THE EFFECTS OF IMMIGRATION STATUS AND ASSIMILATION ON HEALTH SERVICE UTILIZATION AMONG MEXICAN IMMIGRANTS

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DEDICATION

To my parents, Jose and Dalia Lara.

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ABSTRACT

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Relatively less research has focused on how immigration status and assimilation influence health service utilization (HSU) among legal Mexican immigrants and how these effects change over time. The purpose of this thesis is to examine the effects of immigration status and assimilation on HSU among Mexican immigrants in the United States. Using a modified health behavioral model as guidance and panel data from the 2003 New Immigrant Survey (NIS), this study tests several hypotheses pertaining to the effects of immigration status and assimilation on HSU among Mexican immigrants. Logistic regression results show that immigration status and assimilation are by and large significant predictors of HSU among Mexican immigrants, but the effects of some predictors vary between the baseline period and the follow-up period. The effect of length of U.S. residence on HSU is moderated by class of admission and is nonlinear. The implications of the findings are discussed.

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CHAPTER I

INTRODUCTION

Mexicans are the largest and fastest growing group of Latino immigrants in the United States. In 2010, Mexican immigrants (11.7 million) represented 55 percent of 21.2 million immigrants from Latin America and 29 percent of all 40 million immigrants in the U.S. (U.S. Bureau of the Census 2011). Each year, legal immigrants constitute 800,000 to 1 million new people in the United States (DeSipio 2011). Mexico has been the leading sending country of both legal and undocumented immigrants to the United States since 1965 (Yang 1995). Despite these demographics, Mexican immigrants are confronted with barriers to healthcare access and thereby, underutilize health services. Undocumented immigrants are even less likely to have used health services in the past year than their documented counterparts in the U.S. (e.g., Bustamante et al. 2012). Moreover, Mexican immigrants have relatively high rates of diabetes, hypertension, and obesity–disorders that, if left untreated, can lead to cardiovascular disease (CVD) (American Heart Association 2013). Furthermore, recent research shows a high prevalence of undiagnosed diabetes and hypertension, and a lack of disease awareness among Mexican immigrants in the U.S. (Barcellos, Goldman and Smith 2012). Therefore, to reduce health disparities and in part healthcare costs, it is imperative to understand the help-seeking behaviors and sources of underutilization among this population.

Much of existing research has primarily focused on the health service utilization (HSU) behaviors of Latino immigrants as a whole (Akresh 2009; De Jesus and Xiao 2013). Despite the growing and disproportionate share of Mexican immigrants in the U.S. population and the Latino immigrant population, less is known about the HSU behaviors of Mexican legal immigrants in the United States. Among studies that examine the HSU of Mexican legal immigrants (Berk et al. 2000; Bustamante et al. 2012; Castañeda et al. 2013; De Jesus and Xiao 2013; Ortega et al. 2007; Ramirez 2013), there are several important limitations. First, these studies tend to focus on the effects of socio-demographic and cultural factors on Mexican immigrants' underutilization of health services, but give less attention to other determinants of HSU. In particular, there is insufficient research on the effects of immigration status and assimilation on HSU among Mexican immigrants. Second, these studies primarily focus on the HSU behaviors of Mexican immigrants in California, and thus, it is unclear whether these findings are generalizable to Mexican immigrants in the United States. Third, little research has analyzed changes in the determinants of HSU among Mexican legal immigrants over time using a nationally representative sample. Finally, previous research has failed to identify the underlying mechanisms for the positive relationship between duration of U.S. residence and HSU due to a lack of panel survey data. Thus, this study aims to address these limitations by examining the effects of immigration status and assimilation on HSU among Mexican immigrants, and by comparing how these effects on HSU have changed over time using nationally representative data from the New Immigrant Survey (NIS).

THE RESEARCH PROBLEM

The purpose of this study is to examine how immigration status and assimilation influence HSU among Mexican immigrants in the United States over time. Health service utilization is defined as the individual's receipt of formal care from a medical practitioner or health organization, including, but not limited to, physician care, dental care, hospital care, and prescription drugs (Andersen and Newman 1973). By contrast, informal healthcare refers to care provided by the patient's family, which "has a direct influence on the amount of formal care provided by a doctor or hospital" (Andersen and Newman 1973:7). This study will focus on formal health services obtained from a physician in the past year.

Immigration status refers to the class of admission as a legal permanent resident (LPR) and the adjustment of status from a non-immigrant to a LPR. A foreigner can be admitted as a LPR with an immigrant visa, popularly known as a green card. This category of immigrants is classified as "new arrival." The adjustment of status is the process through which foreigners change their non-immigrant status to LPR while in the U.S. (Jasso et al. 2005). This latter category of immigrants is classified as "adjustees." Following Richard Alba and Victor Nee' s (2003:38) definition of assimilation "as the attenuation of distinctions based on ethnic origin," this study defines assimilation as the process through which immigrants become similar to the native population.

This study poses the following research questions: 1) How do immigration status and assimilation influence HSU among Mexican immigrants? 2) How have the effects of immigration status and assimilation on Mexican immigrants' HSU changed over time?

SIGNIFICANCE OF THE STUDY

To my knowledge, this will be the first study to longitudinally examine the HSU behaviors of Mexican immigrants in the United States. This study contributes to our knowledge of immigrants' HSU behaviors by examining the influence of immigration status (class of admission and adjustment of status) and adaptation (English competence, years of residence, and prior trips to the U.S.) on HSU among Mexican immigrants using a modified behavioral model. This will provide a better understanding of Mexican immigrants' met and unmet health needs, changes in their health needs over time, and sources of underutilization. The focus of this study is on the role of immigration status and assimilation on HSU using longitudinal data from the NIS, which distinguishes this study from other existing studies of HSU among Mexican immigrants.

The practical relevance of this study is that understanding Mexican immigrants' HSU behaviors and its mechanisms can offer insight into healthcare and immigration policy development. Immigration status and assimilation factors are important predictors of access to health services and health outcomes. Thus, public health interventions can have important implications for improving access and the health of Mexican immigrants. If this study finds that immigration status is associated with HSU, then this may provide insight into social structural factors related to accessing health services. Additionally, if Mexican immigrants' HSU changes (i.e., initially decreases and increases after a certain point in time) as a function of length of residence, then this may indicate health decline. In other words, if the results support the Healthy Migrant theory (Dubowitz, Bates, and Acevedo-Garcia 2010) then public health strategies may be of great consequence to

addressing social and health inequities through interventions that improve health outcomes among Mexican immigrants.

OVERVIEW OF THE THESIS

Chapter 2 reviews the literature on welfare and immigration reform in the U.S. and how these influence the health behaviors of Mexican immigrants who arrived after 1996. The first section reviews the literature on U.S. policies (i.e., the Personal Responsibility and Work Opportunity Reconciliation Act and the Illegal Immigration Reform and Immigrant Responsibility Act of 1996) and empirical evidence on the effects of immigration status and assimilation on HSU as well as the Mexican health paradox. The following section discusses existing theoretical frameworks and presents a modified health behavior model. The last section lists hypotheses to be tested in this study.

Chapter 3 provides a description of the data and methods of data analysis. Chapter 4 discusses the results and findings of the research hypotheses. Chapter 5 summarizes the main findings, discusses implications, limitations and recommendations for future research.

CHAPTER II

LITERATURE REVIEW, THEORETICAL FRAMEWORKS, AND HYPOTHESES

This chapter reviews the literature and proposes my theoretical framework and research hypotheses for testing. The first section of this literature review provides an overview of U.S. policies including the Personal Responsibility Work and Opportunity Reconciliation Act of 1996 and the Illegal Immigration Reform and Immigrant Responsibility (IIRIRA) of 1996, with an emphasis on the impacts it has had on immigrants' lives in the United States. The second section reviews the empirical evidence on immigration status and assimilation related to health service utilization. The third section discusses existing theoretical frameworks that have been used to study health service utilization including Andersen's health behavior model and the Behavioral Model for Vulnerable Populations. The fourth section introduces a modified health behavior model to study HSU among Mexican immigrants. The fifth section develops research hypotheses pertaining to Mexican immigrants' HSU from the modified health behavior model.

THE U.S. POLICY CONTEXT: WELFARE AND IMMIGRATION REFORM

The Immigration and Nationality Act of 1965 introduced the family reunification program (or family preference admission), which increased the limit of "newly arriving" and "adjusted" immigrants in the U.S. (Jasso and Rosenzweig 1990; Brunner and Colarelli 2010). Brunner and Colarelli (2010) proposed that the 1965 immigration

amendment was enacted to increase rights and privileges while diminishing national and ethnic discrimination against all immigrants. As a result, there has been a dramatic shift of Asian and Latin American immigrants to the United States (LeClere, Jensen, and Biddlecom 1994).

The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA or welfare reform hereafter) and the Illegal Immigration Reform and Immigrant Responsibility (IIRIRA) of 1996 redefined the social membership of immigrants (Fix and Laglagaron 2002; Hagan et al. 2003). The 1996 welfare reform law restricted legal immigrants' access to Temporary Assistance to Needy Families (TANF), Medicaid, Children's Health Program (CHIP), the Supplemental Nutrition Assistance Program (SNAP), as well as public housing programs. This law delineated two categories of eligibility for noncitizens: (i) "qualified" immigrants are those who arrived prior to the enactment of PRWORA (on August 22, 1996), and (ii) "non-qualified" immigrants are those who arrived to the United States after the enactment of PRWORA (Finegold 2012). In addition, this welfare law further restricted eligibility for qualified immigrants based on duration of U.S. residency: (i) more than five years, or (ii) five years or less. Thus, under the 1996 welfare reform qualified immigrants (i.e., legal permanent residents (LPRs) who arrived to the U.S. prior to PRWORA, on August 22, 1996) were permitted to receive benefits. And, immigrants who arrived to the U.S. after August 22, 1996 and have five or less years of U.S. residency are precluded from public programs.

Coupled with PRWORA, the IIRIRA introduced additional provisions for prospective immigrants to the U.S. This law included numerous revisions such as border

enforcement, stricter sanctions against unauthorized immigrants and employers, new provisions for exclusion and deportation, stringent changes to refugee and asylum admission criteria and welfare reform (Fragomen 1997). For first time in U.S. history, the IIRIRA mandated that "a family-sponsored immigrant [may be deemed] inadmissible under the public charge [law]…unless the person petitioning …has executed a legally binding 'affidavit of support'." (Fargomen 1997:452) The responsibility of sponsors of family-based immigrants increased legally and financially. In terms of legal responsibility, state and local governments were permitted to sue sponsors for the receipt of cash or long-term care benefits by unqualified immigrants (i.e., those who do not meet the PRWORA eligibility criteria for public programs), also referred to as the public charge (Kandula et al. 2004). Public program participation decreased more rapidly among immigrants (i.e., from 8.7 percent in 1994 (pre-PRWORA) to 4.9 percent in 1999 (post-PRWORA)) than among U.S. citizens (6.5 percent and 4.8 percent, respectively) (Fix, Zimmerman, and Passel 2001). The steep welfare use decline among immigrants has been attributed to mass confusion and fear of a public charge determination, also referred to as "chilling effects" (Ellwood and Ku 1998). In May of 1999, the INS attempted to reduce any ambiguities by elucidating that participation in non-cash assistance programs and services (e.g., Medicaid, CHIP, emergency medical assistant, prenatal care.) was not grounds for a public charge (Hagan et al. 2003). In terms of financial responsibility, sponsors had to prove that their annual income was at least 125 percent of the federal poverty threshold. To this end, sponsors of immigrants were required to submit income tax returns from the past three years (Fargomen 1997; Hagan et al. 2003).

The confluence of the PRWORA and the IIRIRA has severely limited federally funded public services, opportunities for sponsorship, and enforced stricter immigration laws. For instance, previous studies have documented increases in deportation (Hagan and Rodriguez 2001), lack of healthcare coverage (Ellwood and Ku 1998: Fix et al. 2001), underutilization of health and social services (Lessard and Ku 2003; Fortuny and Chaudry 2011; Finegold 2012), and loss of services for U.S.-born children of (non-citizen) immigrant parents (Fix et al. 2001; Kaushal and Kaetner 2005) among migrants in the U.S., as a result of these reforms. The welfare and immigration reforms of 1996 have emphasized the role of immigration status, time of arrival, length of U.S. residence, and English-ability in facilitating immigrants' access to health services.

EMPIRICAL EVIDENCE

Immigration Status and HSU

Prior to the 1996 welfare reform, non-citizens were eligible to participate in welfare and entitlement programs. However, the passage of PRWORA has resulted in access barriers for newly arrived (i.e., those who have resided in the U.S. for 5 years or less) and undocumented immigrants in the United States. That is, previous studies have noted a reduction in healthcare coverage among noncitizens as the result of the 1996 welfare law. For example, Hagan et al. (2003) argues that post-PRWORA gave rise to confusion as to who was eligible for public benefits, which led many eligible non-citizens to forgo needed medical care out of fear. In a recent qualitative study of Latino immigrants, Ransford et al. (2010) found that both documented and undocumented immigrants delayed seeking medical services due to discrimination, fear of deportation

and expensive out-of-pocket cost of treatment. Some scholars suggest that qualified immigrants opted out of public benefit programs because they were worried that the receipt of benefits would negatively impact their immigration status and the opportunity to naturalize (Ellwood and Ku 1998). Overall, these political effects culminated in social and health inequities largely attributed to access barriers (Carrasquillo, Carrasquillo, and Shea 2000; Goldman, Smith, and Sood 2005).

Welfare and immigrant reforms of 1996 in essence redefined the meaning of immigration status as a type of membership into a nation-state (Shipper 2010). Gilbertson (2006) explicates that nation-states regulate this type of group "membership" through naturalization policies and immigration laws. Fix and colleagues (2001) explained, "the access that states grant to their safety net programs influences immigrants' incentives to naturalize, and in effect defines the meaning of citizenship" (p. 37). In other words, it signified the importance of acquiring LPR. Both the PRWORA and IIRIRA, for the first time in U.S. history, restricted public assistance on the basis of citizenship status, limited sponsorship by implementing annual income requirements, and enforced public charge law (Hagan et al. 2003).

Assimilation and HSU

It is known that immigrants from non-English speaking countries encounter language barriers when accessing health services in the United States. Prior research has provided inconsistent evidence on the effect of English proficiency on HSU among Mexican immigrants. For example, Nandi et al. (2008) found that there were no significant differences between lower levels of acculturation (i.e., limited-English

proficiency) in access to health services among undocumented Mexican immigrants. Bustamante et al. (2010) found that English proficiency was a significant predictor for only certain utilization behaviors (i.e., Emergency Department visit, delay of prescription drug and delay of medical care). These findings, however, may be due to the fact that California has implemented more laws–over 70 laws as of 2006–to address language access barriers to health services than all other states (Perkins and Youdelman 2008).

Earlier studies by Marks et al. (1987) and Solis et al. (1990) concluded that language-use or speaking English was an access–not a cultural–factor in predicting utilization of preventive health services among U.S. Latinos. According to LeClere et al. (1994: 372), "speaking English enables an immigrant to make better use of the formal health care system." English-language ability permits immigrants whose native language is non-English to obtain needed care.

Much of the prior research has found that a longer length of U.S. residence is associated with an improved access to health services among immigrants. From an acculturation perspective, some studies have explained this relationship to be the result of increased familiarity and integration to the host country (Chavez, Cornelius, and Jones 1985; Nandi et al. 2008). Acculturation expositions, however, are often criticized for not providing an explicit definition and for underestimating the complexity of the process of immigrants' adaptation to the host country. Some researchers argue that acculturation is not a linear process (i.e., from Mexican to American), but rather, a multidimensional process (Horevitz and Organista 2012), in which "immigrants not only acculturate but also undergo economic, social, and political integration into the host country"

(Gubernskaya et al. 2013:429). Nevertheless, other studies posit that the relationship between length of U.S. residence and HSU is a byproduct of PRWORA (Ellwood and Ku 1998; Loue, Faust, and Bunce 2000; Kullgren 2003; Kaushal and Kaestner 2005; Derose et al. 2007).

The Mexican Health Paradox

The social gradient in health refers to the spectrum of social and economic status that could affect health throughout the lifespan (Wilkinson and Marmot 2003). In particular, there is a positive relationship between higher SES and better health outcomes (Berkman and Kawachi 2000). The health of Mexican immigrants, however, is deemed paradoxical because it deviates from the social gradient. In other words, the health paradox describes the morbidity or mortality patterns of a particular group such as Latinos or immigrants, which contradicts what would be expected given the group's SES profile (Dubowitz et al. 2010). This epidemiological phenomenon is primarily seen among Mexican immigrants. For this reason it is often referred to as the Mexican Health paradox. It is known that Mexican immigrants have low infant mortality rates, cancers, cardiovascular disease, and mental health disorders compared to their native-born counterparts, non-Hispanic whites, and African Americans (Arcia et al. 2001; Bostean 2012; Chiswick, Lee, and Miller 2008; Gonzales, Haan, and Hinton 2001; Hummer et al. 2007; Markides and Gerst 2011; Morales et al. 2002; Zsembik and Fennell 2005). Horevtiz and Organista (2012) define the Mexican health paradox as the "initially favorable health outcomes among recent immigrants" (p. 3). This definition implies that the better health of recently arrived Mexican immigrants is ephemeral and diminishes

with a longer length of U.S. residence. There are three mechanisms responsible for the health paradox: (1) social and cultural protective factors, (2) health selection, and (3) data artifacts.

The first explanation attributes the paradox to social and cultural protective buffers that diminish with acculturation to the host country (Abraído-Lanza, Chao, and Flórez 2005; Evenson, Sarimento, and Ayala 2004). Abraído-Lanza, Chao, and Flórez (2005) delineate two hypotheses to test this theory. The health behavior hypothesis suggests that the relative health advantage of Mexicans is due to their more favorable health behaviors and health risk profiles than non-Latino whites. Previous studies have found that new arrival Mexican immigrants have better health outcomes, are less likely to smoke tobacco and drink alcohol compared with those who have spent more time in the United States and their U.S.-born counterparts (Abraído-Lanza et al. 2005). The acculturation hypothesis is the supposition that the health behaviors and risk factors become less favorable with greater acculturation. Dubowitz et al. (2010) expounded that the protective buffer offered by immigration status dissipates as immigrants acculturate to the U.S. norm. Findings from past studies showed that greater acculturation was associated with an increased likelihood of (high) alcohol consumption, current smoker, high BMI, and poor diet (Abraído-Lanza et al. 2005; Akresh and Frank 2008; Landale and Oropesa 2001). In other words, acculturation is correlated with an erosion of protective factors and thereby results in deteriorating health among Mexican immigrants.

Second, other studies posit this to be the results of positive health selection in which migrants decide to immigrate on the basis of their health status (Massey 1987;

Jasso et al. 2004). Akresh and Frank (2008) posit that "health selection may refer to the immigration of healthier individuals to the United States" (p. 2058). Although some patterns in Latino health contradicts established epidemiological regularities, Palloni and Morenoff (2001) argue that immigrant health selection is not paradoxical because it is consistent with the selection effect. In a study of legal permanent residents, Jasso and colleagues (2004) suspected that positive health selection reflects U.S. immigration policy in terms of health requirements. The immigration process requires prospective migrants to undergo several medical examinations in order to be lawfully admitted to the U.S. The migrant may be considered inadmissible on medical grounds if they have a communicable disease such as tuberculosis or syphilis; or if they have a mental or physical disorder with injurious behaviors; or if they lack required vaccinations (e.g., polio, hepatitis B, mumps, measles, rubella, tetanus, pertussis, and haemophilus influenza type B); or if they engage in illicit drug use or have an addiction (Jasso et al. 2005; U.S. Citizenship and Immigration Services 2014). As such, it is evident that U.S. immigration policy is an integral component in migrants' decision to immigrate, and by and large shapes their health.

Third, some scholars argue that this epidemiological paradox may be attributed to data artifacts. Smith and Bradshaw (2006) argue that the low mortality rates prevalent among Hispanics were largely the by-product of U.S. mortality classifications including underestimating the number of Latino deaths and the lack of a consistent definition of Latino (e.g., self-identified or Latino surnames) (Dubowitz et al. 2010; Jasso et al. 2004; Smith and Bradshaw 2006). For instance, Smith and Bradshaw (2006) argued that

surnames were used as proxy measures to draw a sample of Latinos from U.S. census data. Nevertheless, there is mounting evidence that supports the Mexican health paradox.

THEORETICAL FRAMEWORKS

Andersen's Health Behavioral Model and Variants

Andersen (1968) developed the health behavior model in 1968. Initially, this framework was developed to understand the purpose of families' use of health service, in which individual utilization was posited to be a function of the family's socio-demographic and economic characteristics. Since then, later works have attempted to explain HSU by societal and individual determinants (Andersen and Newman 1973; Andersen 1995; Gelberg, Andersen, and Leake 2000). The behavioral model is useful for understanding why individuals use health services, distinguishing whether there is equitable access to health services, and informing policy development that aims to create more equitable access (Andersen 1968, 1995).

Andersen's (1995) Behavioral Model of Health Service Use suggests that an individual's utilization is dependent on predisposing, enabling, and health-related factors. An individual's propensity to use health services is determined by demographic (e.g., age, sex, marital status, past illness), social structural (e.g., education, race, ethnicity, occupation, family size, religious affiliation, residential location), and attitudinal-belief variables (e.g., attitudes toward health care services, knowledge and values about health and illness) (Andersen 1968, 1995; Andersen and Newman 1973).

Demographic characteristics refer to the individual's propensity to use health services (Andersen 1968, 1995; Andersen and Newman 1973; Hulka and Wheat 1985;

Wolinsky et al. 1989). In terms of age and sex, Andersen and Newman (1973) explicated, "People in different age groups have different types and amount of illness" and thereby, exhibit "different patterns of medical care" (p. 15). In essence, aging is associated with an increased likelihood of using health services. Individuals at young ages are generally healthy and thus, are less likely to need medical care. However, at older ages the risk for chronic diseases increases thereby creating a higher likelihood for medical care. Andersen and Newman (1973) elucidate age as an associated risk factor (rather than a causal factor) for HSU. In addition, the authors conceptualize past illness as a predisposing factor because people with pre-existing conditions or prior health problems have the potential to need medical care (Andersen and Newman 1973).

Social structure factors refer to the individual's position or status in society and the availability of resources (Andersen 1968, 1995). That is, social structural variables such as education attainment and occupation permit insight into an individual's lifestyle, physical and social environment, and care-seeking behaviors related to health service use (Andersen and Newman 1973). Andersen (1995) later expanded social structure to include social networks, social interactions, and culture. Health service utilization may, in part, be explained by health beliefs and knowledge regarding medical care, practitioners, and diseases (Andersen 1968, 1995). For instance, people may be likely to consult with a physician sooner if they trust and perceive care as adequate and treatment is effective.

Enabling conditions are defined as those conditions, which allow a family or individual to receive needed medical care and the availability of health service resources (e.g., medical personnel and facilities) (Andersen 1968, 1995; Andersen and Newman

1973). Enabling variables include income, health insurance coverage, or some other third-party payer, regular source of care, the nature and accessibility of the source of care (Andersen and Newman 1973).

Lastly, perceived need is the individual's self-assessed decision to seek healthcare services (e.g., experienced symptoms, self-reported health status, and number of disability days or limited daily activity) (Andersen 1968, 1995). Additionally, evaluated need refers to an individual having a medically diagnosed condition that requires treatment by a physician (Andersen 1968, 1995). Health-related need is the most indicative individual determinant of HSU (Andersen and Newman 1973).

Another behavioral health model is the Behavioral Model for Vulnerable Populations (Aday and Awe 1997; Gelberg, Andersen, and Leake 2000). This model employs an integrated approach to studying populations with special health needs by focusing on factors associated with vulnerability. From a health perspective, vulnerability refers to the susceptibility of experiencing poor health outcomes (Aday and Awe 1997). Vulnerable populations include race and ethnic minorities, women and children, the elderly, poor and homeless persons, persons with mental illnesses, chronic diseases, or intellectual/developmental disabilities, as well as undocumented immigrants (Aday and Awe 1997; Gelberg et al. 2000).

The vulnerability model builds on Andersen's (1968, 1995) model to include factors such as substance abuse, lack of shelter, and in general, limited access to resources to name a few. These factors are known to affect the health outcomes of vulnerable population groups (Aday and Awe 1997; Gelberg et al. 2000). This model

primarily focuses on predisposing and enabling (vulnerable) factors. Need-related factors are also included in this model but to a lesser extent. Predisposing characteristics include social structure (e.g., country of birth, acculturation, immigration, and literacy), sexual orientation, and childhood characteristics (e.g., residential history including homelessness, living conditions, mobility, length of time in the community, prior victimization, mental illness, mental health resources, and substance abuse) (Gelberg et al. 2000).

Prior research on immigrants' health behaviors has challenged both the Behavioral Model for Health Service Use and the Behavioral Model for Vulnerable Populations. First, these models do not include a variable for time spent in the United States. LeClere and colleagues (1994) found that immigrants with a longer length of U.S. residence are more likely to have used health services in the past year than recently arrived immigrants. This finding is consistent with subsequent research on immigrants. Second, other studies have found lack of health insurance coverage, long wait times, lack of medical interpreters, discrimination, fear of out-of-pocket expensive cost and deportation are sources of underutilization among Latino immigrants (Ransford et al. 2010). Latino immigrants are known to use cultural alternatives (e.g., home remedies, herbs, botánicas, personal prayer, etc.) as a preferred treatment, but also, as a coping strategy for inadequate medical care (Akresh 2009; Ransford et al. 2010). Thus, a behavioral model for immigrants should consider incorporating these factors.

The BMVP conceptualizes immigrant characteristics (e.g., country of birth, acculturation, immigration status and literacy)–an improvement compared to the

BMHSU– as social structural (predisposing) factors. This conceptualization, however, precludes other essential immigrant characteristics associated with access such as English ability, migration stress, and political, economic, and social adaptation to the host country. Immigration status, length of U.S. residence and English competence are directly and indirectly associated with health outcomes (Passel and Cohn 2010) and also with access to health services (Lara et al. 2005; Ortega et al. 2007; Solis et al. 1990; Yeo 2013). Additionally, it is important to consider ecological factors because they can affect health outcomes. Therefore, these models are inadequate for the study of immigrants and a modified framework is needed.

A MODIFIED MODEL FOR MEXICAN IMMIGRANTS' HEALTH SERVICE UTILIZATION

This study uses a modified version of Andersen's (1968 1995) health behavior model to examine the HSU behavior of Mexican immigrants. Similar to Andersen's (1968, 1995) health behavior model, the modified model includes predisposing (age, sex, marital status, and education), enabling (region of residence and health insurance coverage), and need-related factors (self-rated health status and chronic disease). The modified model builds on the health behavior model to include immigrant-relevant factors including immigration status (class of admission to LPR and adjustment of status) and assimilation factors (English competence, length of U.S. residence, and prior visit to the U.S.). The behavioral model for vulnerable populations conceptualizes immigration status and assimilation as social structural factors (Aday 1999; Gelberg et al., 2000). By contrast, the modified model includes immigration status and assimilation as separate

(immigrant-relevant) factors rather than social structural factors. The inclusion of immigration status and assimilation into the modified model is largely informed by previous findings of the effects of immigration status and assimilation on HSU among Mexican immigrants. The modified model is useful for examining the effects of immigration status and assimilation factors on HSU among Mexican immigrants, holding all else constant.

The acquisition of LPR status signifies a salient event in an immigrant's life, an event that accords them new rights and responsibilities (e.g., employment opportunities, home ownership, reduced tuition at many public education institutions, eligibility for federal financial aid, public benefits and Medicaid if eligibility criteria are met) (US Department of Homeland Security 2013). In addition, there are also economic advantages linked to legal immigration status. That is, the receipt of a green card, or the acquisition of LPR status is associated with an average increase of $15,000 per year (Jasso, Rosenzweig, and Smith 2002). This economic gain can improve access to health services (e.g., health insurance coverage) by the reduction of financial barriers. Income and health insurance are determinants of access and thus utilization (LeClere et al. 1994). Recent research finds that naturalization soon after arrival (within 10 years) and age at immigration (1-17 and 18-35 years of age) are protective health factors in later life (Gubernskaya et al. 2013). This is likely the result of upward mobility.

Past studies of noncitizen Mexicans argue that immigration status became an important predictor that enables/impedes immigrants' access and use of health services after the enactment of the 1996 welfare reform (Ellwood and Ku 1998; Hagan et al. 2003;

Derose, Escarce, and Lurie 2007; Ortega et al. 2007). Specifically, Ortega and colleagues (2007) concluded that the likelihood of HSU is congruous with categories of immigration status from undocumented (decreased utilization) to naturalization (increased utilization), and national-origin groups. The authors found a pattern emerged such that undocumented immigrants had (for most measures) less access and underutilized health services than LPRs, naturalized citizens, U.S.-born counterparts, and U.S.-born non-Hispanic whites (Ortega et al. 2007). Moreover, green card holders and undocumented Mexican immigrants were less likely to have a usual source of care and less likely to report a emergency department visit in the past year than their (non-Mexican) Latino immigrant counterparts and U.S.-born non-Hispanic whites (Ortega et al. 2007).

It is a common practice to use time in the U.S. and English competence as proxy measures for cultural assimilation. From a life course perspective, the context and pace at which an immigrant assimilates to the host society is a multidimensional process that can vary by factors such as age at immigration, class of admission and length of residence (Gubernskaya et al. 2013; Portes and Rumbaut 2001). For instance, younger immigrants are more likely to learn English than elderly immigrants (Rumbaut 1997). Previous studies find that greater acculturation is associated with better access to health services (Akresh 2009; LeClere et al. 1994; Wallace, Mendez-Luck, and Castaneda 2009; Yeo 2013).

Moreover, much of the research on immigrants' help-seeking behaviors has consistently documented a positive association between length of U.S. residence and HSU. However, little research has attempted to provide the rationale for this relationship.

Some research suggests that Mexican immigrants with more time in the U.S. may have better access to health services than their newly arrived counterparts because of familiarity with the healthcare system and deteriorating health due to migration stress and U.S. exposure (Jasso et al. 2005). Findings from previous studies, however, indicate the relationship between length of residence and health outcomes varies by immigration status. Among adjustees, however, legalization immigrants experience worse health than all other immigrants. This is association is likely mediated by legalized immigrants' time since arrival (mean=11 years) (Jasso et al. 2005).

When taken together, these findings suggest that immigrant relevant factors associated with HSU are complex and multidimensional. If, on one hand, the relationship between time in the U.S. and HSU is moderated by health decline, holding all else constant, then U.S. experience may be a predisposing factor. On the other hand, if the association between time in the U.S. and HSU is moderated by health insurance coverage, holding all else constant, then U.S. experience may be an enabling factor. Dissimilar to Andersen's conceptualization of the BMHSU, this study posits that predisposing, enabling, need-related factors are not mutually exclusive, but rather, they are intertwined and contextual.

HYPOTHESES

Portes and Rumbaut (2001) posit that the characteristics of immigrants differ in relation to their class of admission and mode of entry to the United States. That is, characteristics such as socio-demographic factors and human and social capital are significantly related to HSU behaviors. Hence, differences in these characteristics may

contribute to differences in HSU across categories of admission to legal permanent residence. Moreover, much of the research on immigrants' help-seeking behaviors has consistently documented a positive association between length of U.S. residence and HSU. However, little research has attempted to provide the rationale for this relationship. Some research suggests that Mexican immigrants with more time in the U.S. may have better access to health services than their newly arrived counterparts because of familiarity with the healthcare system and deteriorating health due to migration stress and U.S. exposure (Jasso et al. 2005). Findings from previous studies, however, indicate the relationship between length of residence and health outcomes varies by immigration status (Bustamante et al. 2012; Ortega et al. 2007). Among adjustees, however, legalization immigrants experience worse health than all other immigrants. This association is likely due to legalized immigrants' time since arrival (mean=11 years) (Jasso et al. 2005). Therefore, immigrant status is an important enabling factor that facilitates access to and utilization of health services among immigrants in the United States.

Hypothesis 1(a): ***Controlling for other factors, Mexican immigrants who are spouses of U.S. citizens will be more likely to report utilization of health services in the past 12 months than employment-based/other Mexican immigrants. Specifically, I hypothesize that there will be significant differences in HSU between classes of admission to LPR at baseline, and smaller group differences in HSU during the follow-up period.***

Hypothesis 1(b): ***Controlling for other factors, Mexican immigrants who adjusted their status to LPR will be more likely to report utilization of health services in the past 12***

months than new arrival Mexican immigrants. I hypothesize that adjustment of status will be a significant predictor of Mexican immigrants' utilization behaviors at the baseline period but a less significant predictor of HSU during the follow-up period.

Access and utilization of healthcare is also influenced by cultural adaptation factors such as English competence and time spent in the U.S. (Avila and Bramlett 2013; Ku and Matani 2001; LeClere et al. 1994; Ralston and Escandell 2012). Ralston and Escandell (2012) noted a positive association between time spent in the U.S. and visiting the hospital during a prior visit to the U.S. among noncitizen Mexican men. In other words, Mexican migrant men with more U.S. experience were more likely to utilize hospital services for needed care. Prior studies have found this to be, in part, explained by acculturation, while other studies argue that this is the effect of the 1996 welfare reform law. Contrary to prior research, Ramirez (2013) found that recently arrived noncitizen Mexican women in California were more likely to report utilization of postnatal depression treatment with more frequent visits. The latter finding should be interpreted with caution, because California created replacement programs for TANF, food stamps, and Medicaid for immigrants who arrived to the U.S. after PRWORA (Hagan et al. 2003). Jasso et al. (2005), nevertheless, suggest that more time spent in the U.S. is associated with increased access to resources. Furthermore, Redstone and Massey (2004) were successful in estimating immigrants U.S. experience (time) using number of trips to the United States before acquiring a green card, in addition to other measures.

Hypothesis 2: ***Controlling for other factors, Mexican immigrants with more time spent in the U.S. will be more likely to use health services in the past 12 months than those***

with less time in the U.S. More specifically, I predict that Mexican immigrants with a prior visit to the U.S. will be significantly more likely to report health service use than those with no prior visit to the U.S. at baseline and during the follow-up period.

Previous research has found that immigrants with limited-English proficiency are less likely to have insurance and a usual source of care (Derose and Baker 2000), fewer physician visits (Ponce, Hays, and Cummingham 2006) and receive less preventive care (Jacobs et al. 2005), compared to those who speak English only.

Hypothesis 3: ***Holding all else constant, Mexican immigrants who speak English very well/well will be more likely to have utilized health services in the past 12 months than those who speak English not well/not at all. Further, I expect that English competence will be a significant predictor of HSU during the baseline period and less significant in the follow-up period.***

Previous studies have found a nonlinear relationship between duration of U.S. residence and HSU among Mexican and Latino immigrants (Akresh 2009; LeClere et al. 1994). These studies suggest that immigrants undergo an adjustment period to the host country during which behavioral changes occur.

Hypothesis 4: ***As length of U.S. residence increases, Mexican immigrants' HSU patterns will initially decrease and then increase after a certain point of living in the United States. I expect the curvilinear relationship between duration of residence and HSU to be significant at the baseline period and also during the follow-up period.***

Immigrants sponsored as a spouse of a U.S. citizen may have better access to resources (e.g., health insurance coverage, knowledge and familiarity with the U.S. healthcare system) not available to other types of immigrants.

Hypothesis 5: ***All else being equal, the association between duration of residence and HSU may differ for spouses of U.S. citizens than for other immigrants. Specifically, I predict that admission to LPR status will moderate the relationship between years of U.S. residence and HSU at the baseline period but not during the follow-up period.***

While health insurance coverage does not necessarily guarantee access to health services, a disproportionate share (45 percent in 2000 which was an increase from 34 percent in 1997) of immigrants lack health insurance coverage (Carrasquillo, Carrasquillo, and Shea 2000). Additionally, previous studies have found uninsured individuals to delay preventive examines (e.g., Papanicolaou test and cholesterol test), medical and dental care (Ayanian et al. 2000; Sudano and Baker 2003; Yun et al. 2013), use alternative or traditional healing practices (Ransford et al. 2010), and use health services in Mexico (Wallace et al. 2009).

CHAPTER III

DATA AND METHODS

This chapter includes a description of the data, variables and measures used in this study, and methods of data analysis. Data limitations are also introduced in this chapter.

DATASET

The 2003 New Immigrant Survey (NIS) is used in this study. The NIS is a nationally representative longitudinal study of immigrants granted legal permanent residences to the United States during a seven-month period from May to November 2003 (Jasso et al. 2004). The NIS is a panel study of LPRs interviewed during Wave 1 from 2003 to 2004 and who were re-interviewed during Wave 2 from 2007 to 2009. Survey questions from Wave 1 were asked during Wave 2. The NIS is appropriate for addressing the research questions previously mentioned and for testing the hypotheses, as this is the only nationally representative survey of legal permanent residents in the United States. There are three main advantages of the NIS: (1) interviews were conducted soon after LPR status was obtained, in the immigrant's preferred language; (2) the sample includes immigrants' class of admission to LPR status; and (3) survey instruments can be used to track changes over time. Furthermore, the NIS survey was translated into Spanish, Chinese, Korean, Polish, Russian, Tagalog, Vietnamese, Amharic, French, and Haitian Creole, and a few key concepts were translated into Arabic, Croatian, Farsi, French, Gujarati, Hindi, Serbian, Ukrainian, and Urdu (Jasso et al. 2005).

SAMPLE

The NIS uses a multistage probability sampling design based on electronic administrative records from the U.S. Citizenship and Immigration Services and the Office of Immigration Statistics (Jasso et al. 2004). The sampling frame consists all legal immigrants granted permanent residence between May 2003 and November of 2003 (*N*=12,500 adults) (Jasso et al. 2004). Baseline interviews were conducted with adults either by telephone (60 percent) or in-person (40 percent) during the June 2003 to June 2004 period (*N*=8,573). Follow-up (NIS-2003-2) interviews were conducted during the June 2007 to October 2009 period (*N*=3,902). The response rate was 68.6 percent for the baseline survey. The response rate was 46.1 percent for the follow-up survey after adjusting for the 69 decreased and 48 incapacitated respondents (Jasso and Rosenzweig 2013). The retention rate for the 2003 NIS was lower than expected due to a new law that prohibits the use of address reports filed by respondents (Jasso and Rosenzweig 2013).

Sample weights developed by Jasso et al. (2004) are used to correct for stratification (i.e., employment preference and diversity immigrants). Due to visa allocation quotas in the U.S., sample stratification was used to obtain reliable and representative information on the visa categories (Jasso et al. 2004). Specifically, spouses of U.S. citizens were under-sampled (i.e., by half of their natural rate), while employment-preference immigrants were over-sampled (i.e., about twice their frequency) (Jasso et al. 2004). Additionally, diversity principles constitute a small portion (13.5 percent) of the survey sample and thus were sampled at a rate of three times their natural occurrence (refer to Jasso et al. 2004 for additional information). Thus, weighting the

data allows the findings to be generalized to Mexican immigrant adults admitted to the U.S. under various visa categories (Knoke, Bohrnstedt, and Mee 2002).

The current study is restricted to Mexican immigrant adults (18 years or older) who completed the baseline interview (*N*=1,468) and the follow-up (*N*=815) interview in the United States. After dropping respondents with missing data (baseline *N*=71; follow-up *N*=99), the analytic sample consists of 1,398 respondents in Wave 1 and 716 respondents in Wave 2.

VARIABLES AND MEASURES

Dependent Variable

The dependent variable is health service utilization. HSU can be measured differently for discretionary and non-discretionary utilization. For this study, I only select one measurement of HSU as the dependent variable, which is a binary measurement of whether the respondent has seen or talked to at least one physician in the previous 12 months. This variable is based on the following survey question: "Aside from any hospital stays, have you seen or talked to a medical doctor about your health, including emergency room or clinic visits in the last months?" Responses are coded 1, if the respondent reported at least one physician visit in the past 12 months, and 0 if otherwise.

Independent Variables

The key variables in the present study include immigration status (e.g., class of admission to LPR and adjustment status), and assimilation (e.g., English competence, length of U.S. residence, and prior visits to the U.S.).

Immigrants' class of admission or "immigrant visa" refers to "the section of the law under which a person qualifies for admission to LPR" (Jasso et al. 2008). For instance, an individual may qualify for a regular visa as a spouse of a U.S. citizen or refugee, or a special visa such as legalization for those who are undocumented (Jasso et al. 2008); see Jasso, Rosenzweig, and Smith (2002) and the U.S. Citizenship and Immigration Services website for more information. The class of admission variable is useful for gaining insight into existing U.S. immigration policy (Jasso et al. 2004). Class of admission is a categorical variable coded 1 for immigrants sponsored as a spouse of a U.S. citizen and 0 if they were admitted as an employment-based or other immigrant (reference category). "Other" includes immigrants admitted to LPR as a family-preference, diversity, refugees, asylees, parolees, and legalization (Jasso et al. 2004).

Adjustment of status refers to the process in which immigrants acquire a green card while in the United States (U.S. Citizenship and Immigration Services 2013). The adjustment of status variable indicates whether the immigrant adjusted from a nonimmigrant status to LPR while in the host country. The categories of adjustment of status emphasize the diversity of the NIS sample such that it includes immigrants who may have once been undocumented (Akresh and Frank 2008). Hence, this study exclusively focuses on LPRs in the U.S. who were admitted in 2003. This measure of immigration status is coded 1 if the respondent is an adjustee (i.e., applied for LPR in the U.S.) and 0 if the respondent if a new arrival (i.e., applied for LPR in their origin country).

Length of U.S. residence is an interval ratio variable measured in years. This variable is measured as the difference of the year of the interview and the year the respondent moved to the United States. Prior visit to the U.S. is a dichotomous variable coded 0 if the respondent had no prior visits and 1 if the respondent visited the U.S. at least once. The NIS asked all participants how many times they visited the U.S. for less than 60 days, prior to gaining permanent residence. English competence is dummy coded 1 if the respondent speaks English 'very well' or 'well' and 0 if the respondent speaks English "not well" or "not at all" (reference category).

Control Variables

Control variables include age, education, sex, current marital status, residential region, health insurance coverage, and self-rated health status. Respondents' age and education are interval/ratio variables measured in years. Sex is coded 1 if the respondent is female and 0 if the respondent is a male (reference category). Marital status is dummy variable coded as 1 if the respondent is currently married and 0 if not currently married (reference category). Marital status is a collapsed variable in which the not currently married category includes those who are separated, living with a partner, divorced, widowed, and those who live alone and have never been married. Region of residence is a nominal variable that was coded as Northeast, Midwest, West (reference category), and South. Health insurance is a dichotomous variable coded 1if the respondent has any health insurance coverage and 0 if the respondent has no health insurance coverage (reference). Self-rated health is assessed with the following survey question: "Would you say our health is excellent, very good, good, fair, or poor?" Self-rated health is an ordinal

variable that has five categories (1= “poor,” 2= “fair,” 3= “good,” 4=“very good,” or 5=“excellent”); this variable was reverse coded. Chronic condition refers to having at least one medically diagnosed condition such as hypertension, heart disease, diabetes, asthma, lung disease, or cancer.

LIMITATIONS OF DATA

Although there are advantages for using the NIS data to study health service utilization among immigrants, it is not without limitations. The NIS only includes information for two points in time (2003 to 2004 and 2007 to 2009), which does not allow for the use of Cox hazards regression model because time is measured by year rather than by a smaller time-unit such as month. The sample size of Mexican immigrant adults for the follow-up year is modest (*N*=716). Although the sample may include immigrants who were once undocumented, the NIS only includes health-related information for LPRs. Another limitation of using the NIS data is that it does not include information on utilization of health services in a foreign country. Furthermore, while informal care could be important for Mexican immigrants, no information on such care is available in the NIS data. These limitations notwithstanding, the NIS is appropriate for studying the HSU of legal Mexican immigrants in the United States.

METHODS OF DATA ANALYSIS

Descriptive, bivariate correlations and multivariate statistics are used to analyze the data. Descriptive statistics are used to determine the socio-demographic characteristics, immigration status and assimilation among Mexican immigrants. Means and standard deviations are used as measures of central tendency and dispersion,

respectively, for each variable used in this analysis. Bivariate correlations are used to test for multicollinearity between each independent variable and HSU separately for Wave 1 and Wave 2. Regression analyses are performed to test the effects of independent variables on the dependent variable, HSU, for each dimension of immigration status and assimilation. These serve to determine which variables predict utilization behaviors among Mexican immigrants and which predictors are significant. Baseline models (control variables) for Waves 1 and 2, χ^2 statistic and -2 log likelihood values are used to assess the fit of nested models. The immigration status models (Model 2) for Waves 1 and 2 are used to examine the effects of class of admission to LPR and adjustment status on HSU, holding all else constant. The assimilation models (Model 3) are used to examine the effects of English competence, prior trip to the U.S. and length of U.S. residence on HSU during Wave 1 and Wave 2, holding all else constant. Nonlinear models (Model 4) are used to test for a quadratic relationship between length of U.S. residence and HSU during Waves 1 and 2, holding all else constant. Finally, conditional regression models (Model 5) for Waves 1 and 2 are used test whether class of admission variable moderates the relationship between duration of residence and HSU, holding all else constant. The potential findings may shed light on how cultural adaptation varies among legal immigrants and how these dynamic relationships are associated with HSU. The regression results from Wave 1 will be compared with those from Wave 2 to examine how the effects of immigration status and adaptation on HSU have changed after four to six years. This is done by comparing the direction and the significance of the regression parameters for each independent variable and for each wave.

Binary logistic regression is used because the dependent variable, HSU, is dichotomous. Logistic regression is used rather than a linear probability model (LPM) because at least two fundamental assumptions are violated when using a dichotomous dependent variable. A LPM is a linear regression model with a dichotomous dependent variable coded 0 and 1 (Agresti 1990). The first violated assumption centers on normally distributed error terms (Knoke, Bohrnstedt, and Mee 2002). The standard errors are assumed to be normally distributed because the observed values are limited to 0 or 1, and thus, the error terms can only take on two values: 0 or 1 (Knoke et al. 2002). The expected values in the LPM can exceed the 0 to 1 range of the dependent variable. That is, the mean of the variable is a function of the probability that the event will occur (y=1) for a given case (Menard 2002). Thus, the logistic transformation is preferred over the LPM because the expected values do not exceed the 0 to 1 range (Knoke et al. 2002). Furthermore, the predictors can be discrete or continuous in the logistic regression framework because there are no assumptions regarding the distribution of the independent variables (Knoke et al. 2002). The logistic regression model is

$$\ln\left[\frac{p_i}{1-p_i}\right] = \alpha + \sum b_i X_i + e$$

where $ln[p_i/(1- p_i)]$ is the logged odds of HSU within the past 12 months, α is the intercept, X_i is the predictor variables, b_i are the parameter estimates of the independent variables, and e is the error term. The logistic coefficient (b_i) indicates by how much the log of the dependent variable's odds changes for a 1-unit change in the predictor variable (Jaccard 2001; Knoke et al. 2002). SPSS 22.0 is used for all statistical analyses.

CHAPTER IV

RESULTS

This chapter presents descriptive statistics of the sample, bivariate correlation matrices for the baseline period and the follow-up period, and logistic regression results. The chapter concludes with a summary of the results from the statistical analyses.

DESCRIPTIVE STATISTICS

Table 1 presents weighted statistics for all variables used in this study. About one-third of Mexican immigrants had at least one visit or conversation with a physician within the past 12 months during the baseline period. And, half of respondents had at least one visit or conversation with a physician within the past months during the follow-up period. On average, women represented a larger proportion of the sample during the baseline period (59 percent) and an even greater proportion during the follow-up period (66 percent), compared to men. The respondents were on average about 38 years of age (SD=14.5) at the first interview and approximately 41 years old at the follow-up interview. On average, they had slightly more than 9 years of schooling (SD=4.71) in the baseline period and gained a bit more schooling four years later (9.53 years with a standard deviation of 5.26). The majority of respondents were currently married (Wave 1=77 percent; Wave 2=76 percent). During the baseline and the following periods, most respondents resided in the West region compared to the South, Midwest, and Northeast regions. And, some respondents moved from the West to the Midwest four years later.

Table 1. Means and Standard Deviations (in Parentheses) for Mexican Immigrants Aged 18 or Older, 2003 NIS

Variable	Wave 1 Mean (SD)	Wave 2 Mean (SD)
Dependent Variable		
At least One Physician Visit (Past 12 months)	.33	.50
Control Variables		
Predisposing Characteristics		
Age	37.59 (14.50)	41.22 (13.35)
Female	.59	.66
Male	.41	.33
Martial Status		
Currently Married	.77	.76
Not Currently Married (reference)	.23	.24
Education	9.11(4.71)	9.53 (5.26)
Enabling Characteristics		
Region		
Northeast	.03	.03
Midwest	.08	.10
South	.24	.24
West (reference)	.65	.63
Health Insurance	.29	.54
Need Characteristics		
Chronic Condition		
At least one	.15	.22
None (reference)	.85	.78
Self-Rated Health Status	3.57	3.25
Independent Variables		
Immigration Status		
Admission Category to LPR		
Spouse of U.S. Citizen	.49	.49
Employment-preference/Other (reference)	.51	.51
Adjustment Status		
Adjustee	.80	.80
New-Arrival (reference)	.20	.20
Assimilation		
English Competence		
Very well/ Well	.32	.32
Not well/ Not at all (reference)	.68	.68
Prior Visit to the U.S.	.28	.24
Length of U.S. Residence (years)	9.86 (7.54)	14.33(7.20)
N	1,398	716

Note: Data are weighted. Standard deviations (SD) are shown for continuous variables.

The percentage of Mexican immigrants who had health insurance coverage increased from 29 percent in Wave 1 to 54 percent in Wave 2. Only a relatively small percentage of them had a chronic condition (Wave 1= 15 percent; Wave 2= 22 percent). On average, Mexican immigrants self-reported having good/very good health during Wave 1 (mean=3.57 on a 5-point scale) and only good health during Wave 2 (mean=3.25), or declining health over time.

Additionally, 51 percent of them were employment-preference/other immigrants, and 49 percent were spouses of U.S. citizens. The vast majority (80 percent) of the participants were adjustees relative to their newly arrived (20 percent) counterparts in both waves. With respect to acculturation, less than one-third (32 percent) of Mexican immigrants spoke English "very well" or "well"; around one-fourth of them had visited the U.S. at least once prior to becoming a LPR; they on average had lived in the United States for about 10 years during the baseline period.

CORRELATIONAL ANALYSIS

The bivariate correlation matrices indicate the strength and direction of the association between each predictor variable and the dependent variable for Wave 1 and Wave 2. The relationships between the predictor variables and the dependent variable were fairly weak during both waves. Specifically, age is negatively associated with HSU and is only significant during Wave 2. The correlation matrices (Tables 2 and 3) show a significant positive relationship between the female dummy variable and HSU in Wave 1 (r = .084, p< .001) and Wave 2 (r = .106, p< .01), indicating that women were more

Table 2. Correlation Matrix of Variables Used in the Analysis, Mexican Immigrant Adults, 2003 NIS Wave 1

	Physician Visit	Age	Female	Currently Married	Education	Northeast	Midwest	South	Health Insurance
Physician Visit	1.000								
Age	-.013	1.000							
Female	.084***	.112***	1.000						
Currently Married	.055*	-.034	-.045*	1.000					
Education	.101***	-.562***	-.064**	.030	1.000				
Northeast	-.058**	-.033	.010	.050*	.045*	1.000			
Midwest	.103***	.001	-.023	.073**	.024	-.051*	1.000		
South	-.093***	-.075**	.068**	-.022	.054*	-.096***	-.170***	1.000	
Health Insurance	.113***	-.236***	-.038	.138***	.245***	.066**	.119***	-.051*	1.000
Chronic Condition	.081***	.385***	.116***	-.014	-.188***	.009	.006	-.081***	-.099***
Health Status	-.132***	-.349***	-.074**	-.026	.394***	.020	.101***	.067**	.116***
Spouse of U.S. Citizen	.085***	-.414***	-.088***	.446***	.339***	.011	.097***	.024	.225***
Adjustee	.084***	-.431***	-.073**	.037	.325***	.011	-.031	.075**	.235***
English Competence	.080***	-.368***	-.190***	-.117***	.457***	.014	.062*	-.041	.215***
Length of U.S. Residence	.043	.015	-.135***	-.075**	-.027	-.011	-.045	-.075**	.083**
Prior Visit to U.S.	-.022	.129***	-.001	.041	.029	-.051*	-.024	-.063**	-.011

Continued

	Chronic Condition	Health Status	Spouse of U.S. Citizen	Adjustee	English Competence	Length of U.S. Residence	Prior Visit to U.S.
Physician Visit							
Age							
Female							
Currently Married							
Education							
Northeast							
Midwest							
South							
Health Insurance							
Chronic Condition	1.000						
Health Status	-.289***	1.000					
Spouse of U.S. Citizen	-.192***	.220***	1.000				
Adjustee	-.147***	.204***	.310***	1.000			
English Competence	-.132***	.229***	.144***	.268***	1.000		
Length of U.S. Residence	-.022	-.083***	-.102***	.375***	.219***	1.000	
Prior Visit to U.S.	.038	.019	.004	-.060*	-.010	-.094***	1.000

*$p < .05$ **$p < .01$ ***$p < .001$ (one-tailed tests)

likely to have visited or conversed with a physician within the past 12 months compared to men in Wave 1. This association slightly increases in magnitude during Wave 2.

Similarly, currently married Mexican immigrants were more likely to have visited or talked with a physician visit in the past 12 months than those who were not married in Wave 1 (r = .055, p< .05) and Wave 2 (r= .070, p< .05). There is a positive correlation between education attainment and HSU within the past year during the baseline period (r= .101, p< .001) and the follow-up period (r= .152, p< .001).

In terms of region of residence, residing in the South (r= -.093, p< .001) and in the Northeast (r= -.058, p< .01) were negatively associated with HSU within the past 12 months in Wave 1. Conversely, both the South (r= .040, p= .145) and the Northeast (r= .043, p= .127) were positively correlated with HSU during the follow-up period, but this association was not statistically significant. Moreover, there was a positive significant relationship between residing in the West region and HSU in Wave 1 (r= .103, p< .001). This relationship was negative, not positive, and it was not statistically significant in Wave 2 (r= -.032, p= .196). In all, region of residence was not significantly associated with HSU four years later. This pattern is consistent with the implementation of PRWORA in at least two ways. First, states' eligibility requirements for public benefit programs vary between states and across safety-net programs. For example, California used state funds to extend public benefits to all immigrants, whereas other states either completely restricted all immigrants for the first 5 years, or extended benefits only to pregnant immigrant women and children (Perreira et al. 2012). Second, prior research

Table 3. Correlation Matrix of Variables Used in the Analysis, Mexican Immigrant Adults, 2003 NIS Wave 2

	Physician Visit	Age	Female	Currently Married	Education	Northeast	Midwest	South	Health Insurance
Physician Visit	1.000								
Age	-.090**	1.000							
Female	.106**	.103**	1.000						
Currently Married	.070*	-.064*	-.043	1.000					
Education	.152***	-.489***	-.063*	.007	1.000				
Northeast	.043	.031	.007	.038	.025	1.000			
Midwest	-.032	-.006	-.045	.013	.004	-.056	1.000		
South	.040	-.087**	.074*	.007	.050	-.097**	-.185***	1.000	
Health Insurance	.187***	-.139***	.011	.112***	.196***	-.003	.012	-.127***	1.000
Chronic Condition	.006	.448***	.122***	-.035	-.246***	.018	-.060	-.023	.036
Health Status	.044	-.463***	-.048	-.068*	.482***	.058	.051	-.005	.226***
Spouse of U.S. Citizen	.112***	-.396***	-.065*	.289***	.298***	.035	.127***	.038	.170***
Adjustee	.157***	-.434***	-.054	.029	.317***	-.014	-.013	.078*	.144***
English Competence	.073*	-.291***	-.168***	-.117***	.455***	.053	.071*	-.077*	.153***
Length of U.S. Residence	.026	-.048	-.148***	-.101**	.017	.005	-.010	-.053	.018
Prior Visit to U.S.	.018	.124***	-.017	.002	.063*	.013	-.008	-.056	.036

Continued

	Chronic Condition	Health Status	Spouse of U.S. Citizen	Adjustee	English Competence	Length of U.S. Residence	Prior Visit to U.S.
Physician Visit							
Age							
Female							
Currently Married							
Education							
Northeast							
Midwest							
South							
Health Insurance							
Chronic Condition	1.000						
Health Status	-.424***	1.000					
Spouse of U.S. Citizen	-.241***	.279***	1.000				
Adjustee	-.141***	.292***	.345***	1.000			
English Competence	-.140***	.297***	.115***	.178***	1.000		
Length of U.S. Residence	.059	.017	-.061	.374***	.178***	1.000	
Prior Visit to U.S.	-.043	.043	.042	-.048	.000	-.049	1.000

*p< .05 **p< .01 ***p<.001 (one-tailed tests)

shows that region of residence becomes less significant over time as immigrants begin to meet PRWORA eligibility requirements (Perreira et al. 2012).

Moreover, Tables 2 and 3 show the positive relationship between health insurance coverage and HSU, which remained significant across Wave 1 (r= .113, p< .001) and Wave 2 (r=.187, p< .001). While having at least one chronic condition was associated with HSU during Wave 1 (r= .081, p< .001), this relationship was not statistically significant in Wave 2 (p< .441). Furthermore, self-rated health was negatively associated with HSU: Mexican immigrants with better health ratings (e.g., excellent health) were less likely to have seen or talked with a physician within the past 12 months during Wave 1 (r= -.132, p< .001) than those with worse health ratings (e.g., poor health). Nevertheless, self-rated health was not significantly related to HSU in Wave 2 (p= .123).

Finally, Mexican immigrants who adjusted their non-immigrant status to LPR or who were spouses of U.S. citizens were more likely to use health services in the past 12 months than their respective counterparts during Wave 1 (r= .084, p< .001 and r= .085, p< .001, respectively) and Wave 2 (r= .157, p< .001 and r= .112, p< .001, respectively). Additionally, the bivariate correlations (Tables 2 and 3) show a positive relationship between English competence and HSU in Wave 1 (r= .080, p< .001), but less significant in Wave 2 (r= .073, p< .05). The association between duration of residence and HSU within the past year was not statistically significant in neither during Wave 1 (p= .061), nor Wave 2 (p= .252). Similarly, having at least one prior visit to the U.S. was not significantly associated with HSU (in the 12 months) during Wave 1 (p= .212) or Wave 2 (p= .318).

Overall, the correlation matrices show that there are no multicollinearity problems between the predictor variables and the dependent variable (HSU) in Waves 1 or 2. Despite many of the independent variables being significantly associated with HSU during Wave 1, a few of them (i.e., region of residence, chronic condition and self-rated health) were no longer significant during Wave 2. The next section will further examine how these effects change over time using a series of logistic regression models.

MULTIVARIATE ANALYSIS

To examine the effects of immigration status and assimilation on HSU, five logistic regression models are tested for Wave 1 and Wave 2. Model 1 (baseline model) uses only the control variables to predict the likelihood of utilization. Model 2 (immigration status model) includes the control variables and immigration status factors as predictors. Model 3 (the full model) incorporates control variables, immigration status and assimilation factors. Model 4 (conditional model) tests whether the relationship between length of residence and HSU varies across categories of class of admission to LPR. Model 5 (nonlinear model) tests the possibility of a nonlinear relationship between length of U.S. residence and utilization. The results of these models are provided in Table 4 (Wave 1) and Table 5 (Wave 2).

Table 4 and Table 5 show that all five models at baseline and at follow-up predict the HSU to varying degrees. As expected, some of the independent variables were not statistically significant for Wave 2, partly because of sample attrition and reduced sample sizes. Nevertheless, the directions of the logistic regression coefficients are similar across models and waves. The pseudo R^2 values show that the predictors used this analysis

Table 4. Logistic Regression Estimates Predicting Health Service Utilization, Mexican Immigrant Adults, 2003 NIS Wave 1

Predictor	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio
Age	.001	1.001	.008	1.008	.011*	1.011	.011*	1.012	.008	1.008
	(.005)		(.006)		(.006)		(.006)		(.006)	
Female	.420***	1.523	.439***	1.551	.471***	1.602	.463***	1.589	.469***	1.599
	(.124)		(.125)		(.135)		(.136)		(.135)	
Currently Married	.200	1.221	.054	1.056	.193	1.213	.196	1.217	.185	1.203
	(.148)		(.168)		(.182)		(.183)		(.183)	
Education (Years)	.088***	1.092	.080***	1.084	.067***	1.070	.063***	1.064	.067***	1.069
	(.016)		(.016)		(.018)		(.018)		(.018)	
Region of Residence										
Northeast	-1.146**	.318	-1.150**	.317	-1.144**	.319	-1.172**	.310	-1.109**	.330
	(.448)		(.455)		(.460)		(.460)		(.459)	
Midwest	.701***	2.016	.713***	2.041	.833***	2.300	.838***	2.311	.846***	2.330
	(.211)		(.214)		(.228)		(.229)		(.229)	
South	-.457***	.633	-.473***	.623	-.489**	.613	-.528***	.590	-.520***	.595
	(.149)		(.150)		(.162)		(.163)		(.164)	
Health Insurance	.425***	1.530	.355**	1.426	.397**	1.487	.376**	1.456	.393**	1.482
	(.136)		(.138)		(.146)		(.146)		(.146)	
Chronic Condition	.298*	1.348	.294	1.342	.216	1.241	.219	1.245	.211	1.235
	(.179)		(.181)		(.195)		(.195)		(.195)	
Self-rated Health Status	-.435***	.647	-.451***	.637	-.468***	.626	-.480***	.619	-.474***	.623
	(.068)		(.068)		(.073)		(.073)		(.073)	
Class of Admission										
Spouse of U.S. Citizen	—	—	.284**	1.328	.255	1.291	.756**	2.130	.247	1.280
			(.155)		(.164)		(.262)		(.165)	
Adjustment Status										
Adjustee	—	—	.475**	1.608	.480*	1.617	.430*	1.538	.610**	1.841
			(.183)		(.216)		(.216)		(.230)	

Continued

English Competence	—	—	—	—	.465**	1.593	.550***	1.733	.481**	1.617
					(.164)		(.168)		(.165)	
Prior Visit to the U.S.	—	—	—	—	-.328**	.720	-.335**	.715	-.338*	.713
					(.147)		(.148)		(.147)	
Length of U.S. Residence (Years)	—	—	—	—	-.005	.995	.011	1.011	-.051*	.950
					(.010)		(.010)		(.030)	
Spouse of U.S. Citizen X Length of U.S. Residence	—	—	—	—	—	—	-.047**	.954	—	—
							(.019)			
(Length of U.S. Residence)^2	—	—	—	—	—	—	—	—	.002*	1.002
									(.001)	
Constant	-.516	.597	-1.068**	.344	-1.113**	.328	-1.242**	.289	-.895*	.409
	(.392)		(.436)		(.474)		(.480)		(.491)	
-2 Log Likelihood	1647.560		1635.485		1467.498		1461.418		1464.777	
Model χ^2	127.279		139.354		145.447		151.527		148.169	
Pseudo R^2	.121		.132		.151		.157		.154	
Degrees of Freedom	10		12		15		16		16	
Number of cases	1070		1070		964		964		964	

Notes: Numbers in parentheses are standard errors. Data are weighted.

*p< .05 **p< .01 ***p< .001 (one-tailed tests)

Table 5. Logistic Regression Estimates Predicting Health Service Utilization, Mexican Immigrant Adults, 2003 NIS Wave 2

Predictor	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio
Age	-.002	.998	.005	1.005	.003	1.003	.005	1.005	-.001	.999
	(.008)		(.009)		(.009)		(.009)		(.009)	
Female	.554***	1.740	.564***	1.758	.515**	1.673	.509**	1.663	.503**	1.653
	(.173)		(.174)		(.187)		(.187)		(.188)	
Currently Married	.221	1.248	.178	1.195	.245	1.278	.255	1.290	.230	1.258
	(.193)		(.203)		(.224)		(.224)		(.225)	
Education (Years)	.057**	1.059	.053**	1.055	.054**	1.055	.051**	1.052	.052**	1.054
	(.019)		(.019)		(.021)		(.022)		(.022)	
Region of Residence										
Northeast	.796	2.217	.827	2.287	.528	1.695	.485	1.623	.666	1.946
	(.521)		(.527)		(.547)		(.551)		(.553)	
Midwest	.005	1.005	-.010	.990	.042	1.043	.061	1.063	.097	1.102
	(.277)		(.281)		(.303)		(.304)		(.306)	
South	.212	1.236	.192	1.212	.153	1.166	.127	1.136	.107	1.113
	(.196)		(.197)		(.211)		(.212)		(.212)	
Health Insurance	.786***	2.194	.766***	2.150	.770***	2.159	.768***	2.156	.746***	2.109
	(.173)		(.174)		(.184)		(.185)		(.185)	
Chronic Condition	.069	1.072	.041	1.042	-.130	.879	-.123	.885	-.165	.848
	(.232)		(.235)		(.246)		(.247)		(.248)	
Self-rated Health Status	-.143	.867	-.168*	.846	-.174*	.840	-.190*	.827	-.184*	.832
	(.093)		(.094)		(.098)		(.099)		(.099)	
Class of Admission										
Spouse of U.S. Citizen	—	—	.119	1.127	.106	1.112	.967*	2.629	.084	1.087
			(.190)		(.206)		(.462)		(.207)	
Adjustment Status										
Adjustee	—	—	.581**	1.789	.486*	1.626	.360	1.433	.772*	2.058
			(.245)		(.288)		(.293)		(.312)	

Continued

English Competence	—	—	—	—	.110 (.226)	1.117	.211 (.232)	1.235	.123 (.226)	1.131
Prior Visits to the U.S.	—	—	—	—	.065 (.210)	1.067	.096 (.211)	1.101	.079 (.211)	1.083
Length of U.S. Residence (Years)	—	—	—	—	.001 (.014)	1.001	.025 (.018)	1.025	-.122* (.059)	.885
Spouse of U.S. Citizen X Length of U.S. Residence	—	—	—	—	—	—	-.056* (.027)	.946	—	—
(Length of U.S. Residence)^2	—	—	—	—	—	—	—	—	.004* (.002)	1.004
Constant	-1.037* (.573)	.355	-1.683** (.630)	.186	-1.570** (.666)	.208	-1.903** (.687)	.149	-.712 (.775)	.490
-2 Log Likelihood	865.856		859.039		781.505		777.147		776.859	
Model χ^2	53.059		59.877		52.878		57.235		57.524	
Pseudo R^2	.103		.115		.112		.121		.122	
Degrees of Freedom	10		12		15		16		16	
Number of cases	505		505		459		459		459	

Notes: Numbers in parentheses are standard errors. Data are weighted.

*$p < .05$ **$p < .01$ ***$p < .001$ (one-tailed tests)

explain 12 to 16 percent of the variation in the likelihood of HSU for Wave 1, and 10 to 12 percent for Wave 2. The model χ^2 values show that the models fit the data well.

With respect to the control variables, the effect of age on HSU varies in direction (i.e., positive to negative). With the exception of Model 3 and Model 4 in Table 4, age is not significant. In both waves, women were significantly more likely to report HSU within the past 12 months than men. Additionally, respondents who were currently married were more likely to have had at least one visit or conversation with a physician within the past 12 months during both waves, but this effect is not significant in either wave. The odds of HSU within the past 12 months are associated with a 1-unit increase in education in both waves. Mexican immigrants that settled in the Northeast or the South were less likely to have visited or conversed with a physician at least once within the past 12 months in Wave 1. However, Mexican immigrants in the Midwest were more likely to report HSU in Wave 1. Region of residence was not significant in Wave 2. Respondents with health insurance coverage were more likely to have visited or conversed with a physician at least once within the past 12 months in both waves. Turning to need-related factors, Mexican immigrants with one or more chronic diseases were more likely to have visited or talked to a physician at least once in the past 12 months in both Waves. The effect of chronic condition on HSU is weak and insignificant over time. Furthermore, Mexican immigrants with better health ratings are less likely to have visited or conversed with a physician in the past 12 months during both waves. Self-rated health was significant in all models during the baseline period, and most models in Wave 2; it was not significant in Model 1 in Table 5.

Immigration Status and HSU

Model 2 in Table 4 shows that being a spouse of U.S. citizen is positively associated with HSU in the past 12 months for Mexican immigrants for Wave 1. The odds ratio (1.328) shows that Mexican immigrants sponsored as a spouse of a U.S. citizen are about 33 percent (1.328 – 1.000 = 0.328) more likely to have used health services in the past 12 months than employment-based/other immigrants, holding all else constant. As expected, spouse of U.S. citizen is not a statistically significant predictor of HSU for the follow-up period. Results from the full model (Model 3 in Table 4) show that the dummy variable for spouse of U.S. citizen has lost statistical significance after including assimilation predictors. This finding suggests possible moderation.

Holding all else constant, adjustees from a non-immigrant status to LPR were more likely to use health service within the past 12 months than the new arrival by about 61 percent in the baseline period (Model 2 in Table 4) and by about 79 percent in the follow-up period (Model 2 in Table 5). This is partially consistent with hypothesis 1(b) that Mexican immigrants who adjust their non-immigrant status to LPR in the U.S. are more likely to use health services within the past 12 months than their newly arrived counterparts during Wave 1. Contrary of the original hypothesis, adjustment of status remained a statistically significant predictor of HSU and gained some effect in Wave 2. It is likely that this association may be moderated by length of U.S. residence. Jasso et al. (2005) found that adjustees, on average, have longer lengths of U.S. residence (more than 5 years) compared to newly arrived immigrants (about 3 months), using cross-sectional

data from Wave 1 of NIS 2003. Future research that examines the direct and total effects of immigration status on HSU is needed.

Assimilation and HSU

Model 3 tests the effects of assimilation factors: English competence, prior visits to the U.S., and length of residence, on Mexican immigrants' HSU in the past 12 months at baseline (Table 4) and then 4 to 6 years later (Table 5). Model 3 is the full model that includes all the predictors. As shown in Table 4, holding other factors constant, English competence was positively associated with HSU in the past 12 months during the baseline period; Mexican immigrants who spoke English "very well" or "well" were 59 percent more likely to have seen or talked to a physician within the previous year than their respective counterparts who spoke English "not well" or "not at all." By contrast, English competence was no longer a significant predictor of HSU during Wave 2 (p=.625). These results support hypothesis 3 that English competence is a significant predictor of HSU during the baseline period and less significant during the follow-up period. Notwithstanding, the present study ran additional models with the language of the interview variable and the interviewer rated English variable. The results show that only the respondent's rated English was a significant predictor of HSU among Mexican immigrants.

Model 3 in Table 4 shows that prior U.S. visits was significantly and inversely associated with HSU in the past 12 months during Wave 1. That is, Mexican immigrants who have at least one prior U.S. visit were less likely to have visited or talked with a physician in the past 12 months during the baseline period than those who had never been

to the U.S. prior to acquiring a green card, holding other factors constant. However, having a prior U.S. visit was not a significant predictor of HSU during Wave 2, albeit positive as anticipated, (Model 3, Table 5, b = .065, p = .757). These results go against the expectation of a significant positive relationship between prior U.S. visit and HSU at baseline and at follow-up (hypothesis 2). The unexpected findings may be explained by unmeasured family influences. Prior research finds that family members can directly and indirectly facilitate or impede utilization (LeClere et al. 1994; Villatoro and Aneshensel 2014; Yun et al. 2013). LeClere et al. (1994) proposes that immigrant family members may provide immigrants with access to informal care and thus, influence the utilization behaviors of recent immigrants. Nevertheless, this explanation requires verification when data on family influence are available. Furthermore, the results show that the effect of prior U.S. visit on HSU shifted to the expected direction during the follow-up. Although this finding is in line with the acculturation literature (Abraído-Lanza et al. 2005), the effect is weak and not significant at the .05-level.

As expected, the effect of length of U.S. residence on HSU is not significant in either wave (Model 3 in Tables 4 and 5). This is consistent with previous findings (Akresh 2009; Bustamante et al. 2012). The relationship between length of U.S. residence and HSU is probably curvilinear. Recent immigrants are less likely to use health services than their non-recent immigrant counterparts, but this effect has been shown to change direction over time (Akresh 2009; Bustamante et al. 2012). While some scholars attribute this curvilinear relationship to PRWORA criteria (e.g., eligible for public assistance benefits such as health insurance coverage–an indicator of access), other scholars argue

that this effect is due to acculturation (e.g., health decline over time, English proficiency, knowledge of navigating the U.S. healthcare system, etc.). Thus, additionally logistic regression models tests for a curvilinear relationship between length of U.S. residence and HSU in both waves.

The conditional models (Model 4) in Table 4 and Table 5 support hypothesis 5 that class of admission to LPR moderates the effect of length of U.S. residence on HSU during Wave 1 and Wave 2. The effect of length of U.S. residence is weaker for spouses of U.S. citizens than for others. But the positive effect of length of U.S. residence on HSU remained similar between waves as shown in Figure 2. Figure 2 also shows that the effect of length of U.S. residence on the probability of HSU decreased for spouses of U.S. citizens and increased for employment-based/other Mexican immigrants for both periods. Interestingly, Figure 2 shows that the probability of HSU was similar for both spouses of U.S. citizens and for employment-based/other immigrants who had lived in the U.S. for 17 to 18 years. This is consistent with findings from previous studies (Bustamante et al. 2012; LeClere et al. 1994; Wallace et al. 2009) that used cross-sectional survey data.

Model 5 in Table 4 and Table 5 supports the hypothesis of a nonlinear relationship between length of U.S. residence and HSU because the logistic regression coefficients for length of U.S. residence and length of U.S. residence squared are significant at the .05-level. Figure 2 based on the results of length of U.S. residence and length of U.S. residence squared shows that the predicted probability of HSU by Mexican immigrants initially decreased and then increased after residing in the U.S. for about 17

years. This finding is consistent with prior research (Akresh 2009; LeClere et al. 1994) that the likelihood of HSU remains low and then increases after living in the U.S. for about 15 years.

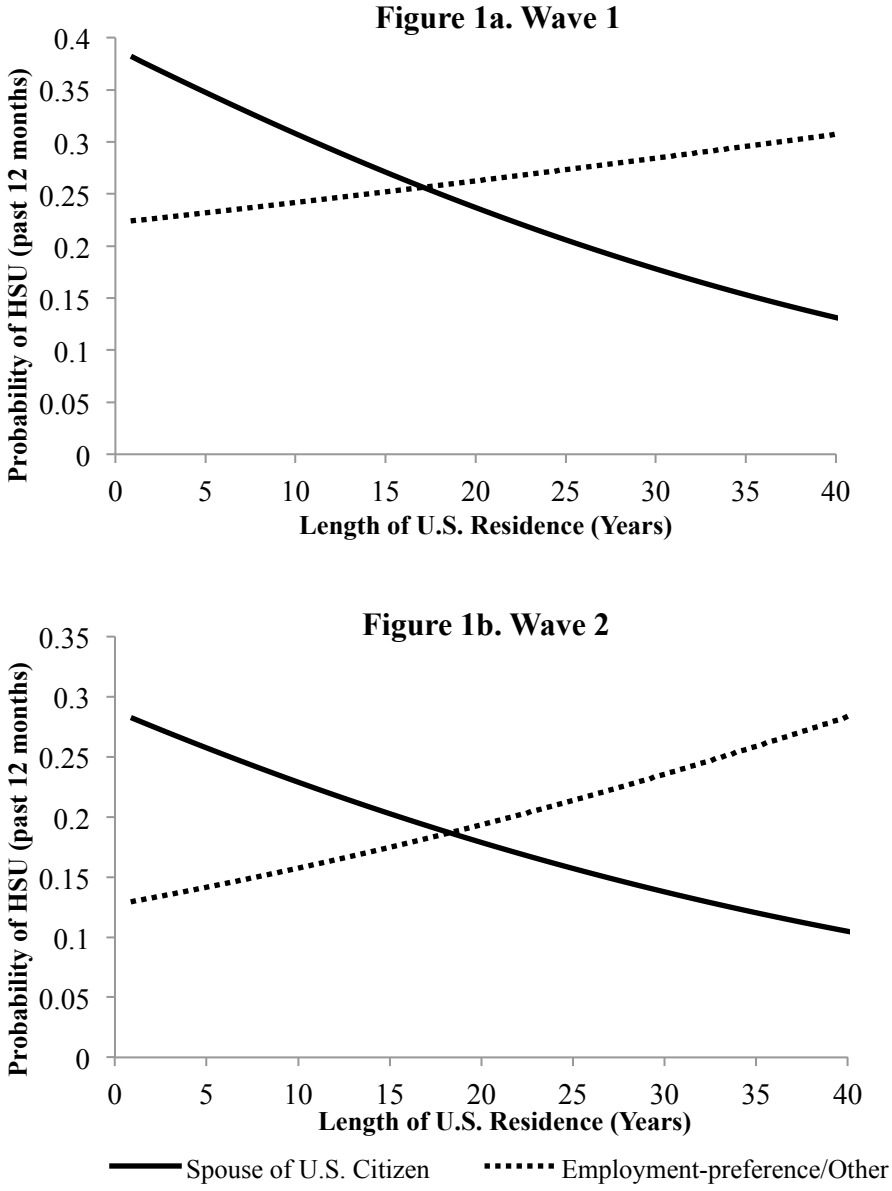

Figure 1. Predicted Probability of Health Service Utilization by Length of U.S. Residence and Immigration Status, Mexican Immigrant Adults

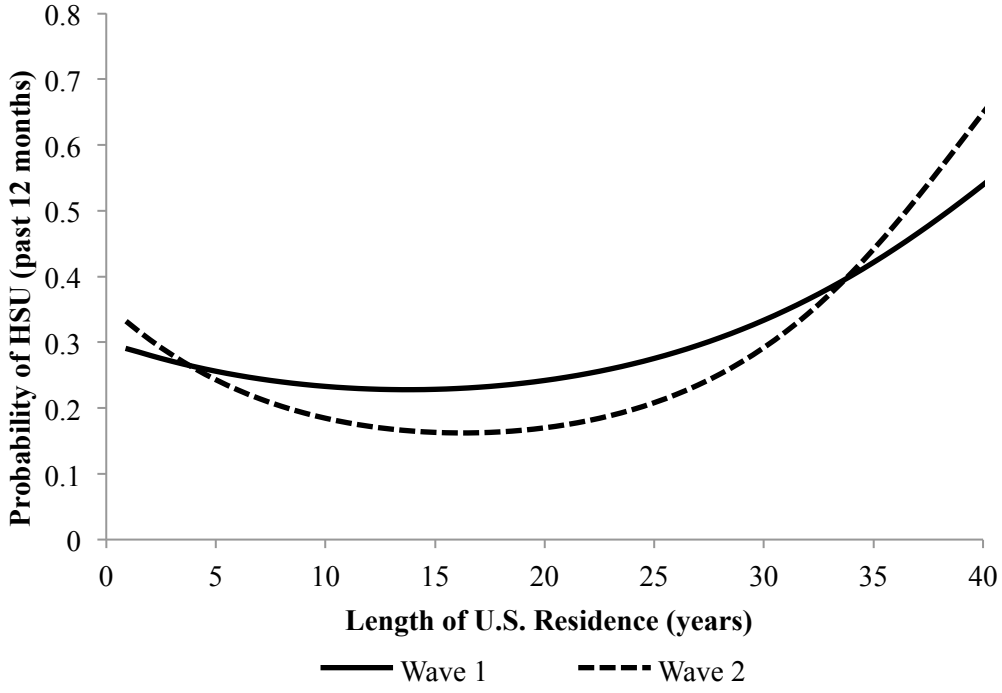

Figure 2. Predicted Probability of Health Service Utilization by Length of U.S. Residence, Mexican Immigrant Adults

SUMMARY

This chapter examined the effects of immigration status and assimilation on HSU among Mexican immigrants. Immigration status was measured with class of admission to LPR and adjustment of status. Assimilation was measured by English competence, prior visit to the U.S., and length of U.S. residence. Logistic regression was used to test the effects of immigration status and assimilation on HSU and how these effects change over time. Tables 1 to 5 showed the results from the statistical analyses.

The descriptive statistics showed, on average, that one-third and half of respondents had at least one visit or conversation with a physician within the past 12 months during Wave 1 and Wave 2, respectively. Relative to Wave 1, a significant

proportion of respondents acquired health insurance coverage during Wave 2, nevertheless, 46 percent were uninsured. The results show that respondents were more likely report worse health ratings and to be diagnosed with a chronic disease over time. These findings lend support to the Migrant Health paradigm, which posits that better health of recent immigrants diminishes with more time spent in the host country. In other words, adaptation to the U.S. is associated with worse health outcomes and thus, a greater propensity to seek care.

Additionally, less than one-third of respondents spoke English "very well" or "well" in both waves. The average length of residence was slightly less than 10 years during the baseline period. The proportion of respondents with at least one prior U.S. visit slightly decreased across waves. This may be due to sample attrition such that, those respondents who were not tracked may have had a prior U.S. visit. There were more employment-preference/other immigrants in both waves. The majority of respondents were adjustees in both waves.

Most of the control variables were significant during the baseline period. While age was not significant in the control variables only model or the immigration status model, it was significant in the full model. However, even after the inclusion of immigration status and assimilation factors, this effect is very weak. In other words, each 1-year increment in age increased the odds of HSU by only 1 percent (1.011-1.000=.011). This effect was even weaker in the full model during the follow-up (OR=1.003). In both waves, females were more likely to have visited or talked to a physician within the past 12 months compared to men. Sex was statistically significant in Wave 1 and Wave 2.

Currently married was not significant in either wave, but married respondents were more likely to report utilization within the past 12 months compared to those who were not currently married. There was a positive significant relationship between education and HSU across both waves. Mexican immigrants with more years of education had a higher probability of HSU within the past 12 months during the baseline period and the follow-up period. Region of residence was statistically significant in the baseline period but not during the follow-up. In the full model, the effects of residing in the Northeast and the South changed from negative in Wave 1 to positive in Wave 2. During the follow-up period, the categories of region of residence were positive in the full model.

The results partially confirm Hypothesis 1(a) that Mexican immigrants sponsored as a spouse of a U.S. citizen are more likely to have visited or talked with a physician in the past 12 months than their employment-based/other immigrant counterparts during the baseline period. Results support Hypothesis 1(b) that Mexican immigrants who adjusted their nonimmigrant status to LPR were more likely to have used health services in the past 12 months during Wave 1 and Wave 2. Unexpectedly, the results show a negative relationship between prior visit to the U.S. and HSU during Wave 1, and a non-significant association during Wave 2. Thus, there is a lack of evidence to support the hypothesis of prior visits to U.S. as a positive significant predictor of HSU during both waves. For Hypothesis 3, English competence predicted HSU during Wave 1, but not during Wave 2 as originally expected. Results confirm Hypothesis 4, that class of admission moderates the relationship between length of residence and HSU during

Waves 1 and 2. Furthermore, the results support Hypothesis 5 that the likelihood of HSU initially decreases and then increases after living in the U.S. for about 15 to 17 years.

CHAPTER V

CONCLUSION

This thesis examines the effects of immigration status and assimilation on HSU among Mexican immigrants in the United States. Relevant literature and theoretical frameworks related to Mexican immigrants' access and utilization were presented. This study uses a modified model for HSU and panel data from the 2003 NIS to discern its appropriateness in explaining the health behaviors of Mexican immigrants. This thesis is guided by two research questions: (1) How do immigration status and assimilation factors affect HSU among Mexican immigrants? (2) How have the effects of immigration status and assimilation on Mexican immigrants' HSU changed over time? This chapter summarizes and discusses the findings and their implications. Limitations of the study and recommendations for future research are also included in this chapter.

SUMMARY AND DISCUSSION OF THE FINDINGS

Few studies have examined Mexican immigrants' health service utilization using a nationally representative sample. This study used panel data from the 2003 NIS to test how immigration status and assimilation influence HSU among Mexican immigrants, and how these effects change, if at all, four years later, while controlling for other potential predictors (age, sex, marital status, education, region of residence, health insurance coverage, health status, and chronic condition). The present study found that immigration status and assimilation are important determinants of HSU among Mexican immigrants.

The present study finds that HSU among Mexican immigrants increased across waves (from 33 percent in 2003-2004 to 50 percent in 2007-2009). This is consistent with previous studies (Breen, Rao, and Meisser 2008; Chi and Handcock 2014; LeClere et al. 1994; Wallace et al. 2009; Yeo 2013) that find immigrants' access increases with more time spent in the United States. Although these studies used cross-sectional data, this study confirms that this is, in part, the case for Mexican immigrants.

Moreover, the health of Mexican immigrants declined over the four to six period between waves. That is, there was an increase, albeit slight, in having a medically diagnosed chronic condition including hypertension, heart disease, diabetes, asthma, lung disease, and/or cancer. Relative to the baseline period, respondents had lower health ratings during the follow-up period. These findings are consistent with "acculturation" such that the better health outcomes of recent Mexican immigrants diminish as they adopt the health behavior norms of the United States over time. The Mexican Health Paradox paradigm posits that the cultural or social protective buffers dissipate with acculturation to the host society (Dubowitz et al. 2010; Horevitz and Organista 2009; Lara et al. 2005; Singh and Siahpush 2002).

About 25 percent of respondents acquired health insurance coverage in Wave 2. Prior research has documented the importance of access (commonly measured with health insurance coverage) vis-à-vis disease awareness. A recent study conducted in California by Barcellos et al. (2010) found that Mexican immigrants who lack health insurance were less likely to be diagnosed with either diabetes or hypertension than those with health insurance. Other studies find that lack of health insurance coverage is a

source of underutilization among Latino immigrants (Chi and Handcock 2014; Thamer et al. 1997). Similarly, Wallace et al. (2009) found that recent immigrants who lack health insurance coverage and who live near the United States-Mexico border (less than 15 miles) are more likely to have used health services in Mexico.

Admission to LPR accords immigrants a new set of rights and responsibilities. That is, LPR means that immigrants are able to legally work in the U.S., own property, and after five years they can naturalize. Immigration status is integral to migrants' access to social and health services in the United States. Compared to undocumented immigrants, legal immigrants have access to employment with benefits such as health insurance coverage (Dubowitz et al. 2010). Many studies have documented substantial heterogeneity in access by immigration status. For instance, about 65 percent of undocumented immigrants and 32 percent of LPRs lack health insurance coverage compared to naturalized immigrants and native-born citizens (Dubowitz et al. 2010). These differences persist across other access measures. After adjusting for health insurance coverage, undocumented immigrants were less likely to have a usual source of care, fewer physician visits and dental visits (Bustamante et al. 2012; Oretga et al. 2007; Pourat et al. 2014; Wallace et al. 2009). Although health insurance coverage does not guarantee access, it ensures timely access to needed care. Legal immigration status plays a key role in facilitating access to health services.

Whereas previous studies have found access differences by immigration status (e.g., documented and undocumented; undocumented, LPR, and naturalized citizen), this study finds systematic differences in HSU within the group of legal permanent residents

from Mexico. As expected, spouses of U.S. citizens were more likely to have visited or talked with a physician within the past 12 months during the baseline period, holding all else constant (Hypothesis 1(a)). After the inclusion of assimilation factors, however, this predictor was not significant during the baseline period indicating possible moderation. (This effect will be revisited later in this section.) In line with Hypothesis 1(b), the results showed that this predictor had a minimal and non-significant effect on HSU in Wave 2, holding all else constant.

The vast majority of respondents were adjustees (80 percent) and a smaller proportion of respondents were new arrivals (20 percent). As expected, adjustees were more likely to have used health services within the past 12 months than their new arrival counterparts in Wave 1, holding all else constant. Adjustment of status was a significant predictor of HSU during the follow-up period as well. This finding provides partial support for the hypothesis of a positive significant relationship between adjustees and HSU within the past 12 months during the baseline period (Hypothesis 1(b)). Unexpectedly, adjustment of status remained a significant predictor of HSU among Mexican immigrants during the follow-up period. This may be explained by adjustees' longer length of U.S. residence relative to their new arrival counterparts. Jasso et al. (2005) found that adjustees on average have resided in the U.S. for more than 5 years, compared to 3 months among their new-arrival counterparts. This study performed additional analyses to test for an interaction effect between length of U.S. residence and adjustment of status on HSU, but there was no significant effect.

These findings are both consistent and inconsistent with findings from previous studies. On one hand, this study found that immigration status was a significant predictor of HSU in both waves. This is consistent with findings from previous studies (Hoerster et al. 2011; Saint-Jean and Crandall 2005) such that immigration status is a positive significant predictor of HSU among immigrants. In a study of migrant farmworkers in the United States, Hoerster et al. (2011) found that LPRs were more likely to have reported HSU within the past 2 years than undocumented immigrants; and they were less likely to report HSU within the past 2 years than naturalized citizens. Saint-Jean and Crandall (2005) found that citizenship status was the strongest predictor of HSU among immigrants in Miami, Florida. The present study showed that class of admission of LPR and adjustment of status were weak to moderate predictors of HSU during the baseline period.

On the other hand, the main effect of class of admission to LPR on HSU was not a significant predictor of HSU during the follow-up period; the conditional effect, however, was significant in both waves. By contrast, adjustment of status had a stronger and significant effect on HSU within the past 12 months during the follow-up period. Even after controlling for assimilation and other factors, this effect was significant. This finding is in opposition with findings from prior studies (Echeverria and Carrasquillo 2006; Wallace et al. 2009). Echeverria and Carrasquillo (2006) found that the effects of immigration status on utilization of preventive care (i.e., pap smear) were not significant after controlling for acculturation. In other words, there were significant differences in reporting a pap smear screening in the past 3 years among Latina immigrants, Latina

naturalized citizens, and U.S.-born whites. Similarly, Wallace et al. (2009) found that citizenship status had no effect on cross-border (Mexico) HSU among immigrants with a longer length of U.S. residence. These studies, however, used cross-sectional data. Drawing on panel data, this study finds that the effect of immigration status (adjustment of status) on HSU increased (rather than decreases) four years later, holding all else constant and even after adjusting for assimilation factors.

The relationship between prior visit to the U.S. and HSU contradicts the expectation of a positive significant relationship across both waves (Hypothesis 2). Results show that Mexican immigrants with at least one prior U.S. visit were less likely to have visited or talked to a physician within the past 12 months during the baseline period. This effect was positive as predicted during the follow-up period, but it was not significant. Therefore, Hypothesis 2 is not supported. It is possible that this predictor was not significant in Wave 2 because of sample attrition and reduced sample size.

This finding may be attributed to unmeasured utilization factors such as complement alternative medicine (CAM) practices. Prior research finds that Latino immigrants use herbal remedies and traditional healers such as curanderos and naturalistas, and cultural alternatives such as spiritual cleansing rituals or limpas (Ransford et al. 2010; Su, Li, and Pagan 2008). They also use health services in Mexico when formal care is inadequate or inaccessible (Akresh 2009; Loera, Reyes-Ortiz, and Kuo 2007; Ransford et al. 2010).

Prior research has shown that Andersen's (1968, 1995) health behavior model predicts certain types of HSU to varying degrees. Akresh (2009) used the health behavior

model to predict utilization of conventional and nonconventional healthcare for Hispanic and Asian immigrants'. The author concluded that the health behavior model was predictive of physician visits and dental care but not for alternative medicine such as homeopathic remedies or folk practices. Thus, a theoretical framework that explains both conventional and CAM utilization among immigrants in the U.S. is warranted.

Language is one measure of acculturation that can facilitate or impede access (Dubowitz et al. 2010). Similar to prior research, the majority (68 percent) of Mexican immigrants reported limited command of English (spoke English "not well" or "not at all") across both waves. As predicted, there was a significant positive relationship between English competence and HSU during the baseline period, and less significant during the follow-up period (Hypothesis 3). During the baseline period, Mexican immigrants who spoke English "very well" or "well" were more likely to have used health services within the past 12 months than those who spoke English "not well" or "not at all". In part, this finding is consistent with previous findings that English proficiency is positively associated with HSU among immigrants in the United States (Akresh 2009; Castañeda et al. 2013; De Jesus and Xiao 2012; Hoerster et al. 2011; LeClere et al. 1994). During the follow-up period, however, the relationship between English competence and HSU is not statistically significant and the effect is relatively small, but the direction of the relationship is as expected: Mexican immigrants who spoke English "very well" or "well" were more likely to have used health services within the past 12 months compared to those who spoke English "not well" or "not at all". This finding indicates that English-ability is not an important predictor of HSU among

Mexican immigrants over time, but having health insurance coverage was the strongest predictor of HSU during the follow-up period.

The nonlinear effect of length of U.S. residence on HSU was significant in both waves as expected (Hypothesis 4). This finding points to the complexity of HSU behavior of Mexican immigrants such that it is not a linear process as the acculturation perspective has suggested. That is, HSU initially declined and then, increased after 17 years of U.S. residence. On one hand, some scholars explain this curvilinear effect as the consequence of PRWORA eligibility criteria for public programs (Ellwood and Ku 1998; Loue et al. 2000; Kullgren 2003; Kaushal and Kaestner 2005; Derose et al. 2007). PRWORA restricts legal immigrants (who arrived after August 22, 1996) from receiving public assistance for the first five years of U.S. residence. In a recent study of the effects of PRWORA on HSU among elderly immigrants, Yeo (2013) found that residing in the U.S. for 15 years or more was a significant predictor of (discretionary) HSU. Length of U.S. residence was not a significant predictor of HSU among elderly immigrants before PRWORA (Yeo 2013). However, HSU may improve at longer lengths of U.S. residence because of increased integration and greater familiarity with the U.S. healthcare system gained over time (Breen et al. 2008; Chavez, Cornelius, and Jones 1985; Nandi et al. 2008). Furthermore, this finding diverges from Akresh (2009) such that she found the opposite effect: HSU increased and then declined after a certain point in time. These differences may be due to Akresh's (2009) focus on the broader group of Latino immigrants. Ortega et al. (2007) stated, "Considering Latinos as a monolithic group masks important differences" (pp.2357-8), meaning that access and utilization varies by

national origin, immigration status (undocumented, LPR, naturalized citizen, and native-born citizen), and such differences are evident among types of health service.

This study finds that the effect of acculturation on HSU varies for different groups of Mexican immigrants (spouses of U.S. citizens and employment-based/other) in both waves. The effect of length of U.S. residence on the probability of HSU decreases for spouses of U.S. citizens and increases for other Mexican immigrants during both the baseline and the follow-up periods. Additionally, the probability of HSU around 17 years of U.S. residence was similar for both spouses of U.S. citizens and employment-based/other Mexican immigrants in both waves. It is also possible that spouses of U.S. citizens with a shorter length of residence are more likely to report HSU compared to other immigrants. This may be attributed to unmeasured family characteristics. For instance, spouses of U.S. citizens may have access to economic and social resources and social support that may be important for utilization. Employment-based/other immigrants, by contrast, are more likely to report HSU compared to spouses of U.S. citizens with a longer length of U.S. residence. This may be due to resource accumulation. It is known that employment-based immigrants are less likely to be uninsured, be a homeowner, more years of education, be proficient in English, and to have fulltime employment compared to other immigrants (Pandey and Kagotho 2010).

Overall, the present study finds immigration status and assimilation are important predictors of Mexican immigrants' HSU at immigration (or admission to LPR) and four years later. In the immigration status model and the full model, adjustment of status was a significant predictor of HSU across both waves. Conversely, the class of admission main

effect was only significant in the baseline period and insignificant in the follow-up period. Similarly, length of U.S. residence was the only assimilation factor that was significant in both waves. English competence and prior visit to the U.S were significant in the baseline period but not significant in the follow-up period.

These results, however, should be interpreted with caution due to the high attrition rate. The attrition rate was higher than expected because of a new government ruling that prohibits the use of address reports to track individuals. Although attrition does not inherently indicate bias, it can increase the risk for potential bias and less precise estimates (Mirowsky and Reynolds 2000). Therefore, future research that attempts to replicate these findings is encouraged.

IMPLICATIONS OF THE FINDINGS

This section discusses the theoretical and practical implications of the findings from this study. The discussion of theoretical implications focuses on how well the modified health behavior model explains the HSU of Mexican immigrants. It also considers the practical or policy implications of the results.

Andersen's (1968, 1995) health behavior model posits individual's help-seeking behavior is a function of predisposing, enabling, and need-related factors. The Behavioral Model for Vulnerable Populations is a derivative of the health behavior model that extends traditional domains (predisposing, enabling, and need-related factors) to include relevant factors (see Chapter 2). Prior research has challenged both models by including English proficiency, length of U.S. residence, immigration status, and policy (Akresh 2009; Bustamante et al. 2012; LeClere et al. 1994; Ortega et al. 2007; Yeo 2013). The

results from this study also challenge Andersen's health behavior model in that immigration status and assimilation were significant predictors of HSU among Mexican immigrants in the United States. Specifically, the inclusion of immigration status and assimilation factors significantly improved the explanatory power of the health behavior model.

Immigration status and assimilation are important determinants of Mexican immigrants' HSU at admission to LPR and over time. That is, spouses of U.S. citizens were more likely to report HSU within the past 12 months than other immigrants, during the baseline period. This relationship was positive during the follow-up period, but it was not statistically significant. Adjustees were also more likely to report HSU in the past 12 months than their new arrival counterparts in both waves; it had a greater effect in Wave 2. This is consistent with findings from previous studies (Bustamante et al. 2012; Ortega et al. 2007) that found heterogeneity in HSU behaviors across categories of immigration status.

The majority Mexican immigrants spoke English "not well" or "not at all," indicating a low degree of cultural adaptation; this was consistent across waves. Moreover, the present study found that respondents who spoke English "very well" or "well" were more likely to report HSU in the past 12 months than those who spoke English "not well" or "not at all," in both waves. In other words, more "acculturated" immigrants are more likely to have talked or visited a physician in the past year than their less "acculturated" counterparts.

Moreover, prior visit to the U.S. was significant in the baseline period but not in the follow-up period. Contrary to what was expected, this study finds that there was a significant negative relationship between prior visit and HSU in Wave 1. In other words, Mexican immigrants who had visited the U.S. at least once prior to gaining LPR were less likely to report HSU in the past 12 months than those with no prior visit during the baseline period, holding all else constant. This may be explained by unmeasured legal status and unmeasured family characteristics. Moreover, LeClere et al. (1994) suggests that an immigrant's family is a source of informal care, thereby reducing their need for formal care. This effect was positive but statistically insignificant during the follow-up period.

Additionally, the inclusion of assimilation predictors reduced the effect of class of admission to LPR (or spouse of U.S. citizen) on HSU indicating possible moderation. Additional analyses showed spouse of U.S. citizen to moderate the relationship between length of U.S. residence and HSU in Wave 1 and Wave 2, net of all other factors. This finding goes against findings from previous studies that find immigration status is not significantly associated with HSU among Mexican immigrants longer lengths of U.S. residence (Wallace et al. 2009). Plausible explanations are manifold: use of cross-sectional rather than longitudinal data; coding length of U.S. residence as a dichotomous variable as opposed to using more categories or interval; and differences in using citizenship status as oppose to immigration status.

The nonlinear effect of length of U.S. residence was a significant predictor of HSU in both waves. This is consistent with findings from other studies, such that the

probability of HSU initially declines and then increases after 17 years of U.S. residence. Whereas much of the prior research has used cross-sectional data, this study confirms that this effect is consistent over time. Overall, these findings underscore the complexity of HSU behavior among legal Mexican immigrants.

The goodness of fit measures show that the inclusion of immigration status and assimilation significantly improved the explanatory power of the models. A comparison of Model 3 with Model 1 reveals that Model 3 (the full model) has a higher explanatory power than Model 1 (the model with the control variables only) because the difference in the model χ^2 (1647.560–1467.498=180.062) is large and statistically significant beyond the .001 level (c.v.=20.515, df 5=15–10) in Wave 1. Similar comparisons show that Model 3 has a higher explanatory power than Model 1 because the difference in the model χ^2 (865.856–781.505=84.351) is large and statistically significant beyond the .001 level (c.v.=20.515, df 5=15–10) in Wave 2. Moreover, the pseudo R^2 values increased from 12 to 15 percent in Wave 1 and 10 to 11 percent in Wave 2. These findings affirm the importance of using theoretically relevant indicators such as immigration status and assimilation to explain the utilization of immigrants.

In all, the present study found that Andersen's (1968, 1995) health behavior model is inadequate and insufficient in explaining the HSU of Mexican immigrants. This is supported by the small pseudo R^2 values previously discussed. In part, this may be attributed to the overemphasis on the use of evidence-based medicine. Andersen's model solely focuses on biomedical utilization and precludes other sources of care such as traditional medicine or CAM (complementary and alternative medicine). Akresh (2009)

found that Andersen's (1968, 1995) health behavior model is less applicable to the utilization of traditional and homeopathic medicine. When taken together, empirical evidence suggests the need for a theoretical framework that uses immigration status, indicators of adaptation, as well as other predictors to explain the utilization behaviors of immigrants. In addition, Andersen's health behavior model does not account for the impact of different types of disease on HSU. Simply put, the perceived severity of an illness influences the type of health care used. Prior research finds that the Taiwanese used traditional medicine for more severe or chronic illnesses, and used Western medicine for less severe or acute illnesses (Kleinman 1980). Furthermore, Ransford and his colleagues (2008) found that Mexican immigrants use traditional forms of care when Western medicine is inadequate or less accessible. Finally, Andersen's model illustrates the determinants of HSU as being linearly related. This conceptualization is problematic because it assumes that ecological and individual-level factors impact HSU in a similar fashion. However, this study shows that HSU is complex and multidimensional such that the direction and magnitude of the effects of the determinants vary within a group of legal immigrants and over time. This study provides empirical evidence that immigration status and assimilation factors should be considered in future research. And, a new theoretical framework that can efficiently explain the HSU of immigrants is warranted.

The findings from this study also have implications for policy. While scholars (e.g., Bustamante et al. 2012; Ortega et al. 2007) have found systematic differences in access by immigration status (e.g., undocumented, LPR, and naturalized immigrants), this study finds that such differences persist within immigration status categories (i.e., legal

permanent residents). This is relevant to developing policies that address the various sources of underutilization for all immigrants. For example, family-based immigrants may have less financial resources and benefits such as health insurance coverage compared to employment-based immigrants. Restricting undocumented and legal immigrants from public programs does little to improve the population health of this nation. As Mexican immigrants constitute a large and growing proportion of the United States' population, the health needs of Americans will increasingly reflect the needs of Mexicans.

Predictors of past utilization (or "realized access") can be used to determine where access falls on the equitable-inequitable access continuum. According to Andersen (1968, 1995), inequitable access occurs when health service utilization is primarily explained by social structure, health beliefs, and enabling factors. In addition to identifying sources of underutilization, Andersen (1995) expounds that a variable must be mutable in order to bring about change through policy and interventions. Thus, sources of underutilization can provide a useful approach to policy development and reform.

Mexican immigrants' HSU was longitudinally predicted by sex (predisposing), education (social structure), health insurance coverage (enabling), self-rated health (need-related), immigration status and length of U.S. residence. Although a significant proportion (25 percent) of Mexican immigrants in this study acquired health insurance coverage four years later, 46 percent were uninsured. Yeo (2013) found that length of U.S. residence and immigration status were significant predictors of HSU among elderly immigrants after the passage of PRWORA, but not before its enactment. This is

consistent with findings from studies of non-elderly immigrants (Hagan et al. 2003; Kaushal and Kaestner 2005; Ku and Matani 2001; Nandi et al. 2008). Overall, efforts at the state and the federal levels should aim to extend public assistance programs to all immigrants regardless of documentation status.

Findings from this study support the hypothesis that more assimilated Mexican immigrants have better access to care than their less assimilated counterparts. Thus, it is imperative to develop strategies that strengthen and support the protective health and social behaviors, and that will target social and health inequities among Mexican immigrants (Iton et al. 2010). Public health strategies are essential for addressing health inequities such that they can identify areas of intervention that can directly affect access and health risk behaviors. Promising practices for improving immigrants access to health and human services include building partnerships between government agencies, community-centered organizations, and immigrants; simplify the application and eligibility requirements for public assistance; and focus on meeting the needs of mixed-status immigrant families (Crosnoe et al. 2012; Fortuny and Chaudry 2011; Perreira et al. 2008).

LIMITATIONS

The present study is not without limitations. To date, the 2003 NIS has only collected data at two points in time, which limit the analysis of immigration status and assimilation effects on HSU. While this study is one of the few studies that has examined these effects at more than one point in time, the time between Wave 1 and Wave 2 (4-6 years) may not capture multiple health behavior changes. Second, the retention rate for

the follow-up period was low and reduced the sample size from 1,398 to 716. The high attrition rate is due to a new government ruling that prohibits the use of address reports filed by the NIS respondents (Jasso and Rosenzweig 2013). While sample attrition does not indicate bias, it can be a source of bias when the characteristics of the respondents who dropped out systematically differ from those who participated in subsequent waves (Mirowsky and Reynolds 2000). Jasso and Rosenzweig (2013), nevertheless, find that the attrition is not selective on attributes such as visa category, country of origin, or human capital characteristics. Third, the analysis of health behaviors prior to and after admission to LPR was not possible due to data limitations. Fourth, the present study could not examine the effects of informal care provided by family members or social networks due to limitations of the data. There is a paucity of panel survey data on the receipt of formal and informal care (LeClere et al. 1994; Ransford et al. 2010). Data collection on various types of care (e.g., Complementary and Alternative Medicine approaches, informal care, etc.) is essential for a more fruitful approach toward understanding individual health behaviors. Fifth, this study only examines two "class of admission" categories due to small sizes among Mexican immigrants.

FUTURE RESEARCH

This study examines the effects of immigration status and assimilation on Mexican immigrants' HSU shortly after admission to LPR and 4 to 6 years later. Future studies should examine Mexican immigrants' HSU behaviors at multiple time points to capture health behavior changes. If panel data with more points in time become available, Cox hazards regression model should be used. This will allow researchers to examine

points in which Mexican immigrants' health changes (decline) and how they respond to those changes. Moreover, because this study only examined having any physician visit, future research should expand the measurements of HSU to include preventive, non-discretionary (e.g., hospitalization), and CAM care to name a few. Due to the high attrition rate this study examines HSU among Mexican immigrants who completed Wave 1 and Wave 2, limiting the generalizability of the findings. Following Bustamante and colleagues' (2012) recommendation, additional research that examines the HSU behaviors among undocumented immigrants in the United States is warranted.

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APPENDIX A

List of Acronyms

List of Acronyms

BMVP	Behavioral Model for Vulnerable Populations
CAM	Complementary and Alternative Medicine
CHIP	Children's Health Insurance Program
HSU	Health service utilization
IIRIRA	Illegal Immigration Reform and Immigrant Responsibility Act
LPM	Linear probability model
LPR	Legal permanent residence
NIS	New Immigrant Survey
PRWORA	Personal Responsibility and Work Opportunity Reconciliation Act
SNAP	SNAP Supplemental Nutrition Assistance Program
TANF	Temporary Assistance for Needy Families

APPENDIX B

IRB Approval Letter

Institutional Review Board
Office of Research and Sponsored Programs
P.O. Box 425619, Denton, TX 76204-5619
940-898-3378
email: IRB@twu.edu
http://www.twu.edu/irb.html

DATE: July 18, 2014

TO: Ms. Joanna Lara
Department of Sociology & Social Work

FROM: Institutional Review Board - Denton

Re: Exemption for The Effects of Immigration Status and Assimilation on Health Service Utilization among Mexican Immigrants (Protocol #: 17769)

The above referenced study has been reviewed by the TWU Institutional Review Board (IRB) and was determined to be exempt from further review.

If applicable, agency approval letters must be submitted to the IRB upon receipt PRIOR to any data collection at that agency. Because a signed consent form is not required for exempt studies, the filing of signatures of participants with the TWU IRB is not necessary.

Although your protocol has been exempted from further IRB review and your protocol file has been closed, any modifications to this study must be submitted for review to the IRB using the Modification Request Form. Additionally, the IRB must be notified immediately of any adverse events or unanticipated problems. All forms are located on the IRB website. If you have any questions, please contact the TWU IRB.

cc. Dr. James Williams, Department of Sociology & Social Work
Dr. Philip Yang, Department of Sociology & Social Work
Graduate School