but they share certain key characteristics.

Age: Three quarters of the uninsured are adults (ages 18 to 64 years), while one quarter of the uninsured are children. Compared with other age groups, it is probable that

young adults might go without coverage. For example, in 2017 adults age 65 years and older and children under age 19 years were likely to have had insurance coverage, respectively compared with young adults aged 19 and 64 years who were uninsured (United States Census Bureau, 2018). Adults of working ages between ages19 to 64 years are at high risk of lacking insurance. Age has been associated negatively with women not receiving preventive services like mammograms and pap smear tests (Holden, Chen, & Dagher, 2015). Thus, the population between ages18 and 64 years, that would be considered a viable labor force of an economy is associated with a higher likelihood of being uninsured.

Race/Ethnicity: The literature has documented that racial minorities had less chances of receiving preventive care services than the Caucasian population (Holden, Chen, & Dagher, 2015). In 2018, the Kaiser Family Foundation found that four in 10 (40%) individuals living in the United States were people of color and would account for more than half of the uninsured population by 2050. In fact, there were 1.8 more diagnoses of late-stage cancer in Black women than in the rest of the population, which explains the risk for late-stage disease (DeSantis, Jemal, & Ward, 2010). Disparities based on race and ethnicity also pointed the likelihood of people of racial ethnic minorities going without health insurance. Income and wealth are related but have distinct dimensions of socioeconomic status that are important in the maintenance of health status. Braveman and Gottlieb (2014) shared that wealth might be relevant when examining race differences in traditional measures of socioeconomic status that include income, education, and employment understate racial socioeconomic disparities in the United States.

Braveman and Gottlieb (2014) also mentioned that the United States Census Bureau listed that African Americans had only 27 cents for every dollar and were in the lowest income quintile. African American families had a median income of $1,500.00, whereas Caucasian families had a median net worth of $9,720.00. This median level of assets does very little to help with serious medical expenditures for African Americans but would offer greater protection to Caucasians. This cycle of poverty, poor health, and no insurance coverage plays out over the course of a lifetime for some. African Americans and Hispanics, according to Kirby and Kaneda (2013), in addition to the likelihood of being uninsured, also reported poorer health, which may be combined with socioeconomic disparities by race and ethnicity to create a vicious cycle of disadvantage.

Schraeder and Shelton (2011) disclosed that prevalence of chronic disease differed by race where 77% of African Americans had at least one chronic illness as did 68% of Hispanic Americans; 64% of Caucasians; and 42% of Asian Americans. African Americans were the highest users of all major health service areas, including hospitalizations, physician visits, home health care, and prescription medications.

Income: Two-thirds of all uninsured persons were members of lower-income families, earning less than 200% of poverty (Holden, Chen, & Dagher, 2015). In addition, low-income people of all races reported worse health status than higher income individuals. Disparities in access and health utilization occurred within low-income individuals resulting in poorer quality of care (KFF, 2018). As of February 2016, of the estimated 24 million uninsured adults, 88% had income less

than 138% of poverty (Collins et al., 2015). Although the ACA sharply reduced uninsured rates for people of color and low-income individuals, coverage disparities persist. Studies indicated that socioeconomic factors can modify the effect of income on health because income intersects with many other social risk factors like race, ethnicity, sex, geographic, and educational attainment (Woolf, Aron, Dubai, Simon, & Zimmerman, 2015). Income may influence health most directly through access to resources, such as quality of food, shelter, and services that directly and indirectly influence health like education and health services (Tjepkema, Wilkins, & Long, 2013).

Education: According to the VCU Center on Society and Health (2015), educational achievement is a strong predictor of health independent of income. Data from the United States Census Bureau (2015) disclosed that 209.3 million people in the United States were 25 years old or older and 66.9 million had a bachelor's degree or higher. One study found that adults with 13 to 15 years of education had 24% to 32% lower odds of poor/fair health compared to high school graduates, and adults with at least a college degree (defined as 16 or more years of schooling) had about 54% to 60% lower odds of poor/fair compared to high school graduates (Zajacova, Hummer, & Rodgers, 2012). Thus, higher educational attainment is associated with better occupational outcomes leading to increased household incomes and other work-related perks, thereby ensuring steady insurance coverage. The VCU Center on Society and Health (2014) also confirmed that higher levels of education lead to higher earnings that can provide access to healthy food, safer homes, and better health care that generally reduces

prevalence of chronic diseases. In 2014, among the uninsured adults born in the United States, 34.7% had a high school diploma, 28.3% had not completed high school and 37% had a post-high school education (Vistnes and Lipton, 2016). More than one-quarter of all uninsured had not earned a high school diploma. Uninsured African Americans and Hispanics were less educated on an average than uninsured non-Hispanic Whites (Holden, Chen, & Dagher, 2015). Thus, education is important not only for higher paying jobs, and economic productivity, but also for saving lives and saving dollars.

Geographical location: Access to health care services is important for disease prevention, detection, diagnosis, and treatment of illness (ODPHP, 2015). However, residents in rural areas face a variety of access barriers. Rural Health Information Hub recorded that barriers to health care resulted in unmet health care needs, including a lack of preventive and screening services and treatment of illnesses (ODPHP, 2015). Rural populations are more likely to travel long distances to access health care services, particularly subspecialist services. Reductions in specialty care also are relevant in rural communities because many providers will decide to relocate to areas where there will be sufficient demand for services. Research has demonstrated that in most states, uninsured rates are higher in rural areas than urban areas, and the financial burden in ED visits has a direct impact on the financial viability of small rural hospitals (Rust et al., 2009). This can be a significant burden in terms of travel, costs, and time away from work (ODPHP, 2015). In addition, the lack of reliable transportation is a barrier to care. In urban areas, public transit is generally an option for patients to get to medical

appointments, however, these transportations services are often lacking in rural areas (KFF, 2014). The uneven geographic distribution of primary care physicians (PCP's) makes access difficult for patients living at a distance from the nearest PCP. Merritt Hawkins, a large physician recruitment firm, reported that the number of PCP shortages that already exists will become more widespread and severe (Berry-Millett, Bandara, & Bodenheimer, 2009). A 2014 Kaiser Family Foundation report revealed that uninsured rural residents faced greater difficulty accessing care due to the limited supply of rural health care providers. And, nearly 20% of the nonelderly population, or 52 million people who lived in the most rural counties of America were spread across almost 2,500 counties that are heavily concentrated in the South and Midwest (KFF, 2014). Thus, the areas where people reside are predictors of their long-term health outcomes, based on the utilization of preventive services and the ability to access relevant and timely care.

**Impact of being uninsured.** Ferrier, Rosko, and Valdmanis (2016) defined uncompensated care costs and financial assistance provided to the patients as the overall measure of hospital bad debt. Financial assistance includes care for which hospitals never expect to be reimbursed. This happens when patients are unable to pay their bills, and do not apply for financial help. In 2016, hospitals nationwide provided more than $38.3 billion in uncompensated care to their patients. Between 2013 and 2015 hospital costs fell 35% since the implementation of ACA and included major coverage provisions. Furthermore, hospital costs declines were larger in states where uninsured rates fell more. These large drops in uncompensated hospital care were certainly the result of the large ACA Medicaid expansion coverage gains noted in

2014. Moreover, because Medicaid expansion serves the most financially vulnerable population and who are those mentioned seeking medical attention at the late stages of their disease process in hospitals, contribute to hospital uncompensated care costs. Meanwhile, other studies have found that Medicaid expansion in 2015 resulted in increases in the shares of people with a personal physician, getting check-ups, and getting the preventive health care services needed such as cholesterol and cancer screenings, and decreases in the shares of people delaying care due to costs, and the reliance of emergency rooms for care (Ferrier, Rosko, & Valdmanis, 2016).

According to Hadley (2003), being uninsured has multiple economic consequences to health systems, taxpayer, and the general public. Adults lacking coverage make inefficient use of the health care system, relying on emergency rooms, when care could have been provided in lower-cost primary care settings had they been insured. Furthermore, taxpayers pay some of the hidden costs associated with the uninsured. Federal, state, and local governments support care of uninsured patients through public health clinics and through payments to safety net hospitals. Taxpayers incur the costs of financing government services when patients are forced by illness to reduce or stop working and no longer have earnings to pay taxes. Lastly, the inadequate care to the uninsured bears hidden costs that fall upon all Americans. Contagious diseases that go untreated because the carrier lacks insurance can threaten the health of the entire population. These are just a few of the many costs that directly or indirectly bring economic consequences from those being uninsured (Hadley, 2003).

**Quantitative studies on health insurance.** The literature review thus far has revealed which factors contribute towards the susceptibility to chronic diseases beyond just the genetic predisposition to them, with particular focus on the uninsured population. These relationships suggest that when individuals do not have health insurance, their consumption of health care decreases and their health becomes susceptible to diseases. This section explores the quantitative studies that ask the question of whether health insurance status matters.

Numerous studies have examined the association between health insurance and health status to determine if health insurance matters. In 2018, Assari, Helmi, and Bazargan tested whether having health insurance at baseline protects individuals against incident chronic medical conditions (CMC). The study measured the presence or absence of health insurance using items related to several types of health insurance and treated insurance status as a dichotomous variable (any insurance 1, none 0). Using linear regression, the study found that having health insurance plays a significant role in the incidence of CMCs. Insured individuals have a lower incidence of CMCs as compared to those that are uninsured (Assari, Helmi, & Bazargan, 2019). In 2019, Assari et al. also found that race was also a factor in the incidence of CMC, with black having a significant and positive impact on the incidence. When interacted with the insurance variable, the results showed that within the Black population, having insurance significantly lowers the incidence of CMCs (Assari et al., 2019). In the United States, health insurance protects individuals against incident CMC; however, the health return of health insurance may depend on race/ethnicity. This finding suggests that health insurance may better protect minorities against developing more chronic diseases, implying that increasing access to health insurance for minorities might have a significant reduction in the incidence of CMCs in the United States (Assari et al., 2019).

A recent study by Duku, Nketiah-Amponsah, Janssens, and Pradhan (2018) also explored the association between insurance status and perception of health care quality to ascertain whether insurance status mattered in the perception of health care quality. The key independent variable of interest was the dichotomous insurance status (1 if insured and 0 otherwise). The authors employed a two-sample independent t-tests to compare the average perceptions of the insured and uninsured on seven indications of non-technical quality of health care. A generalized ordered logit regression, controlling for socio-economic characteristics and clustering at the health facility level tested the association between insurance status and perceived quality of health care (Duku et al., 2018). In the results of this study, the perceptions of health care quality were found to be significantly more negative among the insured population as compared to the uninsured population. Within the uninsured population, the perceptions of health care quality were significantly more negative for those that had been previously insured as compared to those that had never been insured. Thus, once people are insured, they tend to perceive the quality of health care they receive as poor compared to those without insurance (Duku et al., 2018). This study demonstrated that health insurance status matters in the perceptions of health care quality. The findings also imply that perception of health care quality may be shaped by individual experiences at the health facilities, where the insured and uninsured may be treated differently (Duku et al., 2018).

Baker, Sudano, Albert, Borawaski, and Dor (2001) also conducted a study using logistic regression to determine the independent effects of being continuously uninsured, being intermittently uninsured, and being continuously insured on health outcomes after adjustments for base-line sociodemographic factors, preexisting medical conditions, and types of health-related behaviors like smoking and alcohol use. Participants between 51 and 61 years of age

were classified as uninsured if they did not have public or private insurance at the time, excluding those that were covered by Medicare or Medicaid. Of the 7,577 participants analyzed, 717 continuously uninsured participants and the 825 intermittently uninsured were more likely than the 6,035 continuously insured participants to have a major decline in overall health at 21.6%, 16.1%, and 8.3% respectively (Baker et al., 2001). Thus, the lack of health insurance is associated with an increased risk of a decline in the overall health among adults between the ages of 51 and 61 years.

Saunders, Ricardo, Chen, Chin, and Lash (2016) evaluated in another study the association of health insurance status with mortality among working-age participants with albuminuria where a certain level of albumin in the body may be a sign of kidney damage. The sample was selected from people with albuminuria between the ages of 18 and 64 years that either had insurance or were uninsured. A Cox proportional hazards model was used to determine the association between insurance status and all-cause mortality and cardiovascular mortality in patients with chronic kidney disease while adjusting in a stepwise fashion for sociodemographic factors, co-morbidities, and co-morbidity severity/control variables. 13% of the people in the sample were either uninsured had public insurance whereas 67% of the sample had private insurance. Compared to individuals with private insurance, those with public insurance or no insurance were significantly more likely to be racial or ethnic minority, to have income 200% below the federal poverty level and to have less than high school education, and were less likely associated with decreased mortality in the fully adjusted model (Saunders et al, 2016). Compared to private insurance a lack of insurance or having only public insurance were associated with increased mortality even after controlling for sociodemographic, health status,

and health care variables. Thus, improving access to care and preventive services could prevent mortality in individuals with evidence of early chronic kidney disease (Saunders et al, 2016).

To study whether extending health insurance benefits reduces mortality rates in the United States, Thornton and Rice (2008) estimated the effect of extending private health insurance to the uninsured population on health outcomes, measured by mortality, and the aggregate economic benefits to the nation. The analytical framework guided specifications of empirical model and interpretation of results. An instrumental variable fixed-effects estimator is used to account for confounding variables and reverse causation from health status to insurance coverage. The result indicated a negative relationship between private insurance and mortality, thus suggesting that extending insurance to the uninsured population would result in an improvement in population health outcomes (Thornton & Rice, 2008). The estimate of the marginal effect of insurance coverage indicates that 10% increase in the population-insured rate of a state reduces mortality by 1.69 to 1.92% (Thornton & Rice, 2008). Moreover, extending private insurance coverage to the entire uninsured population in the United States would save more than 75,000 lives annually and may yield annual net benefits to the nation in excess of 400 billion dollars (Thornton & Rice, 2008).

The bulk of literature confirms that coverage expansions significantly increase patients' access to care and use of preventive care, primary care, chronic illness treatment, medications, and surgery. As a result, Sommers, Gawande, and Baickner (2017) suggested that having health insurance is beneficial and that repealing ACA will affect health and mortality. The primary driver of uninsured has been the increasing costs of health care, which contributes to the rising proportion of uninsured adults (Anderson, Dobkin, & Gross, 2012). Having health insurance then can imply that access to health care can help combat both, short-term as well as chronic illnesses.

Obama (2016) expounded that health reform is important for the future of America's economy because expanding health insurance coverage would increase the well-being of the uninsured, would prevent budgetary consequences and raise national savings, and lower unemployment rates. Some of these claims are harder to find quantified in the literature, which makes this one less than reliable. However, since this is the driver of the policy to make health insurance available and mandatory for a larger group of people, the implications and the claims need to be studied more closely. Lee (2018) found that having health insurance can shield individuals from financial risk of unanticipated health expenses and facilitate access to health care systems, thereby improving health outcomes. Given those benefits of having insurance, the indirect effect of health on productivity suggests that health insurance is a vital component of human capital investment.

**Can the ACA help?** Blumberg, Garrett, and Holahan (2016) indicate that as of March 2015, ACA had reduced the number of uninsured adults by 18.1 million compared with the number who would have been insured at the time, had the law not been implemented. That decline represents 46% reduction in the number of adults without insurance. The Congressional Budget Office (CBO) model helps to analyze the budgetary and distributional effects of the social security program and to quantify the nations long term fiscal challenges (French, Homer, Gumus, & Hickling, 2016). The model projects individual demographic and economic behavior of the populations such as earnings, age, sex, benefit information more than 75 years into the future (Blumberg, Garrett, & Holahan, 2016). The CBO has forecasted that as a best-case scenario the number of uninsured in 2020 would be 42.7 million uninsured adults with 5.1% unemployment, and the worst-case scenario would be 46.5 million uninsured adults with 9.6% unemployment, which was experienced in the Great Recession (French et al., 2016).

These predictions, according to the Kaiser Family Foundation (2018), give an important need to respond to those demographic and socioeconomic factors that predict the 42.7 million decline of uninsured into the future. Social position and socioeconomic status have been named as major health determinants that will influence the risk of chronic disease. Despite universal access to health services, underprivileged individuals historically have had the lowest rate of health insurance coverage (KFF, 2018). These findings also provide a strong support for ACA in moving uninsured adults into the health care system for general routine exams and receiving preventive care services. The ACA coverage expansion in 2014 that has steadily decreased the uninsured rate and offered more access to care and utilization services explained the important role of insurance coverage had in receipt of preventive care services. Furthermore, the Kaiser Family Foundation (2018) believes that additional interventions may therefore prove useful to address barriers and illustrate why ACA is much needed to increase the use of preventive services among the low-income population.

**Barriers to accessing preventive care.** Among the primary dependent variables that we are considering in our research, while the cholesterol tests, blood pressure measurement, and physical checkups can be considered to be easy to access, the cancer-related checkups often have higher costs of access both in financial and non-financial terms. For instance, cholesterol is often checked through a simple blood test and blood pressure is measured through a blood pressure diagnostic machine that is portable and cost-effective for any health clinic (or even pharmacy) to provide. Physical checkups often include routine questioning of individuals and basic wellness tests that are easily performed in most doctor's offices, health care clinics or even hospitals as a part of any regular or emergent care that is sought by an individual (AHRQ, 2018). But, when we consider cancer related preventive care, we must consider more invasive tests such as a

colonoscopy to detect colon cancer, a mammogram to detect breast cancer, and pap smears to detect cervical anomalies or pre-cancerous cells in women.

This leads to issues of requiring specialty referrals and additional costs to an individual who is seeking preventive care for cancer. In most cases, pap smears are often conducted either by the primary care doctor or ob-gyns, where women are most likely to go for regular medical and wellness care. Breast exams are also a part of most physical examinations for women, although mammograms may not immediately be accessible in most doctor's offices. Similarly, colonoscopies are not typically available in all doctor's offices. Thus, for tests like mammograms and colonoscopy specialty referrals are often given (Perisetti et al., 2018; Greenwood-Lee et al., 2018). It is crucial to remember that since the referral comes from doctor's offices or hospitals, the insured population is at a clear advantage in comparison to the uninsured population that might not have a regular doctor's office that they use for their usual source of care in the first place.

This high cost of health care and access to specialty care is a potential barrier even for insured people because the cost of deductibles, the extent to which the insurance company covers the tests and the potential subsequent diagnostic or therapeutic procedures, have to be considered when deciding whether an individual should seek specialty care (Perisetti et al., 2018). If the self-perceived health status does not warrant an immediate need to get these screenings, it is likely that the individual makes the decision to postpone or avoid getting these preventive tests, simply due to the prohibitive costs associated with them. Among the uninsured population, who might not even have a regular doctor to discuss the pros and cons of the preventive tests, these costs can be even more prohibitive and burdensome. And, unless they have easy access to these

tests through a non-emergency hospital or other health clinics, they are less likely to seek out specialty care, particularly when it comes to long term debilitating diseases cancer.

While the ACA recommended zero cost-sharing and zero co-payment for individuals with insurance for services such as such as colonoscopies, pap smears and mammograms for women, and an annual physical checkup, the amount of deductible and out-of-pocket cost to individuals in terms of obtaining health insurance in the first place varies significantly and remains unclear (Perisetti et al., 2018). As a result of this, individuals might have insurance, but they could still have additional costs if they actually sought out any of the more complicated screenings or tests. When we take the uninsured into account, according to The Medical Expenditure Panel Survey (ARQH, 2018), the average price of an office visit was $199 as of 2018 a cost that the uninsured may avoid for regular physical checkups, let alone specialty treatments or preventive care, unless there is an emergent need to do so at which point it might be too late to prevent the disease. Physical checkups under the ACA plan cover certain preventive screenings and services that patients might receive during a physical, such as blood pressure and cholesterol tests, routine vaccinations, and mammograms, at no additional cost to the patient. However, additional testing and services received during the annual physical may not be covered, depending on the insurance plan for insured individuals, and obviously nothing is covered by anybody for uninsured individuals. Thus, despite all its noble intentions, the ACA does not seem to have addressed the core issue of costs of preventive care correctly.

**Conclusions from the Literature Review**

The literature provides strong evidence linking socio-economic characteristics and access to health care to the health outcomes in a population. The demographic and socioeconomic differences have a big impact between the insured and uninsured population where income

seems to be the forcing driver behind health disparities. Woolf, Aron, Dubai, Simon, and Zimmerman (2015) indicated that low income patients are less likely to receive the recommended health services, such as cancer screening and immunizations. This literature also inventories the factors associated with use of preventive services. Our analysis shows that preventive services use falls below recommended levels and varies systematically across the population with minorities, the poor, and individuals with lower levels of education having especially low rates of use (Bednarek & Shone, 2003). In addition, chronic diseases extract a double -price from the economy due to diminished productivity and increased health care costs that must be borne by the population in one form or another. Higher costs of obtaining health care also means that consumers have less disposable income to purchase products that improve the success of business including health care insurance. Finally, many non-clinical factors such as education, race, ethnicity, and geography also influence health outcomes and the use of preventive care. Being uninsured therefore, predicts the likelihood of having unmet medical needs and as a result, would place the uninsured population at a high risk for chronic diseases to be found much later in the advanced stages due to limited preventive care services and the timely access to them.

## Methodology and Data

The purpose of this study is to identify the relationship between the utilization of preventive health services and the relationship between socioeconomic factors such as race/ethnicity, household income, marital status, education, gender, age, source of usual care, and health status in the uninsured population. Preventive health care services are associated with reducing chronic diseases. To accurately depict the inability of using these services among the uninsured, identifying those at risk were analyzed. The inclusion of the socioeconomic factors is based on the Andersen's behavior model, which is outlined in the following paragraphs. This study uses a set of logistic regression estimates that derive the change in log odds and the odds ratio of utilization of four different types of preventive care: cancer screenings, hypertension screenings, cholesterol screenings, and physical checkups. This analysis of what socioeconomic factors impact an individual's likelihood of using preventive health services aims to inform public policy discussions relating to utilization of preventive care services in the future.

### Theoretical Framework

**Andersen behavioral model.** Andersen (1968) designed the behavioral model to either predict or explain the factors associated with a family's use of health services. The use of this model provides the theoretical framework needed to investigate the link between the use of preventive health services and sociodemographic factors. Andersen suggested that family, later changed to individual use takes place when the individual is predisposed to services, is aware of available services, and is compelled by the need for available services. The predisposition-availability-need equation then overlays to three levels of behavior: health or preventive, illness or diagnosis, and sick-role or treatment (Andersen, 1995). The original model combines use with treatment while future iterations take into account enabling resources, levels of impact, and

social/demographic considerations. The Andersen behavioral model shows that based on this model equity in health services is achieved when the need factors have a strong positive association with health services utilization (Andersen, 1995). The Andersen behavior model illustrated in Figure 1 is widely acceptable as a reliable tool for the study of health services utilization therefore is applied to this study to determine influencing factors associated with health services among the uninsured in the United States.

It is important to note that when this first model was developed in 1968, increased utilization was a major policy goal and cost was not the concern it is today (Andersen, 1995). Its purpose however is still to discover conditions that either facilitate or impede utilization. Andersen (1995) stated that equity is in the eye of the beholder. He argued that equitable access occurs when demographic and need variables account for most of the variance in utilization. To Andersen, inequitable access occurs when social structure (environment, resources, education, income, ethnicity), health beliefs, and enabling resources (income) determine who gets medical care. The literature in this study validate inequitable access. Strong evidence linking socio-economic characteristics and access to health care to the health outcomes in a population suggest inequality. The demographic and socioeconomic differences have a big impact between the insured and uninsured population where income seems to be the forcing driver behind health disparities. Low income patients are less likely to receive the recommended health services, such as cancer screening and immunizations (Wolf et al., 2015).

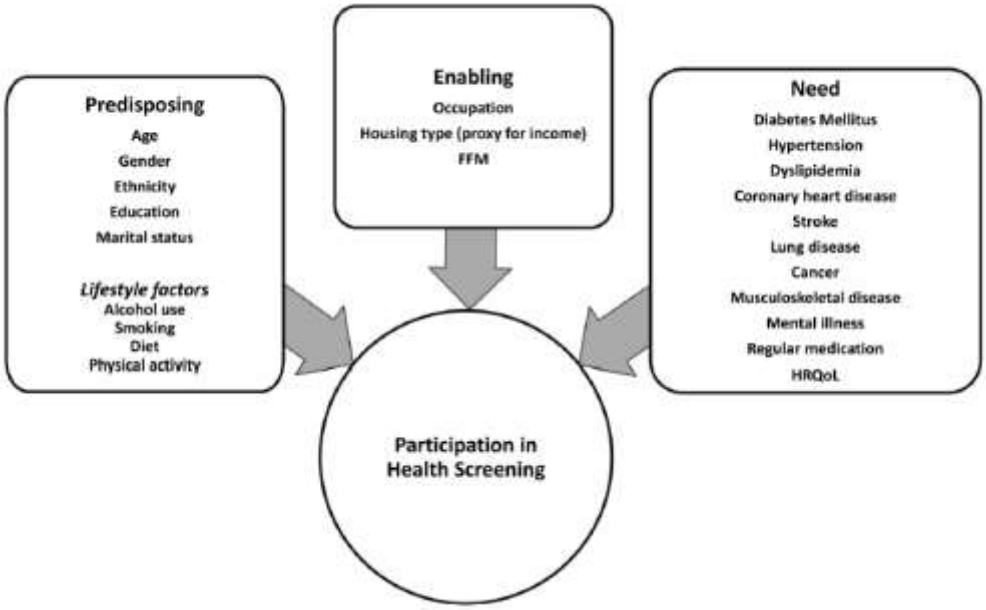


*Figure 1*. Andersen behavioral model.

**Population, Sampling, and Data Collection**

The population for the current study consisted of individuals older than age 18 years without health insurance and was limited to non-Hispanic Whites, non-Hispanic Blacks, and Hispanics and other race in order to have enough statistical power to compare preventive services utilization across race and ethnicity.

**Sample size.** A non-random purposive sampling technique was used whereby subjects were selected because of specific characteristics beginning with being uninsured. Other characteristics observed were age, poverty level, education, marital status, education, region located in the United States, and their perception of physical health status, language, and location of usual source of care.

The calculation of a minimum sample size for logistic regression requires previous knowledge such as the expected odds ratio (effect size), a proportion of observations in either group of the dependent variable, and the distribution of each independent variable. If these are

not known, it is best to use an estimate to determine an appropriate sample size. Hosmer, Lemeshow, and Sturdivant (2013) suggested a minimum sample of 10 observations per independent variable in the model but cautioned that researchers should seek 20 observations per variable if possible. LeBlanc and Fitzgerald (2000) suggested a minimum of 30 observations per independent variable. Using the calculation suggested by Leblanc and Fitzgerald, the calculated minimum sample size 30 x the number of total independent variables calculated as 30 x 7 = 210 participants, thus at least 240 participants will be sampled for this study. The analysis conducted all contained samples sizes of 1150 individuals.

**Data collection.** This current study utilized the data collected in 2015 from Medical Expenditure Panel Survey (MEPS). Information collected from the MEPS depicted the type of medical coverage offered in the United States and its use among residents. The surveys appeared to be appropriate for addressing the variables guided by the research questions in this present study. The MEPS collected data through five rounds of interviews and through various interviewing techniques. Each sample unit was first prescreened by telephone to determine whether insurance was offered to the employees. Shortly after the prescreening phone call, a questionnaire was mailed to the households for additional information (AHRQ, 2018). Data related to health insurance coverage were obtained through unions, employers, and private health insurance companies. The Agency for Healthcare Research and Quality (2018) indicated that surveys were conducted on an annual basis, with the range of responses varying between 65% and 71%.

The MEPS is sponsored by the Agency for Healthcare Research and Quality and is supported by the National Center for Health Statistics (AHRQ, 2018). In the present study,

MEPS was responsible for providing valid and reliable information on insurance coverage of the U.S. Population (AHRQ, 2018).

## Validity

Validity in research is the extent to which an instrument accurately measures what it is intended to measure (Leedy & Ormrod, 2010). The validity of the instruments for data collection in this study is, of paramount importance. Golafshani (2003) maintained that validity in a study is associated with "quality, rigor, and trustworthiness" of the research (p. 602). Validity is the correct interpretation of data based on several forms of evidence (Creswell, 2013). The use of a quantitative approach and validated instruments in this study would positively contribute to the study's validity. A quantitative research methodology is a scientific approach that places emphasis on hypothesis testing and making relevant statistical inferences based on the testing (Wienclaw, 2015). Flyvbjerg (2006) argued that quantitative method enhances the validity of study results.

**Internal validity**. Internal validity refers to an experiment's ability to correctly identify causal relationships (Field, 2013). In this study, the researcher will not attempt to establish causal relationships. There are, however, threats to the validity of the study's statistical conclusions. Threats to statistical validity come in three forms: reliability of the instrument, data assumptions, and sample size. The reliability of the secondary data has been evaluated and found to be appropriate for use in this analysis. In the MEPS data on health care utilization and expenditure are crosschecked with insurance providers health records. However, the self-reported data regarding health conditions and behaviors are subjective and mainly based on opinion and are therefore more difficult to crosscheck for accuracy and validity. Data assumptions will be checked before and during the data analysis stage. An appropriate sample size using power

analysis was performed to minimize the statistical concerns associated with small samples. As noted earlier the minimum sample size is 210 unique observations which the sample of this study satisfies as the smallest sample size of all four analyses is 1855 observations.

The statistical model utilized in this paper is based on factors of preventive care use as delineated by the widely accepted Andersen behavioral model framework. Even though this paper attempts to explore associations, and not causal relationships, there are some potential endogeneity and omitted variable bias that should be considered. The model does not attempt to control for state and local level effects that could affect preventive care utilization for example, some states provide more subsidies to obtain some preventive services. The effects of insurance status are limited to a binary construct so this study does not tease out any potential utilization differences by insurance type for instance, utilization for those who are privately insured may be significantly different by those who are insured by Medicaid/Medicare. The paper also does not control for the spatial proximity to preventive care providers. Extant literature has provided evidence of significant disparities in preventive care access between urban and rural regions. Endogeneity may be an issue because insurance status may help to capture the effects of the financial barriers that prevent care use but may capture the effects of unobservable factors such as risk-aversion. It may be that having insurance doesn't influence a person's demand for preventive care but rather this person is relatively risk averse and is therefore more likely to both have insurance and to engage in preventive measures to avoid bad health status and the economic consequences of poor health.

**External validity.** External validity refers to the extent that a study's findings generally apply to larger populations or different settings (Field, 2013). The external validity threats of this study may include the population. There may be limited generalizability because the researcher

will not gather a sample that is representative of the entire population of adults in other demographic categories. The effects of insurance on preventive care utilization derived in this study can be compared to the statistical estimations found in high impact studies that have already assessed the degree to which having insurance matters. This will help to establish evidence of external validity and hopefully lend credence to risk associations established by this study.

**Data Analysis**

The following research questions will be addressed in the study to estimate the impact of socioeconomic variables on preventive care utilization among the uninsured in the United States for the year 2015:

- What is the relationship between obtaining preventive care such as regular cancer screening (colon, breast, and cervix), hypertension screening, cholesterol screening, and physical checkups and socioeconomic variables such as race/ethnicity, household income, marital status, education, gender, age, source of usual care, and health status for the uninsured population in the United States?
- What are the differences in the preventive care usage between insured and uninsured population in the United States and do socioeconomic variables impact each population differently?

The data will be cleaned by examining the dataset for missing data (Field, 2013). If a value is missing, the entire case will be removed from the analysis (listwise deletion). In listwise deletion, a case is dropped from an analysis because it has a missing value in at least one of the specified variables. The analysis is only run on cases which have a complete set of data. Descriptive statistics of the data for the predictor and dependent variables will be reported.

Frequency and percentages summary will be obtained for categorical variables while the measure of central tendencies of means and standard deviations and minimum and maximum values will be conducted for continuous variables.

**Statistical Method**

Logistic regression is a statistical method for analyzing a dataset in which there are one or more independent variables that determine an outcome. Logistic regression is the appropriate method to use for this study because the outcome variables are binary. The outcome is measured with a dichotomous variable that takes the value of 0 for not utilizing preventive health care services and 1 for utilizing preventive care health services. Preventive care services such as the screenings discussed in this dissertation are covered entirely by insurance for insured people. Using these services can help avoid certain chronic diseases as well as catch diseases in their early stage, or to limit the harm chronic diseases can cause. This study examines the logistic (or logit) regression models that estimate the probability of obtaining preventive care services such as cancer screenings, hypertension screenings, cholesterol screenings, and physical checkups. Furthermore, logistical regression will enable us to identify the odds of getting preventive care services for each independent variable. The goal of logistic regression in this study is to find the best fitting model to describe the relationship between dependent variable to equal a response or outcome from the set of independent variables in this study. The change in the log odds that are associated with the independent variables of interest (race/ethnicity, the log of household income, marital status, education attainment, gender, age, insurance status, having a source of usual care, and self-reported health status) are calculated for the four different analyses where cancer screenings, hypertension screenings, cholesterol screenings, and physical checkups all serve as the dependent variables. Due to the reality that log odds are not readily interpretable to

researchers and common audiences alike, this study using STATA to exponentiate the log odds coefficients derived in the above equations in order to garner more easily interpretable odds ratios. The resulting odds ratios are discussed in detail in Chapter 4.

Binary logistic regression will be utilized in this quantitative non-experimental study to measure the relationships between race/ethnicity, household income, marital status, education, gender, age, source of usual care, insurance status, health status and the dichotomous dependent variables cancer screening, hypertension screening, cholesterol screening, and physical check-ups. The cancer screening variable will be defined by whether the participant received any colon, breast, or cervix screening according to the criteria for preventive care set forth by the U.S. Preventive Service Task Force (AHRQ, 2018). Likewise, hypertension screening, cholesterol screening, and physical check-ups are also defined as binary variables where our interest is in whether they utilized the procedure or not, as recommended by the USPSTF criteria guide to clinical preventive services used around the nation to provide appropriate and effective preventive care (AHRQ, 2018). Table 2 summarizes the analyzed preventive services acknowledged by the USPTSF.

The log odds and odds ratio of having a screening are calculated for each independent variable of interest. In terms of coding, race/ethnicity are modeled as four dummy variables, *white* = 1 if non-Hispanic White, 0 otherwise; *black* = 1 if non-Hispanic Black, 0 otherwise; *otherrace* = 1 if non-Hispanic other race, 0 otherwise; and *hispanic* = 1 if individual is Hispanic, 0 otherwise. Household *income* is modeled as a continuous variable but has been logarithmically transformed prior to fitting the models since it is known to follow a log-normal distribution.

Table 2

*U.S. Preventive Task Force Preventive Service Measures and Guidelines*

| Screening | Recommended population | Frequency |
|---|---|---|
| Mammogram | Women aged 40-74 years | Every 2 years |
| Colonoscopy | Adults aged 50-75 years | Every 10 years |
| Cervical (pap smear) | Women aged 21-65 years | Every 3 years |
| Blood pressure (hypertension) | Adults aged > 18 years | Every 2 years |
| Cholesterol test | Men aged > 35 years<br>Women aged > 45 years | Every 5 years |
| Routine checkup (physical checkups) | Adults aged >18 years | Yearly |

Marital status is coded as 1 if individual is *married* and 0 otherwise. *Education* is a continuous variable, measured by the number of years of schooling ranging from zero to 17, but takes the value of minus one for those participants that did not declare their level of education in the survey or those that were considered to be inapplicable (e.g., people who are in school, because the dataset includes non-adults as well). This will not be a problem because when we test for cancer and other preventive care variables, most of these observations will be excluded in the regression analyses due to their age. Gender will be modeled as *female* = 1 if respondent is female, 0 if male. *Age* is modeled as a continuous variable representing the age in years of the respondent. However, we add three binary variables to separate out the effects of age based on three categories representing physical age in years. The *ageunder19* variable takes the value of one if the individual is younger than 19 years old, *age19to64* variable takes the value of one if person is between 19 and 64 years old, and the *ageover64* variable takes the value of one if person is over 64 years old. The source of usual care is captured by variable *usualcare* where *usualcare* = 1 if doctor, 2 if hospital non-ER, and 3 if ER. A person's self-perceived health status

is indicated by the five-tiered ordinal variable *healthstatus* where *healthstatus* ranges from *1* = excellent, *2* = very good, *3* = good, *4* = fair, *5* = poor; *0* if unwilling to provide answer.

If we define $p_i$ as the probability of getting a particular preventive screening i, then the log odds are defined as:

$$ln\left(\frac{p_i}{1-p_i}\right) = \beta_{0i} + \beta_{1i}Race + \beta_{2i}lninc + \beta_{3i}married + \beta_{4i}education + \beta_{5i}female + \beta_{6i}age + \beta_{7i}ageover64 + \beta_{8i}uninsured + \beta_{9i}usualcare + \beta_{10i}healthstatus + u_i$$

Thus, for *i* = cancer screening, hypertension screening, blood cholesterol screening, and physical checkups, we will estimate four separate logit models using STATA. To make interpretation of the results easier, we will use the log odds transformation for all these equations by applying the following equation:

$$\left(\widehat{\frac{p_i}{1-p_i}}\right) = e^{\beta_{0i}} \cdot e^{\beta_{1i}Race} \cdot e^{\beta_{2i}lninc} \cdot e^{\beta_{3i}married} \cdot e^{\beta_{4i}education} \cdot e^{\beta_{5i}female} \cdot e^{\beta_{6i}age} \cdot e^{\beta_{7i}ageover64} \cdot e^{\beta_{8i}uninsured} \cdot e^{\beta_{9i}usualcare} \cdot e^{\beta_{10i}healthstatus}$$

This allows us to obtain the log odds for each independent variable as compared to its alternative values, with all other variables being held constant at their mean values for the dataset. The significance of these results is that they could illustrate which independent variables impede or enable use of preventive health care services in the sample, and consequently in the adult population in the United States.

We expect this study to offer answers to the two research questions discussed listed above as well as to guide public policy for a new approach to utilization of preventive care services among residents in the United States. Table 3 contains the descriptions and Table 4 contains the summary statistics of the data set broken into three categories: all observations, individuals who had insurance in the year 2015, and individuals who did not have insurance in

the year 2015. The differences in the utilization rates between the insured and uninsured populations are approximately 11% for cancer check screenings, 22% for hypertension screening, 25% for cholesterol, and 32% for physical check-ups. These trends are indicative of significantly different preventive care utilization by insurance statuses.

Chapter 2 provided a comprehensive overview of the chronic diseases epidemic in the United States, the economic consequences of chronic disease, and the impact of being uninsured. Research indicated that many diseases and conditions can be prevented or treated if detected at an earlier stage through utilization of preventive services however cost from obtaining health insurance detracted many individuals from obtaining preventive services (Racovich, 2012). We hope this study helps identify some of the socioeconomic factors and use of preventive health service that enable or impede use of services.

As the population ages and individuals suffer from multiple conditions or comorbidity it is important that all stakeholders such as government, policy makers, health providers, and society as a whole can improve quality of life as well as help reduce the health care costs of this country. With focus on the uninsured in this study, we offer to validate the relationship between lack of health insurance and the probability or odds of obtaining preventive health services in the United States.

This study offers insight into the association between lack of health insurance and influences of the socioeconomic characteristics associated with low use of preventive health care services. The intent of this research is to obtain a comprehensive understanding of the topic to help guide for more affordable uses of preventive health screenings and to allow early diagnosis of chronic diseases for better health outcomes.

Table 3

*Descriptions for the Relevant Variables Obtained from MEPS Sample for year 2015*

| Variable | Description |
|---|---|
| Independent Variables | |
| white | =1 if non-Hispanic White, 0 otherwise |
| black | =1 if non-Hispanic Black, 0 otherwise |
| otherrace | =1 if non-Hispanic other race, 0 otherwise |
| hispanic | =1 if Hispanic, 0 otherwise |
| income | family income in dollars |
| lnincome | natural log of family income in dollars |
| married | =1 if married, 0 otherwise |
| education | number of years of schooling; -1 = inapplicable |
| female | =1 if respondent is female, 0 otherwise |
| age | age in years |
| ageunder19 | =1 if person < 19 years |
| age19to64 | =1 if person between 19 and 64 years old |
| ageover64 | =1 if person over 64 years old |
| usualcare | =1 if doctor, 2 if hospital non-ER, 3 if ER |
| healthstatus | Ranges from 1 = excellent to 5 = poor; 0 if unavailable |
| Intermediate Variables | |
| mammogram | =1 if mammogram done every 2 years, age 40-74; 0 otherwise |
| colonoscopy | =1 if colonoscopy done every 10 years, age 50-75; 0 otherwise |
| papsmr | =1 if pap smear done every 3 years, age 21-65; 0 otherwise |
| Dependent Variables | |
| cancer_chk | =1 if mammogram or colonoscopy or pap smear done; 0 otherwise |
| hypertension | =1 if blood pressure checked in last 2 yrs for age 18+ |
| cholesterol | =1 if cholesterol tested every 5 years for 35+men & 45+women |
| phys_checkup | =1 if annual physical check for age 18+, 0 otherwise |

Table 4

*Summary Statistics of the MEPS Sample for year 2015*

| | All Observations | | | | | Insured in 2015 | | | | | Uninsured in 2015 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Obs | *M* | *SD* | Min | Max | Obs | *M* | *SD* | Min | Max | Obs | *M* | *SD* | Min | Max |
| white | 35,427 | 0.371 | 0.483 | 0 | 1 | 31,193 | 0.394 | 0.489 | 0 | 1 | 4,234 | 0.204 | 0.403 | 0 | 1 |
| black | 35,427 | 0.195 | 0.396 | 0 | 1 | 31,193 | 0.198 | 0.398 | 0 | 1 | 4,234 | 0.172 | 0.377 | 0 | 1 |
| otherrace | 35,427 | 0.109 | 0.311 | 0 | 1 | 31,193 | 0.114 | 0.318 | 0 | 1 | 4,234 | 0.066 | 0.249 | 0 | 1 |
| hispanic | 35,427 | 0.325 | 0.469 | 0 | 1 | 31,193 | 0.294 | 0.456 | 0 | 1 | 4,234 | 0.558 | 0.497 | 0 | 1 |
| income | 35,418 | 61,710 | 58,614 | 0 | 521,685 | 31,184 | 64,199 | 60,042 | 0 | 521,685 | 4,234 | 43,380 | 42,497 | 0 | 452,339 |
| lnincome | 34,257 | 10.654 | 0.998 | 2.20 | 13.16 | 30,226 | 10.692 | 1.003 | 2.20 | 13.16 | 4,031 | 10.370 | 0.911 | 5.01 | 13.02 |
| married | 35,418 | 0.343 | 0.475 | 0 | 1 | 31,192 | 0.342 | 0.474 | 0 | 1 | 4,226 | 0.350 | 0.477 | 0 | 1 |
| education | 35,427 | 4.905 | 6.821 | -1 | 17 | 31,193 | 4.877 | 6.874 | -1 | 17 | 4,234 | 5.111 | 6.411 | -1 | 17 |
| female | 35,427 | 0.520 | 0.500 | 0 | 1 | 31,193 | 0.529 | 0.499 | 0 | 1 | 4,234 | 0.450 | 0.498 | 0 | 1 |
| age | 35,192 | 35.712 | 22.621 | 0 | 85 | 31,014 | 35.721 | 23.462 | 0 | 85 | 4,178 | 35.645 | 14.968 | 0 | 85 |
| ageunder19 | 35,427 | 0.286 | 0.452 | 0 | 1 | 31,193 | 0.310 | 0.463 | 0 | 1 | 4,234 | 0.112 | 0.315 | 0 | 1 |
| age19to64 | 35,427 | 0.584 | 0.493 | 0 | 1 | 31,193 | 0.545 | 0.498 | 0 | 1 | 4,234 | 0.867 | 0.340 | 0 | 1 |
| ageover64 | 35,427 | 0.130 | 0.336 | 0 | 1 | 31,193 | 0.145 | 0.352 | 0 | 1 | 4,234 | 0.021 | 0.145 | 0 | 1 |
| usualcare | 35,427 | 1.002 | 0.720 | 0 | 3 | 31,193 | 1.056 | 0.689 | 0 | 3 | 4,234 | 0.601 | 0.807 | 0 | 3 |
| healthstatus | 35,427 | 1.490 | 1.454 | 0 | 5 | 31,193 | 1.470 | 1.459 | 0 | 5 | 4,234 | 1.632 | 1.409 | 0 | 5 |
| mammogram | 10,025 | 0.487 | 0.500 | 0 | 1 | 8,885 | 0.512 | 0.500 | 0 | 1 | 1,140 | 0.289 | 0.454 | 0 | 1 |
| colonoscopy | 14,266 | 0.337 | 0.473 | 0 | 1 | 12,791 | 0.362 | 0.481 | 0 | 1 | 1,475 | 0.119 | 0.323 | 0 | 1 |
| papsmr | 12,538 | 0.645 | 0.479 | 0 | 1 | 11,050 | 0.638 | 0.481 | 0 | 1 | 1,488 | 0.696 | 0.460 | 0 | 1 |
| cancer_chk | 19,402 | 0.619 | 0.486 | 0 | 1 | 17,105 | 0.633 | 0.482 | 0 | 1 | 2,297 | 0.515 | 0.500 | 0 | 1 |
| hypertension | 24,577 | 0.902 | 0.298 | 0 | 1 | 21,126 | 0.933 | 0.250 | 0 | 1 | 3,451 | 0.710 | 0.454 | 0 | 1 |
| cholesterol | 23,863 | 0.545 | 0.498 | 0 | 1 | 20,506 | 0.579 | 0.494 | 0 | 1 | 3,357 | 0.333 | 0.471 | 0 | 1 |
| phys_checkup | 24,465 | 0.683 | 0.465 | 0 | 1 | 21,056 | 0.727 | 0.445 | 0 | 1 | 3,409 | 0.411 | 0.492 | 0 | 1 |

## Results

Access to medical care is a concern to U.S. policy makers and those interested in health care reform. Wide disparities in access by health insurance status are of special importance. Providing affordable health care access to the uninsured through preventive health care services could contribute to improving early detection for better health outcomes while also minimizing the overall health care costs in the nation. Chapter 4 contains the results of estimates of the model identified in Chapter 3 and identifies the differences between the insured and uninsured population in terms of utilization of preventive care services. Identifying which factors make significant contributions to the utilization of preventive care services among the insured, uninsured, and general population can help determine which policy instruments would result in reducing the proportion of chronic diseases in the United States.

The following questions guided this study to understand the association between health care coverage and utilization of preventive care services in the United States:

- What is the relationship between obtaining preventive care services such as regular cancer screening, (colon, breast, cervix), hypertension screening, cholesterol screening, and physical checkups and socioeconomic variables such as race/ethnicity, household income, marital status, education, gender, age, usual source of care, health status and insurance status?
- What are the differences in the preventive care usage between insured and uninsured populations in the United States and do socioeconomic variables impact each population differently?

This chapter begins with a discussion of the descriptive statistic summaries for the sample from the household component of the Agency for Healthcare Research and Quality Medical

Expenditure Panel Survey (MEPS) shown in Table 4, Summary of Statistics of the MEPS Sample for year 2015, in Chapter 3. Thereafter, we discuss whether the differences in the utilization of preventive care services are different between the insured and uninsured samples by conducting two-sample t-tests. Next, we present the logistic regression estimates in terms of odds ratios to measure the relationships between the independent variables: insurance status, race/ethnicity, household income, marital status, education, gender, age, source of usual care, and health status and the dichotomous dependent variables: cancer screening, hypertension screening, cholesterol screening, and physical check-ups. Finally, we also present the results of the logistic regression analysis separately for the insured and uninsured sub samples.

**Summary Statistics Discussion**

**Race/ethnicity.** In the sample from MEPS for 2015, we find that of the 35,427 observations 37.1% are non-Hispanic White, 32.5% are Hispanic, 19.5% are non-Hispanic Black, and 10.9% are other races. Among the 4,234 uninsured people, 55.8% are Hispanic, 20.4% are non-Hispanic White, 17.2% are non-Hispanic Black, and 6.6% are other races. Among the 31,193 insured people, 39.4% are non-Hispanic White, 29.4% are Hispanic, 19.8% are non-Hispanic Black, and 11.4% are other races. Interestingly, the uninsured population is disproportionately Hispanic because Hispanic comprises only 32.5% of the entire sample but constitutes 55.8% of the uninsured sample population.

**Income.** The average household income for insured individuals is about $64,199 with a standard deviation of $60,042. This indicates that about 67% of the insured people have a household income between $4,000 and $124,000. On the other hand, when we consider only the uninsured people in the sample, we find that 67% of the uninsured have between $1,000 and $80,000 annual household income. Thus, there is an income disparity of close to $24,000

between the insured and uninsured samples. While this is a substantial difference, it is important to remember that some of the people who are in the uninsured sample might be choosing to remain uninsured for reasons not related to their household incomes.

**Marital status.** The proportion of the entire sample that is married is 34.3%. There is a negligible difference in the marriage rate of the insured population compared to the uninsured population.

**Education.** In the dataset the value of -1 is used to represent those observations that were listed as "inapplicable" (e.g., people who are in school or refused to answer, because the dataset includes non-adults as well). A total of 17,962 observations fall under this category; therefore, we need to be careful when interpreting the mean and standard deviation of the education variable. This will not be a problem when we estimate our logistical regressions, because when we test for cancer and other preventive care variables, most of these observations will automatically not be counted in the regression due to the age and other restrictions on the testing parameters.

Out of the remaining 17,465 observations, we find that the mean number of years of schooling is 10.98 with a standard deviation of 4.65 as shown below in Table 5.

Table 5

*Breakdown of the Education Variable*

| Education | Obs | *M* | *SD* | Min | Max |
|---|---|---|---|---|---|
| uninsured | 2,222 | 10.64 | 3.72 | 0 | 17 |
| insured | 15,243 | 11.03 | 4.77 | 0 | 17 |
| Total | 17,465 | 10.98 | 4.65 | 0 | 17 |

There is a difference of about one year on an average in the educational attainment between the uninsured and insured and the spread of education is higher in the insured than in the uninsured sample.

**Sex.** Exactly 52% of the total sample is female. The percentages of the insured and uninsured populations that are female are 52.9% and 45%, respectively, indicating that more males than females are uninsured for the year 2015.

**Age.** The age distribution in the entire sample is consistent with the expectations of population age distribution in the country with 26.6% being under the age of 19 years, about 58.4% between the ages of 19 to 64 years, and 13% over the age of 64 years. Among the insured sample, 31% are 18 years old or younger, 54.5% are between the ages of 19 and 64 years, and 14.5% are older than 64 years. In the uninsured sample, 11.2% are 18 years old or younger, 86.7% are between 19 to 64 years old, and 2.1% are 65 years or older. Most of the uninsured population falls between the ages of 19 and 64 years, which is indictive of the realities of people 65 years and older who are aging into Medicare coverage and children under 19 years of age who are often covered by government or parent coverage.

**Source of Usual Care.** Nearly half of the sample population (49.7%) have a regular doctor as their usual source of care. Just over a quarter (25.3%) cited having no usual source of care. Just under a quarter (24.5%) utilize non-ER hospital services as a usual source of care. Only 0.5% use the hospital ER as their usual source of care, which contradicts many of the assumptions that are made regarding people substituting ER care for regular care. However, as seen in Table 6, about 20.7% of the insured sample had no usual source of care compared to 59.6% of the uninsured sample. The percentages of having a doctor as the usual source of care are 53.5% for the insured and 21.7% of the uninsured. Surprisingly, there is not a big difference among those who utilize the ER as the usual source of care when comparing both insured and uninsured populations (0.4% versus 0.9%). This presents a challenge to the belief that without

insurance, people tend to go to the ER for care, leading to significantly higher costs to the economy.

Table 6

*Breakdown of the Usual Care Variable*

| | Insured | | Uninsured | |
|---|---|---|---|---|
| Usual Source of Care | Freq. | Percent | Freq. | Percent |
| No usual source of care | 6,443 | 20.66% | 2,522 | 59.57% |
| Doctor's office | 16,683 | 53.48% | 917 | 21.66% |
| Hospital, non-ER | 7,929 | 25.42% | 757 | 17.88% |
| Hospital, ER | 138 | 0.44% | 38 | 0.90% |
| Total | 31,193 | 100% | 4,234 | 100 |

**Health status.** Approximately 39.9% of the entire sample were unwilling to answer a question soliciting their health status. Only 11.4% perceive their current health status as being excellent, 19.9% as very good, 19% as good, 8.1% as fair, and 1.7% as poor. Interestingly, as seen in Table 7, those who are insured are more likely to indicate their health status (41% vs. 31.6%). In addition, insured were less likely to indicate in excellent health status compared to the uninsured (10.7% vs. 16.8%).

Table 7

*Breakdown of the Health Status Variable*

| | Insured | | Uninsured | |
|---|---|---|---|---|
| Perceived Health Status | Freq. | Percent | Freq. | Percent |
| Unknown | 12,797 | 41.03% | 1,338 | 31.60% |
| Excellent | 3,340 | 10.71% | 710 | 16.77% |
| Very good | 6,196 | 19.86% | 849 | 20.05% |
| Good | 5,836 | 18.71% | 902 | 21.30% |
| Fair | 2,494 | 8% | 381 | 9% |
| Poor | 530 | 1.70% | 54 | 1.28% |
| Total | 31,193 | 100% | 4,234 | 100% |

**T-Tests to Compare Preventive Care Utilization**

The crux of the research question is to discover any significant differences in the preventive service utilization rates by those who are uninsured compared to those who have insurance. The preliminary step in data analysis requires a simplistic two sample t-test with unequal variances to provide statistical justification for the pursuit of a more sophisticated regression analysis that incorporates the socioeconomic factors that may influence preventive care utilization rates. The distribution of preventive service utilization rates differs between insured and uninsured populations. This study uses t-test with unequal variances as the exploratory data analysis because the sample size of the insured population is considerably larger than the sample size of the uninsured population. The results presented in Table 8 contain the two-sample t-test results for the four types of preventive care included in this study.

Table 8

*Two-Sample T-Tests with Unequal Variances*

| Difference: | diff = mean(0) - mean(1) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Ho: | diff = 0 | | | | | | | |
| Ha: | diff ! = 0 | | | | | | | |
| | Cancer Check | | Hypertension | | Cholesterol Check | | Physical Check-up | |
| Group | Obs | *M* | Obs | *M* | Obs | *M* | Obs | *M* |
| *0* = insured | 17,105 | 0.633 | 21,126 | 0.933 | 20,506 | 0.579 | 21,056 | 0.727 |
| *1* = uninsured | 2,297 | 0.515 | 3,451 | 0.710 | 3,357 | 0.333 | 3,409 | 0.411 |
| Difference | | 0.119 | | 0.224 | | 0.247 | | 0.316 |
| t-value | | 10.734 | | 28.246 | | 27.921 | | 35.231 |
| Degrees of freedom | | 2,898 | | 3,798 | | 4,646 | | 4,359 |
| p-value | | 0.000 | | 0.000 | | 0.000 | | 0.000 |

There were statistically significant utilization differences by insurance status at the .001 level for cancer screening, hypertension screening, cholesterol screening, and physical check-ups. About 63% of the insured population utilized cancer screenings, whereas only 51% of the uninsured population utilized cancer screenings. This 12% difference represents the smallest difference found for the four types of preventive care. The analysis found a 22-percentage point difference in hypertension screening utilization between the two groups. The t-test for cholesterol screening reveals an approximate 25% disparity between the insured and uninsured. The most pronounced difference was in the utilization of physical check-ups with an approximate difference of 32%. The results of the two-sample t-tests with unequal variances merit the effort of a more robust statistical analysis.

**Results of Logit Analysis**

Binary logistic regression was used in this quantitative, non-experimental study to measure the relationships between independent variables, such as race/ethnicity, household income, marital status, education, gender, age, source of usual care, insurance status, and health

status and the four dichotomous dependent variables cancer screening, hypertension screening, cholesterol screening, and physical check-ups. As discussed in the previous chapter, the cancer screening variable was defined by whether the participant received any colon, breast, or cervix screening according to the criteria for preventive care set forth by the U.S. Preventive Service Task Force (AHRQ, 2018). Likewise, hypertension screening, cholesterol screening, and physical check-ups are also defined as binary variables where our interest is in whether they utilized the procedure, recommended by the USPSTF criteria guide to clinical preventive services used around the nation to provide appropriate and effective preventive care (AHRQ, 2018). Table 9 displays the results of the estimated logistical models in the form of odds ratios to determine the likelihood of utilizing preventive care for cancer, hypertension, cholesterol, and getting general physical checkups.

Table 9

*Logistical Regression Outcomes and Odds Ratios for Preventive Health Care*

| | DV: cancer_chk | | DV: hypertension | | DV: cholesterol | | DV; phys_checkup | |
|---|---|---|---|---|---|---|---|---|
| IV | *OR* | *z* | *OR* | *z* | *OR* | *z* | *OR* | *z* |
| white | 1.463 | 6.50 | 1.782 | 7.36 | 1.008 | 0.09 | 1.021 | 0.40 |
| black | 1.980 | 10.23 | 2.151 | 8.39 | 1.378 | 3.25 | 1.678 | 8.66 |
| hispanic | 1.280 | 3.96 | 1.248 | 2.84 | 1.197 | 1.98 | 1.106 | 1.85 |
| lnincome | 1.069 | 3.46 | 1.094 | 3.42 | 1.285 | 7.98 | 1.079 | 4.40 |
| married | 2.036 | 18.02 | 1.216 | 3.64 | 1.131 | 2.15 | 1.098 | 2.74 |
| education | 1.009 | 3.71 | 1.014 | 4.13 | 1.007 | 2.12 | 1.007 | 3.12 |
| female | 8.901 | 54.33 | 2.269 | 16.54 | 0.138 | -33.12 | 1.633 | 16.02 |
| age | 1.013 | 8.28 | 1.017 | 8.15 | 1.309 | 67.34 | 1.025 | 18.91 |
| ageover64 | 0.362 | -16.12 | 1.648 | 3.75 | 0.037 | -22.17 | 1.671 | 7.38 |
| usualcare | 1.273 | 9.72 | 2.146 | 21.33 | 1.597 | 13.05 | 1.662 | 23.71 |
| healthstatus | 1.071 | 4.96 | 1.099 | 4.90 | 1.060 | 2.78 | 1.058 | 4.55 |
| uninsured | 0.572 | -10.10 | 0.311 | -21.44 | 0.493 | -9.36 | 0.402 | -20.92 |
| Constant | 0.042 | -13.48 | 0.407 | -2.94 | 0.000 | -34.28 | 0.126 | -10.27 |

**Race/ethnicity.** When we compare the base models in Table 9 that encompass the entire dataset, we find that there are many statistically significant differences in the usage of preventive care by the various socioeconomic independent variables. The variables for race and ethnicity produce interesting findings. When considering those who identify as non-Hispanic White, we find that the odds ratios for cancer, hypertension, cholesterol, and physical checkups are 1.46, 1.78, 1.007, and 1.02 respectively. This translates to a 46%, 78%, 0.7%, and 2% increase in the odds of getting the respective preventive care for each of these variables, as compared to their counterparts. Being non-Hispanic White is statistically significant for cancer check and hypertension at the 0.01 level but is not statistically significant even at the 0.1 level for cholesterol screening and physical check-ups. This implies that non-Hispanic Whites in our sample are more likely to get cancer and hypertension screenings than the others. Similarly, we find that the corresponding increases in the odds for non-Hispanic Blacks utilizing preventive care are 98% for cancer screening, 115% for hypertension screening, 37% for cholesterol screening, and 68% for physical checkups. These increased odds indicate that non-Hispanic Blacks have a higher likelihood of receiving all four types of preventive care in comparison to others. The associated odds ratio for the four types of preventive care are statistically significant at the .001 level. When examining the associations between utilization of the four preventive care types and identifying as Hispanic, the resulting odds ratios from the logistic regressions yield a 28% increase in the odds for cancer screening utilization, a 25% increase in the odds of having hypertension screening, about 20% in the odds of having a cholesterol screening, and about 11% in the odds of having a physical checkup. These increased odds indicate that Hispanic individuals have a higher likelihood of receiving all four types of preventive care in comparison to others. There are varying levels of statistical significance as the odds ratios for Hispanics are

statistically significant at the .01 level for cancer screening and hypertension utilization and at the .05 level for cholesterol screening utilization. The odds ratio was statistically significant at 0.10 level for physical checkups.

**Income.** Since the income variable is a continuous log variable, we must be careful with the interpretation of the odds ratio. The odds ratio in this case represents the change for every 1% increase in the income variable. Thus, for the cancer screening preventive care model, an odds ratio of 1.068 corresponds to a 6.8% increase in the odds of having a cancer screening for every 1% increase in income. The hypertension screening model has an odds ratio of 1.094 for income, which corresponds to a 9.4% increase in the odds of having the screening for each 1% increase in income. The odds ratio of 1.285 corresponds to a 28.5% increase in the odds of having cholesterol screening for a 1% increase income. For the physical checkups model, there is a 7.8% increase in the odds of getting a physical checkup for each percentage increase in income. The odds ratios associated with the natural log income variable suggest that higher levels of income have a positive relationship with the utilizations rates of all four types of preventive care screenings. It is important to note that the odds ratios for income are statistically significant at the 0.001 level in all the four models.

**Marital status.** The odds ratio for having a cancer screening of those who are married compared to those who are not married is 2.03 and is statistically significant at the 0.001 level. This implies that people who are married are more than twice as likely to receive cancer screening**.** The odds ratio of having a hypertension screening is 1.22 and is statistically significant at the 0.001 level, implying that married individuals are 22% more likely to seek preventive care for hypertension. Married individuals are also 13% more likely to have a cholesterol screening (*OR* = 1.13) with a significance level of 0.05. Similarly, the odds ratio for

physical checkups is 1.098 for married individuals indicating an almost 10% higher probability of getting physical checkups as compared to unmarried individuals with a statistical significance of 0.01. While there is no way to confirm this directly, the fact that the individual is married might be contributing to a better check over personal health. That is because the disparities between married and unmarried individual in terms of seeking all types of preventive care is significantly and substantially higher, holding all other variables constant.

**Education.** The education variable is a continuous variable, which implies that we must be careful when considering the impacts of education on preventive care utilization. The effects of education on the likelihood of utilizing any of the four types of preventive care of interest are positive but not nearly as pronounced as the effects of the other independent variables incorporated into the regressions. The percent increase in the odds for each additional year of education completed are about 0.8% for cancer screenings, 1.4% for hypertension screening, 0.07% for cholesterol screening, and 0.7% for physical checkups. It is important to note that even though all the associated odds ratios are greater than 1, education is only statistically significant at the 0.05 level for cancer screenings and hypertension screenings. The relatively modest increase in the odds ratios convey a positive association with increased education attainment and the utilization of preventive care services.

**Gender.** Females exhibit statistically significant and increased odds of having all types of preventive care checkups as compared to males. For instance, females are 8.9 times more likely to get cancer checks in our model. Part of this disparity can be explained by the fact that two out of three cancer check services included in our sample are designed for females (mammograms and pap smears). But, this trend of higher odds of getting preventive care among females is also seen in some of the other types of care, albeit not at the same intensity. The odds ratio for

females is 2.27 in the hypertension screening model, implying that females are more than twice as likely as males to get preventive care and testing for hypertension. The odds ratio for females in the physical checkup model is 1.63, demonstrating that women are 63% more likely to get physical checkups as compared to males in our sample. An interesting exception to this trend is found in the cholesterol screening model where the odds of getting cholesterol screening decrease by 87% among females as compared to males. The odds ratios are all statistically significant at the .001 level. The question that we cannot answer in this study, because there might be a more medical explanation for it, is that if females are getting more physical checkups and hypertension checkups as compared to males, why is it that they are not getting higher levels of cholesterol screening.

**Age.** The odds of having cancer screening for individuals over the age 64 years decrease by 64% (*OR* = 0.36) as compared to those that are under 65 years old. The odds of having hypertension screening and physical checkup for individuals over the age of 64 years increase by about 65%, and 67%, respectively as compared to the younger population. The odds of having cholesterol screening for individuals over the age of 64 years decreases by 97% (*OR* = 0.03) as compared to those that are younger. The odds ratios are all statistically significant at the 0.001 level. This result is interesting because Medicare typically is made available to people over the age of 64 years and one would expect that preventive care would increase across all four dependent variables, not just the hypertension screening and physical checkups. On the other hand, since two out of the three cancer check variables are related to women seeking pap smears or mammograms that often are not covered under regular physical checkups, the finding for cancer check variable may not be very surprising. The biggest shocker here is the cholesterol screening, because it appears that among people over than the age of 64 years there is a sharp

reduction in getting cholesterol screening done. However, it is important to remember that we have also included age as a continuous variable in our model, which might be capturing a sizable portion of the increased odds of getting all the screenings done as age increases.

When we examine the effects of age as a continuous independent variable, there is a 31% increase in the odds of having a cholesterol screening for every one-year increase in age from the average of 22 years for the dataset. The change in the odds for the other three types of services associated with age are positive, but less pronounced. When we consider the entire dataset, there is only about 1 to 2% increase in the odds of the utilization of the three preventive care services (cancer screening, hypertension screening, and physical checkups) for each additional year of age.

**Source of usual care.** Logistic regressions include a control variable for the source of usual care (*0* = other/no usual source of care, *1* = office, *2* = if not ER, and *3* = ER). The results of usual source of care presented in Table 4.5 show increased odds of 27% for cancer screening, 114% for hypertension screening, 59% for cholesterol screening, and 66% for physical check-ups, respectively for each step-wise increase in the usual source of care ordinal variable from its mean of one. This implies that people who are either using hospital (non-ERs) or ERs for their usual source of care are more likely to get preventive care than those using regular office visits for their health care needs. As counter-intuitive as it sounds, this result is meaningful because it indicates that those that are going to the hospital, either for a non-ER or ER visit, are getting the types of check-ups or screenings that we recommend as our preventive care variables. It is possible that the doctor's office is overlooking the significance of these preventive care services or the people going to their doctor's office for regular care are not realizing the importance of getting these sorts of screenings or care at the recommended intervals. For instance, an individual

who goes to a doctor's office to get medication for some other health condition might claim to have avoided the ER or the hospital for care. However, the doctor's office would be most likely to test only for the presented condition rather than perform other screenings. In a hospital visit, since tests are performed to eliminate all possible conditions, screenings could occur even if the patient does not request them. Having a primary care doctor has shown to be associated with higher utilization for preventive care when needed, as we observed in the literature review, and is associated with better preventive health and chronic disease treatment. However, it appears that unless an individual has certain obvious risks that require regular screenings, these often get overlooked in regular doctor visits. While it is beyond the scope of this dissertation to delve into the reasons for this result, this variable needs to be studied further with more specific questions of what consists of usual medical care for most individuals.

**Health status.** Logistic regressions include a control variable for the perception of health status (*0* = unavailable, *1* = excellent, *2* = very good, *3* = good, *4* = fair & *5* = poor). The odds for utilizing cancer screenings increase by about 7% for each tier increase on a five-tiered self-perceived health status Likert scale, with a mean of 1.49. For example, the odds of having a cancer check utilization are 7% higher for those who self-report their health status as good (= 3) versus those who report it as very good (= 2). With respects to hypertension screening utilization, the odds of utilization increase by roughly 10% for a one tier increase on the perceived health status scale. As it pertains to cholesterol screening utilization, the odds increase by roughly 6% for a one tier increase in health status. Lastly, the odds of physical checkup utilization increased by approximately 6% for each tier increase. All the odd ratios are statistically significant at the 0.01 level. This implies that the poorer the self-perceived health status the more likely an individual is to utilize all four types of preventive health care services.

**Uninsured.** Approximately 12 percent of our sample was uninsured for all of the year 2015. The results of the logistical regressions indicate that there are clear and statistically significant (at 0.01 level) lower odds for the utilization of all preventive care services among the uninsured as compared to those that are insured. The odds ratios for the *uninsured* variable (*0* = has insurance, *1* = uninsured) corresponding to cancer check, hypertension check, cholesterol check, and physical checkups are 0.57, 0.31, 0.49, and 0.40, respectively. This indicates that the uninsured are 43% less likely to get cancer screenings, 69% less likely to get hypertension screenings, 51% less likely to get cholesterols screenings, and 60% less likely to get physical check-ups than their insured counterparts. Ironically, unlike the other three, hypertension screenings or blood pressure checkup is available for free in most pharmacies and large grocery stores, which leads to the question of what other factors are driving the avoidance of preventive care services among the uninsured. While this question is not going to be explored significantly in this dissertation, it does create a venue for future exploration on this topic.

**Sub Sample Analysis: Outcomes Between Insured and Uninsured Individuals**

Since the primary focus of this dissertation is to study the differences among insured and uninsured populations in the context of utilization of preventive care, we now proceed to test the uninsured and insured sub samples separately by estimating the logistical regression models for all four dependent variables. Before we present the results of the logistical regression models, it is important to perform a Chow test to identify whether the sub sample analysis is indeed desirable in this case. To determine whether the sub sample models by insurance status are significantly different from the full model, we perform the Chow Test. Table 10 shows the results of this test for all four of the dependent variables in our study. The interpretation of the results of the Chow

Test demonstrate that for three out of the four dependent variables, separating the estimations by sub sample yields more accurate results of the odds ratios for the variables.

Table 10

*Chow Test for Sub Samples*

| Dependent Variable | LR Test | $Chi^2$ d.f. | Prob > $chi^2$ |
|---|---|---|---|
| Cancer_chk | 146.12 | 11 | 0.0000 |
| Hypertension | 41.21 | 11 | 0.0000 |
| Cholesterol | 178.85 | 11 | 0.0000 |
| Phys_chk | 13.32 | 11 | 0.2729 |

*Note.* H0: The insurance status sub sample models are not different from the full sample model. Ha: The insurance status sub sample models are significantly different from the full sample model. Assumption: Full model for each dependent variable is nested within the sub sample models.

When we compare the estimates of logistic regression obtained from the full model with the corresponding results obtained by insurance status (*uninsured* = 0, *uninsured* = 1), we find that there are 11 degrees of freedom that can be saved by running the models separately for cancer, hypertension, and cholesterol variables because the sub sample models are significantly better than the full model. For the physical checkup variable, we find that the sub sample models are not better than the full model, implying that the full model is more dependable. This is because the probability of getting regular physical checkups is not affected by insurance status but rather is affected by an individual's characteristics and preferences.

Table 4 contains the descriptive statistics for all variables for insured and uninsured sub samples. Tables 11 to 14 contain the logistical results for each of the four dependent variables for both sub samples separately.

Table 11

*Cancer_chk for Insured vs Uninsured*

| | Insured Sub-sample | | | Uninsured sub-sample | | |
|---|---|---|---|---|---|---|
| DV: *Cancer_chk* | *OR* | *SE* | *z* | *OR* | *SE* | *z* |
| white | 1.463 | 0.088 | 6.31 | 1.286 | 0.307 | 1.06* |
| black | 1.953 | 0.135 | 9.66 | 2.441 | 0.615 | 3.54 |
| hispanic | 1.240 | 0.081 | 3.28 | 1.752 | 0.385 | 2.55 |
| lnincome | 1.089 | 0.022 | 4.16 | 0.881 | 0.055 | -2.04 |
| married | 2.063 | 0.087 | 17.16 | 1.518 | 0.180 | 3.51 |
| education | 1.008 | 0.003 | 3.19 | 1.017 | 0.009 | 1.98 |
| female | 7.995 | 0.338 | 49.18 | 32.372 | 4.963 | 22.68 |
| age | 1.012 | 0.002 | 7.21 | 1.032 | 0.005 | 6.10 |
| ageover64 | 0.372 | 0.024 | -15.24 | 0.213 | 0.103 | -3.19 |
| usualcare | 1.245 | 0.034 | 8.10 | 1.449 | 0.098 | 5.46 |
| healthstatus | 1.086 | 0.016 | 5.64 | 0.957 | 0.041 | -1.03* |
| Constant | 0.039 | 0.010 | -13.07 | 0.033 | 0.024 | -4.62 |
| Observations | 16,725 | | | 2,156 | | |
| LR chi2(11) | 3,494.89 | | | 902.29 | | |
| Prob > chi2 | 0.00 | | | 0.00 | | |
| Pseudo R2 | 0.1590 | | | 0.3020 | | |
| Log likelihood | -9,242.70 | | | -1,042.87 | | |

*Note.* * values insignificant at the $p = .05$ level.

When comparing the results for the cancer check variable, we find that all the race/ethnicity variables in both sub samples are associated with higher rates of cancer screenings as compared to others. What is important to note is that the odds for non-Hispanic Black and Hispanic individuals are all statistically significant at the 0.05 level and higher among the uninsured group as compared to the insured group, whereas the odds for non-Hispanic White individuals are lower and statistically insignificant at 0.05 level among the uninsured group as compared to the insured group. Income has a positive and significant impact on the odds of getting cancer screenings in the insured group but has a negative impact on the odds of getting cancer screenings in the uninsured group. Married individuals are more likely to get preventive

cancer screenings in both groups, but the odds are almost double in the insured group as compared to only a 50% increase in the uninsured group. Years of education do not increase the odds of getting preventive care in either group by a substantial amount, even though the variable is statistically significant at 0.05 level.

One of the starkest differences can be seen in the *female* variable across the two sub samples. While the odds of getting preventive cancer screenings increase by 800% for females as compared to males in the insured sample, the odds of getting preventive cancer screenings increase by a whopping 3,200% in the uninsured sample. A large portion of this type of difference still can be explained by the fact that two out of the three cancer screenings considered are "female-oriented," but it also implies that the availability of mammograms or pap smears for uninsured people is making a clear and positive impact on the usage of these services among the most vulnerable population in the country.

The age variables are comparable across both samples in terms of marginal increase in odds of getting cancer screenings and the age-over-64 variable decreasing the odds of getting cancer screenings. The usual source of care variable shows 24% increased odds of getting cancer screenings for insured individuals versus 44% increased odds of getting cancer screenings in the uninsured sample. This confirms to what we discussed earlier about getting these screenings done in a hospital instead of at a doctor's office.

The perceived health status variable comparison across both samples provides some very interesting results. In the insured sample, as the perception of health worsens, the likelihood of getting preventive cancer screenings increases by eight percent for every tier at a 0.05 level of significance. However, in the uninsured sample, as the perception of health status worsens, it lowers the likelihood of getting preventive cancer screenings by about five percent, albeit that it

is not statistically significant. It would be interesting to study this in more detail in the future because the costs of getting cancer screenings are often prohibitive and could be highly correlated with many other variables in the model for the uninsured sub-sample, leading to a multicollinearity issue with the results.

Table 12

*Hypertension Screening for Insured vs Uninsured*

| | Insured Sub-sample | | | Uninsured sub-sample | | |
|---|---|---|---|---|---|---|
| DV: Hypertension | *OR* | *SE* | *z* | *OR* | *SE* | *z* |
| white | 1.982 | 0.172 | 7.89 | 1.124 | 0.209 | 0.63* |
| black | 2.229 | 0.233 | 7.67 | 1.714 | 0.335 | 2.76 |
| hispanic | 1.284 | 0.114 | 2.81 | 1.011 | 0.173 | 0.06* |
| lnincome | 1.129 | 0.036 | 3.83 | 1.024 | 0.048 | 0.50* |
| married | 1.157 | 0.078 | 2.17 | 1.318 | 0.118 | 3.08 |
| education | 1.009 | 0.004 | 2.25 | 1.028 | 0.007 | 4.40 |
| female | 2.330 | 0.142 | 13.90 | 2.150 | 0.184 | 8.95 |
| age | 1.017 | 0.003 | 6.57 | 1.017 | 0.004 | 4.58 |
| ageover64 | 1.597 | 0.231 | 3.24 | 1.378 | 0.776 | 0.57* |
| usualcare | 2.378 | 0.106 | 19.35 | 1.776 | 0.103 | 9.91 |
| healthstatus | 1.126 | 0.027 | 4.92 | 1.055 | 0.034 | 1.67* |
| Constant | 0.260 | 0.095 | -3.70 | 0.349 | 0.190 | -1.93* |
| Observations | 20,674 | | | 3,280 | | |
| LR chi2(11) | 1,239.52 | | | 344.25 | | |
| Prob > chi2 | 0.00 | | | 0.00 | | |
| Pseudo R2 | 0.1229 | | | 0.0868 | | |
| Log likelihood | -4,424.73 | | | -1,809.87 | | |

*Note.* * values insignificant at the $p = .05$ level.

When comparing the results for the hypertension screening variable for the insured population, we find that all the race/ethnicity variables are associated with higher rates of hypertension screenings as compared to others with increased odds of 98% among non-Hispanic White, 123% increased odds among non-Hispanic Black, and 28% increased odds among Hispanic, all of which are significant at the 0.01 level. Among the uninsured population, the odds ratios are statistically insignificant at the 0.05 level for non-Hispanic White and Hispanic

variables but are statistically significant at 0.01 level and increased by 71% for the non-Hispanic Black variable as compared to the others. One of the key things to notice is that among both, insured and uninsured individuals, the non-Hispanic Black variable indicates the highest odds of getting preventive hypertension screening. Income has a positive impact on the odds of getting hypertension screenings in both the insured and uninsured groups but is only statistically significant at the .05 level for the insured population with an odds ratio of 1.13, indicating a 13% increase in the odds of getting a hypertension screening done for each 1% increase in income. Married individuals are more likely to get hypertension screenings in both groups since the odds increase by approximately 16% in the insured group and 32% for the uninsured group and are both statistically significant at the 0.05 level. Years of education increase the odds of hypertension screenings in both groups by an insubstantial amount, even though the variable is statistically significant at 0.05 level.

Gender does have a positive and statistically significant relationship with hypertension screening among both groups as the odds for insured females increase by 133% and increase by 115% among uninsured females. The odds of having hypertension screening for individuals older than the age of 64 increase by about 38% for uninsured individuals, and 60% for insured individuals. However, the age 64 variable is only statistically significant for the insured population at the 0.05 level, but is not significant in the uninsured population. Part of this happens because there might be few individuals in that age group that are not receiving any form of medical insurance due to eligibility for Medicare. In the effects of age as a continuous independent variable, there is about a 2% increase in the odds of having a hypertension screening for every one-year increase in age for both populations. The usual source of care variable shows 138% increased odds of getting hypertension screenings for insured individuals versus 78%

increased odds of getting hypertension screenings in the uninsured sample. The perceived health status variable comparison across both samples provides some very interesting results. In the insured sample, as the perception of health worsens, the likelihood of getting preventive hypertension screenings increases by 13 percent for every tier at a 0.05 level of significance. In the uninsured sample, the effect of perceived health status is not statistically significant.

Table 13 shows the comparative results between the insured and uninsured sub samples for the cholesterol screening dependent variable. These results indicate that the only race/ethnicity variable that is statistically significant for cholesterol screenings is the non-Hispanic Black variable in both sub samples. The odds of receiving cholesterol screenings increase by 31% among the insured non-Hispanic Black and a whopping 79% among the uninsured non-Hispanic Black as compared to others. Income has a positive and significant impact on the odds of getting cholesterol screenings in both groups. Within the insured population the odds of getting cholesterol screening increase by 33% for each 1% increase in income and within the uninsured population, there is a 15% increase in the odds of cholesterol screening utilization for every 1% in income. Marital status did not exhibit a statistically significant relationship to cholesterol screening in either sub sample. However, while each additional year of education did not increase the odds of getting preventive care in either group by a substantial amount, it is a statistically significant indicator in the uninsured group but not in the insured group.

Table 13

*Cholesterol Screening for Insured vs Uninsured*

| | Insured Sub-sample | | | Uninsured sub-sample | | |
|---|---|---|---|---|---|---|
| DV: Cholesterol | *OR* | *SE* | *z* | *OR* | *SE* | *z* |
| white | 1.000 | 0.094 | 0.00* | 0.937 | 0.243 | -0.25* |
| black | 1.309 | 0.142 | 2.48 | 1.788 | 0.485 | 2.14 |
| hispanic | 1.140 | 0.116 | 1.29* | 1.366 | 0.327 | 1.30* |
| lnincome | 1.330 | 0.048 | 7.97 | 1.152 | 0.079 | 2.07 |
| married | 1.097 | 0.073 | 1.40* | 1.153 | 0.134 | 1.22* |
| education | 1.003 | 0.004 | 0.74* | 1.031 | 0.009 | 3.47 |
| female | 0.105 | 0.007 | -31.84 | 0.313 | 0.037 | -9.82 |
| age | 1.345 | 0.007 | 59.83 | 1.210 | 0.008 | 28.05 |
| ageover64 | 0.021 | 0.003 | -23.36 | 0.063 | 0.035 | -4.93 |
| usualcare | 1.658 | 0.070 | 12.06 | 1.412 | 0.097 | 5.01 |
| healthstatus | 1.052 | 0.026 | 2.09 | 1.075 | 0.045 | 1.74* |
| *Constant* | 0.000 | 0.000 | -32.42 | 0.000 | 0.000 | -12.68 |
| Observations | 20,076 | | | 3,190 | | |
| LR chi2(11) | 19,397.55 | | | 1,908.38 | | |
| Prob > chi2 | 0.00 | | | 0.00 | | |
| Pseudo R2 | 0.7106 | | | 0.4689 | | |
| Log likelihood | -3,950.66 | | | -1,080.88 | | |

*Note.* * values insignificant at the $p = .05$ level.

Gender does have a negative and statistically significant relationship with cholesterol screening utilization among both groups as the odds for insured females decreases by 90% and decreases by 69% among uninsured females as compared to the corresponding males in the groups. The odds of having cholesterol screening for individuals older than the age of 64 decrease by about 98% for insured individuals and 94% for uninsured individuals. The age-over-64 variable is statistically significant for the insured population at the .001 level. Examining the effects of age as a continuous independent variable, there is about a 34% increase in the odds of having a cholesterol screening for the insured population for every one-year increase in age. There is about a 21% increase in the odds of having a cholesterol screening for the uninsured population for every one-year increase in age. The usual source of care variable shows 66%

increased odds of getting cholesterol screenings for insured individuals versus 41% increased odds of getting cholesterol screenings in the uninsured sample. The usual source of care variable is statistically significant in both populations at the .001 level. In the insured sample, as the perception of health worsens, the likelihood of getting preventive cholesterol screenings increases by five percent for every tier at a 0.05 level of significance. In the uninsured sample, the effect of perceived health status is not statistically significant.

When comparing the results for the physical checkups variable for the insured and uninsured sub samples, as seen in Table 14, we find that the only race/ethnicity variable that is statistically significant is the variable for non-Hispanic Black in both groups. The odds of getting physical checkups increase among insured non-Hispanic Black increase by 68% and by 59% in the uninsured group as compared to the others in each group, respectively. Income has a positive and significant impact on the odds of getting physical checkups screenings among both the insured and the uninsured groups, with 8% increased odds in the former and 10% increase in the latter for each additional percentage increase in incomes. Marital status is statistically significant for the uninsured population with an increased odds ratio of 1.27 for married as compared to unmarried individuals, but this variable is not statistically significant in the insured sub-sample. Each additional year of education increases the odds of obtaining physical checkups in both groups by an insubstantial amount, even though the variable is statistically significant at 0.05 level.

Table 14

*Physical Checkup for Insured vs Uninsured*

| | Insured Sub-sample | | | Uninsured sub-sample | | |
|---|---|---|---|---|---|---|
| DV: Phys_chkup | *OR* | *SD* | *z* | *OR* | *SD* | *z* |
| white | 1.039 | 0.056 | 0.72* | 0.841 | 0.145 | -1.00* |
| black | 1.677 | 0.107 | 8.12 | 1.592 | 0.282 | 2.63 |
| hispanic | 1.120 | 0.065 | 1.95* | 0.979 | 0.155 | -0.14* |
| lnincome | 1.078 | 0.020 | 4.00 | 1.103 | 0.048 | 2.25 |
| married | 1.067 | 0.040 | 1.71* | 1.272 | 0.105 | 2.93 |
| education | 1.005 | 0.002 | 2.32 | 1.017 | 0.006 | 2.80 |
| female | 1.625 | 0.054 | 14.51 | 1.657 | 0.126 | 6.62 |
| age | 1.025 | 0.001 | 17.44 | 1.024 | 0.003 | 7.28 |
| ageover64 | 1.667 | 0.121 | 7.05 | 1.044 | 0.424 | 0.11* |
| usualcare | 1.679 | 0.041 | 21.49 | 1.604 | 0.075 | 10.05 |
| healthstatus | 1.064 | 0.015 | 4.49 | 1.033 | 0.030 | 1.10* |
| Constant | 0.125 | 0.027 | -9.47 | 0.045 | 0.023 | -6.14 |
| Observations | 20,612 | | | 3,242 | | |
| LR chi2(11) | 2,371.02 | | | 331.29 | | |
| Prob > chi2 | 0.00 | | | 0.00 | | |
| Pseudo R2 | 0.0982 | | | 0.0754 | | |
| Log likelihood | -10,888.76 | | | -2,030.81 | | |

*Note.* * values insignificant at the $p = 0.05$ level.

Gender does have a positive and statistically significant relationship with physical checkups among both groups as the odds of females getting a physical checkup increase by 62% in the insured group and increase by 66% in the uninsured group, as compared to the corresponding males in each group. The odds of having a physical checkup for individuals older than 64 increase by about 4% for uninsured individuals, and 67% for insured individuals. However, the age-over-64 variable is only statistically significant for the insured population at the .05 level and is statistically insignificant in the uninsured population. Examining the effects of age as a continuous independent variable, there is about a statistically significant 2% increase in the odds of having a physical checkup for every one-year increase in age for both groups.

The usual source of care variable shows 68% increased odds of getting physical checkups for insured individuals versus 60% increased odds of getting physical checkups in the uninsured sample. The usual source of care variable is statistically significant in both populations at the .001 level. As an insured individual's perception of health worsens, the likelihood of getting physical checkups increases by six percent for every tier at a 0.05 level of significance. In the uninsured sample, the effect of perceived health status is not statistically significant.

**Summary/Conclusion**

Overall, results of those sampled for the year of 2015 indicated the hypothesis was supported. The utilization of preventive care services is related to a lack of health insurance, which could otherwise enable them to obtain timely preventive care. From the results of the study, those who lack health insurance have lower preventive care utilization. The uninsured are 43% less likely to get cancer screenings, 69% less likely to get hypertension screenings, 51% less likely to get cholesterols screenings, and 60% less likely to get physical check-ups than their insured counterparts. The results indicated that there are clear and statistically significant (at 0.01 level) lower odds for utilization of all four preventive care services (cancer screening: colon, breast, cervix), hypertension screening, cholesterol screening, and physical checkups) among the uninsured compared to those that are insured. Likewise, the results demonstrate the importance of understanding the determinants of preventive services among the variety of population subgroups.

## Conclusion and Future Scope

The objective of this dissertation was to examine and analyze the use of preventive health services and sociodemographic factors controlling for health insurance coverage among adults in the USA. As discussed in earlier chapters of this study, current trends in the population, such as aging adults and uninsured adults, forebodes an increase in the number of adults suffering from chronic diseases. The trends include a growing population of older adults living with one or more chronic disease requiring years of ongoing medical attention. These conditions result in many adverse health outcomes, increased health care needs, and higher medical costs. Specifically, this study focused on the association between lack of health insurance and influences of the socioeconomic characteristics associated with low use of preventive health care services. Moreover, the intent of this research was to obtain a comprehensive understanding of the topic to help provide an avenue to improve the use of preventive services. Examining the insured versus uninsured, could assist policy makers who need to provide more affordable uses of preventive health screenings to their constituents. In addition, it would allow the disadvantaged individuals discussed in this dissertation to receive early diagnosis of chronic diseases for better health outcomes.

The Andersen behavior model is a widely accepted, reliable tool for the study of health services utilization. The model details predisposing, enabling, and need factors associated with health care services utilization (Andersen, 1995). We applied it to this study to determine influencing factors associated with health services among the uninsured in the United States. The inclusion of the socioeconomic factors is based on the theoretical framework of the model. These factors help us identify the population at risk and determine why the uninsured do not receive health services. This study analyzed age, gender, education, marital status, and race/ethnicity in

relation to predisposing factors that explained the study subjects' natural tendency to utilize health care services. Enabling factors applied to this study were income, health insurance status, and regular source of care, which are defined as the resources available to individuals to utilize preventive services (cancer screening, hypertension screening, cholesterol screening, and physical checkups). Finally, need factors represent health status or disease and are essential causes of health services utilization like chronic diseases. The framework from this model that societal determinants affect individual determinants, both directly and indirectly, through the health service system and that have the most influence on people's decision about the use of preventive health services reflect the importance of seeking medical care. In this study, we can identify the unique characteristics that we share in the summary below.

**Summary of the Study**

We first estimated the average estimates of factors that contribute to the utilization of preventive care services and identified which of them are significant contributors among the insured and uninsured sub samples and in the general combined sample taken from the MEPS dataset for the year 2015. The descriptive statistics suggest that the uninsured population is disproportionately Hispanic because *hispanic* comprises only 32.5% of the entire sample but constitutes 55.8% of the uninsured sub-sample. Next, we observe there is an income disparity of close to $24,000 between the insured and uninsured sub samples. Lower levels of education have been linked with higher levels of chronic diseases and mortality, as well as income levels demonstrating that higher socioeconomic position is associated with better health. Out of the 17,465 observations, we found that the mean number of years of schooling is 10.98 with a standard deviation of 4.65 as shown in Table 5. There is a distinct difference between the

educational attainment among uninsured and insured people and the spread of education is higher in the insured than in the uninsured sample.

Females also exhibited a statistically significant increase in the odds of having all types of preventive care checkups relative to males, except in the cholesterol screening model. The odds of cholesterol screening decreased by 87% among females as compared to males. In addition, the percentages of the insured and uninsured populations that were *female* were 52.9% and 45%, respectively, indicating that more males than females were uninsured for the year 2015. For the age variable, most of the uninsured population fell between age 19 to 64 years, which is indictive of the realities of people that are 65 years and older aging into Medicare coverage and children under 19 years of age often covered by government or parent coverage. Having a primary care has been associated with higher utilization for preventive care when needed and with better preventive health and chronic disease treatment. About 20.7% of those that are insured cited having no usual source of care compared to 59.6% of the uninsured sample. The percentages of having a doctor as the usual source of care are 53.5% for the insured and 21.7% of the uninsured. Thus, groups that have a lower socioeconomic status are less likely to have a regular source of care, which leads to a lower use of preventive health services. This finding is consistent with the results obtained from other studies as discussed in Chapter 2 that disadvantaged groups that do not have a usual source of care and are less likely to use preventive health services, thereby increasing their propensity for the incidence of chronic medical conditions. Finally, perceived health status building on the Andersen behavior model when the need factors have a strong positive association with health service, from this sample implied the poorer the self-perceived health status, the more likely an individual was to utilize all four types of preventive health care services.

Table 9 presented the outcomes of the logistical regression estimates in terms of odds ratios relating to preventive care services. The results demonstrate that there is evidence pointing to several statistical significance differences in use of preventive care services by socioeconomic factors. Non-Hispanic Whites in our sample were likely to get cancer and hypertension screening as compared to others. The odds ratios associated with the natural log income variable suggested that higher levels of income had a positive relationship with the utilization rates of all four types of preventive care screenings. Literature has either indicated a positive relationship between higher income/social class and utilization rates of preventive services, or no relationship at all (Brunner et al., 2013). More research is necessary into the role of income and socioeconomic status in the uptake of preventive health services. As we look at marital status, individuals who were married had a higher likelihood of obtaining screenings than compared to those unmarried individuals. The results agree with previous research indicating that generally marriage acts positively for the promotion of good health related behaviors. The education variable was positive, but not nearly as pronounced. These are interesting results, especially when we take into account that the literature reviewed in Chapter 2 emphasized the notion that higher education correlates with higher use of preventive care services.

The results also showed that there is a gender difference, with women having higher odds of using preventive services than men. Older people had lower odds of undergoing preventive services as compared to those under 65 years of age. Furthermore, individuals with a usual source of care implied that people who used a hospital or emergency room as their source of care were more likely to get preventive care services than if they visited their regular office visits for preventive services. Lastly, the results of logistic regressions using preventive services for health

status implied that people with a poor self-perceived health status were more likely to utilize all four types of preventive health care services.

One crucial piece of evidence that needs to be emphasized in the context of policy and recommendations is the increased odds of getting preventive care among people who use non-ER or ER hospital visits for their usual source of care. It seems to be not only contradictory to expectations but also hovers in the face of the entire argument of providing easier or at least mandatory access to medical insurance in the population. If the whole point of increasing insurance access is to ensure that people get timely medical care and reduce the risk of suffering from chronic diseases, our sample results indicate that this is not happening. There has to be some type of a requirement at doctor's offices to ensure that basic preventive care is provided to their clients. In the light of no such existing requirements for preventive care checkups, having health insurance mandates is simply a smoke-and-mirrors approach to pretending that all is well with the world if everyone has insurance.

Finally, displayed in tables 11 to 14 are the logistical results for each of the four dependent variables for both sub samples displayed separately to examine the probability and volume of preventive care utilization use of the dependent variables as they might differ between uninsured and insured groups. Of the starkest differences in cancer screenings were seen in the female variable where the odds of getting preventive cancer screening increased by 800% for females as compared to males. Since two of the cancer screenings, mammograms and pap smears, are specific to women, this result might be naturally biased towards women when considering cancer screenings collectively. Nonetheless, this implies that the availability of these services to the uninsured is making a positive impact on cancer screenings. The results for cancer screening also suggest that years of education do not increase the odds of getting preventive

screenings in either group by any substantial amount, even though it was statistically significant. We had expected that education would have had a stronger positive effect on preventive care use since the literature review revealed in various studies that having a higher education correlated positively with having higher income, which in turn, results in the ability to afford health insurance. However, while income had a positive and significant impact on the odds of getting cancer screenings in the insured group, it had a negative impact on the odds of getting cancer screenings for the uninsured group. This suggests that income may not determine an individual's ability to afford preventive health care in the United States. Part of this discrepancy can also be explained by the fact that health insurance for those below the age of 19 years or above the age of 64 years is usually covered either by government programs or by other adults.

The analysis of hypertension screening yielded interesting results in the perceived health status variable comparison of both samples. In particular, the type of usual source of care increased the odds of hypertension screening by 138% for the insured, and 78% for the uninsured. Results also indicated for both populations a 2% increase for hypertension screens for every one year of increase in age. As the perception of health worsened, the likelihood of getting preventive hypertension screenings increased by 13%. This suggests that the factor of perception of health contributes to the use of preventive health services for both groups, but the disadvantaged groups are still less likely to utilize hypertension screenings as they age.

Cholesterol screening indicated a negative relationship with the gender variable showing that females had decreased odds of 90% in the insured and 69% in the uninsured group as compared to males for getting timely cholesterol checks. Interestingly, race/ethnicity variables indicated that the only race that was statistically significant for cholesterol screenings was non-Hispanic Black in both sub samples. Recall bias may have hindered the patient's inability to

respond to this survey question where respondents are asked to recollect health related events that happened with the large time frame of 5 years, as in cholesterol screening utilization. A lack of utilization of cholesterol screening requires special attention considering this is a screening that is simple and cheap. If gone undetected, this could have substantial harmful effects on health with increasing age. As with other preventive services, early diagnosis can prompt early treatment of cholesterol levels and prevent further development of cardiovascular complications.

In the comparisons of physical checkups for both insured and uninsured sub samples, a rather interesting race/ethnicity related trend was observed. The only race/ethnicity variable that was statistically significant was the non-Hispanic Black in both groups. Physical checkups are beneficial to assist patients with health and lifestyles and to help refer future visits. Obtaining basic health services also allows for screenings and treatments to detect problems before they start. The odds for physical checkups increased by 68% for insured non-Hispanic Blacks and 59% in the insured group as compared to other race groups. Non-Hispanic Blacks generally are at a higher risk for chronic diseases. For this reason, it is possible that this group was aware of the threats and therefore utilized the preventive services more than any other race group.

**Policy Implications of Empirical Findings**

This study relates to insurance status versus uninsured status and their use of preventive health care services. The implications suggest that if the current U.S. health care reform does in fact make preventive care services free or affordable to all residents who hold insurance, it is likely that Americans will increase their use of preventive care services. The U.S. health care market should take this policy implication into serious consideration when calculating the future costs of health care. Policy implications are if they begin making health insurance available to

more people and consider making preventive care services free of out of pocket charges more individuals would consume more preventive care services.

This study supports why efforts to increase health insurance coverage to all is important, but also identifies that simply increasing the incidence of insurance is not enough to ensure optimal health outcomes for the population. For example, when comparing the 2015 sample results for insured versus uninsured groups, the utilization of preventive care services were related to the lack of health insurance on the one hand, but the usual source of care variable indicated that people who used their doctor's offices as their usual source of care were less likely to obtain the appropriate preventive care screenings in a timely manner.

The analysis of all independent variables, such as race/ethnicity, income, marital status, education, gender, age, usual source of care, and perception of health status, to investigate the influences of health insurance status on the utilization of preventive care services is important. It can guide policy makers in the design, implementation, and monitoring of strategies to improve availability of preventive health services. In addition, these findings can address the possible obstacles in the effective access and utilization of such services.

One final policy implication that can be taken from these results comes from the observed differences in Tables 11 to 14. Logistic regression models contained the statistical findings of the sub sample analysis between insured versus uninsured. Preventive care utilization for all four dichotomous dependent variables that helped measure the relationships between our socioeconomic factors of the study indicated that those who lacked health insurance were less likely to get any of the four screenings than their insured counterparts. We learned through a review of existing literature in Chapter 2 that chronic diseases are slower to develop, are longer in duration, and have multiple causes, some occurring years before the onset symptoms. This

suggests that more focus should be on prevention and preventive care services instead of treatment of chronic diseases once they become pronounced. Table 15 lists those four services that were less likely to be obtained in the uninsured group by percentage. These outcomes confirm that, in general, insured individuals do better than those that are uninsured when it comes to utilization of core preventive care services. This should provide a useful guideline for policy purposes to help address disparities among utilization of preventive health services by improving affordability, accessibility, and availability of these services for a larger proportion of the population. Simply increasing the perceived access to these services by mandating health insurance coverage is perhaps neither a necessary nor a sufficient condition to ensure an increase in the utilization of these services.

Table 15

*Breakdown of the Four Dependent Variable Screenings*

| Preventive Care Utilization | Uninsured |
|---|---|
| Cancer Screening | 43% less likely |
| Hypertension Screening | 69% less likely |
| Cholesterol Screening | 51% less likely |
| Physical checkups | 60% less likely |

**Contributions and Limitations of this Study**

As with all research, this study has some limitations. One of its biggest limitations is that we recognize that there are other non-insurance-based factors that appear to be influencing the usage of preventive care services in the population of the United States. Thus, other factors driving the avoidance of preventive care services among the uninsured need to be further explored. This study utilized correlational data, which means that relationships demonstrated can only be inferred with caution. Endogeneity may be an issue because insurance status may help

capture the effects of the barriers that prevent care use but may capture the effects of risk-aversion. An alternative interpretation of this result is that having insurance does not influence an individual's demand for preventive care directly, but rather that relatively risk averse individuals obtain health insurance and are therefore more likely to both have insurance and to engage in preventive measures to avoid bad health status and the economic consequences of poor health.

Another limitation of this study is that it includes only one-year data from the MEPS database in the post-ACA era from 2015. This limits the ability to assess how consistent the results are over a longer period and to identify trends versus cross-sectional information. This study has, nevertheless, offered interesting insights of preventive health services barriers for adults by describing the relationship between socioeconomic position and utilization of preventive care services in relation to the four dependent variables. This study was also successful in identifying populations that show lower utilization of these services.

**Suggestions for Future Research**

This study was focused on a large sample taken from the population in the United States for the year 2015. Examining the model and method to a smaller, more geographically specific population may provide additional useful information regarding access to preventive care services. As mentioned in Chapter 2, the Kaiser Family Foundation (2018) claimed that undocumented immigrants in the United States constitute close to 25% of the population of people who qualify for subsidies in the marketplace and those who are eligible for Medicaid. Literature review from the same source identified South Texas as one of the regions having the highest number of uninsured rates (KFF, 2018). Obtaining a sample representative of the population and using demographics, socioeconomics factors as in this study, as well as adding other variables to identify the differences among citizens, legal residents, and undocumented

immigrants could help address another selected group that was not discussed in this dissertation. In addition, adding an independent variable of geographic locations urban and rural locations to the study could help further contribute to this study to identify if rural areas have higher uninsured rates. This could help provide more effective information on the availability and necessity of the population, in turn providing efficient ways to prevent chronic diseases as well as apply better methods to enable the use preventive care services to all the uninsured populations.

The statistical evidence from this study reflects associations that alone do not always establish causation. We must broaden public health practices to include other indicators that measure the burden of chronic diseases. The idea, according to Bauer et al. (2014), is to address down streaming indicators by measuring those burdens beyond medical practices and, therefore, intensify the need to upstreaming by considering the social, economic and environmental origins of health problems that manifest at the population level, not just the symptoms or the end effect. As mentioned in Chapter 1, the CDC suggested that reducing chronic illnesses in the 21st century required addressing a range of community-based and clinically-based prevention strategies that dealt with the root cause of chronic conditions. These prevention strategies are organized in four domains described by the CDC: 1) epidemiology and surveillance to monitor trends, 2) environmental approaches that promote health services and support healthy behaviors, 3) health system interventions to improve effective delivery and use of clinical and preventive care services, and 4) community resources linked to clinical services to improve and sustain management of chronic diseases. Although this study only focused on health system interventions to improve effective use of clinical and preventive health services, social factors that impact on health, such as those suggested by the CDC, would be recommended for future

studies. Further research on correlations between epidemiology, environment, and community resources could help further address the disparities to deal with root causes of chronic conditions among the uninsured populations. We end our discussion with the hope that this and future research studies can help guide public policy in a direction that supports the efforts to improve the utilization of preventive care services among all members of the society to ensure a lower rate of chronic conditions and related mortality or disability issues.

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