

HOW HAVE SOCIOECONOMIC INEQUITIES IN HEALTH CARE UTILIZATION
CHANGED OVER TIME?
A THIRTY-YEAR ANALYSIS OF THE UNITED STATES OF AMERICA

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By

Adam M. Wright, B.A.

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Thesis Advisor: Yuriy Pylypchuk, Ph.D.

ABSTRACT

In 2008, the World Health Organization issued a report calling for urgent action on behalf of governments around the world to address differences in health within and between countries, observing that “social injustice is killing people on a grand scale.” Although substantial change has occurred in the United States healthcare system over the past thirty years, empirical studies and anecdotal reports indicate that Americans continue to face worsening health outcomes largely as the result of avoidable systematic differences in the delivery of care. This study examines how socioeconomic inequities in health care utilization have changed in the United States between 1983 and 2011. Specifically, logit regression models are used to calculate differences in the probability of visiting a doctor and being admitted to a hospital, and negative binomial regression models are used to examine population differences in the frequency of use of these services. After controlling for health status and demographic characteristics, the results from most years examined demonstrate that income, education and employment status are key determinants in explaining differences in utilization; however, the probability of an individual being admitted to a hospital is less sensitive to socioeconomic influences than is the utilization of doctor services. Overall findings of this study indicate that a positive relationship exists between socioeconomic status and health care utilization and, although there is slight variation over time, inequities are persistent in the United States healthcare system.

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Many thanks,
Adam M. Wright

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INTRODUCTION

A fundamental principle inherent to healthcare systems in most advanced democracies is the idea of horizontal equity; that is, individuals with equal need should be given equal care, irrespective of personal characteristics like race, income, employment status or education. In 2008, the World Health Organization issued a report calling for urgent action on behalf of governments around the world to address differences in health within and between countries, observing that “social injustice is killing people on a grand scale.” Although substantial change has occurred in the United States healthcare system over the past thirty years, empirical studies and anecdotal reports indicate that Americans continue to face worsening health outcomes largely as the result of avoidable systematic differences in the delivery of care. Socioeconomic inequities in the utilization of health care do not arise naturally as a result of the human condition; rather, they are the result of the interplay between the circumstances in which people live, work and age and the combination of inadequate social and economic policies shaped by sociopolitical structures and processes. To ameliorate these problems, it is important that policymakers and health experts are adequately informed about the presence of health inequities and their evolution over time.

Several studies on inequities in health care utilization are available in the literature (Almeida and Sarti 2013; Braveman et al. 2010; Curtis and MacMinn 2008; Decker and Remler 2005; Gamble and Stone 2006; Hajizadeh et al. 2012; Lasser et al. 2006; Leu and Schellhorn 2004; van Doorslaer et al. 2000; Waidmann and Rajan 2000). However, most of these studies have focused solely on racial inequities, have concentrated on one point in time, have focused their

attention to the effects of universal health insurance systems on reducing disparities in health, or have examined the evolution of inequities in countries other than the United States. This study contributes to the current literature by examining how the relationship between socioeconomic status and health care utilization has transformed over time in the United States between 1983 and 2011. Although the descriptive nature of this study provides health experts and policymakers with important detailed information on how the relationship between socioeconomic status and health care utilization has changed over time, no statements of causality can be expressed.

This study uses ten cross-sections of data from the National Health Interview Survey (NHIS) and the Medical Expenditure Panel Survey (MEPS) to specifically examine how inequities in the utilization of doctor and hospital services along the lines of income, education and employment have changed over a twenty-nine year period. First, logit regression models are used to calculate the probability of visiting a doctor and being admitted to a hospital. Second, negative binomial regression models are used to examine population differences in the frequency of use. It is important to note that although inequities in utilization may be the product of underutilization by individuals with low levels of care or overutilization by individuals with high levels, this study focuses on utilization only and not on demand for or access to health care. Such issues are often difficult to observe and require data that is not always readily available.

Overall findings of this study indicate that a positive relationship exists between socioeconomic status and health care utilization, and that there is slight variation over time. After controlling for health status and demographic characteristics, the results from most years

examined demonstrate that income, education and employment status are key determinants in explaining differences in utilization. Regarding doctor utilization, poorer individuals are slightly less likely to contact a doctor and, while variation exists across years, the difference is generally diminishing over time. Results show that although inequities in the likelihood of making contact with a doctor are present, the poor have on average the same number of annual visits as those who are not poor or middle income earners. Individuals with high levels of income are found to have a higher probability of contacting a doctor and make more visits in a given year. In relation to the effect of education, findings indicate that higher levels of education are associated with both a higher probability of contacting a doctor and a higher frequency of visits, and that this positive relationship is stable over time. Employed individuals are only marginally less likely to contact a doctor compared to those who are unemployed or not in the labor force, and have fewer visits on average. Regarding rates of hospital utilization, findings indicate that the probability of an individual being admitted to a hospital is less sensitive to socioeconomic influences than is the utilization of doctor services.

This paper is organized in the following manner. First, this paper provides a review of the current literature and institutional background. Second, the methodological approach and underlying conceptual model is discussed. Third, this paper describes the empirical model and estimation strategy. Fourth, a description of the data used in this analysis is reviewed. Fifth, this paper presents the results of the study. Sixth, a number of policy implications, caveats and limitations are explored. Finally, this paper concludes with a discussion of findings and suggestions for future research.

LITERATURE REVIEW & INSTITUTIONAL BACKGROUND

According to the Organization for Economic Cooperation and Development (OECD) – which tracks and reports annually on more than 1,200 health system measures across more than 30 industrialized countries – the United States healthcare system differs markedly from other countries (Squires 2011). For instance, whereas most countries have achieved almost universal coverage, or at the least have a system that is comprised of a mix of public and private financing and delivery of services, the United States is characterized by a patchwork of predominantly private sources (Brown 2008; Madrian 2006; Squires 2011). The United States spends substantially more on health care than any other country in the developed world; in 2008 about 16 percent of GDP was spent on health care, which was nearly double the OECD median (Squires 2011). Despite this exceptionally high level of spending, reports indicate that the United States does not appear to achieve better health outcomes relative to other developed countries (Henry J. Kaiser Family Foundation 2012). The United States also has relatively few physicians and doctor visits compared to other countries, and hospital admission rates are lower and the average length of stay is shorter, yet spending is higher per discharge (Squires 2011).

Recently, rising income inequality and soaring costs of medical services in the United States – coupled with reports of worsening access to care and persistent disparities in utilization rates for minorities and low-income groups – have led health experts and policymakers to call for urgent action on the social and economic determinants of health with the goal of achieving absolute health equity (CSDH 2008; U.S. Department of Health and Human Services 2013). Although the presence and impact of horizontal inequities in health care utilization is well-documented, most

studies in the United States have focused primarily on the effect of race or ethnicity and have failed to explore in greater detail the effect of socioeconomic status on utilization. Furthermore, of the few studies that have examined the relationship between socioeconomic status and health care utilization, most have focused narrowly on one point in time, have been predominantly concerned with outcomes for children or the elderly, or have excluded other measures of socioeconomic status beyond just that of income.

For example, while addressing the question of how scientific research can best contribute to reducing health inequities in the United States, Gamble and Stone (2006) acknowledge that inequities stem from multiple dimensions along the lines of gender, income, education and geographic location, but focus the attention of their analysis primarily on racial and ethnic disparities in health. Waidmann and Rajan (2000) provide a comprehensive analysis of health disparities among racial and ethnic groups in the United States – finding that both the magnitude and reasons behind racial and ethnic disparity depend significantly on the state, the ethnic group and the type of measure being studied – but do not focus in detail on measures of socioeconomic status. Braveman et al. (2010) use data on five child and six adult health indicators to examine indicator rates across multiple income and education categories both overall and within racial and ethnic groups. Findings suggest that health indicators in the United States are often patterned strongly along both socioeconomic and racial or ethnic lines, signifying that a robust link exists between hierarchies of social advantage and health, however the study does not specifically examine patterns of inequity in the utilization of health care (Braveman et al. 2010).

Several studies have compared health characteristics and utilization of services across countries, but have focused solely on one point in time or have concentrated their attention to the effects of universal health insurance systems on reducing disparities in health. Lasser et al. (2006) compare health status, access to care and utilization of medical services in Canada and the United States, focusing on disparities according to race, income and immigration status. Findings indicate that compared to Canadians, respondents from the United States are less likely to have a regular doctor, are more likely to have unmet health needs, and have a higher probability of forgoing needed medicines (Lasser et al. 2006). However, although the study clearly shows that inequities along the lines of socioeconomic status and race are present in both countries – being more extreme in the United States – it only provides a snapshot of one point in time and does not seek to examine how such inequities might change over time. Decker and Remler (2005) compare the effect of income and self-reported health status in the United States and Canada in the late 1990s, focusing specifically on the effect of universal health insurance on reducing socioeconomic disparities in health. Findings indicate that the availability of universal health insurance is likely to decrease the difference in the strength of the income gradient in the United States compared with Canada. Similarly, van Doorslaer et al. (2000) compared equity in the delivery of health care in the United States and 10 European countries using a range of survey years between 1987 and 1996 – depending on data availability and comparability across countries – but did not seek to examine how inequities change over time. Results indicate that in all countries, lower-income groups are likely to be more demanding users of health care, but after adjusting for need differences there is little evidence of significant inequity in the delivery of health care overall (van Doorslaer 2000).

Of the studies that have sought to examine the change in socioeconomic inequities in health care utilization over time, to date all have been concentrated on countries other than the United States. Curtis and MacMinn (2008) examine patterns of health care utilization in Canada between 1978 and 2003. Results indicate that socioeconomic inequities in utilization are apparent, being more significant in regards to initial contact with the health care system than the number of visits, and that specialist services are becoming increasingly problematic over time. Leu and Schellhorn (2004) investigate income-related equity in access to health care in Switzerland over a twenty-year period between 1982 and 2002. Findings show that, on average, the degree of inequity along the lines of socioeconomic status is small in magnitude and that there is little variation over time. Almeida and Sarti (2013) provide a detailed analysis of the evolution of income-related inequalities in health status and health care utilization in a variety of Latin American and Caribbean countries with mixed results. Finally, Hajizadeh et al. (2012) measure horizontal inequities in health care utilization in Australia between 1983 to 2005 and find that the distributions of physician visits are generally pro-poor, whereas the distributions of dentist, specialist and ambulatory visits are, on average, pro-rich.

METHODOLOGICAL APPROACH & UNDERLYING CONCEPTUAL MODEL

Some studies have modeled the demand for health care similar to other non-medical goods and services in order to estimate demand elasticities, examine levels of consumer responsiveness to prices, and predict utilization rates of medical services (Duan et al. 1983; Feldstein et al. 1977; Manning 1987; Newhouse et al. 1980). Other studies have applied the principal-agent framework as the basis for modeling health care utilization, whereby patients (the principal) rely on physicians (the agent) to perform some type of service on their behalf or for assistance in making optimal medical choices (Blomquist 1991; Buchanan 1988; Curtis and MacMinn 2008; Jensen et al. 1976; Mooney and Ryan 1993). As a consequence of information asymmetries – whereby the doctor has more information than the patient – a principle-agent problem can arise when doctors pursue their own goals rather than the goals of the patient (Drummond and McGuire 2001; Pindyck and Rubinfeld 2013). In such circumstances, due to economic, personal or other reasons, doctors fail to offer the exact level of care that patients would have used if they were basing their decisions on perfect information.

Ordinarily, empirical studies that focus on the principle-agent model as a framework for examining health care utilization assume that medical decisions are a two-step process (Curtis and MacMinn 2008; Gerdtham 1997; Pohlmeier and Ulrich 1995; Wagstaff and van Doorslaer 2000). As such, a two-part hurdle model is frequently used to account for the unique distribution of the count data. In the first step, a logit model is used to estimate the relationship between the likelihood of contact and individual characteristics. In the second step, prior studies have typically used a zero-truncated negative binomial regression to estimate the number of visits to a

doctor or the length of stay in hospital, conditional on at least one visit. However, due to time limitations and the size and complexity of the data used, this study employs a negative binomial regression without truncation to examine the effect of socioeconomic status on the change in the population mean number of days spent in hospital and the change in the population mean number of annual doctor visits. While this method does not allow for detailed analysis of the frequency of visits conditional on at least one visit, it is nevertheless well-suited for over-dispersed count data and indicates the frequency of utilization for the overall population (Cameron and Travidì 1986; Gardner et al. 1995; Greene 1994; Hilbe 2011).

Using both a logit model to estimate the probability of contact and a negative binomial model to estimate the frequency of use allows for in-depth policy analysis of the relationship between socioeconomic status and health care utilization. For example, if significant effects are witnessed in the likelihood of making contact with a doctor or hospital, then problems with information dissemination or perverse incentives and disincentives for individuals who are seeking care may be a primary concern. In which case, policymakers should focus on initiatives that remove existing barriers that limit the utilization of services, better educate the public about the proper use of medical services, provide better transportation assistance for individuals who require it, assist employees in negotiating time away from work to visit a doctor, or provide better availability through opening more clinics with extended operating times to accommodate those who may work irregular hours. Likewise, if significant effects are witnessed in the frequency of visits or length of stay in hospital, then policymakers may wish to focus on initiatives that

promote better patient-provider communication and appropriate levels of care through enforcing clinical guidelines that have a strong commitment to horizontal equity.

EMPIRICAL MODEL & ESTIMATION STRATEGY

The strength of the relationship between socioeconomic status and health care utilization in the United States is examined using measures of relative income, education and employment status. The primary focus is on individuals between the ages of 24 and 64, an age group who are most likely to be making their own decisions about health care and whose utilization rates are likely to be responsive to socioeconomic factors. First, logit regression models are used to examine the effect of socioeconomic status on the probability that an individual either contacts a doctor or is admitted to a hospital:

$$\begin{aligned} \text{contact} = & \beta_0 + \beta_1 \text{poor} + \beta_2 \text{highincome} + \beta_3 \text{lessthanHS} + \beta_4 \text{somecoll} + \beta_5 \text{collgrad} + \\ & \beta_6 \text{postcoll} + \beta_7 \text{employed} + \beta_8 \text{white} + \beta_9 \text{male} + \beta_{10} \text{poorhealth} + \\ & \beta_{11} \text{prevmarr} + \beta_{12} \text{nevmarr} + \beta_{13} \text{Age24to29} + \beta_{14} \text{Age30to34} + \\ & \beta_{15} \text{Age35to39} + \beta_{16} \text{Age45to49} + \beta_{17} \text{Age50to54} + \beta_{18} \text{Age55to59} + \\ & \beta_{19} \text{Age60to64} + \beta_{20} \text{midwest} + \beta_{21} \text{south} + \beta_{22} \text{west} + \mu \end{aligned}$$

(Equation 1)

where *contact* is an indicator denoting whether or not an individual either contacted a doctor or was admitted to a hospital in the past 12 months; *poor* is an indicator denoting whether or not an individual's total annual family income is less than 100 percent of the federal poverty level; *highincome* is an indicator denoting if an individual's total annual family income is more than 400 percent of the federal poverty level (for years 1998-2011 only); *lessthanHS* is an indicator denoting whether an individual did not graduate from high school; *somecoll* is an indicator denoting if an individual completed between one and three years of university education but did not graduate; *collgrad* is an indicator denoting if an individual graduated from university but did not go on to complete any further years of education; *postcoll* is an indicator denoting if an

individual has completed at least one or more years of post-graduate education at university; and *employed* is an indicator denoting whether or not an individual is employed. The base case is a non-white female who is between 40 and 44 years of age, is a high school graduate, is married, reports being in excellent or good health, is currently unemployed and resides in the northeast region of the country.

Since health status and other demographic variables are known to be correlated with both income and the utilization of doctor or hospital services, a number of controls are also included. The variable *white* is an indicator that denotes whether or not an individual's race is white; *male* is an indicator that denotes whether or not an individual is male; *poorhealth* is an indicator that denotes whether or not an individual reports being in fair or poor health; *prevmarr* is an indicator denoting whether or not an individual has been married previously; *nevmarr* is an indicator denoting if an individual has never been married; seven indicator variables are included to represent individuals from various age groups (for example, *Age24to29* denotes individuals who are between 24 and 29 years of age; the base case is individual's between 40 and 44 years of age); *midwest* is an indicator denoting if an individual resides in the mid-western region of the United States; *south* is an indicator denoting whether or not an individual resides in the southern region; and *west* is an indicator denoting whether or not an individual resides in the western region.

The coefficient on the variable *poor* indicates the degree to which poor individuals are more or less likely to contact a doctor or be admitted to a hospital compared to individuals who are not

poor (or, for years between 1998 to 2011, compared to individuals who are low- to middle-income earners). Likewise, for years between 1998 and 2011, the coefficient on *highincome* indicates the degree to which individuals with income greater than or equal to 400 percent of the federal poverty line are more or less likely to contact a doctor or be admitted to a hospital compared to low- to middle-income earners. Holding all other factors in the model constant, the sign and size of $\beta_{lessthanHS}$, $\beta_{somecoll}$, $\beta_{collgrad}$, and $\beta_{postcoll}$ indicate the effect of education, while $\beta_{employed}$ captures the effect of an individual's employment status on their likelihood of utilizing doctor or hospital services.

The next step of the analysis uses negative binomial regression models to examine the change in the average length of stay in hospital and the mean number of annual doctor visits for the population:

$$\begin{aligned}
 Visits/LOS = & \beta_0 + \beta_1 poor + \beta_2 highincome + \beta_3 lessthanHS + \beta_4 somecoll + \beta_5 collgrad + \\
 & \beta_6 postcoll + \beta_7 employed + \beta_8 white + \beta_9 male + \beta_{10} poorhealth + \\
 & \beta_{11} prevmarr + \beta_{12} nevmarr + \beta_{13} Age24to29 + \beta_{14} Age30to34 + \\
 & \beta_{15} Age35to39 + \beta_{16} Age45to49 + \beta_{17} Age50to54 + \beta_{18} Age55to59 + \\
 & \beta_{19} Age60to64 + \beta_{20} midwest + \beta_{21} south + \beta_{22} west + \mu
 \end{aligned}$$

(Equation 2)

where *visits* equals the population mean number of annual visits in the case of doctor utilization, *LOS* equals the population mean length of stay in the case of hospital utilization, and all other variables indicate the same as those in Equation 1.

All else being equal, if socioeconomic inequities in the utilization of health care exist along the lines of income, education or employment status, then the coefficients on these variables will be statistically significant and their direction and size will provide an indication of the magnitude of inequity present in any given year. A note of caution is in order, however, when comparing the results prior to and after 1995. Between 1983 and 1995, the base category is “not poor” (which reflects individuals with total annual family income equal to or greater than 100 percent of the federal poverty level), whereas between 1998 and 2011, the base category is “low- to middle-income” (which reflects individuals with total annual family income between 100 percent and 399 percent of the federal poverty level). Thus, the magnitudes of the coefficient estimates prior to and after 1995 are not directly comparable due to a slight change in the base case. Nevertheless, the estimates from each year examined are expected to tell a reasonably consistent story about how a change in socioeconomic status affects the utilization of health care services in the United States.

DESCRIPTION OF DATA

Data used for this analysis include the 1983, 1986, 1989, 1992, and 1995 National Health Interview Survey, as well as the 1998, 2001, 2004, 2008 and 2011 Medical Expenditure Panel Survey. The NHIS is a cross-sectional personal interview household survey conducted by the National Center for Health Statistics – a part of the Centers for Disease Control and Prevention (CDC) – which uses a nationwide sample to monitor the health of the civilian, noninstitutionalized population of the United States. The MEPS is a set of large-scale surveys of families, individuals, medical providers and employers conducted by the Agency for Healthcare Research and Quality – a part of the US Department of Health and Human Services – which collects detailed data on the health services that the US population utilizes drawn from a nationally representative subsample of households that participated in the prior year’s NHIS. Although the panel design of the MEPS features several rounds of interviewing, for the purposes of this study only the first round of data for each year is used to provide a cross-sectional analysis comparable to that used from the NHIS. All data were obtained via public use files downloaded from the NHIS and MEPS websites. Survey weights are utilized in all years of analysis to account for the complex sampling methodologies within each survey, and observations missing required information are excluded. The sample is restricted to individuals between 24 and 64 years of age; such individuals are most likely to make their own health care decisions, and their interaction with medical providers is more sensitive to socioeconomic and demographic characteristics than those younger than 24 or older than 64 years of age. Although this study seeks to examine the change in the effect of socioeconomic status on health care

utilization over a complete thirty-year period, at the time of publication the most recent year of available data was 2011.

The utilization of health care services is acquired through individuals' self-report of visits to medical providers and overnight stays in hospital in the 12 months prior to the survey interview date. This study focuses primarily on two measures of health care utilization, which include visits to a doctor and visits to a hospital. Doctor visits comprise of whether an individual visited a doctor or doctor's assistant either at a doctor's office, clinic, hospital emergency room or outpatient department of a hospital. Hospital visits include if an individual is admitted as an inpatient for at least one or more nights, and excludes visits to an emergency room or outpatient clinic unless the person is admitted and stays overnight.

The primary focus of this study is the relationship between socioeconomic status and health care utilization, specifically examining how this relationship changes over time. Family income, education and employment status are included as measures of socioeconomic status. Indicator variables for poor and high income are derived from a categorical variable that measures family income as a percentage of the federal poverty level, based on family size and composition. The variable "poor" is set equal to one for individuals whose total annual family income is less than 100 percent of the federal poverty level in a given year. The variable "high income" is set equal to one for individuals whose total annual family income is greater than or equal to 400 percent of the federal poverty level in a given year. Between 1983 and 1995, data collection and measurement limitations prevent the analysis of both poor and high-income individuals, as the

data only classify whether or not an individual is below or above the federal poverty level. As has already been emphasized elsewhere, the magnitudes of the coefficients are not directly comparable across all years, therefore, a note of caution is in order when comparing data between 1983-1995 and 1998-2011.

For education, a series of indicator variables are constructed to capture the effect of varying levels of education. “Less than high school” is set equal to one to capture the effect of individuals who did not graduate from high school (indicating that the highest level of completed education is between zero and eleven years). “High school graduate” is set equal to one to capture the effect of individuals who graduated from high school but did not go on to complete any higher years of education. “Some college” is set equal to one for individuals who have completed between one and three years of university education, but did not graduate from university. “College graduate” is set equal to one for individuals who graduated from university but did not go on to complete any higher years of university education. “Post college” is set equal to one for individuals who have completed one or more years of graduate-level education at university. For employment status, an indicator variable is constructed to compare the effect of those who report being employed versus those who report being unemployed or not in the labor force. “Employed” is set equal to one for individuals who report being employed or having a job to return to by the end of the survey interview period in a given year. The variable is set equal to zero for individuals who report being unemployed or are not in the labor force altogether.

A measure of an individual's health status consists of general self-reported health status, which is captured by five categories (excellent, very good, good, fair and poor) across each year examined. Previous studies have demonstrated a convincing link between self-assessed health and mortality, and found that it is also a strong predictor of changes in functional ability and life satisfaction (Decker and Remler 2004; Idler and Kasl 1991; Idler and Angel 1990; Kennedy et al. 1998; Mossey and Shapiro 1982). Thus, although self-reported health status may be affected by some subjective influences – such as different attitudes and perceptions that can vary across different population subcultures (Angel and Thoits 1987) – it is nevertheless a meaningful measure of an individual's objective health status. For all years examined, poor health status is set equal to one for all individuals who report being in fair or poor health and is set equal to zero for all individuals who report being in good, very good or excellent health.

Based on the health care utilization literature (Braveman et al. 2010; Curtis and MacMinn 2008; Lasser et al. 2006; Van Doorslaer et al. 2000), a number of other control variables are included to help isolate the effect of socioeconomic status on health care utilization. An indicator variable labeled “white” is set equal to one for all individuals who report their main racial background as white, and is set to zero for all other individuals who are non-white. The indicator variable “male” is set equal to one for all individuals who are male. To capture the effect of differences in marital status and control for this when examining the effect of socioeconomic status on health care utilization, a number of indicator variables are constructed. “Married” is set equal to one for all individuals who are married or will be married by the end of the survey reference period. “Previously married” is set equal to one to represent all individuals who are

widowed, divorced or separated. “Never married” is set equal to one for all individuals who have never been married. Eight indicator variables are used to represent different age groups (in five-year age intervals from 24 to 64), while four indicator variables representing the northeast, midwest, south and western regions of the United States are also included to control for regional differences in the utilization of health care. Some studies reason that health behaviors or lifestyle variables have an important impact on an individual’s health and utilization of health care services, whereby individuals who engage in perceived negative health behaviors such as drinking or smoking may have different attitudes towards health care than those who live healthier lifestyles, and that socioeconomic status is found to be associated with a higher prevalence of such negative behaviors (Birch et al. 1993; Curtis and MacMinn 2008; Deaton 2002). However, other studies argue that negative health behaviors are themselves a function of low socioeconomic status, and that ultimately such behaviors have been found to explain only a small portion of socioeconomic inequities in health and health care utilization (Decker and Remler 2004; Lantz et al. 1998; Marmot 1994; Williams 1990). As such, this study does not find it necessary to include a control for negative health behaviors.

RESULTS

Descriptive Statistics

Table 1 presents the weighted sample means for health care utilization and socioeconomic status. Between 1983 and 2011, 70.54 to 73.52 percent of the population contacted a medical doctor. The highest proportion of contacts was made in 2008 (at 73.52 percent), which was a 2.98 percentage point increase from 1983 (at 71.09 percent). By 2011 the increase had diminished to 1.82 percentage points (at 72.36 percent). Although the contact rate remained relatively constant for most years, the data indicate an overall slightly increasing trend in the proportion of individuals contacting a doctor over the study period. The frequency of visits to a doctor for the population increased on average from 3.71 visits in 1983 to a peak of 6.11 visits in 2004, and then slightly decreased over the remainder of the study period to an average of 5.66 visits by 2011.

The data indicate that fewer noninstitutionalized Americans between 24 and 64 years of age are being admitted to a hospital as time progresses. Between 1983 and 2011, 10.90 to 6.44 percent of the population was admitted to a hospital for one or more nights. The lowest proportion of hospital admissions were made in 1998 (at 6.44 percent), which was a 4.46 percentage point decrease from 1983 (at 10.90 percent). By 2011 the decrease had diminished to 3.96 percentage points (at 6.94 percent) however the data indicate a noticeable decreasing trend in the probability of individuals being admitted to a hospital over the twenty-nine years examined.

Table 1
Sample Means for Health Care Utilization, 1983–2011

<i>Characteristics</i>	<i>1983</i>	<i>1986</i>	<i>1989</i>	<i>1992</i>	<i>1995</i>	<i>1998</i>	<i>2001</i>	<i>2004</i>	<i>2008</i>	<i>2011</i>
Doctor Contact	71.09	71.96**	73.28*	73.52*	73.34*	70.54	72.61*	71.83	73.15*	72.36*
Doctor Visits	3.71	3.93*	4.00*	4.34*	4.10*	5.46*	5.67*	6.11*	5.70*	5.66*
Hospital Contact	10.90	9.04*	8.26*	7.68*	7.48*	6.44*	7.12*	7.07*	6.74*	6.94*
Length of Stay	0.94	0.66*	0.58*	0.50*	0.43*	0.43*	0.45*	0.45*	0.39*	0.40*
Poor	7.39	9.06*	7.52	8.95*	8.85*	9.32*	8.85*	9.97*	10.32*	12.12*
High Income	-	-	-	-	-	45.11	46.04	44.13	44.09	41.26*
Less Than High School	21.68	17.98*	16.17*	14.63*	13.31*	15.76*	15.24*	14.45*	13.30*	11.53*
High School Graduate	39.96	39.83	38.89*	37.96*	36.94*	34.00*	33.16*	31.81*	30.44*	26.94*
Some College	17.85	19.82*	20.83*	21.96*	22.66*	23.17*	22.17*	23.56*	24.43*	26.07*
College Graduate	11.64	12.94*	13.60*	14.49*	15.71*	17.08*	17.89*	18.54*	19.40*	21.91*
Post College	8.88	9.42**	10.52*	10.96*	11.38*	10.00*	11.53*	11.64*	12.42*	13.55*
Employed	70.39	75.57*	77.78*	77.20*	78.59*	81.35*	80.82*	79.10*	79.36*	76.43*
White	87.35	86.52*	86.10*	85.31*	84.48*	82.96*	83.34*	81.15*	80.95*	80.18*
Male	48.28	48.59	48.82	48.98**	49.03**	48.92	49.11	48.90	48.79	48.81
Poor Health	11.49	10.07*	9.19*	9.91*	10.04*	12.21***	12.01	13.08*	13.52*	13.51*
Married	74.79	74.37	73.58*	73.90*	72.99*	62.99*	63.56*	62.53*	61.35*	59.43*
Previously Married	13.78	13.40	13.55	13.08*	13.34***	17.94*	17.47*	17.25*	17.64*	17.59*
Never Married	11.44	12.23*	12.87*	13.01*	13.67*	19.07*	18.97*	20.22*	21.01*	22.98*
Age 24 to 29	22.10	20.95*	19.47*	17.49*	16.56*	15.66*	14.65*	15.45*	15.83*	15.17*
Age 30 to 34	16.52	16.85	17.00***	16.76	15.69*	14.12*	13.61*	12.58*	11.45*	11.91*
Age 35 to 39	13.84	14.87*	15.13*	15.74*	15.94*	15.36*	14.56**	12.93*	12.30*	12.11*
Age 40 to 44	11.15	11.85*	13.13*	14.21*	14.74*	15.44*	14.99*	14.78*	12.87*	11.85**
Age 45 to 49	9.31	9.56	10.52*	11.51*	12.69*	12.91*	13.34*	13.65*	12.83*	12.62*
Age 50 to 54	9.04	8.60**	8.70***	9.04	9.69*	11.26*	12.43*	12.08*	13.27*	13.91*
Age 55 to 59	9.47	8.87*	8.33*	7.87*	7.68*	8.22*	9.12	10.55*	11.57*	11.70*
Age 60 to 64	8.55	8.45	7.72*	7.37*	7.01*	7.02*	7.30*	7.97**	9.88*	10.72*
Northeast	21.57	22.00	20.89**	20.64*	20.07*	19.04*	19.29*	18.86*	18.47*	17.95*
Midwest	25.40	24.22*	24.70**	24.50*	23.72*	23.18*	23.30*	22.55*	22.25*	21.48*
South	32.75	32.72	33.01	32.52	35.28*	35.20*	35.09*	35.79*	36.15*	37.30*
West	20.28	21.07**	21.39*	22.33*	20.93**	22.58*	22.32*	22.79*	23.13*	23.27*
Sample Size	46,394	28,917	55,251	60,006	48,013	11,226	16,201	16,143	15,741	17,022

*Significantly different from 1983 (1998 for high income) at the .01 level.

**Significantly different from 1983 (1998 for high income) at the .05 level.

***Significantly different from 1983 (1998 for high income) at the .10 level.

Notes: Sample reflects characteristics of non-institutionalized individuals between the ages of 24 and 64 living in the United States of America.

Source: Author's calculations using the National Health Interview Survey 1983-1995 and the Medical Expenditure Panel Survey 1998-2011

The average length of stay in hospital also decreased over time. In 1983, the population mean number of days in hospital was 0.94, decreasing to 0.40 by 2011.

On average, Americans are reporting themselves to be less healthy over time. In 1983, the proportion of individuals who reported being in poor or fair health was 11.49 percent, but by 2011 this number increased by 2.02 percentage points to 13.51 percent. The data indicate that in 1989 the proportion had dropped to 9.19 percent and remained relatively stable until 1998, when the proportion jumped to 12.21 percent and continued to rise for the remainder of the study period.

In relation to socioeconomic status variables, the data indicate that more individuals are reported as being poor over time. The percentage of individuals with family income below the federal poverty level ranges from a low of 7.39 percent in 1983 to a high of 12.12 percent in 2011, which is a 4.73 percentage point increase over the study period. Between 1998 and 2001, the data indicate that the proportion of individuals with high family income is decreasing over time, with a high of 46.04 percent in 2001 to a low of 41.26 percent in 2011, representing a 4.78 percentage point decline. It is clear that Americans' education levels are rising over time, with substantially fewer individuals with less than a high school education and fewer individuals who only graduated from high school without going on to complete additional years of education. Between 1983 and 2011, 21.68 to 11.53 percent of individuals did not graduate from high school, representing a 10.15 percentage point decrease over the length of the study. Over the same period, the proportion of individuals who graduated from high school without furthering

their education decreased from a high of 39.96 percent in 1983 to a low of 26.94 percent in 2011, representing a total decrease of 13.02 percentage points. The proportion of individuals who have completed between one and three years of university education has increased by 8.22 percentage points, with a low of 17.85 percent in 1983 and a high of 26.07 percent in 2011. The data show that the proportion of individuals who have graduated from university but did not go on to attempt post-graduate studies has increased substantially over time by a total of 10.27 percentage points, ranging from a low of 11.64 percent in 1983 to a peak of 21.91 percent in 2011. The proportion of individuals who have completed one or more years of post-graduate studies has also increased noticeably over the study period, with a low of 8.88 percent in 1983 to a high of 13.55 in 2011 (a 4.67 percentage point increase). The employment rate has also increased over time; between 1983 and 2011, 70.39 to 81.35 percent of individuals were employed. The highest rate of employment was in 1998 (at 81.35 percent), representing a 10.43 percentage point increase since 1983 (at 70.39 percent). By 2011, this increase had diminished to 6.04 percentage points (at 76.43 percent).

A number of demographic trends are also evident. The proportion of individuals who are white has steadily decreased over time, ranging from a high of 87.35 percent in 1983 to a low of 80.18 percent in 2011 (indicating a 7.17 percentage point decrease over the study period). Between 1983 and 2011, the proportion of individuals who are male remained constant overall, with a low of 48.28 percent in 1983 and a high of 49.11 percent in 2001. By 2011 the proportion of males fell to 48.81 percent, however the difference in means over years are largely statistically insignificant.

The data also indicate that over time there are fewer married, more single and more previously married Americans between the ages of 24 and 64. From 1983 to 2011, the proportion of individuals who are married fell by a total of 15.36 percentage points, from a peak of 74.79 percent in 1983 to a low of 59.43 percent by 2011. Over the same time period, the proportion of individuals who are previously married ranged from a low of 13.78 percent in 1983 to about 17.59 percent in 2011, with a peak of 17.94 percent observed in 1998. As time progressed, the proportion of individuals who have never been married increased steadily from a low of 11.44 percent in 1983 to a high of 22.98 percent in 2011, indicating an 11.54 percentage point increase in just under thirty years. It is also clear that the American population is aging over time. Over the twenty-nine years examined, there are fewer individuals below 39 years of age and significantly more individuals in the 40 to 64 age groups by the end of the study. In terms of shifting domestic migration patterns, the data indicate that over time fewer individuals are residing in the northeast and midwest regions of the United States and more individuals are moving to the south and western regions.

In sum, more Americans are contacting medical doctors than in the past. The data show that there is a statistically and practically significant decrease in the proportion of individuals who are being admitted to a hospital (about 4 percentage points over the twenty-nine years examined). Americans are, on average, reporting themselves to be less healthy over time, and fewer individuals are married. The proportion of individuals who are white has steadily decreased, and it is clear that the American population is aging. Levels of poverty have varied, however it is

clear that a larger proportion of individuals between the age of 24 and 64 now live in poverty compared to in 1983, and that there are fewer individuals with a high family income. The employment rate has fluctuated, however overall the trend indicates increasing levels of employment over time. Americans education levels are, on average, increasing over time, and the American population is becoming more concentrated in the south and western regions.

Socioeconomic Status and Doctor Utilization

Table 2 presents the results of using a logit regression model to examine the effect of socioeconomic status on the probability of an individual contacting a doctor. A note of caution is in order when comparing the results prior to and after 1995. Due to data limitations, the results reflect slightly different characteristics stemming from a difference in the base category concerning family income. Between 1983 and 1995, the base category is “not poor” (which reflects individuals with total annual family income equal to or greater than 100 percent of the federal poverty level), whereas between 1998 and 2011, the base category is “low- to middle-income” (which reflects individuals with total annual family income between 100 percent and 399 percent of the federal poverty level).

Between 1983 and 1995, the probability that an individual who reports being in fair or poor health contacts a doctor is between 12.48 and 16.70 percentage points higher than for individuals who are in better health. The difference decreases over time, with a slight increase in 1986 then lowering by 1995. Between 1998 and 2011, the difference is between 12.96 to 19.26 percentage points higher than for those in better health.

Table 2
Change in Predicted Probability of Contacting a Doctor, 1983–2011

<i>Characteristics</i>	<i>1983</i>	<i>1986</i>	<i>1989</i>	<i>1992</i>	<i>1995</i>	<i>1998</i>	<i>2001</i>	<i>2004</i>	<i>2008</i>	<i>2011</i>
Poor	-4.75*	-5.56*	-6.90*	-5.31*	-3.94*	-1.33	-2.79**	-5.40*	-4.38*	-1.80
High Income	-	-	-	-	-	5.38*	3.35*	5.82*	7.20*	5.27*
Less Than High School	-4.43*	-4.05*	-3.76*	-5.68*	-5.20*	-10.47*	-9.70*	-7.61*	-7.07*	-8.37*
Some College	4.92*	4.79*	4.11*	4.40*	4.26*	6.70*	3.12*	4.22*	6.46*	6.92*
College Graduate	6.91*	5.35*	5.27*	5.92*	6.04*	8.26*	5.32*	6.71*	11.87*	9.37*
Post College	9.67*	8.77*	6.64*	7.74*	7.59*	11.07*	5.98*	9.32*	12.93*	13.39*
Employed	0.13*	-0.71*	-1.48*	-1.75*	-1.70*	0.13	-2.28**	-1.35	-1.37	-2.73**
White	0.49*	2.76*	1.27*	1.36*	0.46*	9.31*	6.32*	5.12*	7.91*	5.69*
Male	-17.52*	-17.82*	-17.17*	-18.88*	-16.78*	-23.66*	-19.96*	-20.80*	-22.08*	-20.04*
Poor Health	16.10*	16.70*	14.02*	12.89*	12.48*	19.26*	12.96*	14.51*	17.32*	18.16*
Previously Married	0.38*	-1.28*	-1.62*	-1.31*	-0.50*	-1.28	-3.73*	-0.11	-1.90	1.03
Never Married	-4.72*	-4.62*	-5.28*	-6.06*	-4.26*	-4.07**	-3.31*	-1.83	-6.16*	-3.98*
Age 24 to 29	3.97*	3.39*	2.05*	3.14*	-0.75*	-7.19*	-4.59*	-10.23*	-9.60*	-7.21*
Age 30 to 34	2.63*	2.39*	1.70*	1.75*	-0.50*	-5.28**	-3.12**	-10.17*	-3.18***	-2.81
Age 35 to 39	0.40*	0.15*	0.15*	0.46*	-1.08*	-3.92***	-3.68*	-5.57*	-3.72**	-2.08
Age 45 to 49	1.26*	2.11*	0.82*	2.97*	1.41*	0.88	0.84	-0.87	1.40	4.35**
Age 50 to 54	1.76*	2.75*	2.03*	3.38*	2.66*	5.49**	4.70*	4.46*	5.61*	6.12*
Age 55 to 59	2.99*	3.63*	3.13*	5.35*	5.45*	13.09*	7.84*	8.29*	9.34*	10.44*
Age 60 to 64	5.71*	6.97*	5.01*	7.83*	6.02*	13.63*	11.81*	12.17*	12.19*	15.79*
Midwest	-0.91*	0.99*	0.25*	-1.39*	-1.97*	3.87**	-1.70	0.17	0.65	4.35*
South	-1.44*	0.39*	-0.86*	-2.57*	-2.81*	-0.35	-4.75*	-3.71*	-5.11*	-2.64***
West	-0.50*	-0.73*	-0.70*	-1.84*	-3.02*	0.32	-8.16*	-3.04**	-4.79*	-4.94*
Sample Size	46,394	28,917	55,251	60,006	48,013	11,226	16,201	16,143	15,741	17,022

*Significant at the .01 level.

**Significant at the .05 level.

***Significant at the .10 level.

Notes: Sample reflects characteristics of non-institutionalized individuals between the ages of 24 and 64 living in the United States of America. Numbers indicate the percentage point change in the predicted probability of contacting a doctor for a change in the specified characteristics from the base case, all else being equal. The base case is a non-white female who is between 40 and 44 years of age, is a high school graduate, is married, reports being in excellent or good health, is currently unemployed and resides in the northeast region of the United States of America.

Source: Author's calculations using the National Health Interview Survey 1983-1995 and the Medical Expenditure Panel Survey 1998-2011

In regards to the effect of poverty on health care utilization, the data indicate that the poor are less likely to contact a doctor in each year examined, however the difference in utilization

between the poor and their relative comparator is generally diminishing over time. Poverty is significantly associated with doctor visits, except in 1998 and in 2011. Between 1983 and 1995, the probability that a poor individual contacts a doctor is between 3.94 to 6.90 percentage points lower than for individuals who are not poor. The difference increases between 1983 and 1989 but then decreases to a low of 3.94 percentage points in 1995. Socioeconomic inequities in the utilization of doctors are more detailed between 1998 and 2011 due to the inclusion of high-income families in the analysis. During this period, the probability that poor individuals contact a doctor is between 1.33 to 5.40 percentage points lower compared to individuals with low- to middle-incomes. The data show that the difference increases noticeably from 1998 (at 1.33 percentage points lower than comparator) to a peak in 2004 (at 5.40 percentage points lower than comparator), but then decreases by 2011 (to a difference of 1.80 percentage lower than comparator). High family income is also significantly associated with contacting a doctor. Between 1998 and 2011, the probability that an individual with high family income contacts a doctor is between 3.35 to 7.20 percentage points higher compared to individuals with low- to middle-incomes. The difference diminishes between 1998 and 2001, after which the difference increases substantially to a peak in 2008 (at 7.20 percentage points higher than comparator), but then settles to a difference of 5.27 percentage points in 2011.

In all years examined, education is significantly associated with contacting a doctor. Between 1983 and 1995, individuals who did not graduate from high school are between 3.76 and 5.68 percentage points less likely to contact a doctor compared to high school graduates. During the same period, individuals with university-level education are between 4.26 to 9.67 percentage

points more likely to contact a doctor compared to individuals who graduated from high school but did not go on to further their education. Between 1998 and 2011, individuals who did not graduate from high school are between 7.07 to 10.47 percentage points less likely to contact a doctor compared to high school graduates. The data indicate that individuals with university-level education are, on average, between 3.12 to 13.39 percentage points more likely to contact a doctor than their comparator. Being employed is not a strong predictor of contacting a doctor. Compared to individuals who are unemployed or not in the labor force, employed individuals are between 0.13 to 2.73 percentage points less likely to contact a doctor, however the results are not statistically significant in 2004 and 2008, and are statistically significant at the 5 percent level in 2001 and 2011. In all years, the results show that gender is highly statistically and practically associated with contacting a doctor, and the effect is relatively stable over time. Men are between 16.78 to 23.66 percentage points less likely to contact a doctor compared to women. Race is also significantly associated with contacting a doctor in each year. Between 1983 and 1995, individuals who are white are 0.46 to 2.76 percentage points more likely to contact a doctor compared to non-whites. The difference is larger between 1998 and 2011, whereby whites are 5.12 to 9.31 percentage points more likely to contact a doctor compared to non-whites.

Between 1983 and 1995, marital status has a significant association with doctor utilization and remains fairly constant over time, however the magnitude is smaller for individuals who have previously been married (being 0.38 to 1.62 percentage points lower than the comparator). Compared to married individuals, those who have never been married are 4.26 to 6.06 percentage points less likely to contact a doctor. Between 1998 and 2011, the data indicate that

the difference in probability of contacting a doctor between married and previously married individuals is no longer statistically significant (except in 2001 at 3.73 percentage points lower). During the same period, individuals who have never been married are, on average, 1.83 to 6.16 percentage points less likely to contact a doctor compared to those who are married. Older individuals are significantly more likely to contact a doctor, and this trend is increasing in magnitude over time. In most years, individuals from the south, midwest or western regions of the United States are, on average, less likely to contact a doctor than an individual who resides in the northeast.

Table 3 shows the change in the population mean number of annual visits to a doctor for a change in the specified characteristic, all else being equal. Individuals who report being in fair or poor health have, on average, between 4.48 and 5.88 more visits to a doctor than the mean for all individuals. The data indicate that doctor visits among the poor are not significantly different from the population mean except in 1998, when they have 1.45 more visits on average. Between 1998 and 2011, high-income earners have between 0.55 and 1.24 more visits, on average, than the population mean. Individuals who have not graduated from high school have between 0.23 and 2 fewer visits to a doctor over the course of the study period, peaking in 2001 and then decreasing slightly to 1.27 fewer visits in 2011. In the early period of the study, individuals with university education have slightly more visits to a doctor, but by 2011 the number increases substantially. Individuals who are employed are, on average, likely to have between 1.03 and 2.17 fewer visits to a doctor.

Table 3
Change in Population Mean Number of Doctor Visits, 1983–2011

<i>Characteristics</i>	<i>1983</i>	<i>1986</i>	<i>1989</i>	<i>1992</i>	<i>1995</i>	<i>1998</i>	<i>2001</i>	<i>2004</i>	<i>2008</i>	<i>2011</i>
Poor	0.03	-0.05	-0.18	-0.02	0.17	1.45**	-0.20	-0.49	-0.18	-0.07
High Income	-	-	-	-	-	0.50***	0.25	1.03*	1.23*	1.24*
Less Than High School	-0.23**	-0.47*	-0.13	-0.75*	-0.25	-1.42*	-2.00*	-1.81*	-1.43*	-1.27*
Some College	0.65*	0.41*	0.82*	0.67*	0.64*	1.17*	0.89*	0.71**	1.16*	1.52*
College Graduate	0.51*	0.73*	0.56*	0.47*	0.67*	1.05*	1.17*	1.15*	2.02*	2.30*
Post College	1.20*	1.11*	0.96*	0.92*	0.99*	1.39*	1.51*	1.66*	2.52*	2.47*
Employed	-1.03*	-1.21*	-1.13*	-1.72*	-1.55*	-1.15*	-1.94*	-2.17*	-1.90*	-1.95*
White	0.49*	0.63*	0.56*	0.56*	0.37*	2.31*	1.87*	1.12*	2.32*	1.49*
Male	-1.37*	-1.74*	-1.72*	-1.56*	-1.87*	-3.00*	-3.07*	-3.07*	-3.06*	-2.30*
Poor Health	4.48*	5.07*	5.05*	5.54*	5.23*	5.88*	5.28*	5.38*	5.11*	4.58*
Previously Married	0.47*	0.31***	0.23***	0.72*	0.46*	0.01	0.25	0.68**	0.40	0.71**
Never Married	-0.50*	-0.44**	-0.21	-0.37**	-0.21	0.25	0.62**	-0.02	0.24	0.70**
Age 24 to 29	0.63*	0.47**	0.14	0.19	0.07	-2.52*	-2.20*	-2.02*	-2.25*	-2.45*
Age 30 to 34	0.44*	0.21	0.40**	0.52*	0.05	-1.30**	-0.96**	-1.51*	-1.07**	-0.67
Age 35 to 39	-0.02	0.03	0.01	-0.01	0.02	-0.88***	-0.49	-0.28	-0.32	-0.74
Age 45 to 49	0.12	0.02	-0.12	0.04	-0.08	0.07	0.27	0.74	0.55	0.20
Age 50 to 54	0.10	0.47**	-0.18	-0.00	-0.05	0.16	1.98*	1.28*	1.34*	0.90***
Age 55 to 59	0.10	0.17	0.02	0.17	0.32	1.72*	1.80*	2.05*	2.02*	2.09*
Age 60 to 64	0.07	0.03	-0.10	0.16	0.03	1.54*	2.65*	2.49*	2.73*	2.50*
Midwest	-0.26**	0.07	-0.20***	-0.16	-0.10	-0.33	-0.47	-0.60***	0.05	-0.01
South	-0.34*	-0.08	-0.28**	-0.63*	-0.62*	-1.34*	-1.17*	-1.70*	-1.08*	-1.54*
West	0.54*	0.38**	0.26***	-0.04	-0.03	-0.57	-1.50*	-0.54	-0.80**	-0.84**
Sample Size	46,394	28,917	55,251	60,006	48,013	11,226	16,201	16,143	15,741	17,022

*Significant at the .01 level.

**Significant at the .05 level.

***Significant at the .10 level.

Notes: Sample reflects characteristics of non-institutionalized individuals between the ages of 24 and 64 living in the United States of America. Numbers indicate the change in the population average number of annual doctor visits for a change in the specified characteristics from the base case, all else being equal. The base case is a non-white female who is between 40 and 44 years of age, is a high school graduate, is married, reports being in excellent or good health, is currently unemployed and resides in the northeast region of the United States of America.

Source: Author's calculations using the National Health Interview Survey 1983-1995 and the Medical Expenditure Panel Survey 1998-2011

Race is significantly associated with the number of visits to a doctor in all years examined, and the difference is growing over time. In 1983, those who are white had 0.49 more visits to a doctor and by 2011 had 1.49 more visits. The data show that males make fewer visits to a doctor

over the study period. In 1983, males have 1.37 fewer visits and by 2008 have 3.06 fewer visits. The difference decreased slightly in 2011 to 2.30 fewer visits. Previously married individuals have slightly more visits to a doctor, although the results are statistically insignificant in 1998, 2001 and 2008, and are only marginally significant in 1986 and 1989. The results for individuals who have never been married are mixed. In the early years of the study, never married individuals have between 0.50 and 0.37 fewer visits, but by 2011 those who have never been married have 0.70 more visits. The results are statistically insignificant in 1989, 1995, 1998, 2004 and 2008. Between 1983 and 1995, younger individuals have about the same number of doctor visits as older individuals. In the later years of the study, the results are mixed but show an overall trend of younger individuals having fewer visits and older individuals having noticeably more.

In sum, compared to those in better health, individuals with fair or poor health are much more likely to contact a doctor and to have more visits. Individuals who are poor are slightly less likely to contact a doctor, but have on average the same number of annual visits as those who are not poor or middle-income earners. Individuals with high income are much more likely to contact a doctor and to have more visits. Less educated individuals are less likely to contact a doctor and have fewer visits on average, whereas individuals with higher education levels are more likely to contact a doctor and have more annual visits. Overall, employed individuals are only marginally less likely to contact a doctor compared to those who are unemployed or not in the labor force, and have fewer visits. Whites are more likely to contact a doctor compared to non-whites, and over time are making more visits. Males are less likely to contact a doctor

compared to women and make on average substantially fewer visits compared to females. Older individuals are more likely to contact a doctor compared to younger individuals, and over time have more visits. Compared to married individuals, those who are previously married or never married are, on average, less likely to contact a doctor, but their difference in the number of visits is mostly statistically and practically insignificant. Regional differences also are present; compared to individuals living in the northeast, individuals in other areas are less likely to contact a doctor and have, on average, slightly fewer visits.

Socioeconomic Status and Hospital Utilization

Table 4 presents the results of using a logit regression model to examine the effect of socioeconomic status on the probability of an individual being admitted to a hospital. Again, a note of caution is in order when comparing the results prior to and after 1995 (due to slight differences in the base case stemming from income data limitations noted previously).

Similar to the utilization of doctors, health status is most significantly associated with hospital admissions compared to other factors in the model. Over the course of the study, individuals who report being in fair or poor health are, on average, 10.60 to 18.61 percentage points more likely to be hospitalized compared to individuals in better health. Between 1983 and 1995, the probability of being admitted to a hospital overnight was between -0.29 to 2.57 percentage points more than those who are not poor, with results indicating an increasing magnitude in difference over time.

Table 4
Change in Predicted Probability of Admission to a Hospital, 1983–2011

<i>Characteristics</i>	<i>1983</i>	<i>1986</i>	<i>1989</i>	<i>1992</i>	<i>1995</i>	<i>1998</i>	<i>2001</i>	<i>2004</i>	<i>2008</i>	<i>2011</i>
Poor	-0.29*	1.98*	0.91*	1.50*	2.57*	3.55*	0.46	0.74	2.86*	1.11
High Income	-	-	-	-	-	0.13	-1.73*	-1.14**	-0.79***	-0.08
Less Than High School	-0.56*	-0.42*	-0.24*	-0.84*	-0.99*	0.11	-0.56	-1.18	-0.51**	-1.25***
Some College	0.73*	1.07*	0.68*	0.87*	0.50*	0.70	0.63	0.61	1.43**	-0.14
College Graduate	-0.96*	-0.26*	-0.45*	0.81*	0.63*	1.01	0.32	0.12	1.64	-1.15
Post College	-0.77*	0.37*	0.53*	0.60*	0.70*	-0.53	1.49	1.13	0.83	-0.91
Employed	-4.15*	-4.24*	-3.63*	-4.22*	-4.19*	-1.25**	-2.46*	-2.82*	-1.75*	-3.27*
White	0.49*	0.59*	0.71*	0.88*	0.00	-0.03	0.21	2.22*	0.45	0.16
Male	-3.67*	-2.93*	-2.81*	-3.07*	-3.07*	-2.16*	-3.30*	-3.55*	-2.30*	-2.47*
Poor Health	18.19*	18.61*	15.98*	16.69*	15.84*	10.60*	12.71*	14.82*	11.88*	13.31*
Previously Married	-1.51*	-1.30*	-0.81*	-0.56*	-0.50*	-0.37	1.14	-0.21	-0.72	-0.42
Never Married	-3.96*	-3.89*	-3.83*	-3.77*	-3.88*	-2.33*	-2.72*	-3.24*	-2.43*	-2.87*
Age 24 to 29	6.98*	5.25*	6.92*	6.88*	5.69*	3.49*	3.46*	5.34*	6.98*	9.37*
Age 30 to 34	3.63*	3.69*	3.89*	3.68*	3.77*	2.96**	7.26*	3.19**	5.58*	4.94*
Age 35 to 39	1.18*	0.03**	1.20*	0.59*	0.39*	1.33	1.92***	0.75	2.43**	4.95*
Age 45 to 49	0.56*	-1.39*	1.15*	0.48*	0.13*	0.00	1.75	-0.04	1.12	1.61
Age 50 to 54	1.26*	1.46*	1.29*	0.97*	0.94*	0.82	2.55**	-0.24	0.79	2.86**
Age 55 to 59	1.99*	1.26*	0.56*	0.91*	1.37*	1.57	2.87**	2.44***	1.95***	3.06**
Age 60 to 64	1.35*	0.50*	1.08*	1.61*	0.40*	3.18**	5.55*	3.18**	4.90*	6.77*
Midwest	1.23*	0.44*	1.78*	0.99*	1.04*	-0.12	1.10	-0.46	1.11	0.44
South	0.99*	0.87*	1.59*	-0.50*	0.19*	0.92	0.73	-0.63	-0.13	-0.81
West	-1.11*	-1.65*	-0.09*	-1.28*	-1.08*	-0.85	-2.47*	-2.01**	-1.13***	-1.74**
Sample Size	46,394	28,917	55,251	60,006	48,013	11,226	16,201	16,143	15,741	17,022

*Significant at the .01 level.

**Significant at the .05 level.

***Significant at the .10 level.

Notes: Sample reflects characteristics of non-institutionalized individuals between the ages of 24 and 64 living in the United States of America. Numbers indicate the percentage point change in the predicted probability of being admitted to a hospital for a change in the specified characteristics from the base case, all else being equal. The base case is a non-white female who is between 40 and 44 years of age, is a high school graduate, is married, reports being in excellent or good health, is currently unemployed and resides in the northeast region of the United States of America.

Source: Author's calculations using the National Health Interview Survey 1983-1995 and the Medical Expenditure Panel Survey 1998-2011

However, between 1998 and 2011, compared to low- to middle-income earners, individuals who are poor were, on average, 0.46 to 3.55 percentage points more likely to contact a hospital, yet the difference is diminishing over time. During the same period, individuals who have a high

family income are, on average, less likely to be admitted to a hospital compared to those with low- to middle-income.

Between 1983 and 1995, education is significantly associated with contacting a hospital, although the magnitude in differences between individuals with different years of education is relatively small (less than 1.5 percentage points in any given year). After 1995, there appears to be little effect. Nevertheless, the data indicate that individuals who did not graduate from high school are, on average, 0.24 to 1.25 percentage points less likely to contact a hospital compared to those who graduated high school but did not go on to further their education. Employment status is also significantly associated with admission to a hospital. Between 1983 and 2011, individuals who are employed are, on average, 1.25 to 4.24 percentage points less likely to contact a hospital compared to those who are unemployed or not in the labor force. Individuals who are white are, on average, more likely to contact a hospital compared to non-whites, however the difference in any given year is relatively small in magnitude or is statistically insignificant (except for a peak in 2004 of 2.22 percentage points higher than the comparator).

Gender is found to be highly significantly associated with hospital admissions. During the study period, men are, on average, 2.16 to 3.67 percentage points less likely to be admitted to a hospital compared to women. In regard to marital status, between 1983 and 1995, individuals who have never been married or are previously married are significantly less likely to be admitted to a hospital compared to those who are married. Between 1998 and 2011, however, the difference between previously married and married is statistically insignificant. The data also

indicate that, on average, younger and older individuals are more likely to be admitted to a hospital compared to individuals who are in the middle age groups. While regional differences are apparent, the data indicate that the magnitude of difference between those who live in the northeast compared to elsewhere is relatively small or statistically insignificant in most years examined.

Table 5 shows the changes in the population mean length of stay in hospital for a change in the specified characteristics, all else being equal. Not surprisingly, health status is also most strongly associated with the number of nights spent in hospital, but the magnitude of difference is decreasing over time. In 1983, the mean number of days spent in hospital for those in poor health was 1.49 more days than the mean number of days for all individuals; by 2011, the difference diminishes to 0.77 more days. In the early years of the study, poor individuals do not have a statistically significant difference in the number of days spent in hospital compared to individuals who are not poor, but by the final years of the study they have a slightly longer length of stay compared to low- to middle-income earners. Between 1998 and 2011, individuals with high income are, on average, likely to have shorter lengths of stay, but the magnitude of difference diminishes noticeably by the end of the study period. Education is not a strong predictor of the number of days spent in hospital; the results are largely statistically insignificant in most years. Employment status is, however, a strong predictor of the average number of days spent in hospital.

Table 5
Change in Population Mean Number of Days in Hospital, 1983–2011

<i>Characteristics</i>	<i>1983</i>	<i>1986</i>	<i>1989</i>	<i>1992</i>	<i>1995</i>	<i>1998</i>	<i>2001</i>	<i>2004</i>	<i>2008</i>	<i>2011</i>
Poor	0.14	-0.06	0.05	0.13*	0.19*	0.51*	0.08	0.19***	0.31*	0.18**
High Income	-	-	-	-	-	-0.20**	-0.24*	-0.19*	-0.11	-0.10***
Less Than High School	0.01	0.01	0.03	-0.06	-0.06	-0.07	0.03	-0.14***	0.03	-0.20**
Some College	0.04	0.08	-0.02	-0.02	0.07	0.07	0.12	0.02	0.09	-0.06
College Graduate	-0.24*	-0.15***	-0.20*	-0.08***	-0.05	-0.01	-0.03	-0.08	0.08	-0.10
Post College	-1.19**	-0.15***	-0.09	-0.10***	-0.05	-0.03	0.07	-0.07	0.01	-0.01
Employed	-0.68*	-0.46*	-0.47*	-0.41*	-0.41*	-0.20**	-0.31*	-0.43*	-0.25*	-0.26*
White	0.01	0.00	0.05	-0.02	-0.06	0.02	-0.06	-0.14	-0.09	-0.08
Male	-0.16*	-0.09***	-0.17*	-0.12*	-0.09*	-0.19**	-0.28*	-0.17*	-0.13**	-0.24*
Poor Health	1.49*	1.15*	1.01*	0.90*	0.75*	1.00*	0.83*	0.71*	0.73*	0.77*
Previously Married	0.09	-0.05	0.06	0.11*	0.02	-0.07	0.16**	0.05	-0.14**	-0.08
Never Married	-0.04	0.01	-0.14**	-0.03	-0.11**	-0.37*	0.02	-0.12	-0.19**	-0.17*
Age 24 to 29	0.18**	0.01	0.06	0.09	-0.02	-0.00	-0.13	0.03	0.19***	0.11
Age 30 to 34	0.21**	0.06	0.07	0.01	0.01	0.02	0.21**	0.00	0.12	0.03
Age 35 to 39	0.06	0.02	0.02	-0.04	-0.10***	0.23	0.05	0.07	0.03	0.05
Age 45 to 49	0.30*	-0.14	0.08	0.09	-0.05	0.13	0.12	-0.07	-0.01	0.05
Age 50 to 54	0.39*	0.08	0.11	0.16**	0.12***	0.30***	0.16	0.04	0.11	0.14
Age 55 to 59	0.64*	0.16***	0.17**	0.13**	0.17*	0.25***	0.27***	0.30**	0.34**	0.30**
Age 60 to 64	0.44*	0.18***	0.20**	0.21*	0.13***	0.42*	0.68*	0.24***	0.40*	0.29**
Midwest	0.17**	0.00	0.04	0.07	0.05	-0.13	-0.02	-0.14	0.12	-0.02
South	0.05	0.04	0.03	0.01	0.00	-0.08	0.07	-0.14	0.02	-0.05
West	-0.25*	-0.23*	-0.08	-0.16*	-0.12*	-0.32**	-0.12	-0.32*	-0.15***	-0.14**
Sample Size	46,394	28,917	55,251	60,006	48,013	11,226	16,201	16,143	15,741	17,022

*Significant at the .01 level.

**Significant at the .05 level.

***Significant at the .10 level.

Notes: Sample reflects characteristics of non-institutionalized individuals between the ages of 24 and 64 living in the United States of America. Numbers indicate the change in the population average length of stay in hospital for a change in the specified characteristics from the base case, all else being equal. The base case is a non-white female who is between 40 and 44 years of age, is a high school graduate, is married, reports being in excellent or good health, is currently unemployed and resides in the northeast region of the United States of America.

Source: Author's calculations using the National Health Interview Survey 1983-1995 and the Medical Expenditure Panel Survey 1998-2011

The results show that individuals who are employed have shorter lengths of stay on average, but that the magnitude of difference is diminishing over time. Race is not a useful predictor of the number of days spent in hospital; the results show that there is no statistically significant

difference in any year examined. Males spend noticeably fewer days in hospital than their comparator, and the overall difference seems to be growing over time (with brief periods of decline in 1986, 1995 and 2008). In general, older persons spend more days in hospital and younger persons about the same as middle-aged individuals. Those who are previously married spend about the same number of days in hospital compared to married individuals (with exceptions in 1992 and 2001 when they are more likely, and in 2008 when they are less likely). Over time, the results show that individuals who have never been married are, on average, likely to spend fewer days in hospital than their comparator. The results do not indicate a statistically significant difference in the length of stay between those who reside in the northeast, midwest or southern regions of the country, yet those who reside in the western region spend fewer days in hospital on average.

Summary of Findings

In sum, the data indicate that probability of an individual being admitted to a hospital appears to be less sensitive to socioeconomic factors than does the utilization of doctor services. Nevertheless, socioeconomic inequities in the utilization of hospitals are present in most years examined, however the magnitude has remained relatively consistent over the study period. For both doctor visits and hospital admissions, self-reported health status is most strongly associated with the probability of contact, and the magnitude of the relationship between health status and health care utilization is also relatively stable over time. Individuals who are poor are slightly less likely to contact a doctor, however the difference in utilization is generally diminishing over time, and they have on average the same number of annual visits as those who are not poor or

middle income earners. Individuals with high income are much more likely to contact a doctor and to have more visits. A pattern of income inequity is also found when examining the probability of admission to a hospital. After controlling for health status, results indicate that poorer individuals are more likely than individuals from middle-income families to be admitted to a hospital, and that individuals from higher income families are less likely, on average, to be admitted. In the early years of the study, poor individuals do not have a statistically significant difference in the number of days spent in hospital compared to individuals who are not poor, but by the final years of the study they have a slightly longer length of stay. Between 1998 and 2011, individuals with high income are, on average, likely to have shorter lengths of stay, but the magnitude of difference diminishes noticeably by the end of the study period.

The results show that being employed is not a strong predictor of contacting a doctor. Compared to individuals who are unemployed or not in the labor force, employed individuals are between 0.13 to 2.73 percentage points less likely to contact a doctor and have fewer visits, however the results are not highly statistically significant between 1998 and 2011. Employment status is, however, found to be negatively associated with admission to a hospital. Between 1983 and 2011, individuals who are employed are, on average, 1.25 to 4.24 percentage points less likely to contact a hospital compared to those who are unemployed or not in the labor force, and on average have shorter lengths of stay. In terms of the effect of education, the results show that less educated individuals are less likely to contact a doctor and have fewer visits on average, whereas individuals with higher education levels are much more likely to contact a doctor and make more visits each year. In the earlier years of this study, education is found to be

significantly associated with contacting a hospital, although the magnitude of difference between individuals with different years of education is relatively small (less than 1.5 percentage points) and stable until 1998, after which the data indicate little effect. Nonetheless, the data indicate that individuals who did not graduate from high school are, on average, 0.24 to 1.25 percentage points less likely to contact a hospital compared to those who graduated high school but did not go on to further their education. Regarding length of stay, the results show that education is not a strong predictor of the number of days spent in hospital.

POLICY IMPLICATIONS, CAVEATS & LIMITATIONS

Although the descriptive nature of this study does not lead to any claims of causality, the findings nevertheless have important implications for policy initiatives that address socioeconomic inequities in the utilization of health care. Specifically, because the data indicate that poor individuals are less likely to contact a doctor and high-income earners are more likely, policymakers may wish to focus their efforts on strategies that remove existing barriers that limit the utilization of services, better educate the public about the proper use of medical services, or provide better availability through opening more clinics with extended operating times to accommodate those who may work irregular hours. Although it seems that the utilization of hospital services is less sensitive to socioeconomic influences, such policies would also be appropriate in addressing the inequities present in the likelihood of making contact with a hospital. It is evident that individuals with high levels of family income are likely to have more visits to a doctor annually and have shorter lengths of stay in hospital. To address this, policymakers should implement initiatives that promote better patient-provider communication and appropriate levels of care through enforcing clinical guidelines that have a strong commitment to horizontal equity.

More generally, in echoing recent calls to action by the World Health Organization, it is imperative that federal and state governments in the United States work toward creating conditions for equitable health and health care utilization through the targeted use of social and economic policies and regulations. Moreover, in addition to the need for strong political support and leadership, it is crucial that the United States implement a “whole-of-government”

mechanism as defined by the WHO (2008) that promotes the goal of health equity through creating and strengthening institutional structures in government that promote cross-government policy coherence. Most importantly, the United States should take immediate action to ameliorate widening income inequality and declining mobility for the population. Likewise, action must be taken to address other root causes of inequity, including implementing policies that adequately address issues relating to access to care, care coordination, supplier-induced demand, provider biases, poor communication between patients and providers, and poor levels of health education and literacy. Although much attention has focused recently on the aspirations of the Patient Protection and Affordable Care Act 2010 in addressing some of these issues, it remains to be seen whether or not this landmark piece of legislation will in fact reduce inequities in the United States' healthcare system or improve the health of America's most vulnerable and disadvantaged in a meaningful way.

While the results of this study generally coincide with existing evidence of socioeconomic inequities in health care utilization in the United States, a number of limitations and caveats are in order. Due to time limitations, this study was not able to control for endogeneity in the relationship between health and socioeconomic status. This is of particular concern because the direction of causality is not always clear and may cause biased estimates if left unaddressed (Ettner 1996; Frijters et al. 2005; Wooldridge 2013). Likewise, the results of this study may suffer from omitted variable bias by not including controls for negative health behaviors. For example, some studies show that certain health behaviors and lifestyle choices have an impact on an individual's health and utilization of health care, whereby individuals who engage in negative

health behaviors like consuming alcohol or smoking cigarettes may have different attitudes towards health care than those who live healthier lifestyles, and that socioeconomic status is associated with a higher prevalence of such behaviors (Birch et al. 1993; Curtis and MacMinn 2008; Deaton 2002). Similarly, due to time and data limitations, this study did not control for the healthy immigrant effect, a phenomenon whereby immigrants are initially healthier than native-born citizens, but over time their health approaches that of the general population (Gushulak 2007; McDonald and Kennedy 2004). Utilization patterns for immigrants may vary systematically from native-born citizens due to barriers to utilization stemming from language issues, racial or ethnic discrimination within the system, or other cultural issues (Curtis and MacMinn 2008; Deri 2005; Kennedy et al. 2006). Failing to control for this may bias in the results.

As previously mentioned, a note of caution is in order when comparing the results prior to and after 1995, stemming from slight differences in the measurement of income. Between 1983 and 1995, the base category is “not poor” – which reflects individuals with total annual family income equal to or greater than 100 percent of the federal poverty level – whereas between 1998 and 2011, the base category is “low- to middle-income,” reflecting individuals with total annual family income between 100 percent and 399 percent of the federal poverty level. Thus, the magnitude of the estimates prior to and after 1995 are not directly comparable. Furthermore, because this study only examined the differences in utilization between the poor and high-income earners, some level of detail in analysis is sacrificed. For example, individuals who are near but above the federal poverty level are hypothesized to have different health outcomes

compared to the poor or middle-income earners (Gross et al. 1999; Newman and Chen 2007).
Therefore, other measures that capture the full income gradient may yield different results.

CONCLUSIONS & SUGGESTIONS FOR FUTURE RESEARCH

This study provides a thirty-year analysis of the relationship between socioeconomic status and health care utilization in the United States. Specifically, the focus of this study is on how inequities in the utilization of doctor and hospital services along the lines of income, education and employment have changed over time. First, logit regression models are used to calculate the probability of visiting a doctor and being admitted to a hospital. Second, negative binomial regression models are used to examine population differences in the frequency of use. The descriptive nature of this study provides health experts and policymakers with important detailed information on how the relationship between socioeconomic status and health care utilization has changed over time, however no statements of causality can be expressed.

Overall findings of this study indicate that a positive relationship exists between socioeconomic status and health care utilization, and that there is slight variation over time. After controlling for health status and demographic characteristics, the results from most years examined demonstrate that income, education and employment status are key determinants in explaining differences in utilization. Regarding doctor utilization, poorer individuals are slightly less likely to contact a doctor and, while variation exists across years, the difference is generally diminishing over time. Interestingly, the results show that although inequities in the likelihood of making contact with a doctor are present, the poor have on average the same number of annual visits as those who are not poor or middle income earners. Individuals with high levels of income are found to have a higher probability of contacting a doctor and make more visits in a given year. In relation to the effect of education, findings indicate that higher levels of education are

associated with both a higher probability of contacting a doctor and a higher frequency of visits, and that this positive relationship is stable over time. Employed individuals are only marginally less likely to contact a doctor compared to those who are unemployed or not in the labor force, and have fewer visits on average.

Regarding rates of hospital utilization, findings indicate that the probability of an individual being admitted to a hospital is less sensitive to socioeconomic influences than is the utilization of doctor services. Nevertheless, socioeconomic inequities in the utilization of hospitals are present in most years examined, however the magnitude has remained relatively small and consistent over the study period. Results illustrate that poorer individuals are more likely to be admitted to a hospital, whereas those with high income are less likely, on average, to be admitted. In the early years of the study, poor individuals do not have a statistically significant difference in the number of days spent in hospital compared to individuals who are not poor, but by the final years of the study have a slightly longer length of stay. Between 1998 and 2011, individuals with high levels of income are, on average, likely to have shorter lengths of stay, but the magnitude of difference diminishes noticeably by the end of the study period. In the earlier years of the study, education is found to be significantly associated with contacting a hospital, although the magnitude of difference between individuals with different years of education is relatively small and stable until 1998, after which the data indicate that education has little effect. Findings also suggest that education is not a strong predictor of the number of days spent in hospital in a given year. Employment status is found to be negatively associated with the probability of admission to a hospital; between 1983 and 2011, individuals who are employed are, on average, less likely to

contact a hospital compared to those who are unemployed or not in the labor force and, on average, have shorter lengths of stay.

The findings of this study have a number of important policy implications. Because the data indicate that poor individuals are less likely to contact a doctor and high-income earners are more likely, policymakers should focus on efforts to remove existing barriers that limit the utilization of services, better educate the public about the proper use of medical services, and provide better availability through opening more clinics with extended operating times to accommodate those who may work irregular hours. Although it seems that the utilization of hospital services is less sensitive to socioeconomic influences, such policies would also be appropriate in addressing the inequities present in the likelihood of making contact with a hospital. To address inequities in the frequency of visits to a doctor and the length of stay in hospital, policymakers should implement initiatives that promote better patient-provider communication and appropriate levels of care through enforcing clinical guidelines that have a strong commitment to horizontal equity.

Although a number of limitations are present in this study, such issues provide opportunity for future research. For example, because the near poor are hypothesized to have different health outcomes than individuals living below the federal poverty level – yet data and time limitations only allowed for multi-year comparisons between those who are poor and those who are not poor – a finer level of analysis can be achieved using different measures of income that allow for examination of the full income gradient. Additionally, the results of this study may be biased due

to omitted variables or issues concerning endogeneity. As such, future research could improve this study by including controls that are hypothesized to have an impact on both socioeconomic and health related indicators, such as immigration status and interactions between income, education, employment and health status. Furthermore, this study used a negative binomial regression to examine differences in the population mean length of stay in hospital and the population mean number of annual visits to a doctor. While this procedure is well-suited for modeling count data with over-dispersion of outcomes, a zero-truncated negative binomial regression is more appropriate given that policymakers are interested in the frequency of use conditional on at least one visit, which allows for application of a two-part hurdle model. Finally, other measures of utilization may be included for a more detailed analysis. For example, in addition to general practitioners and hospital services, future research could include an examination of differences in the utilization of visits to specialists and dentists.

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