



AN ABSTRACT OF THE ESSAY OF

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Title: Health Care Utilization and Access among Immigrants and U.S. Born Citizens: Implications from the California Health Interview Survey

Abstract approved:

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The objective of this study is to identify the variation in health care access and utilization among immigrant and U.S. born citizens in California. It aims at finding the reasons behind the disparity so that U.S. health agencies can make more efforts to improve the availability of health care services to immigrants. As an important determinant of health care utilization, the insurance coverage variable is also considered as a type of health care access. It is examined closely to see its relationship with other variables among immigrants.

In this essay, Andersen's Behavioral Model of Health Services Utilization (BHMSU) is used as the theoretical framework. The data are from the 2011-2012 California Health Interview Survey. There are 5,311 naturalized immigrants and 31,801 U.S. born citizens in the available sample. Chi-square tests and student t-tests are applied to detect significant differences in values of explanatory variables between the two groups. A negative binomial model of number of doctor visits and a logistic regression model of insurance coverage are then used to analyze the variation of health care utilization and health care access among immigrants. This study shows that immigrants are less likely to

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visit doctors after accounting for other variables, which means that immigrants' health care utilization is significantly lower than for U.S. born citizens. Determinants for health care utilization are gender, health insurance coverage, income level, race and age. As for health care access, the insurance coverage variable is used as a measurement. As indicated from the study, lengthy duration of residence in the U.S. does not affect the probability of immigrants' insurance coverage. However, language proficiency is a significant factor in predicting whether immigrants are insured as are socio-economic variables such as gender, race, income, age and marital status.

Results indicate that naturalized citizens need greater access to health care and that insurance is a key variable in obtaining health care. This implies that immigrants can particularly benefit from the Affordable Care Act. The results also indicate that language translation services would be beneficial. Further research is needed to explore other aspects of health care access and utilization and to examine the current procedures of medical services. It also calls for evaluations of impacts of government programs including the Affordable Care Act on the insurance coverage and health care utilization of immigrants.

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Health Care Utilization and Access among Immigrants and U.S. Born Citizens:  
Implications from the California Health Interview Survey

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I understand that my essay will become part of the permanent collection of Oregon State University library. My signature below authorizes release of my essay to any reader upon request.

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Shaoshan Liao, Author

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## **1. Introduction and Statement of the Problem**

The access and utilization of health care services has been a heated topic in the last several decades. There are many reasons for people to access health care services: some of them might want to cure illness and improve health conditions while others might just want to get more information about preventive health care services.

Obama's Health Care Reform is officially called the Patient Protection and Affordable Care Act (PPACA), and was signed into law on March 23, 2010. The purpose of the Act (sometimes called "Obamacare") is to grant more rights to Americans who struggle to buy their own insurance ([obamacarefacts.com](http://obamacarefacts.com)). It regulates behaviors of insurance companies and lowers costs effectively. It also increases subsidies to States' Medicaid and Children's Health Insurance programs. Moreover, it expands preventive health care services and provides cost assistance to low income families via a health insurance marketplace. The changing dynamics of health insurance coverage would make health care services more accessible to people.

With the implementation of the PPACA and the evolution of the health care delivery system, the study of health care utilization is becoming more and more popular. By studying variations and trends in the health care utilization patterns among different groups in the U.S, we are able to identify the weaknesses of the current health care system, forecast future health care needs and allow health care services to be more accessible to people. Insurance coverage is a very significant factor in affecting health care utilization. It also affects health care access since many people cannot afford health care without it. Knowing the influences of other variables on the probability of being

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insured sheds some lights on how government programs like Obamacare could help to increase health care access for immigrants who are naturalized citizens.

The United States has a diverse population. Immigrants from all over the world come to the U.S. searching for a better life and strive to make their dreams come true. Statistics have indicated that the immigrant population in the U.S. was 28.4 million in 2000. Based on the estimates from the U.S. Census Bureau's 2012 American Community Survey, the immigrant population has climbed to 40.8 million which constitutes 13% percent of the U.S. population of 313.9 million. The Census Bureau predicts that the immigrant population will continue to grow in the next decade. The rapid increase in the number of immigrants not only impacts the country's demographics and labor market, but also has a strong influence on the social and economic resources in the society.

Some scholars suggest that the increasing number of immigrants has brought serious social and economic problems to the country. One of the major concerns is whether immigrants create a net fiscal drain to society rather than economic stimulation (Rothman and Espenshade 1992). However, evidence suggests that overall economic benefits brought by immigrants exceed public expenditures on immigrants for services. Thus in order to better motivate immigrants to make contributions to the U.S. society, some scholars suggest that promoting the immigrants' adaptation process is a proper way to welcoming immigrants into our society and reducing their discomfort. The adaptation process does not mean erasing the differences of immigrants. Rather, it means giving more care to immigrants' needs and providing them with resources to solve their unique problems (McDonald and Balgopal 1997).

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However, due to different socioeconomic backgrounds and limited resources from federal and state level policies, immigrants have been identified as a vulnerable group (Derose et al 2007). Most of the time, it is not easy for them to adapt to mainstream society. Some of them even have a hard time in satisfying their basic needs. Efforts have been made to explore immigrants' use of welfare and social services, especially their basic needs for the health care system. Extensive studies have shown that the health care utilization patterns of immigrants or their participation in government-funded insurance programs have long been neglected by researchers (Chavz 1986; Chavz, Cornelius and Jones 1985; Flores and Lopez-Garza 1992; Rumbaut et al. 1988). Some literature only focuses on examining the variation of health care utilization among different groups of immigrants (Bustamante et al. 2012; Waidmann et al. 2000; Weinick et al. 2000). Very few studies give attention to the differences in health care utilization between immigrants who are naturalized citizens and U.S. born citizens. Although they have the identity as naturalized citizens, health care resources may not as be accessible to them as to many health care resources as U.S. born citizens.

Therefore this study focuses on the variations of health care utilization patterns among these immigrants and U.S. born citizens. In order to look at potential benefits of government programs like Obamacare, this study also investigates the relationship between the probability of having insurance coverage and other factors among immigrants.

In this study, I use the California Health Interview Survey 2011-2012 as our data source. According to the Public Policy Institute of California, the population of immigrants in California is larger than any other state. Thus the California Health Interview Survey is

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an ideal source for us to know more about immigrants and their accessible health care services. California is home to more than 10 million immigrants. In 2011, foreign-born immigrants constituted 27% of California's population, almost twice the U.S percentage. Almost half (47%) of California's immigrants were naturalized U.S. citizens, and another 26% had some other legal status (including green cards and visas). According to the Department of Homeland Security, about 27% of immigrants in California are undocumented. In this article, I define immigrants as those who are naturalized citizens but were born in a foreign country. Naturalized citizens constitute the largest segment of immigrants. Permanent residents, refugees and undocumented immigrants are not considered in this study since there is no precise method to estimate the total number of these immigrants merely based on the California Health Interview Survey. The inferences I make will be based on the situation in California.

In the following sections, I review the literature about health care access and utilization patterns in the U.S. and explore the determinants of health care access and utilization. Then I use Andersen's Behavioral Model of Health Services Utilization (BHMSU) to arrange the determinants and examine our data in a negative binomial regression model with number of doctor visits as the dependent variable and in a logistic regression model with insurance coverage as the binary outcome. Results are examined to reveal the variations of health care utilization among immigrants and U.S. born citizens and specific factors that affect the immigrants' health care access. The results could be used to evaluate how many health care services are being properly delivered to immigrants and which aspects we should improve regarding the quality of health services. The analysis about health insurance coverage can give us some ideas about how to increase health care

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assess in terms of health insurance coverage. Recommendations are made to improve related health services for immigrants accordingly.

## **2. Literature Review**

Health care utilization is referred to as “The measure of the population's use of the health care services available to them” according to the Manitoba Centre for Health Policy in University of Manitoba. A quantitative measure of health care utilization is the actual usage of health services (Andersen, 1995). Health utilization is important indicator of the health care system and the quality of health care services. In the analysis below, I use the number of doctor visits within a year to represent the actual usage of health services.

Health care access is referred to as “the ease with which an individual can obtain needed medical services” according to the RAND corporation research and development center. Penchansky and Thomas (1981) described health care access as the extent to which people have the ability to approach and receive medical services. In the analysis below, I use the binary health insurance coverage variable to represent one aspect of health care access.

The most important factor in determining adult use of medical services is health insurance. It has been documented that people who cannot pay for health care services, either out-of-pocket through private or social health insurance (such as Medicare or Medicaid), may not receive needed services in the United States (National Center for Health Statistics 2012). Adults with insurance are found to have more physician visits

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(Simmons, L. A., Andersen, E. A., and Braun, B., 2008). Also those covered by insurance tend to be twice as likely to access health care services as their counterparts without insurance (Mueller, Patil and Boilesen 1998). Recent studies have shown that immigrants are found to have lower rates of health insurance, use fewer health care services and receive lower quality of care than U.S. born populations (Pitkin et al. 2007). On the other hand, insurance can also be considered as an important proxy for health care access. Vargas and his coworkers (2012) used binary variables of whether an individual had a usual place to go when sick and whether an individual delayed in obtaining health care services to measure health care access. In the analysis below, insurance coverage is used to measure health care access.

One of the important determinants of health care access and utilization is socio-economic status. Socio-economic status includes income, age, educational attainment and other variables which reflect an individual's relative position in the society. Financial constraints (i.e., income) are usually the major barrier to access of medical services. People with low income and without appropriate insurance might fail to cover the health care expense, and thus are more likely to be in ill health (National Center for Health Statistics [NCHS], 2012). Also recent immigrants are found to be less likely to be employed in jobs that provide health insurance benefits (Chavez 1986; Cobb-Clark 1991; Siddharthan 1991; Rumbaut et al., 1988; Valdez et al., 1993). This tends to reduce their access and utilization of health services. Statistics have shown that immigrants are less likely to graduate from high school than the U.S. born population. They are more likely to work in service occupations and have lower incomes. Situations vary across ethnic groups. For example, the proportion of Asian immigrants living below the federal poverty

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level is similar to that for U.S. born populations (11 percent) (Derose et.al, 2007). However, the proportion of Latin American immigrants is twice as high (22 percent) which indicates that Latin American immigrants are faced with a more severe economic situation. On the whole, educational attainment of Asian immigrants is much higher than Latin American and African American immigrants. With the gaps in income and educational attainment, perceptions and health beliefs towards health care services vary which result in disparities in utilization rates.

Racial and ethnic disparities are potential factors which influence different levels of health care access and utilization. Evidence has shown that people who belong to a racial or ethnic minority tend to have lower health care utilization (Lillie-Blanton, Parsons, Gayle and Dievler, 1996; Mayberry, Mili and Ofili, 2000). The variations in social-economic status lead to huge differences in health care access and utilization among racial or ethnic minorities. The health care utilization gap is obvious when the data are stratified by social class and position (Lillie-Blanton et al., 1996).

For immigrants, two important factors that should be included in the model of health care access are duration of residence and language proficiency. Duration of residence in the United States is often used as a proxy for acculturation and the degree of immigrants' adaptation to the life in the United States. It is possible that immigrants with shorter duration of residence have higher medical needs but limited knowledge and access to the health care system due to unfamiliarity of local policies and regulations. Studies have shown that duration of residence has significantly affected immigrant's use of preventive services, although it is not the main reason for the health care utilization gap between immigrant and native born populations (Delacollette, Van der Stuyft, Molima 1996;

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Honig-Parnass, 1982). Scholars such as Stromberg, Peyman and Dowd (1974) have found significant effects of duration of residence on the health care utilization patterns of immigrants.

Language proficiency is also an important proxy for acculturation and identified to be crucial in acquiring knowledge about the health care system and health services. The U.S. health care system is largely geared toward serving English speakers. Limited language ability prevents immigrants from learning about the health care system and making better use of it. In addition, language proficiency plays an important role in adopting the value systems and health-seeking behaviors in the host country. Fiscella et al. (2002) have found that the health care access patterns for English-speaking Hispanic patients were not significantly different from those non-Hispanic white patients. In contrast, Spanish-speaking Hispanic patients were significantly less likely than non-Hispanic white patients to have a physician visit. Aroian et al. (2005) indicated that Chinese elders underutilize services due to problems of language and of cultural norms related to the need for care, cost and long waits for appointment. Worse still, solid evidence showed that language barriers can adversely affect the quality of health care, which of course affects patients' willingness to access health care services again. Woloshin et al. (1995) have found that when a patient does not speak the language of his or her health care provider, multiple adverse effects on the patient's health care process may occur. Language barriers also block the access to educational information about preventive care.

To organize the factors mentioned in the past literature, I use the Behavioral Model of Health Services Utilization (BMHSU) developed by Andersen (1968, 1995). The original behavior model was developed in the late 1960s to better explain why people use health

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services. The model presents a framework in which the predisposing factors, enabling factors and individual need factors work together to affect the health care access and utilization. The behavioral model has been revised and updated with more detailed indicators (Aday and Awe 1997; Andersen 1995; Akresh 2009; Berdahl et al. 2007; Janicke et al. 2000). The later version recognizes the dynamic nature of the behavior model, with outcomes possibly influencing health behaviors in turn.

In the most recent BMHSU, actual use of health care services is defined as the dependent variable as a measurement of health outcome. With rising health care costs and the need to improve the efficiency of health service centers, Andersen also included consumer satisfaction as an important health outcome variable in 2008. Consumer satisfaction can be measured by four dimensions: availability of services, financing options, provider's characteristics and quality of services.

The number of visits to the primary care provider is often used to evaluate the actual use of health care services. On the other hand, many studies suggest health care use could be evaluated at inpatient hospitalization days, emergency department use, whether there are delays in getting medical services or prescriptions and the total health care use (Janicke and Finney, 2000). The number of doctor visits has proven to be the most widely used variable to measure health care utilization. Although the BMHSU model does not mention what variable we should use to measure health care access, health insurance coverage is the dependent variable for measuring health care access among immigrants in this paper.

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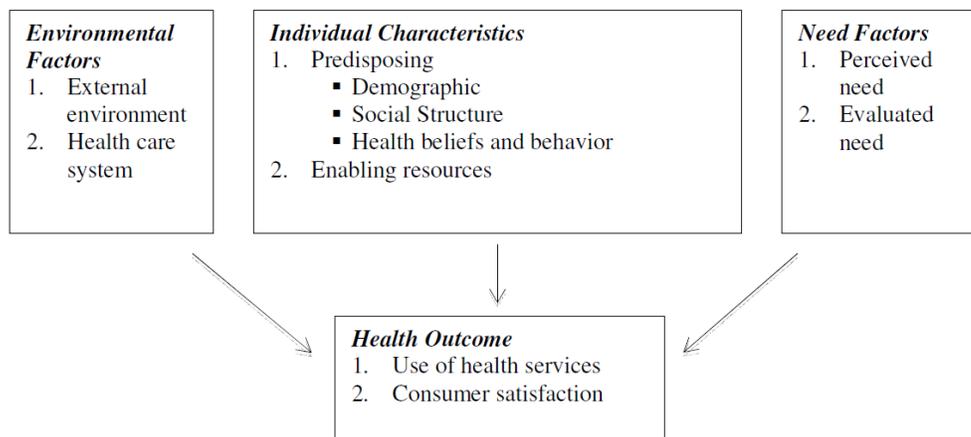


Figure 1: Behavior Model of Health Services Use (BMHSU)

According to the most recent Behavioral Model of Health Services Utilization, there are three major factors that affect health care access and utilization. (See Figure 1.)

The first factor is the environmental factor which describes the external environment such as macro health care policy, the structure of the health care system and public expenditure on health care reform. Previous studies have used the availability of health care providers and facilities as macro-level indices since those factors are determined externally and are necessary for people to access health care services. By those indices, we can roughly know the amount of health care resources available to the community (Janicke and Finney, 2000). Other literature has also listed the number of specialist physicians, general practitioners and number of hospital beds as external environment factors. For immigrants, environmental factors are mostly the availability of health care centers and the health care policies and facilities that could satisfy immigrants' diverse needs.

The second factor is the individual factor. The individual factor describes the person's individual characteristics. Andersen (1995) claims that the individual factor can be divided into two parts: predisposing factors and enabling resources.

Predisposing factors include demographic information, social structure and health beliefs. Demographic information includes age and gender which reveals basic biological information and could be of importance when it comes to the influence on health care consumption behavior. Andersen and Newman (1993) suggested that the social structure variables are comprised of race/ethnicity, occupation, educational attainment, marital status, family size and religion which indicate the relative position of the patient's socio-economic status. The U.S. has the most diverse group of immigrants in the world. There are various races among the immigrants. Those minorities might not have equivalent opportunities for education and occupation. Thus it is necessary to account for race/ethnicity, occupation and educational attainment as predisposing variables. Berdahl et al. (2007) pointed out that legal status exerted great influences on immigrants' behaviors in health care utilization, especially for Latino populations. Documented and undocumented immigrants have very different health care utilization patterns. Predisposing characteristics also include health beliefs or health values that an individual has towards health and illnesses and the knowledge of health and health services. Akresh (2009) used family origin as a proxy to measure health beliefs.

The second part of the individual factor is the enabling resources. Shi and Stevens (2005) suggest that educational attainment of the mother should be included in the enabling resources. Akresh (2009) indicates that language proficiency and length of residence are indispensable parts of enabling resources since they are important proxies for immigrants'

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adaptation to mainstream society. Other studies (Hargraves and Hadley, 2004; Goldman et.al, 2005) have shown that insurance coverage, household income level and urbanity of family residence should not be neglected. Although these variables do not directly determine the health status of the person, they indicate the extent of health care resources available to immigrants. Specifically, income is a two-sided variable. Some scholars indicate that income can increase personal health status through better nutrition or more exercise and thus reducing doctor visits. Other scholars think that it could directly increase doctor visits. Therefore, income can work both ways and the impact of income on doctor visits depends on the comprehensive influences combined with other factors.

The third factor is the need factor. The need factor consists of self-perceptions (perceived need) and objective evaluations (evaluated need) of general population health conditions. Perceived need describes the need of receiving health services. For example, general state of health status, functional state and illness symptoms greatly affect how people view their health and the desire to seek help. Evaluated need, on the other hand, is the professional assessments and objective measurements of patients' health status and need for medical care from the perspective of the health care provider. Contextually, these two factors distinguish themselves from environmental factors and population health indices which refer to a more broad sense of overall environmental and population related conditions. Most of the studies measured the need factor by medical conditions diagnosed by a health care provider (Arcury et al., 2005; Shi and Stevens, 2005; Berdahl et al., 2007).

Based on the BMHSU model, many revised and expanded models have been created to deal with specific groups of immigrants. A particular example is a study examining Vietnamese traditional health beliefs and practices which hinder them from accessing

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health care services. The Predisposing factors need to be tailored to the specific group of people when the model is applied (Jenkins et al., 1996). In the analysis below, I adopt the BMHSU model as the basic framework. English proficiency and years living in the U.S. are added to the model of health care access.

### **3. Methods**

#### **3.1 Data**

In this article, I use the data from the 2011-2012 California Health Interview Survey (CHIS). The California Health Interview Survey (CHIS) is a population-based telephone survey of California's population conducted every other year since 2001. The survey is conducted by the UCLA Center of Health Policy Research in collaboration with other health departments. In order to better estimate the overall population and recognize major racial and ethnic groups, the survey employed a multi-stage sample design. Households were drawn from each county and stratified. The sample I used contained 37,112 adult respondents who represent the household population in California. To capture the rich diversity of the California population, interviews were conducted in English, Spanish and several Asian languages based on the analysis of 2000 Census data. The overall screener response rate is 31.8%. The response rate is consistent with similar telephone health surveys in California (CHIS 2007). For those non-respondents, some in-person follow-up interviews were conducted. Results have shown that there is no significant difference

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between the answers from respondents and those from non-respondents after weighing the sample.

### **3.2 Variables**

The list of variables and their definitions are provided in Table 1. I first discuss the dependent variables, followed by immigration status and other factors.

#### ***Health Care Access and Utilization***

According to Andersen's model, the health outcome is measured by the use of health services or customer satisfaction. Based on the CHIS data, I measure health outcomes in this study with the use of health services and the health insurance coverage. A count variable is used to measure health care utilization (i.e., how many times an individual has seen a medical doctor in the past 12 months) in a negative binomial regression model. This variable is commonly used in studies regarding measuring health care utilization (Vargas et al., 2009; Weinick, Zuvekas, and Cohen, 2000). A binary variable is used to measure health care access (i.e., whether an individual has some kind of health insurance coverage in all of the past 12 months) in a logistic regression model. Specifically, I want to look at how the probability of insurance is determined by socio-economic status, length of residence and language of proficiency of immigrants, thus the logistic regression model only uses the sample of 5311 immigrants.

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### ***Immigrants and U.S. Born Citizens***

All CHIS respondents were asked about their nationalities by responding to a series of questions about whether they are citizens of the United States, whether they were born in the U.S. and whether they are legal residents in the country. In this study, I classified the immigrants to be naturalized citizens who were born in a foreign country but have the identity of U.S. citizenship. Although these immigrants are also U.S. citizens, cultural differences, language problems and socio-economic status may make it difficult to enjoy the benefits of health care services. Our available sample contains 31,801 U.S. born citizens and 5,311 naturalized citizens. The naturalized citizens account for 15.7% of the California residents<sup>1</sup>. In our data, survey respondents are all at least 18 years old.

### ***Explanatory Variables***

A number of explanatory variables have been included in both the negative binomial regression model and the logistic regression model based on Andersen's Behavioral Model. No environmental factors are included in our models since external factors are considered fixed in a year. Also no need factors are included due to endogeneity problem of the model.

On the level of individual factors, predisposing factors include race/ethnicity, gender, marital status, educational attainment and age. First of all, a dichotomous variable is used to describe immigrants' identity. If the person is an immigrant, the dummy variable

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<sup>1</sup> The remaining adults (about 10.23% of California residents) in the CHIS sample are non-citizens which are comprised of permanent residents, undocumented immigrants, students and visitors on temporary visas or refugees and asylum seekers.

“immigrant” equals 1. Two dummy variables representing race/ethnicity are included since race is an important variable in defining cultural identities. According to the UCLA Health and Policy Center’s definition in 2007, white people is used as our reference category. The two dummy variables are “Latino” and “Other races” since Latino is the largest immigrant population in California. Variables for gender, marital status and educational attainment are also represented by dummy variables and age is a continuous variable.

As for enabling factors, I include insurance coverage and annual household income level in the negative binomial regression model. Income can enable doctor visits, but it has an additional effect in that it can improve health through better nutrition or safer housing, for example. In that case, income leads to fewer doctor visits through improved health. The impact of income on doctor visits will be the net effect of these two forces.

Annual household income, English proficiency and duration of residence are included in the logistic regression model. English proficiency is a dichotomous variable with 1 being very well and 0 being not very well. The duration of residence is described by three dummy variables (living in the U.S. for no more than 4 years; between 10 and 14 years; equal to or more than 15 years). The reference category is defined as living in the U.S. between 5 to 9 years. It is chosen because most immigrants have to live in the U.S. 5 years before becoming citizens. The health insurance coverage dummy is based on the question “Did you have insurance in every month of the past 12 months” with “Yes” being 1 and “No” being 0. The annual household income level measures the whole household’s income in the past 12 months in units of 100,000 dollars. The need factor is not included since no relevant variables could be extracted from the data.

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#### **4. Statistical Analyses and Results**

I first provide some descriptive statistics of our data and make some comparisons between U.S. born citizens and immigrants. For continuous variables like age, income and number of doctor visits, student t-tests were applied to see if there were significant differences in mean values of those variables between the two groups. For the remaining dummy variables, Chi-square tests were used to determine whether there were significant differences in percentages of people with characteristics represented by dummy variables. As we can see from Table 2, compared with U.S. born citizens, immigrants are more likely to be married (61.89%, p-value<0.01) and have fewer years of education (40.56%, p-value<0.01). Immigrants also have lower annual household income (\$55,000, p-value<0.01) and a lower rate of insurance coverage (83.20%, p-value<0.01). Immigrants are composed of a more diverse group of races and ethnicity. As for health care utilization, the number of doctor visits of immigrants are significantly fewer than those of U.S. born citizens (4.30, p-value<0.01). All of the statistics above suggest that immigrants are at a disadvantage regarding health care access and utilization. Their socio-economic status has evidently adversely affected immigrants' ability to access health care services. There are no significant differences in age and male variables among U.S. born citizens' group and immigrants' group which indicate that the sampling strategy in the survey was appropriate.

After examining the descriptive statistics, I use a negative binomial regression and a logistic regression to model the determinants of health care access and utilization for U.S

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born citizens and immigrants. Results are presented in Table 3 for number of doctor visits and Table 4 for insurance coverage.

For the negative binomial regression model, Table 3 shows the estimated percentage change in the number of doctor visits from unit changes in the regressors. For the immigrant variable, the number of doctor visits for immigrants is estimated to be 15.1% lower than that of U.S. born citizens (Table 3, p-value <0.01). It shows that being an immigrant does reduce the expected number of doctor visits within a year even when demographic and enabling factors are taken into account. Gender, age, race/ethnicity, income and insurance all significantly affect the number of doctor visits. The number of doctor visits of Latino or other races is estimated to be 8.0% and 5.2% lower than that of white people. People who are female and elderly tend to visit doctors more often (Table 3, p-value<0.01, p-value<0.01). Marital status and college education positively affect doctor visits but are not significant when other variables are held constant. In addition, the expected number of doctor visits for those who have insurance coverage is 76.8% higher than that of those who do not have insurance coverage (Table 3, p-value <0.01) which shows that insurance coverage is crucial in health care utilization. As for income level, a \$100,000 increase in annual household income is estimated to reduce number of doctor visits by 14.9% (or equivalently, a \$1,000 increase in income leads to a 1.5% reduction in visits), given other factors. This may imply that the influence of income on health dominates the influence of income on the ability to pay for doctor visits. In summary, despite the fact that immigrants have the identities as naturalized citizens in the U.S., they still have relatively lower health care utilization rates controlling for insurance coverage, income level and other indicators of socio-economic status.

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Secondly, lower health care utilization for immigrants and the importance of health insurance utilizing health care in the previous results indicates that it might be interesting to examine insurance coverage for the immigrant sample. Thus, in the logistic regression model, I only use the sample of 5311 immigrants instead of total sample of 37112 respondents.

A logistic regression model is applied to the data where the insurance coverage dummy is the dependent variable. Table 4 shows the marginal effects of regressors, that is, the effect of a unit change of a regressor on the probability of having insurance coverage. Among immigrants, language proficiency is a significant factor in affecting the probability of insurance coverage (Table 4,  $p\text{-value} < 0.01$ ). An immigrant who can speak English very well is estimated to have a probability of being covered by health insurance of 0.07 percentage points higher than an immigrant who cannot speak very well. Surprisingly, duration of residence does not affect immigrants' probability of being insured significantly. All coefficients for living in the U.S. for no more than 4 years, between 10 and 14 years and more than 15 years are not significantly different from living in the U.S. between 5 to 9 years (Table 4,  $p\text{-value} = 0.88$ ,  $p\text{-value} = 0.94$ ,  $p\text{-value} = 0.49$ ). (The 5 to 9 year residence group is the reference category since immigrants usually must live in the U.S. 5 years or more to apply for citizenship. ([Uscis.gov/us-citizenship](http://uscis.gov/us-citizenship))). It indicates that the number of years that an immigrant has lived in the U.S. beyond 9 years does not significantly affect insurance coverage. Perhaps acculturation effects regarding insurance coverage occur primarily in the first 9 years.

In addition to language proficiency, income is also a significant factor. A \$100,000 increase in annual household income is estimated to increase immigrants' probability of

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being insured by 0.2 (Table 4, p-value<0.01). The probability of being insured for immigrants who are neither white nor Latino is estimated to be 0.05 higher than for white immigrants (Table 4, p-value<0.01). This group includes non-Latino Black and Asian immigrants. On the other hand, being a Latino does not have a significant effect on the probability of being insured compared to white people (Table 4, p-value=0.996). Gender, age and marital status also affect immigrants' probability of being insured significantly. The probability for a female immigrant to have insurance coverage is 0.03 higher than for a male immigrant (Table 4, p-value<0.01). Meanwhile, married immigrants are estimated to have a probability of being insured of 0.022 lower than a single immigrant (Table 4, p-value=0.038). Similar to the analysis in the negative binomial regression model, the college variable does not have a significant impact on the probability of being insured for immigrants (Table 4, p-value=0.828). This logistic regression model shows that it is the socio-economic status and the language proficiency rather than duration of residence that affect this aspect of people's access in health care services.

## **5. Discussion**

As an important measurement of health care utilization, the number of doctor visits is significantly affected by immigration status. It means that immigrants are indeed at a disadvantage in utilizing health care services compared to U.S. born citizens. Health insurance coverage is a prominent factor in deciding people's health care utilization rate. Without health insurance, the expected number of doctor visits falls dramatically. This indicates that Obamacare is critical. With the implementation of Obamacare, more and

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more citizens will have health care coverage and low income people will be able to afford health insurance with lower costs. Immigrants have lower income on average than U.S. born citizens. Obamacare is expected to increase immigrants' health care utilization via greater insurance coverage. Surprisingly in the results, the income variable is correlated with the expected number of doctor visits negatively. It suggests that rich people actually utilize health care services less since they pay more attention to their health or can afford better health such as nutrition. Effective measures should be taken to increase the health care utilization of low income people through health insurance. Being in a different race/ethnicity other than white people does reduce the expected number of doctor visits and more group interviews are needed to find out what specific needs of those minorities should be met. Females and old people tend to visit doctors more often. This information should be taken into account when it comes to allocating local health care resources.

Immigrants who can speak proficient English are found to be more likely to have health insurance coverage. It is not surprising at all considering that English proficiency is an important skill to gain knowledge about health care services and make better use of the health care system. The results suggest that language translation services are important in providing satisfying health care services. One interesting fact is that no matter how long immigrants have lived in the U.S., the probability of having health insurance is not affected. One reason could be that insurance is more of a financial-related type of health care access. The number of years living in the U.S. enhances immigrants' perceptions and knowledge towards health care system but it does not have as great an influence on getting insurance as other financial-related considerations (i.e., income). If another variable is chosen to measure health care access, or if duration is measured in years rather

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than 5-year increments, the significance level of duration of residence might change. Married immigrants and female immigrants are less likely to have insurance coverage. In Obamacare, gender and marital status are not taken into consideration in terms of health insurance cost assistance which helps to remove obstacles of insurance enrollment for married and female immigrants

In conclusion, our findings quantify the effects of immigration status on health care access and utilization based on the CHIS data. According to our analysis, immigration status reduces health care utilization. Immigrants' language proficiency has a significant effect on utilizing health care services. Based on our data, most of health care utilization among U.S. born citizens and immigrants can be traced to socioeconomic and demographic characteristics such as gender, income, insurance coverage and race. Considering immigrants having lower income and lower rates of insurance coverage, the most effective way to improve immigrants' health status is to put more sources in preventive care services and provide immigrants with informative health-related workshops. There are many other factors that could potentially affect health care access and utilization but are not included in our models. These factors are health status diagnosed by medical authorities, the lack of familiarity with the U.S. health care system, the supply of neighborhood health services and immigrants' social network system. Statistics have shown that it is easier for immigrants who have stronger social networks to gather information about health care services (Gresenz et al., 2009).

Obamacare aims at getting everyone insured with low costs. Kicking off on October 1<sup>st</sup> 2013, the health insurance marketplace has helped over 8 million uninsured Americans to be covered by insurance with lower premiums (obamacarefacts.com). Premium costs are

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no longer based on health status, gender, pre-existing conditions and duration of coverage. The only factors that affect premiums are income, age, tobacco use, family size, geography and the type of insurance plan. The health insurance marketplace also provides multiple language services which guarantees language barriers are not a major issue in terms of enrolling into health insurance. Combined with our analysis on the logistic regression model, Obamacare would be able to remove obstacles for female and married immigrants or non-English speaking immigrants. It enables more uninsured immigrants to choose their own insurance with lower costs. The data in this paper were collected in 2011-2012 when Obamacare just started to take effect and the health insurance marketplace was not yet established. With the gradual implementation of Obamacare, more uninsured Americans especially naturalized immigrants might be able to reap great benefits from this policy. However, to reach more immigrants, the promotion of Obamacare must be able to reach different local communities with racial and ethnic diversity in California.

## **6. Limitations**

Although our study uses the latest dataset available from the California Health Interview Survey, inferences based on the results can be made only to the naturalized immigrants and U.S. born citizens within California. The health care access and utilization situations of immigrants all over the U.S. need to be examined with a larger dataset sampling from all the States in order to obtain general results. Immigrants who are not naturalized

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citizens might also be considered. They are likely to have poorer outcomes than the immigrants studied here.

There can be many ways of measuring health care utilization and access. Doctor visits and insurance are only particular aspects. The variables included in the models are restricted to variables available in the survey which weakens the prediction accuracy of the models. The survey was dependent on self-reported data which might not be accurate enough to evaluate the actual needs of immigrants. In addition, since the survey was conducted by landline telephones or cellphones, poor families who cannot afford those or migrant farm workers who do not have landlines might be underrepresented in the data.

## **7. Conclusion**

This study has applied the latest CHIS data to examine the variation in health care access and utilization between immigrants and U.S. born citizens. Previous studies used old and small databases. Our study shows that compared with U.S. born citizens, immigrants have fewer numbers of doctor visits within a year. Second, insurance plays a prominent role in health care utilization, but immigrants have lower rates of insurance than non-immigrants.

Another unique contribution from our study is that immigrants' language proficiency is found to be crucial in deciding the probability of being insured or not. Duration of residence is not so important when it comes to health insurance coverage holding other variables constant. Here in the paper, insurance is considered to be a type of health care

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access. Further study is needed to examine other types of health care access such as the distance from home to health care services and health-related resources in the local community. Besides immigration status, gender, health insurance coverage, income level, race and ethnicity are all significant variables that explained the variations in health care access and utilization. More variables such as perceived health status, the location of residence (urban and rural), immigrants' social network and the supply of neighborhood health services should also be considered in the further studies as important determinants in health care access and utilization patterns. Given that immigrants tend to have lower income and are less likely to have insurance coverage, more community resources should be invested in providing language translation services and free preventive health care services. Obamacare should be made full use of to expand insurance coverage to low income immigrants and providing them with informative health-related workshops.

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Table 1 Summary of Dependent and Independent Variables

Variables	Definition of Variable
Dependent variables	
Number of doctor visits	Number of doctor visits in the past year
Health insurance coverage	= 1 if covered by insurance in the past whole year =0 if no insurance for the past whole year or for some of the months within last year
Independent variables	
Immigrant	=1 if immigrant, naturalized citizen =0 if U.S. born citizen
Male	=1 if male; =0 if female
Married	=1 if married; =0 if not married
Latino	=1 if Latino; = 0 if not Latino
Other race/ Ethnicity	=1 if non-white and non-Latino (i.e., Black or Asian, non-Latino); =0 otherwise
Education (College or above)	=1 if have some college or above =0 if doesn't have any college education or below
English proficiency for immigrants	=1 if speaks English very well =0 if does not speak very well
Age	Individual's age in years (ranges from 18-45)

Years 0-4	=1 if immigrant has lived in the US for 4 years or less  =0 if lived in the US 5 years or more
Years 10-14	=1 if immigrant has lived in the US between 10 and 14 years  =0 otherwise
Years 15+	=1 if immigrant lived in the US 15 years or more  =0 if lived in the US less than 15 years
Annual household income	In dollar amount (in units of 100,000 dollars)

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Table 2 Summary Descriptive Statistics

Variables	U.S. born citizens (n=31,801)	Immigrant (n=5311)	P value <sup>b</sup>
Health care access and utilization			
Number of doctor visits	5.17 <sup>a</sup>	4.30 <sup>a</sup>	<0.01
Health insurance	88.29	83.20	<0.01
Predisposing factors <sup>c</sup>			
Male	41.77	41.03	0.309
Latino	7.83	29.11	<0.01
Other race/Ethnicity	16.23	56.45	<0.01
Married	46.44	61.89	<0.01
Education (College or above)	49.52	40.56	<0.01
Age	56.20 <sup>a</sup>	56.25 <sup>a</sup>	0.85
Enabling factors			
Health insurance	88.29	83.20	<0.01
Annual household income	0.74 <sup>a</sup>	0.55 <sup>a</sup>	<0.01

Data source: California Health Interview Survey (CHIS) 2011-2012

<sup>a</sup> values above all expressed as % except for continuous variables (age, income, number of doctor visits). Annual household income is in units of 100,000 dollars

<sup>b</sup> p values are based on chi-square tests for dummy variables and student's t-tests for continuous variables (age, income, number of doctor visits)

<sup>c</sup> Years in the U.S. for immigrants and English proficiency for immigrants are omitted in the predisposing factors since no U.S. born citizens' data are available

Table 3 Negative binomial regression results with robust variances<sup>1</sup>

Variables	Negative binomial regression <sup>2</sup>
	Number of doctor visits <sup>3</sup>
Immigrant	-15.1%*** ( $<0.0001$ ) <sup>4</sup>
Predisposing factors	
Male	-15.3%*** ( $<0.0001$ )
Latino	-8.0%** (0.034)
Other race/Ethnicity	-5.2%* (0.066)
Married	0.5% (0.811)
Education(College or above)	0.4% (0.843)
Age	0.8%*** ( $<0.0001$ )
Enabling factors	
Health insurance	76.8%*** ( $<0.0001$ )
Annual household income	-14.9%*** ( $<0.0001$ )

\* Significant at 10% level; \*\*significant at the 5% level; \*\*\*significant at 1% level

<sup>1</sup> All negative binomial regression results are in the form of percentages and represent the estimated percentage change in the number of doctor visits from a unit change in the regressor.

<sup>2</sup> The chi-squared value for the likelihood-ratio test of  $\alpha = 0$  indicates that there is over-dispersion in the negative binomial regression model.

<sup>3</sup> Number of medical doctor visits for both immigrants and U.S. born citizens in the past year. The sample I use in this model contains 5311 immigrants and 31801 U.S. born citizens.

<sup>4</sup> The numbers below the coefficients are corresponding p-values in parentheses.

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Table 4 Logistic regression results with robust variances<sup>1</sup>

Variables	Logistic regression <sup>2</sup>
	Health insurance coverage
Predisposing factors	
Male	-0.03*** (0.002) <sup>3</sup>
Latino	-0.00008 (0.996)
Other race/Ethnicity	0.05*** (0.002)
Married	-0.022** (0.038)
Education (College or above)	-0.003 (0.828)
English proficiency	0.07*** (<0.0001)
Age	0.007*** (<0.0001)
Years 0-4	0.009 (0.880)
Years 10-14	-0.002 (0.943)
Years 15+	-0.02 (0.494)

Enabling factors	
Annual household income	0.20*** ( $<0.0001$ )

\* Significant at 10% level; \*\*significant at the 5% level; \*\*\*significant at 1% level

<sup>1</sup> All logistic regression results are in the form of marginal effects with p-values in parentheses. The Logistic regression is only estimated within the immigrant sample of 5311 individuals.

<sup>2</sup> The Pseudo  $R^2$  for this logistic regression model is 0.1475.

<sup>3</sup> The numbers below the coefficients are corresponding p-values in parentheses.

Table 5 Logistic regression results with robust variances in odds ratio<sup>1</sup>

Variables	Logistic regression <sup>2</sup>
	Health insurance coverage
Predisposing factors	
Male	0.771*** (0.002) <sup>3</sup>
Latino	0.999 (0.996)
Other race/Ethnicity	1.518*** (0.002)
Married	0.831** (0.038)
Education (College or above)	0.979 (0.828)
English proficiency	1.740*** (<0.0001)
Age	1.058*** (<0.0001)
Years 0-4	1.077 (0.880)
Years 10-14	0.982 (0.943)
Years 15+	0.855 (0.494)

Enabling factors	
Annual household income	5.333*** ( $<0.0001$ )

\* Significant at 10% level; \*\*significant at the 5% level; \*\*\*significant at 1% level

<sup>1</sup> All logistic regression results are in the form of odds ratios with p-values in parentheses. The Logistic regression is only estimated within the immigrant sample of 5311 individuals.

<sup>2</sup> The Pseudo  $R^2$  for this logistic regression model is 0.1475.

<sup>3</sup> The numbers below the coefficients are corresponding p-values in parentheses.

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