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HEALTH SERVICE UTILIZATION AMONG CHINESE, FILIPINO, AND ASIAN
INDIAN OLDER ADULTS IN THE UNITED STATES

by

Jing Tan

A dissertation presented to the
Graduate School of Arts and Sciences
of Washington University in
partial fulfillment of the
requirements for the degree
of Doctor of Philosophy

August 2009

Saint Louis, Missouri

ABSTRACT OF THE DISSERTATION

Health Service Utilization among Chinese, Filipino, and Asian Indian Older Adults

in the United States

by

Jing Tan

Doctor of Philosophy in Social Work

Washington University in St. Louis, 2009

Professor Nancy Morrow-Howell, Chairperson

The United States is becoming more ethnically diverse, with a rapidly growing Asian population. At the same time, the graying of America brings with it special consideration for America's ethnic minorities. The current research on service utilization among Asian American older adults is very limited. The purposes of this study are: (1) to describe and compare health service needs and health insurance coverage among Chinese, Filipino, and Asian Indian older adults; (2) to use modified Andersen's behavior model to identify what predisposing factors, enabling factors, need factors, and immigrant-related factors are associated with health service utilization; and (3) to test whether the relation between these factors and service utilization vary by ethnic group.

This dissertation pooled nine years of data (1998-2006) of National Health Interview Survey (NHIS) to explore the health status, health insurance, and health service utilization among specific Asian American subgroups. The total sample size is 851,581.

The subpopulation is 1412 persons aged 65 and older who self-identified as Chinese (618), Filipino (581), and Asian Indian (213). Univariate, bivariate, path analysis, and multiple group analysis were used to answer the research questions.

The univariate and bivariate results indicate that sociodemograhic characteristics, health needs, and health insurance status vary among Chinese, Filipino, and Asian Indian older adults. Asian Indian older adults are younger, higher percentage of male, less likely to live alone, bigger family size, higher education level, less likely to be poor, more likely to be non-citizens and foreign born, and significantly less likely to have health insurance coverage in general and Medicare coverage. Path analyses results show that there are different factors associated with two types of health services utilization – doctor visits and hospital stays. Having health insurance, poorer self-reported health and greater activities limitations are associated with higher likelihood of doctor visits and hospital stays. In addition, married older adults are less likely to have hospital stays. Multiple group analysis results reveal that path models of both types of health service utilization do not vary by ethnic groups. In spite of limitations of this study, these findings have important implications for social work practice and research.

Acknowledgements

This dissertation is dedicated to my parents for their unconditional love, care and support to me. Both of my parents did not have opportunities to receive formal education and had to make their own livings when they were teenagers. However, they believe in education and made great scarifies to support my brother and me to attend college. Now my brother is a civil engineer in China and I am finishing my Ph. D. in the United States. There is no word that can express my love and thanks for my parents. Sadly, my father died this April after battling with cancer for five years. Although my father was not able to see the day I am graduating, I know that he is proud of me and will be with me in spirit.

I would like to express my sincere gratitude to my advisor, Dr. Nancy Morrow-Howell, for her mentoring, support and encouragement throughout my doctoral education. It is my great fortunate to have her as my advisor and mentor. She has taught me not only how to be a researcher and a teacher, but also how to be a good person. I also want to thank the rest of my committee: Dr. Carolyn Baum, Dr. Timothy McBride, Dr. Yunju Nam, Dr. Shanta Pandey, and Dr. Ed Spitznagel.

In addition, many thanks to my friends and colleagues in the Brown school, especially Lucida Cobb, Njeri Kagotho, Maurice Gattis, Paul Sacco, Henrika McCoy, and Suzanne Pritzker. There are a lot of names that I am not able to list here. I am grateful that I had shared these past six years with you.

Last but not least, special thanks to my husband Hui Luo and my son Puqi. You two are the most important men in my life. Only with your love and companionship, I am able to go through the hard time and finish this dissertation. I love you!

Dedication

To my parents Xianshun Tan (1949-2009) and Meilan Deng.

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CHAPTER I: INTRODUCTION

Background: Asian American Older Adults in the U.S.

The United States is becoming more ethnically diverse, with a rapidly growing Asian population. At the same time, the graying of America brings with it special consideration for America's ethnic minorities. According to the 2000 census data, the Asian population numbered 10.2 million and 7.7% of them were aged 65 and over. Between 1990 and 2000, the Asian American population in the United States increased by 52.4%, which closely follows the Hispanic growth rate of 57.9% for the same period. Among 10 million Asian in the United States, or 3.6 percent of the total population, five groups numbered one million or more and together accounted for about 80% of the Asian population: Chinese, Filipino, Asian Indian, Vietnamese, and Korean. Chinese was the largest group and represented about 24% of the Asian population, followed by Filipino (18%), and Asian Indian (16%). Together these top three groups made up 58.3% of the Asian population. Overall, Asian American older adults represented 2.3% of the total American population over the age of 65. They are the fastest-growing ethnic minority group over age 65, and the growth has been mainly due to immigration (Leclere, Jensen, & Biddlecom, 1994).

Compared with other U.S. minorities, there has even been less research on Asian Americans, who have been described as "one of the most poorly understood minorities [whose] health problems and health care needs have not been adequately recognized or addressed" (Lin-Fu, 1988). Although Asian American older adults constitute the fastest

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growing racial group aged 65 years old and over in the United States today, little research is being conducted on this population (Tanjasiri, Wallace, & Shibata, 1995).

With regard to the health service utilization among Asian American older adults, the lack of empirical information contribute to the myth that Asian American groups are "model minorities" whose elders have little need for services outside those provided by their extended families (Balgopal, 1995; Fong & Mokuau, 1994). Asian cultures are often characterized as "caring for their own" and typically underutilize formal services. It is concluded that Asian American older adults tend to underutilize most social and health services (Hooyman & Kiyak, 2008).

Literature has so far mainly focused on documenting low service use by Asian American older adults and explaining the low service use. For example, most studies of services to Asians seek to explain why Asian American older adults in the United States use few senior services (P. N. Chen, 1979; Cheng, 1978; Fuji, 1973; Kamikawa, 1981; J. J. Lee, 1986; Moon, Lubben, & Villa, 1998; Salcido, Nakano, & Jue, 1980; Wu, 1975). Commonly used approaches include looking for external barriers (e.g., language difficulties, culturally generated distrust of service providers, and lack of bilingual/bicultural staff) and/or internal characteristics (e.g., individual negative attitudes, cultural beliefs toward services, and preferred helping resources) which prevent use (Y. L. Liu, 2003). In addition, lack of theory is a prominent limitation in the literature on service utilization among Asian American elderly. A few studies used conceptual frameworks that are drawn from Andersen-Newman's health service utilization model (N. G. Choi, 2001a; Kuo & Torres-Gil, 2001; J. W. Min, 2005; Pourat, Lubben, Wallace, & Moon, 1999). In order to apply in Asian American elderly, these studies modified Andersen-

Newman's health service utilization model and added cultural and immigrant variables. For example, as an important predictor, immigrant status (citizenship, birth place, national origin, and the years in the U.S.) was included in most analysis, and categorized as an enabling factor in Anderson model. In some studies, English-speaking ability and traditional value also were included as enabling variables.

Significance and Purpose of the Study

The current research on service utilization among Asian American older adults is very limited and far from systematic. There is no review article on service utilization among Asian American older adults and most information is quite outdated. Little is known about the health and insurance status, and service utilization of older Asian Americans.

Nationally-based data for Asian American older adults is sparse, due primarily to the slow process of change in ongoing national surveys and methodological problems in the gathering of nationally-based aging data for these populations (E. S. H. Yu & Liu, 1994). When data on Asian American is collected, despite the vast diversity, it is often not broken down for subethnic groups. Most existing studies were based on small samples of one or a few ethnic groups in geographically limited areas. For many subethnic groups of Asian American elders, even small-scale, exploratory studies are rare (N. G. Choi, 2001b).

Asians in the United States are not a homogeneous group. Under the Asian American label, there are more than 30 ethnic groups. Each group has a unique language and culture tradition and a different history in the United States. Previous studies either

use one category such as "Asian/Pacific Islanders" to cover multiple and diverse ethnic groups of people whose families have migrated from vastly different Asian countries and Pacific Islands to reside in the United States, or only focused on one individual Asian ethnic group.

Because of a lack of data sets large enough to enable intraethnic distinction to be made in multivariate analyses, most previous research has analyzed the Asian population as a whole. The limited existing aggregate data on Asian American older adults tend to paint a deceptively positive picture of "model" minority health and well-being. Some researchers concluded that the health of Asian American older adults appears equivalent to if not better than that of other older adults groups (Gelfand, 2003; Markides, 1987). Many researchers pay attention to only the success of some segments of the population and not to the severe problems of others. This is the myth of the model minority, which holds that Asian American populations have succeeded in countries outside their homelands due to special cultural values and behaviors (Lin-Fu, 1988). In opposition to the model minority stereotype, some Asian American researchers have pointed out the continued and glaring disparities in health and welfare of particular groups of Asian American immigrants (Zane, Takeuchi, & Young, 1994). Tanjasiri et al. (1995) argue that aggregate data on Asian American older adults clouds the bimodal distribution in socioeconomic and health status. Hence, it is important to recognize the heterogeneity natural of the Asian American older adults population.

The use of over-generalized ethnic aggregate categories masks the high degree of heterogeneity known (or suspected) to exist across national origin groups with respect to socioeconomic status, health status, and cultural characteristics. In addition, this approach

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loses the opportunity to observe the unique health needs of specific Asian ethnic groups living in the United States. It is clear that a timely response to the growing demand for a social work knowledge base on Asian American elders is in dire need. Furthermore, better understanding of the similarity and difference of service utilization patterns among subethnic groups of Asian American older adults is important due to the dramatic increase in their population and vast internal heterogeneity.

An improved understanding of various ethnic Asian American elders' health needs is very important to health care providers and health service researchers. Differences among Asian Americans in socioeconomic status, health insurance coverage, immigrant status, and cultural characteristics may differently affect health status, health seeking behavior and access to health services. Health care needs, therefore, vary by ethnicity and economic status. Identification of ethnic differences is important for health service providers and researchers (Diwan, Jonnalagadda, & Balaswamy, 2004; Wolinsky & Johnson, 1991). Health care providers know their services are most effective when tailored or customized toward the specific health needs of the target population being served.

To my knowledge, no study has examined the health status, health insurance, and service utilization of these top three Asian American elders groups. This dissertation fills the substantial knowledge gaps regarding the state of old Asian Americans by examining health status, health insurance coverage and factors related to service utilization. Furthermore, this study builds on current literature by providing up to date and population specific information on patterns of health service utilization among three major Asian American older adults: Chinese, Filipino, and Asian Indian. This dissertation

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will clarify the extent to which Asian American older adults are a homogeneous or heterogeneous group regarding health need and service utilization; and therefore provide insights for future social work practice and research on this population.

The purposes of this study are: (1) describe and compare health service needs and health insurance coverage among Chinese, Filipino, and Asian Indian older adults; (2) use modified Andersen-Newman's health service utilization model to identify what predisposing factors, enabling factors, need factors, and immigrant related factors are associated with health service utilization; and (3) test whether the relation between these factors and service utilization vary by ethnic group.

CHAPTER II: LITERATURE REVIEW

Immigrant History of Asian Americans

The immigration of Asians to the United States has approximately 150 years of history. With the industrialization of the United States after the Civil War, the first group of Asians -- Chinese and Japanese -- immigrated to the United States. They were seen as uneducated and docile workers who would work for cheap wages on sugar plantations in Hawaii, in the gold mining camps in California, or on the railroads under construction (Gelfand, 2003).

However, immigration restrictions quickly arose as nativist sentiment grew in the country. In 1882, the Chinese Exclusion Act was passed, closing off immigration to the United States from China. Japanese workers were brought in to replace the Chinese. The year 1906 saw the first entrance of Filipinos into the United States as workers in the territory of Hawaii. Restrictions were placed on Japanese immigrants by 1907. The National Origins Act of 1924 expanded the restrictive quality of American immigration policies. This act established quotas for admissions of immigrants from every country, but did not include any Asian quotas (Gelfand, 2003). It was not until the passage of the Magnuson Act of 1943 that many of the immigration and naturalization restrictions were removed for Chinese immigrants (J. J. Lee, 1986). The Immigration and Nationality Act of 1965 further equalized opportunities for immigration to the United State by abolishing strict quotas and allowing persons to enter the United States on the basis of a person's job skills or a desire to reunite with family.

The influx of Asian immigrants started since the pass of the liberalized immigration law of 1965. The number of Asian immigrants rose from only 83,000 in the 1965-1969 period to 1.7 million in the 1990-1994 period. After the peak period of 1990-1994, the immigration flow from Asian began to decline over the next years. Accord to the 2000 census data, Asian Americans numbered approximately 12 million, accounting for 4.2% of the U.S. population. Among them, Chinese Americans emerged as the largest Asian group, with more than 2.4 million in 2000, and are expected to maintain their numerical dominance in the future. In population size, Filipinos, Asian Indians, Vietnamese and Koreans followed Chinese Americans in order (P. G. Min, 2006).

The Chinese were the first Asian group to immigrate in significant numbers to the United States. The immigration pattern of Chinese Americans is characterized as three waves (J. J. Lee, 1986). Prior to 1950, a majority of Chinese immigrants were uneducated laborers who emigrated from largely Cantonese-speaking areas of Canton and Hong Kong. A second wave of Chinese immigrants is viewed as those who arrived after 1950. This wave included many highly educated professionals and politicians escaping the intellectual and political persecution of communist rule in Mainland China. This group was derived from mainly Mandarin-speaking areas of China and from Taiwan. The third, and current, wave of Chinese immigrants includes a greater variety of educated professionals, uneducated laborers, refugees and business persons, as well as non-working family members who immigrate under family reunification provisions of current immigration laws. A variety of languages and traditional lifestyle are represented in today's immigrants from China.

Filipino Americans make up the second largest Asian group in the United States. The first recorded immigrants to the United States from the Philippines – fishermen and trappers settled down in southern Louisiana between middle of the 1700s and the 1839s. The immigration pattern of Filipino Americans is often referred as four waves: pensionados agricultural immigrants, postwar immigrant, and post-1965 immigrants (Bankston, 2006). As a result of the U.S. occupation of the Philippines, the Pensionado Act was passed in 1903, which provided funds to qualified students for study in the United States. The second wave of Filipino immigrants was labors in the agriculture of Hawaii and on the west coast during the 1920s. Post World War II, the third wave of Filipino immigrants includes wives of U.S military personnel and Filipino nurses. The fourth, and current, wave of Filipino immigrants includes immediate relatives of U.S. citizen or noncitizen legal residents of the United States. The immigration of Filipinos peaked in the early 1990s but sharply declined in the latter half of the decade. The reason of the decline is the closure of the U.S. military bases in the Philippines, which gradually moderated the Filipino immigration flow over the year.

The immigration pattern of Asian Indian Americans can be broadly divided into three phases (Kibria, 2006). The first phase involves the migration of male workers from the state of Punjab in Indian to work as railroad and farm labors in California and Washington during the late nineteenth and early twentieth centuries. The second phase of Asian Indian settlement is marked by the watershed of the 1965 Immigration and Nationality Act, and majority of Indians coming to the U.S. entered under the occupational category of professional and technical workers. The third phase of Asian Indian immigration begins in the 1980s and continues to the present time. Asian Indian

immigration has escalated since the early 1990s mainly because India has taken advantage of the 1990 Immigration Act's preference for occupation-based immigrants more effectively than any other country. Indian immigrants composed the largest Asian immigrant group in the twenty-first century, and its flow is likely to maintain its current momentum. Thus, Asian Indian Americans will be the second-largest Asian group in the near future.

Sociodemographic Profile and Health Status of Asian American Older Adults

Overall, Asian American elderly represented 2.3% of the total American population over the age of 65 and they are the fastest-growing ethnic minority group over age 65. Approximately 8 percent of the Asian population is 65 and over, and it is projected to double in 2050 (J. L. Angel & Hogan, 2004). Generalizations about Asian elderly are difficult. In fact, this is one of the most internally heterogeneous population groups in the United States with respect to ethnic composition, immigration history, language and religion, and other sociodemographic variables. Of all Asian American age groups, the elderly present the most variations in these characteristics because a large proportion of them are foreign-born, first-generation immigrants and, thus, are more likely to adhere to the culture of their country of origin than the younger generations (N. G. Choi, 2001b).

In general, Asian American elderly consist of two cohorts of immigrants (Tanjasiri et al., 1995). Those two cohorts differ widely in terms of ethnicity and socioeconomic status. Immigrants who arrived in the late 19th and early 20th centuries make up the first cohort of Asian American elders, sharing the experience of

discrimination and isolation. The second cohort consists of elderly Asian Americans who immigrated to this country since passage of the 1965 immigration Act, which allowed entry of relatives of U.S. citizens and permanent residents.

Asian American population, including elders over the age of 65, display a unique "bimodal" distribution in socioeconomic characteristics that points to a disproportionate representation at both tails of the distribution curves for income and educational attainment (Lin-Fu, 1993; Tanjasiri et al., 1995). In terms of income level, at one end of the spectrum, compared to whites and blacks, a higher proportion of Asian American elderly householders in families with married couples appeared to enjoy incomes of $50,000 or more, and higher proportions of Asian American elderly living alone had incomes of $35,000 and more (U.S Census Bureau, 1993a). At the lower end of the spectrum, 12% of Asian American elderly had annual incomes below the federal poverty level compared to 10.8% of Whites (U.S Census Bureau, 1993b). Similar paradoxes exist for educational attainment. Overall, elderly Asian American have a higher proportion of college graduates compared to the general U.S. population. However, at the lower end of the education spectrum, 12.7% Asian American elders possess no education compared to only 1.4% and 5.7% of the nation's White and Black older population, respectively (U.S Census Bureau, 1992).

The limited data that are available on Asian American elderly depict Asian American elderly to be healthier than other older population groups, indicated by the long life expectancy at birth and at age 65 (Gelfand, 2003). Prior research had shown Asian American elderly have a lower level prevalence in all major disease categories and lower mortality rates than Whites (W. T. Liu & Yu, 1985), and tend to be healthier than other

ethnic groups in terms perceived health status, health-promoting behaviors, and exposure to health risk factors (M. S. Chen, 1993; Lubben, Weiler, & Chi, 1989). However, this healthy picture of Asian American elderly can be misleading. Some researchers believe that the notion that Asian American elders are healthier than other elderly population is largely based on lower health service utilization rates among elderly Asian Americans, along with some national health statistics that portray slightly lower rates of coronary heart disease and cancer-related deaths among selected groups of Asian American elders than in the population at large (Takata, Ford, & Lloyd, 1998; Zane et al., 1994). Tanjasiri and colleagues (1995) argue that aggregate analysis of data on Asian American elderly blurs substantial differences across Asian American groups with respect to socioeconomic and health status. Similar to socioeconomic status, there is a bimodal distribution in health status. Some Asian American elders, such as Japanese and Chinese Americans who immigrated in the 1930s, fare quite well, while others have very low income and poor health status. As a whole, higher rates of hypertension, cholesterol, and cancer present among Asian Americans, especially among low-income subgroups, and Asian women have the highest rate of osteoporosis (Hooyman & Kiyak, 2008).

Health Insurance Status among Asian American Older Adults

Majority of Asian American population growth has been due to immigration (Frisbie, Cho, & Hummer, 2001). Of all Asian American age groups, the older adults present the most diversity because a large proportion of them are foreign-born, first-generation immigrants (N. G. Choi, 2001b). The high proportion of immigrants in the Asian American older population presents challenges for the U.S. health care system. The

Personal Responsibility and Work Opportunity Reconciliation Act of 1996 bars most

public assistance and social services for noncitizen immigrants, unless individual states

are willing to pay for the cost. As a result, noncitizens – especially recent immigrants –

have had very limited access to Medicaid and SSI (S. Choi, 2006). To become a U.S.

citizen, a person should have been lawfully admitted for permanent residence and have

resided continuously as a lawful permanent resident in the U.S. for at least five years

before applying (U.S. Citizenship and Immigration Services, 2008). Furthermore, in

terms of health insurance older immigrants often face more challenges that younger

immigrants, such as more difficulty to pass the U.S. citizenship test due to limited ability

to learn English and memorize new information, more difficulty to obtain employment-

based health insurance through working due to lower labor market participation, and

more urgent needs for health insurance due to poor health status (Nam, 2008).

Existing studies mainly focus on general immigrants, and there has been little

research to examine health insurance coverage among older immigrant population. Prior

studies have shown that as a whole group, immigrants are much less likely to be insured

than native-born Americans (Carrasquillo, Carrasquillo, & Shea, 2000; Prentice, Pebley,

& Sastry, 2005; Thamer, Richard, Casebeer, & Ray, 1997). Disproportionate older

immigrants lack of health insurance, 12% of noncitizen elders lacked health insurance

compared with 1% of nonimmigrant elders in 1997 (Carrasquillo et al., 2000) and about

45% of older adults who do not have any health insurance coverage were foreign-born in

2000, who only count for 1.2% of the U.S. older population (S. Choi, 2006; Friedland &

Pankaj, 1997).

The two main sources of health insurance are employment-based health insurance and public programs, such as Medicare and Medicaid (Glied, 2001). The rate for private insurance of adult immigrants is 41%, which is much lower than that of the native born counterparts is 78% (Leclere et al., 1994). Due to immigrants' marginal employment with no or low benefits, immigrants are less likely to have employment-related private health insurance(R. J. Angel, Angel, & Markides, 2002; Ku & Matani, 2000) . As a result, older immigrants are more depend on Medicare or Medicaid if they are eligible. Although Medicare is almost universal among older adults over 65 in the U.S., older immigrants are less likely to be entitled for Medicare due to lack of work history in the U.S. (Sakauye, 1992). Before the welfare reform, older immigrants made up 13% of the U.S. older Medicaid recipients (Ellwood & Ku, 1998), however Medicaid enrollment of immigrants fell (Ku & Matani, 2001). Moreover, Nam (2008) found that older immigrants' health insurance status was associated with their citizenship status and length of stay in the U.S., and Medicaid participation significantly decreased among noncitizen and recent immigrant elders after welfare reform.

To the best of my knowledge, there is no study have been conducted to examine health insurance coverage among specific older immigrant populations and studies of Asian American older adults based on nationally representative data are rare. Based on a sample from National Health Interview Surveys (NHIS, 1992-1994), (Ryu, Young, & Kwak, 2002) examined differences in health insurance among Asian Americans (18 years old and over) and found that each ethnic group analysis yielded a unique pattern for prediction health insurance. For Chinese Americans, significant predictors of health insurance coverage included age, education, marital status, family size, family income,

government employment, years lived in USA, and number of conditions. For Filipino Americans, age, family income, private company employment, years lived in USA, and number of conditions was significant in explaining health insurance coverage. For Asian Indian Americans, significant predictors included family size, family income, government employment and self-employed status, years lived in USA. Another study analyzed data from the 1998 Current Population Survey to examine the differences of health insurance coverage among immigrants by citizenship status and country of origin (Carrasquillo et al., 2000). It revealed that the uninsured rates of immigrants from China, Philippines, and Indian were all around 20%. Furthermore, private health insurance coverage rates for these three groups were 69%, 70%, and 76% respectively, government insurance coverage rates were 15%, 18%, and 6% respectively. Local study among Chinese in Los Angeles (aged 18 through 65 years) showed that 39% of respondents were without health insurance (Takeuchi, Chung, & Shen, 1998).

Empirical Findings of Health Service Utilization among Asian American Older Adults

As mentioned before, a major finding from most studies on health service utilization among Asian American older adults is underutilization (Boult & Boult, 1995; W. T. Liu & Yu, 1985; J. Min & Moon, 2006). As summarized in Appendix 1, research on various Asian American elderly groups has generally documented low rates of utilization or participation in health services (Boult & Boult, 1995; N. G. Choi, 2001a; Moon et al., 1998; Shin, Kim, Juon, Kim, & Kim, 2000; Tsai & Lopez, 1997; Yee & Weaver, 1994). In addition, studies that examined service use in individual Asian

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American elderly subgroups showed significant within-group variations (Kuo & Torres-Gil, 2001; Lai, 2001; Y. L. Liu, 2003; Shin et al., 2000; Tsai & Lopez, 1997).

Asian American older adults as a whole group

Ambulatory medical care services. Ambulatory medical care services refer to any medical are delivered on an outpatient basis, such as medical care provided in physicians' offices, hospital emergency room, or outpatient department. Studies found that Asian/Pacific American elders visit physicians half as often as white Americans of the same age group (Boult & Boult, 1995; W. T. Liu & Yu, 1985; E. S. H. Yu & Cypress, 1982). Using 1992-1994 NHIS, study found that age, sex, education, marital status, employment, years in US, health insurance, self-reported health and number of conditions were statistically significant in explaining number of physician visits in previous year for the aggregate Asian American sample (Ryu et al., 2002). Asian Americans were found to have the highest rate of use emergency room services (30%) compared to any other groups, and there is a much lower dentist visit per person per year for Asian/Pacific Americans, compared with white (W. T. Liu & Yu, 1985).

Preventive care services. Preventive care is measures taken to prevent illness or injury, rather than curing them. Using 2001 California Health Interview Survey (CHIS), racial/ethnic disparities were examined in the use of preventive services recommended for people aged 65 and older by the U.S. Preventive Services Task Force and American Cancer Society – receipt of influenza vaccine within the preceding year, receipt mammogram within the preceding two years for women, and receipt of colorectal cancer screening (J. Y. Chen, Diamant, Pourat, & Kagawa-Singer, 2005). They found that Asian

Americans were significantly less likely to obtain a mammogram compared to whites, while controlling for other explanatory factors. Focused on breast and cervical cancer screening practice among Asian and Pacific Islander women, study documented that 71.7% of women aged 50 and older had a mammogram in the past two years, and 69.5% had a clinical breast exam in the past two years. About 73.7% of women aged 18 and over who had not undergone a hysterectomy had a Pap test in the past three years. Women with health insurance and those who had seen a physician in the past year were more likely to have been screened (Coughlin & Uhler, 2000).

Home health care service. Home health care is provided to individuals and families in their place of residence for the purpose of promoting, maintaining, or restoring health or for maximizing the level of independence while minimizing the effects of disability and illness, including terminal illness. Home health services include skilled visits, such as nursing, physical and occupational therapies, and social work, and home health aide. Among these home health services, skilled nursing and home health aide services are the most majority. Data drawn from initial Outcomes Assessment Information Set (OASIS) records, studies found that API elders received more home health aide services than white elders (J. S. Lee & Peng, 2001), while similar levels of skilled service utilization were observed across four racial-ethnic groups – White, Black, Hispanic, and Asian elders (Peng, Navaie-Waliser, & Feldman, 2003). A comparative study of African American, Asian American, and Hispanic older person in nutrition supplement programs found that being Asian American and lacking English language proficiency decreased the likelihood of participation in home-delivered meal programs, even when nutrition and health statuses were controlled for (N. G. Choi, 2001a).

Hospice care. Hospice care is defined as a program of palliative and supportive care services providing physical, psychological, social, and spiritual care for dying persons, their families, and other loved ones. Hospice services are available in both home and inpatient settings. Based on a case study of a large metropolitan hospice facility located in Virginia, the hospice provided services to 30% of Caucasians, 20% of Asians, 19% of Hispanics, and 18% of African-Americans. When break down different services, Asian used more R.N, social work, Physician and less home health aides and chaplain than Caucasians. The total visits per patient are 20.8 for Asians, 23.1 for African-Americans, 26.8 for Hispanics, and 19.8 for Caucasians (O'mara & Arenella, 2001). Using Linked Medicare-Tumor Registry Database, older Asian Medicare beneficiaries who are dying of six different cancers especially those who are born abroad, was found to be less likely than older white patients use Medicare hospice care at the end of life (Ngo-Metzger et al., 2003).

Individual Asian American older adults subgroups

Ambulatory medical care services. Chinese subgroup. A Study based on 1808 Chinese American residents of San Francisco found that most uninsured respondents relied on Western doctors first; a larger percentage used herbalists and Chinese medicine doctors. Poverty, limited English skills, and noncitizenship status all serve as significant barriers to access and use health service (M. Jang, Lee, & Woo, 1998). Using 1994 South California Taiwanese Elderly Survey, a study documented that 16% respondents did not visit a doctor in the past year and predictors of higher doctor visits include having arthritis, having children living by, poor health status, using alternative medicine and

preferring same cultural professionals (Kuo & Torres-Gil, 2001). A study surveyed 177 Chinese elders in Boston and identified that insurance, health and social network are factors affecting physician visits (Miltiades & Wu, 2008). Using mix methods, the use of traditional and Western health services by Chinese immigrants of Houston and Los Angeles were examined and revealed high rates of self-treatment and home remedies; medium rates of utilization of integrated Western and traditional health services, including travel to country of origin for care; and low rates of exclusive utilization of Western or traditional Chinese treatments (Ma, 1999). Furthermore, qualitative content analysis revealed that Chinese elders underutilize services because of problems related to language, transportation, cost, long waits for appointments, and because of cultural norms/values related to need for care, preference for self-over professional care, fear, and distrust of western biomedicine, and the obligation to refrain from using formal services (Aroian, Wu, & Tran, 2005).

Korean subgroup. Finding from a study based on 233 Korean American elders of Los Angles showed older Koreans had more ambulatory physician visits. In addition, positive perceptions of health reduced office visits, while chronic conditions, fewer depressive symptoms, availability of health insurance, and stronger social networks were predictors of use of traditional healers(Pourat et al., 1999; Pourat, Lubben, Yu, & Wallace, 2000). In the contract, a study based on 205 Korean American elders of Baltimore found older Koreans grossly underutilized ambulatory health service and used different types of health services, including western medicine, traditional Korean medicine, and both. It also revealed that public insurance and having a regular physician were important to the utilization of physician care, whereas perceived needs were crucial

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to the utilization of oriental medicine (Kim, Han, Kim, & Duong, 2002; Shin et al., 2000).

Using a sample of 230 older Korean American in Florida, health insurance coverage was

found to be a significant enabling factor for hospital visits after controlling for

predisposing and need factors (Y. Jang, Kim, & Chiriboga, 2005).

Asian Indian subgroup. Based on data collected from 100 older Asian Indian

immigrants in New York, a study found that the number of medical conditions is

significant in predicting the likelihood of physician visits. Having medical insurance was

also a significant predictor for the use of emergency department services while poor

English proficiency was associated with the use of traditional medicine (Shibusawa &

Mui, 2008).

Multiple subgroups comparison. Data drawn from the NHIS 1992-1995, 8

specific API groups were compared in terms of annual physician visits (Frisbie et al.,

2001). It found that age-adjusted percentages of no annual physician visits among white,

Japanese, Chinese, Filipino, Korean, Asian Indian, Pacific Islander, Vietnamese, other

Asian are 22.7, 25.1, 33.8, 25.3, 36.4, 29.4, 25.2, 26.0 and 32.6. Compared to native born,

physician visits were less common among immigrants. Vietnamese and Koreans provided

a striking contrast. The odds of visiting a physician three or more were 50% higher for

Vietnamese. Conversely, Koreans were significantly less likely to visit a physician at all.

Hospital stays. Different from ambulatory medical care services which are often

driven by the decisions of the elder, hospital care normally occurs at the direction of

physicians (Damron-Rodriguez, Wallace, & Kington, 1994). English-speak ability and

education were found to be significant predictors for hospital stays in Chinese American

elders sample (Kuo & Torres-Gil, 2001). Public insurance and having a regular physician

were important to hospitalization for older Korean Americans; while age and having

medical insurance predicted the likelihood of hospital stays for older Asian Indian

immigrants (Shibusawa & Mui, 2008; Shin et al., 2000).

Preventive care services. Chinese subgroup., Insurance status was found to be a

very important factor related to preventive care services. Insured respondents received

two or three times more regular checkups, dental exams, and early detection test than the

uninsured respondents (M. Jang et al., 1998). In terms breast cancer screening among

Chinese women, mammography use was significantly associated with acculturation,

English-speak ability, insurance coverage, knowledge of mammography, and perceived

need (Tang, Solomon, & McCracken, 2000; M. Yu, Hong, & Seetoo, 2003); while

clinical breast exam and breast self-exam are associated with acculturation, modesty and

recency of physical examination (Tang et al., 2000).

Korean subgroup. For Korean women, factors positively related to mammography

use include doctor's recommendation, very likely to obtain if physician recommended,

felt comfortable request the test, had friends and relatives who had obtained, friends and

relative supportive and said worthwhile, having insurance, and speaking English (Juon,

Kim, Shankar, & Han, 2004; Maxwell, Bastani, & Warda, 1998; M. Yu et al., 2003).

Factors related to having regular Pap smears include age, knowledge of guideline,

physician recommendation, health insurance, and having friends or family receiving Pap

smears (Juon, Seung-Lee, & Klassen, 2003). In addition, higher percentage of life time

spent in the U.S. and ever having had a checkup when no symptoms were present are

associated with screening for three cancer sites – cervix, breast, and colon/rectum

(Maxwell, Bastani, & Warda, 2000).

Filipino subgroup. For Filipino women, factors positively related to mammography use include doctor's recommendation, very likely to obtain if physician recommended, felt comfortable request the test, had friends and relatives who had obtained, friends and relative supportive and said worthwhile (Maxwell, Bastani, & Warda, 1997). In addition, higher percentage of life time spent in the U.S. and ever having had a checkup when no symptoms were present are associated with screening for three cancer sites – cervix, breast, and colon/rectum (Maxwell et al., 2000).

Vietnamese subgroup. For Vietnamese women, being married, higher level of education, having a female doctor, having a respectful doctor, having requested the test, and physician recommendation were associated with Pap test receipt (Nguyen, McPhee, Nguyen, Lam, & Mock, 2002).

Home- and Community-based care services. Home- and community-based care (HCBC) services cover a wide range of services, such as senior centers, home health services, visiting nurse services, senior transportation services, and nutrition programs. Among Chinese elders, barriers to utilization of HCBC include lack of knowledge of services, language differences, lack of transportation; while living alone, and preferring services provided by same cultural background professionals, having functional limitation, and having resided longer in the U.S. increased the likelihood of utilization (Kuo & Torres-Gil, 2001; Tsai & Lopez, 1997). Moreover, Chinese American seniors are internally diversified, and service use variations are related to then characteristics that define the subgroups, to perceptions of service need, availability, accessibility and to service source preference (Y. L. Liu, 2003). Researchers has found extremely low levels

of awareness and utilization of long-term health and social services among older Korean Americans (Moon et al., 1998).

  Hospice care. Using Linked Medicare-Tumor Registry Database, older Asian Medicare beneficiaries who are dying of six different cancers as a group was found to be less likely than older white patients to use Medicare hospice care at the end of life. Futher more, all five API subgroups had lower rates of hospice use than white patients, adjusting for patient demographic and clinical characteristics. Of those who enrolled in hospice (approximately 20% of the total sample), Japanese Americans had a shorter median length of stay (21days), and Filipino Americans had a longer median length of stay (32 days) than white patients (26 days). Overall, approximately 20% of patients enrolled within 7 days of death, and only 6% had hospice stays that were longer than two months, with no significant differences across racial or ethnic groups (Ngo-Metzger et al., 2003).

CHAPTER III: CONCEPTUAL FRAMEWORK

As mentioned in chapter II, lack of theory is a prominent limitation in the literature on health service utilization among Asian American older adults. Although there are several theoretical models available for service utilization research, the use of theory among those empirical studies is very limited. Nine studies' conceptual frameworks are drawn from Andersen's behavioral model of health service utilization (N. G. Choi, 2001a; Y. Jang et al., 2005; Kuo & Torres-Gil, 2001; Miltiades & Wu, 2008; Pourat et al., 1999; Pourat et al., 2000; Ryu et al., 2002; Shibusawa & Mui, 2008; Shin et al., 2000), two studies were guided by the PRECEDE/PROCEED model that used to understand health behaviors such as adherence to treatment and preventive health behavior (Juon et al., 2004; Juon et al., 2003). Other studies are without theoretical frameworks in their research, and either selected their independent variables based on literature reviews and empirical findings or used empirical generalizations from qualitative design. The conceptual framework of this study is based on the Andersen's behavioral model of health service utilization.

Andersen's Behavioral Model of Health Service Utilization

The Behavioral Model of Health Service Utilization was initially developed in the late 1960s to understand why families use health service and to define and measure equitable access to health care (Andersen, 1968). The model's unit of analysis originally was the family and later shifted to the individual in order to take into account the potential heterogeneity of family members (Andersen, 1995).

During the last a few decades, the behavioral model has been modified by Andersen and his colleagues several times. Andersen (1995) summarized that there were

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four phases of the development of this model. Phase one is the initial behavioral model – the model of the 1960s – which suggests that people's use of health services is a function of their predisposition to use services, factors which enable or impede use, and their need for care (Andersen, 1968; Andersen & Anderson, 1967). In the 1970s, Aday and other collaborators developed phase two of the model. In this phase, the health care system was included, owing to the recognition of the importance of national health policy. Consumer satisfaction was also added in this phase as an explicit outcome of health services (Aday & Andersen, 1974; Aday, Andersen, & Fleming, 1980; Aday, Andersen, Loevy, & Kremer, 1985; Andersen, Kravits, & Anderson, 1975; Andersen & Newman, 1973; Andersen, Smedby, & Anderson, 1970; Fleming & Andersen, 1986). During the 1980s though the 1990s, a third phase of the model includes both perceived health status and evaluated health status as outcomes of health services. It also acknowledges the external environment and personal health practice as important inputs for understanding use of health service (Andersen, Davidson, & Ganz, 1994). A final phase four emerging model has gained complexity by adding feedback loops. The emphasis of this phase is the dynamic and recursive natural of a health services' use model (Evans & Stoddart, 1990; Patrick, Stein, Porta, Porter, & Ricketts, 1988).

Despite the several modifications, the basic hypothesis of the behavior model stays unchanged (Figure 1). This model posits the actual use of health care service as a function of three factors: predisposing, enabling, and need factors (Andersen, 1968).

Figure 3.1 The Initial Behavioral Model (Andersen, 1995)

PREDISPOSING → **ENABLING** → **NEED** →**USE OF**
CHARACTERISTICS **RESOURCES** **HEALTH SERVICES**
-- Demographic   -- Personal/Family   -- Perceived
-- Social Structure   -- Community   -- (Evaluated)
-- Health Beliefs
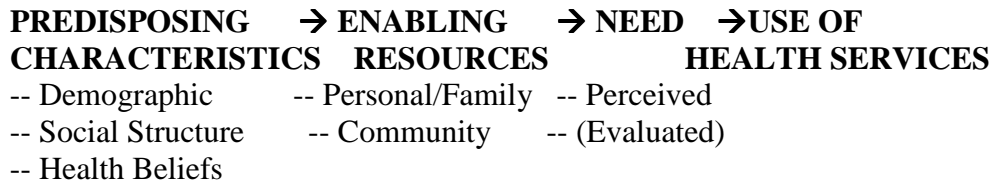
The predisposing factors include demographic characteristics (e.g. age, gender,

and marital status), social structural characteristics (e.g. education, social class, race,

ethnicity, and employment status) and health beliefs (attitudes, values and knowledge of

health and health service). Those factors act as indicators of a greater propensity toward

service use (Andersen, 1968). Predisposing factors are not directly responsible for service

use. In addition, some characteristics are closely related to the enabling factors, such as

education and occupation. However, they are classified under predisposing factors since

they precede the enabling factors in time.

The enabling factors refer to resources or means that enable individuals to obtain

service, as well as resources or means that may impede service use. These include

individual resources and community resources, such as health insurance, income, regular

sources of care, availability, accessibility and affordability of services, and residence. The

enabling factors are seem as a must for service use, even among the individuals with high

propensity to service use, Finally, the need factors have been conceptualized either as

need perceived by the individual or need evaluated by professionals, which is the most

direct and important cause of health service use. In other words, the presence of

predisposing and enabling condition is necessary, but not sufficient in service use. The

need factor is considered a more immediate and powerful predictor of service use (Andersen, 1995).

The final component, the resultant behavior focused on in the model, is use of health services. Considering the degree of choice one can make on the part of individuals, Andersen (1968) made a distinction between discretionary and non-discretionary utilization. The distinction is important because Andersen assumes that the level of discretion of service use behavior determines that contribution of each of the three factors as a predictor. Andersen indicates that the more discretionary the behavior, the more important will be the predisposing and enabling factors in explaining service use behavior. On the other hand, when there is little discretion to be exercised due to severe health conditions or in case of hospitalization, need tends to be a primary indicator of service use behavior (Andersen, 1968). He classified hospitalization as low discretionary, physician visit as medium discretionary, and dental care as high discretionary.

Implications for Asian American Older Adults

The behavioral model of health service utilization was evaluated as the most frequently used and widely applied frameworks for studying health service utilization (Aday & Andersen, 1998). From 1975 to 1995, at least 395 published articles drew from the behavioral model, including 139 studies of service use in the formal medical sector (Phillips, Morrison, Andersen, & Aday, 1998). This model is not only applied to health service use in general, but also to specific service use such as mental health service use, certain program use, and social service use (N. G. Choi, 2001a; Goodwin & Andersen, 2002). The behavioral model has been widely adopted in studies of both health and social

service use among elders (N. G. Choi, 2001a). Andersen (1995) himself agreed that only by careful integration of cultural and structural variables could the behavioral model best explain service utilization for ethnic minorities in their social contexts.

This model was applied to explain utilization behavior among minority groups. However, some researchers find that the model is not sensitive to the diverse cultural and structural barriers in health care (Moon et al., 1998; Wallace, Snyder, Walker, & Ingman, 1992; Wolinsky & Johnson, 1991). The behavior model was also checked for its applicability to health studies of Asian and Pacific Islander Americans (Andersen, Harada, Chiu, & Makinodan, 1995). Andersen and colleagues concluded that given the rapid growth of the Asian and Pacific Islander Americans population, this group is underrepresented in the published work and studies are needed to determine cultural influences on health status and outcomes of the health care system for ethnic subgroup of this population.

Several studies use this model to examine the service utilization among Asian American elderly as shown in Chapter II, including physician visits, hospital visits, home- and community-based care programs, long-term care, nutrition supplement programs, and traditional healers (N. G. Choi, 2001a; Y. Jang et al., 2005; Kuo & Torres-Gil, 2001; Miltiades & Wu, 2008; Pourat et al., 1999; Pourat et al., 2000; Ryu et al., 2002; Shibusawa & Mui, 2008; Shin et al., 2000). In order to apply in Asian American older adults, those studies modified Andersen's health service utilization model. For example, as an important predictor, immigrant status (citizenship, birth place, national origin, and the years in the U.S.) was included in most analysis and categorized as an enabling factor in Anderson model. In some studies, English-speaking ability and traditional value also

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were included as enabling variables. Furthermore, Pourat and colleagues (2000) pulled

out cultural beliefs as independent factors along with predisposing, enabling and need

factors. In their study, cultural factors include perceptions of health, immigrant status and

other cultural beliefs.

In order to take immigrant status into account, this dissertation modifies the

Andersen's behavioral model of health utilization by adding immigrant status. Instead of

defining immigrant status as enabling factors, the adapted Andersen Model in this

dissertation adds immigrant status as a factor besides predisposing, enabling, and need

factors. The predisposing factors include age, gender, education, marital status, family

size and live arrangement. The enabling factors include health insurance and poverty

status. The need factors include self-rated health and activity limitation. The immigrant-

related factors include citizenship status and nativity. The conceptual model proposed in

this dissertation is graphically represented in Figure 3.2.

Figure 3.2 The Adapted Andersen Model

Predisposing Factors
Age, gender, marital status, education, family size, live arrangement

Immigrant-related Factors
Citizenship status
Nativity

Enabling Factors
Health insurance, poverty status

Need Factors
Self-rated health
Activity limitations

Health service Utilization
Health profession visit
Hospital overnight

Ethnic groups
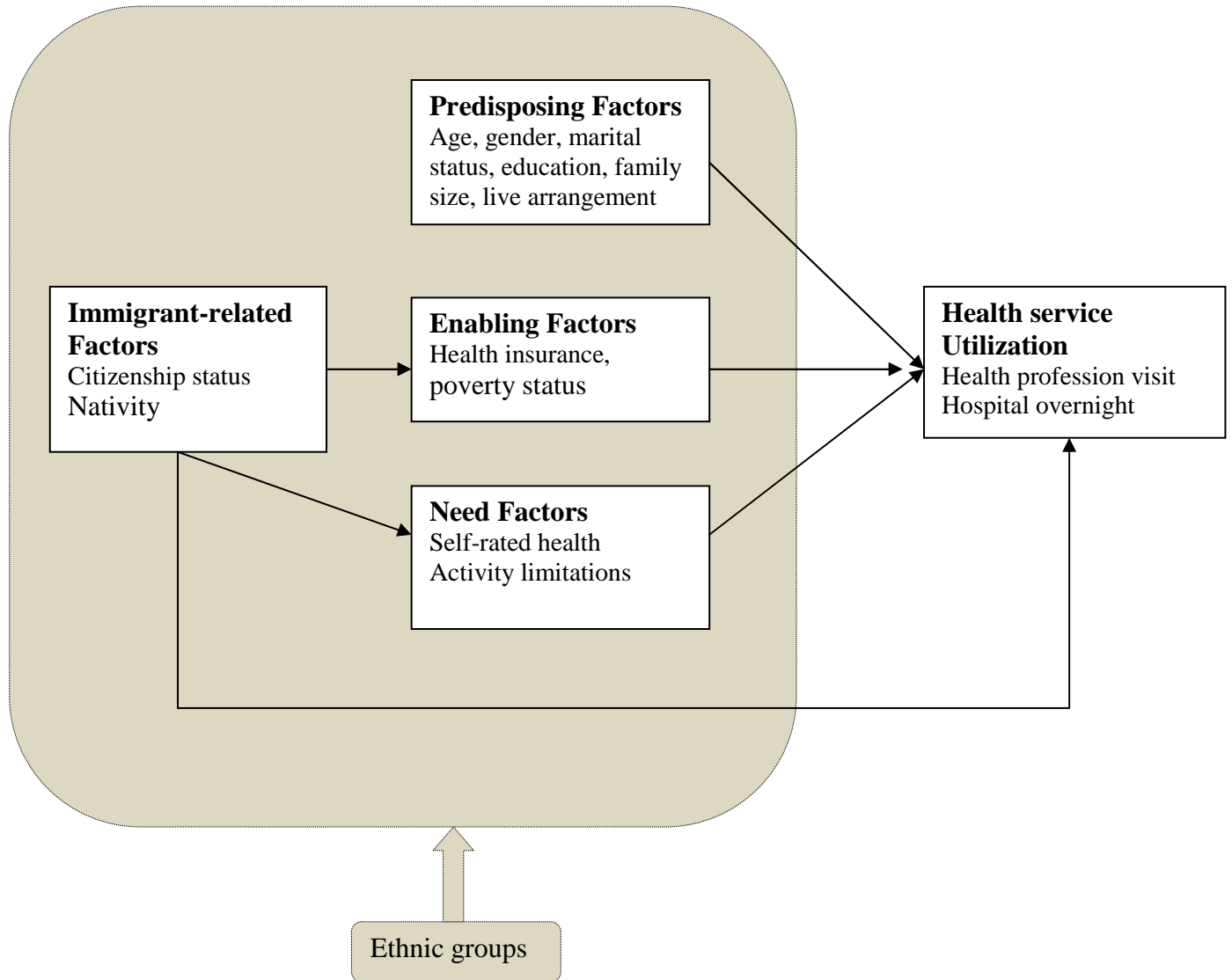
Aims, Research Questions and Hypotheses

To achieve the study's aims, the following research questions are addressed based on the theoretical model proposed.

Aim 1. To describe and compare health service needs and health insurance coverage among Chinese, Filipino, and Asian Indian older adults

Research Question 1: What are the health needs, health insurance status of Chinese, Filipino, and Asian Indian older adults (aged 65 and over)? Do they vary among these three groups?

Aim 2. To examine what predisposing factors, enabling factors, need factors, and citizenship status are associated with health service utilization

Research Question 2: What predisposing factors, enabling factors, need factors and immigrant-related factors are associated with health service utilization?

Literature has showed that factors positively related to more doctor visits include being female, not married, lower education level, having children close by, larger social network, better economic status, being citizen, longer stay in the U.S., insured, more medical conditions, and poor health status (M. Jang et al., 1998; Kuo & Torres-Gil, 2001; Miltiades & Wu, 2008; Ryu et al., 2002; Shibusawa & Mui, 2008; Shin et al., 2000). Factors positively related to more hospital stays include being older, lower education level, having insurance, and better English-speak ability (Kuo & Torres-Gil, 2001; Shibusawa & Mui, 2008; Shin et al., 2000). The following hypothesis is based on the proposed conceptual model and will test the factors associated with health service utilization.

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Hypothesis A: In regard to predisposing factors, being older, female, lower educated, and not married, and bigger family size are associated with higher likelihood of health service utilization.

Hypothesis B: In regard to enabling factors, having health insurance and not poor are associated with higher likelihood of health service utilization.

Hypothesis C: In regard to need factors, lower self-reported health and more activities limitations are associated with higher likelihood of health service utilization.

Hypothesis D: In regard to immigrant-related factors, being U.S. citizen and U.S. born are associated with higher likelihood of health service utilization. (Direct effect)

Hypothesis E: Enabling factors and need factors each mediate the relationship between immigrant-related factors and health service utilization.

Aim 3. To test whether the relation between these factors and health service utilization vary by ethnic group

Research Question 3: Does the relation between these predisposing factors, enabling factors, need factors, and immigrant-related factors and health service utilization vary by ethnic groups?

Limited multiple Asian American subgroup comparison study shows that variables predicting health services utilization are different for different subgroups (Frisbie et al., 2001). No hypotheses are stipulated since this is an exploratory question intended to describe the different patterns of health service utilization among three groups of Asian American elders: Chinese, Filipino, and Asian Indian.

CHAPTER IV: METHODS

Data

As illustrated earlier, nationally-based data for Asian American older adults is sparse, and when data on Asian American is collected, it is often not broken down for subethnic groups. Therefore, most existing studies were based on small samples of one or a few ethnic groups in geographically limited areas. Sometime researchers have to aggregate data and analyze the Asian population as a whole because of a lack of sample size large enough to enable intraethnic distinction to be made in multivariate analyses.

This dissertation uses the National Health Interview Survey (NHIS), which has been conducted annually since 1957 by the National Center for Health Statistics. The main objective of the NHIS is to monitor the health of the United States population through the collection and analysis of data on a broad range of health topic. The NHIS is a large-scale household interview survey of a statistically representative sample of the civilian, noninstitutionalized population of the United States. Interviewers visit 35,000-40,000 households across the country and collect data about 75,000-100,000 individuals. Even though the NHIS is household survey, the data are also available on the individual level, including the dimensions of health status and limitation of activity, health care access and utilization, health insurance, and other socio-demographic variables. In addition, the survey assesses respondents' immigration status, length of residence, and place of origin, which are important variables to this study.

The sampling plan follows a complex, multistage sample design that involves stratification, clustering, and oversampling of specific population subgroups (NHIS,

2008a, 2008b). The sampling plan is redesigned after every decennial census. The most current sampling plan was implemented in 2006, and it has many similarities to the previous sampling plan (1995-2005). In addition to the continued oversampling of black and Hispanic persons carried out in the NHIS according to the 1995-2005 sample design, persons of Asian descent are also oversampled according to the new sample design (Cohen & Martinez, 2007). The first stage of current sampling plan consists of a sample of 428 primary sampling units (PSU's) drawn from approximately 1,900 geographically defined PSU's that cover the 50 states and the District of Columbia. A PSU consists of a county, a small group of contiguous counties, or a metropolitan statistical area. Within a PSU, two types of second-stage units are used: area segments and permit segments (NHIS). NHIS provide final weights for analytic purposes to yield valid estimates for the civilian, noninstitutionalized population of the United States (NHIS, 2008a, 2008b).

Study Sample

The feasibility of studying the health status, health insurance, and health service utilization of specific Asian groups has been enhanced materially, because data generated by the NHIS from 1992 onward became public available for research. Beginning in 1992, the NHIS added Asian ethnic group detail to the 'race' item for Japanese, Chinese, Filipino, Asian Indian, Korean and Vietnamese. These six groups together comprise about 90% of the Asian American population. Then in 1996, the categories for the four smaller groups, Japanese, Asian Indian, Korean and Vietnamese, were combined into the 'other Asian and Pacific Islander' group for data release. From 1997, the categories for the three bigger groups, Chinese, Filipino, Asian Indian were reported and other three

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smaller groups were combined into the 'other Asian and Pacific Islander' group. Starting

from 1998, the NHIS collected information on U.S. citizenship status.

This dissertation pooled nine years of data (1998-2006) to yield sufficient

statistical power to explore the health status, health insurance, and health service

utilization among specific Asian American subgroups. The total sample size is 851,581.

The subpopulation used for this dissertation includes persons aged 65 and older who self-

identified as Chinese, Filipino, and Asian Indian. The total subpopulation size for this

dissertation is 1412, with 618 Chinese, 581 Filipino, and 213 Asian Indian. The

subpopulation size of three Asian ethnic groups' older adults by year in this dissertation

is represented in Table 4.1.

Table 4.1 Subpopulation Size of Three Asian Ethnic Groups of Older Adults (age 65 and above) by Year

	Chinese	Filipino	Asian Indian	
1998	52	63	14	129
1999	60	60	16	136
2000	65	50	24	139
2001	68	49	19	136
2002	58	46	25	129
2003	68	62	29	159
2004	54	54	22	130
2005	78	75	29	179
2006	118	122	35	275
TOTAL	618	581	213	**1412**

Although the domain of interest (subpopulation) of this dissertation is older adults

(65 and older) from three Asian ethnic groups (Chinese, Filipino, and Asian Indian), full

data file from 1998-2006 are used for this dissertation. The reason to use the unsubsetted

data is because the sample design of NHIS. When complex survey data such as NHIS are

subsetted, the sample design structure is compromised because the complete design

information is not available; subsetting data deletes important design information needed for variance estimation (NHIS, 2008a, 2008b).

Measures

Dependent Variables

  Health Service Utilization. There are three questions in NHIS related to health service utilization: (1) see to a doctor or other health care professional at a doctor's office, a clinic, an emergency room, or some other place, during the past two weeks; (2) hospital overnight stay during the past 12 months; (3) receive care at home from a nurse or other health care professional during the past two weeks.

  Only the first two measures are included in this dissertation because the highly skewness of receiving home visit towards no. In NHIS, doctor or other health care professional visit was regarded as a relatively trivial life event compared to hospitalization. Hence immediate past – two weeks had been used as a reference period for physician visit, while hospitalization is assumed to be more landmark event, and longer observational period – 12 months has been use. Both measures were dichotomous variables coded as yes or no.

Independent Variables

  Independent variables are selected based on the conceptual framework proposed. The variables used in this dissertation are listed in Table 2 with brief descriptions.

  Predisposing factors. The predisposing factors include age, gender, marital status, education, family size, and living arrangement. In addition to use actual age, age is also

broken down to three categories: young-old (65-74), middle-old (75-84), and old-old (85 years and older). Marital status is coded as married and not married (widowed, divorced, separated, and never married). Education level is measured by the year of education attainments and is regrouping to a three level variable: less than high school, high school graduate, and more than high school. Family size indicates the number of persons in family. Living arrangement is categorized into two groups: these who live alone and these who live with others.

Enabling factors. The enabling factors include poverty status and health insurance. Poverty status is a variable created from the ratio of the family's income to the corresponding poverty threshold. Family income less than 100 percent of the poverty threshold was coded as "poor"; between 100 percent and 199 percent of the poverty threshold was coded as "near poor"; and 200 percent and more of the poverty threshold was coded as "not poor."The NHIS has a full range of data items addressing health insurance. This dissertation coded the health insurance data in two ways. First, a dichotomous variable was created to code respondents' general health insurance coverage as insured or uninsured. Second, detailed information on respondents' health insurance coverage is created by different types of health insurance: private, Medicare, Medicaid, and other types of insurance.

Need factors. The need factors include self-reported health status and activity limitations. Self-reported health status was based on a standard NHIS question that asks the respondent to rate his or her health as excellent, very good, good, fair, or poor. The measure of activities limitation in this dissertation was an overall measure of activity limitation defined by the NHIS. The respondent was asked whether he or she had any

activity limitations due to difficulty with memory; difficulty walking without the use of special equipment; being unable to work, or being limited in the amount of work that can be accomplished, because of a physical, mental, or emotional problem; and difficulty handling the routine needs/activities of daily living. The summary variable based on affirmative responses was dichotomized as limited and not limited.

Immigrant-related factor. The immigrant-related factors include citizenship status and nativity. Both citizenship status and nativity were dichotomous variables (citizenship: yes/no; native-born: yes/no). For people who are not native-born, a further question was asked to measure the length of stay in the U.S. – number of years spent in the U.S. – with five categories: (1) less than one year; (2) one year, less than five years; (3) 5 years, less than 10 years; (4) 10 years, less than 15 years; and (5) 15 years or more.

Table 4.2 Description of Variables Used in Dissertation

Variables	Description
Dependent Variables	
Doctor visit	Past two weeks: yes, no
Hospital overnight stay	Past 12 months: yes, no
Independent Variables	
Predisposing Factors	
Age	1)65-74, 2)75-84, 3)85+
Gender	Male, female
Marital status	Married, not married
Education	1)less than high school, 2)high school graduate, 3)more than high school
Family size	Number of persons in family
Living arrangement	Live alone, live with others
Enabling Factors	
Poverty status	1)Poor, 2)near poor, 3)not poor
Health insurance	Insured, uninsured
Need Factors	
Self-reported health	1) excellent, 2)very good, 3)good,4) fair, 5) poor
Activity limitations	Any activity limitation: yes, no
Immigrant-related Factors	
Citizenship status	citizenship: yes/no
Nativity	native-born: yes/no

Missing Data Analysis

Extent of Missing Data

Most of variables used in this dissertation have missing data, and the number and

percentage of missing cases by ethnic groups are presented in Table 3. For all the

respondents including in the dataset, the variable with the most missing cases are poverty

status (29.1%). When breaking down into ethnic groups, Asian older adults have much

higher missing cases in education and immigration-related variables – citizenship and

length of stay. For education, the percentage of massing cases among the whole sample is

3.2%, however the percentages for Chinese, Filipino, and Asian Indian older adults are

11.5%, 7.7%, and 12.2% respectively. In terms of immigration-related variables, 6.6%

and 12.6% of Chinese older adults, 3.3% and 8.6% of Filipino older adults, and 6.1% and

10.8% of Asian Indian older adults are missing information on citizenship and length of

stay in U.S. respectively, comparing to only 1.1% and 1.7% of the whole sample

respectively.

Table 4.3 Number and Percentage of Missing Cases by Ethnic Groups

Variables	All N=851581	Chinese older adults n=618	Filipino older adults n=581	Asian Indian older adults n=213
Doctor visit	6518(0.8%)	11(1.8%)	7(1.2%)	5(2.3%)
Hospital stays	5991(0.7%)	14(2.3%)	7(1.2%)	4(1.9%)
Age	0	0	0	0
Gender	0	0	0	0
Marital status	7255(0.9%)	8(1.3%)	8(1.4%)	1(0.5%)
Education	27486(3.2%)	71(11.5%)	45(7.7%)	26(12.2%)
Family size	0	0	0	0
Living alone	0	0	0	0
Poverty status	247474(29.1%)	222(35.9%)	214(36.8%)	81(38%)
Insurance	8950(1.1%)	10(1.6%)	10(1.7%)	3(1.4%)
Health status	3648(0.4%)	6(1.0%)	5(0.9%)	5(2.3%)
Limitations	3405(0.04%)	2(0.3%)	3(0.5%)	2(0.9%)
Citizenship	9341(1.1%)	41(6.6%)	19(3.3%)	13(6.1%)
Nativity	4795(0.6%)	11(1.8%)	6(1.0%)	5(2.3%)
Length of stay	14405(1.7%)	78(12.6%)	50(8.6%)	23(10.8%)

In terms of the pattern of missing cases by ethnic groups, results shown that the

percentage of respondents who have completed information on all variables included in

the study is 69.4% for the whole sample, while the percentages for Chinese, Filipino, and

Asian Indian older adults are 56.6%, 57.5%, and 55.4% respectively.

Due to the sensitivity natural of immigration-related variables, further missing

data analyses are conducted to compare the characteristics between respondents who

answered these variables and who did not. The results of the missing data analyses in the

whole sample indicate that respondents who did not answer the immigration-related information were older, more likely to be married, less educated, poorer, healthier, less likely to use health services, and more likely to be Asians. These different were statistically significant (results not show).

Multiple Imputation

In order to avoid the inaccurate parameter estimates, biased standard errors and population means caused by missing data, multiple imputation was conducted using the STATA ICE procedure for incomplete data for all respondents (Royston, 2005). Many different approaches have been used to impute missing data, and multiple imputation is viewed as one of the most attractive methods for general-purpose handling of missing data in multivariate analysis (Allison, 2000). In multiple imputation, each missing value is replaced by a set of (m>1) plausible value drawn from their predictive distribution, and the variation among the m imputations reflects the uncertainty with which the missing values can be predicted from the observed ones. Unlike the other imputation methods, multiple imputation generate multiple (m) completed datasets, the estimates and standard errors are combined to produce overall estimates and standard errors that reflect missing-data uncertainty (Schafer & Olsen, 1998). Multiple imputation is attractive because it can be highly efficient even for small values of m, and often just three to five imputation are sufficient for adequate estimation (Parker & Schenker, 2007; Schafer & Olsen, 1998).

Following the rules provided by Rubin (1996), the multiple imputation process of this study includes all the variables to be used in the analyses, a number of additional variables that may highly related to these variables, and strata and cluster variables that

are related to the sample design structure. Five "complete" datasets are generated for the study. Each of these five simulated compete datasets are analyzed through MIM in STATA, which is a prefix command for working with multiply imputed datasets. Results are combined or "rolled up" to generate less biased estimates of parametric statistics using Rubin's rules. An average estimate is calculated based on the beta coefficients of five datasets; standard errors for each beta and the variability between the estimates are also averaged across the datasets (Rubin, 1987).

However, the range of bivariate analyses that can be conducted using MIM in STATA is limited. Further analyses also showed that there was no difference between average parameter to roll up all five imputed datasets and parameters of single imputed data. Therefore, first imputed data was selected to conducting descriptive and bivariate statistics.

Data Analysis

Data Analysis for Aim 1

First, descriptive statistics of sociodemographic variable are produced for Chinese, Filipino, and Asian Indian older adults. Next, to answer the first research question, descriptive statistics are used to describe the health needs, health insurance status, and health service utilization among Chinese, Filipino, and Asian Indian older adults. Frequencies and percentages will be reported, and χ^2 statistics will be used to test for differences in health characteristics, health insurance status, and health service utilization among three ethnic groups of older adults: Chinese, Filipino, and Asian Indian. All descriptive statistical analyses were conducted using the STATA software Version 10

"svy" (survey) commands (Stata Corp, College Station, Tex) that account for the complex survey design of the NHIS. The final weight for the pooled multiyear data was calculated as the mean of the nine years' weights.

Data Analysis for Aim 2 & 3

To examine the factors related to health service utilization and the moderate effect of ethnicity based on the proposed conceptual framework, path analysis is conducted by using Mplus software. Path analysis is the original structural equation modeling (SEM) technique for analyzing structural models with observed variables (Kline, 2005). Path analysis is an extension of the regression model, used to test the fit of the correlation matrix against two or more causal models which are being compared by the researcher (Garson, 2006, 2008). Path analysis allows the simultaneous modeling of several related regression relationships, and a variable can be a dependent variable in one relationship and an independent variable in another (Muthén & Muthén, 1998-2007). The regression weights predicted by the model are compared with the observed correlation matrix for the variables, and a goodness-of-fit statistic is calculated. The best-fitting of two or more models is selected by the researcher as the best model for advancement of theory (Garson, 2006, 2008).

There are a few different SEM computer programs available for personal computers, such as LISREL, Amos, Mplus, and et al. The reason to choose Mplus 5.0 for this study is because its capability of analyzing complex survey data by adjustments for sample weights and design effects, along with its special features of analyzing multiple imputation data sets. In addition, robust estimation of test statistics and standard errors

for nonnormal data is available in Mplus, therefore it is able to conduct path analysis

where the dependent variable is dichotomous. However, during the process of model

building and analyzing, it was discovered that although Mplus has the capacity to handle

multiple imputed datasets, chi-square statistics cannot be computed on combined datasets.

Furthermore, the analysis shows that chi-square statistics cannot be trusted after adjusting

for design effects because a lot of strata contain no subpopulation members. Since the

domain of interest is a small fraction of the total sample, the cluster sizes are small, which

means there is not much effect of the clustering. After analyzing the distribution of

weight variable and consulting with statistician, only the domain of interest

(subpopulation) of this dissertation – older adults (65 and older) from three Asian ethnic

groups (Chinese, Filipino, and Asian Indian) – was used for the path analysis (N=1412).

In order to represent the whole United State population, sampling weight was accounted

for by including a WEIGHT IS statement in the Data command in Mplus.

In this dissertation, path analysis involved the following three steps: initial model

fitting, model trimming and multiple group analyses across ethnic groups. Weighted least

squares mean variance (WLSMV) was used to estimate the parameters because the type

of analysis was general and at least one dependent variable was binary. First, two path

models were built based on proposed theoretical model and bivariate relationships to

explore the factors related to doctor visits and hospital stays.

Second, the models were trimmed by removing non-significant paths from the

model one by one with the smallest t value first (Schumacker & Lomax,

2004).Throughout the model trimming process, the chi-square goodness of fit statistic

was monitored during each model refitting. Since the chi-square value for WLSMV

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cannot be used for chi-square difference tests, chi-square difference test (DIFFTEST) was calculated to indicate if the newer model was significantly better or worse fitted the data. The model trimming process was completed when chi-square became significant, or newer model was significantly worse fitted the data, or every remaining path had a statistically significant t-value.

After the final path models were built, the third step was multiple group analyses of final path models across ethnic groups. Multiple group analyses (GROUPING) of path coefficients were conducted across three ethnic groups to test if the final path models fitted three ethnic subsamples.

Testing the fit of the model, establishing whether the model is consistent with the data, is the most important part of path analysis (Mertler & Vannatta, 2005). There are multiple indices of fit that can be used, and there is little consensus on the best tests of model fit. Two main model indices were used for assessing the model fit in this study: the chi-square and the root mean square error of approximation (RMSEA).

The chi-square is the most common used model fit criterion, with a non-significant value indicates that the sample covariance matrix and the model-implied covariance matrix are similar (Schumacker & Lomax, 2004). A significant chi-square means the hypothesized relationships represented by the model are statistically unlikely event given the data, and therefore the model should be rejected (Byrne, 2001). The RMSEA is another highly informative global fit measure (Byrne, 2001), and it represent the degree of misfit per degree of freedom (Keith, 2006). In general, RMSEA less than or equal to 0.05 is indicative of good model fit (Browne & Cudeck, 1993; Byrne, 2001). Along with chi-square, RMSEA informs how well the path model is specified.

Both unstandardized (b) and standardized (β) path coefficients are reported for each path in the model. However standardized path coefficients are preferable because the same unit of measurement is used for all variables therefore can be compared across variables (Pedhazur, 1997). The strength of the path is measured by the value of β, with near zero (<0.05) is considered little to no substantive effect and an increase in value equated to increased importance in the variable relationship (Hair, Anderson, Tatham, & Black, 1998; Keith, 2006).

Research Question 1: What are the health needs, health insurance status of Chinese, Filipino, and Asian Indian older adults (aged 65 and over)? Do they vary among these three groups?

Sample Description and Group Comparisons of Independent Variables

Sociodemographic characteristics comparison by ethnic groups

Table 5.1 describes sociodemographic characteristics of Asian American older adults by ethnic groups. There was a difference of region of residence among Asian American older adults by ethnic groups (F (6,285) =17.84, p<0.001). Asian Indian older adults were more geographically dispersed than Chinese and Filipino older adults. Majority of Chinese (60.4%) and Filipino (73.35%) older adults lived in the West of the U.S., while Asian Indian older adults scattered across the whole country.

There were differences of age (F (2,289) =10.60, p<0.001) and gender (F (2,289) =19.95, P<0.001) among Asian American older adults by ethnic groups. Among three groups of Asian American older adults, Chinese had the highest mean age (73.67 years), while Asian Indians were the youngest (71.22 years). Asian Indian older adults were significantly younger than Chinese (t=-4.61, p<0.001) and Filipino (t=-2.98, p=0.003) older adults; while there was no significantly difference in age between Chinese and Filipino older adults (t=1.90, p=0.059). Both Chinese and Filipino older adults had more female than male, while Asian Indian older adults had more male (60.53%) than female (39.47%). In terms of gender distribution, Asian Indians were significantly different from

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Chinese (t=-4.55, p<0.001) and Filipino (t=6.2, p<0.001), while the difference between Chinese and Filipino was not statistically significant at 0.05 level (t=-1.84, p=0.067).

There were differences of marital status (F (2,289) =5.47, p=0.0046), living arrangement (F (2,289) =3.07, p=0.0481) and family size (F (2,289) =9.28, p<0.0011) among Asian American older adults by ethnic groups. Majority of Asian American older adults were married, and Filipino had the highest percentage of older adults were not married (41.22%). Comparing to Filipino older adults, Chinese (t=2.59, p=0.10) and Asian Indian (t=2.64, p=0.009) were more likely to be married, while there was no significant difference between Chinese and Asian Indian (t=0.23, p=0.821). Filipino had the highest percentage of older adults who lived alone (17.17%), while Asian Indian had lowest percentage of older adults who lived alone (9.06%). With regards to living arrangement, there was no statistically significant difference between Chinese and Filipino older adults, whereas Asian Indian older adults were less likely living alone than both Chinese (t=-2.06, p=0.04) and Filipino (t=-2.4, p=0.017) older adults. Chinese older adults had the smallest average family size (2.74), while Asian Indian had the biggest average family size (3.51). With regards to average family size, there was no statistically significant difference between Filipino and Asian Indian older adults, whereas Chinese older adults significantly had smaller family size (t=-3.06, p=0.002; t=-3.85, p<0.001) than both Filipino and Asian Indian older adults.

There was a difference of education (F (2,289) =7.63, P<0.0016) among Asian American older adults by ethnic groups. In regards to education level, Filipino had the lowest percentage of older adults who reported less than high school education (24.57%); more than half of Filipino (52.39%) and Asian Indian (53.68%) older adults who reported

more than high school education. Both Filipino and Asian Indian older adults had significantly higher education lever than Chinese (t=3.67, p<0.001; t=2.22, p=0.027), while the difference between Filipino and Asian Indian older adults were not statistically significant.

There was a difference of poverty status (F (2,289) =3.71, P=0.0257) among Asian American older adults by ethnic groups.   Chinese had the highest percentage of older adults who were poor (14.29%) or near poor (29.24%), and Asian Indian had the highest percentage of older adults who were not poor (71.28%). Asian Indian older adults were significantly less likely to be under poverty line than Chinese, but Filipino was not significantly different from both Asian Indian and Chinese.

There was a difference of citizenship status (F (2,289) =13.32, p<0.001) among Asian American older adults by ethnic groups. In terms of citizenship status, Asian Indian had the highest percentage of non-citizens older adults (35.29%), followed by Chinese (25.87%) and Filipino (16.55%). Filipino had significantly lower percentage of non-citizens comparing to both Chinese (t=-3.15, p=0.002) and Asian Indian (t=-5.05, p<0.001). Asian Indian had significantly higher percentage of non-citizens comparing to Chinese (t=2.19, p=0.029).

In terms of nativity status, there was a difference of citizenship status (F (2,289) =5.73, p=0.0036) among Asian American older adults by ethnic groups. Asian Indian had the highest percentage of foreign born older adults (92.87%), followed by Chinese (79.9%) and Filipino (79.57%). Asian Indian had significantly lower percentage of native born old adults comparing to both Chinese (t=-3.12, p=0.002) and Filipino (t=-3.31, p=0.001). Asian Indian had significantly higher percentage of non-citizens comparing to

Chinese (t=2.19, p=0.029), while the difference between Chinese and Filipino older adults were not statistically significant. Among the foreign born older adults, there was no statistically significance difference in length of stay in the U.S. by ethnic groups (F (2,263) =0.66, p=0.5164).

In summary, regarding sociodemographic characteristics, there were differences among Asian American older adults by ethnic groups. Asian Indian older adults were unique from Chinese and Filipino with younger age, higher percentage of male, less likely to live alone, bigger family size, higher education level, less likely to be poor, more likely to be non-citizens, and more likely to be foreign born. These results are consistent with the different immigration pattern of Asian Indian. Compared to Chinese and Filipino, Asian Indian had much shorter history in the United States. Asian Indian older adults were more likely to be born outside of the US, less likely to have citizenship, with higher education level and in better economic situation.

Health insurance status comparison by ethnic groups

Table 5.2 shows health insurance of Asian American older adults by ethnic groups. There were differences of health insurance coverage in general (F (2,289) =9.95, p=0.001) and Medicare coverage (F (2,289) =6.91, p=0.0012), but not Medicaid (F (2,289) =0.12, p=0.8853) and private health insurance coverage (F (2,289) =1.84, p=0.1601) among Asian American older adults by ethnic groups.

In terms of health insurance coverage in general, Filipino had the highest rate of insured older adults (96.16%), followed by Chinese (95.51%) and Asian Indian (87.44%). Asian Indian older adults were significantly less likely to be insured as compared to both Chinese (t=-3.58, p<0.001) and Filipino (t=-3.83, p<0.001) older adults, however there

was no statistically significant difference in rates of insured between Chinese and Filipino older adults (t=0.45, p=0.65).

When breaking down into different types of health insurance coverage, different ethnic groups of older Asian Americans presented different patterns. Filipino had the highest percentage of older adults who were covered by Medicare (76.03%) while Asian Indian had the lowest percentage (61.23%). Asian Indian older adults were significantly less likely to have Medicare as compared to both Chinese (t=-3.44, p=0.001) and Filipino (t=-3.23, p=0.001) older adults, whereas there was no statistically significant difference between Chinese and Filipino older adults (t=0.10, p=0.92). However, with respect to Medicaid and private health insurance, no statistically significant differences were found among these three Asian American older adults.

In summary, with regards to health insurance coverage, Asian Indian older adults were significantly less likely to have health insurance coverage in general and Medicare coverage. Since health insurance coverage in general and Medicare were strongly influenced by the previous working experience, these results could also be explained by the short immigration history of Asian Indian in the United States.

Health needs status comparison by ethnic groups

Table 5.3 presents self-rated health status and activity limitation of Asian American older adults by ethnic groups. There was a difference of health status (F (2,289) =3.98, P=0.0198) among Asian American older adults by ethnic groups, but not activity limitation (F (2,289) =1.66, p=0.1926).

About three quarters of older Asian Americans were in good health and without any activity limitation. In terms of self-rated health status, both Filipino and Asian Indian

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were healthier than Chinese older adults (t=-2.36, p=0.017; t=2.13, p=0.034), while older Filipinos did not significantly differ from Asian Indians (t=0.31, p=0.758). As for activity limitation status, no statistically significant differences were found among these three ethnic groups of Asian American older adults.

In summary, Chinese older adults had significantly lower self-rated health than Filipino and Asian Indian older adults. Since Chinese had the longest immigration history in the United States, these results provided possible evidence to support the healthy immigrant effect – immigrants are generally healthier than native-born persons—but that this effect tends to diminish over time.

Group Comparisons of Dependent Variables

Table 5.4 reports health care utilization characteristics among three ethnic groups of Asian American older adults. There were no statistically significant differences in doctor visits ($F_{(2,289)}$ =0.35, P=0.7071) and hospital stays ($F_{(2,289)}$ =0.72, p=0.4868) among three ethnic groups of Asian American older adults. During the past two weeks, 22.5% of Chinese American, 22.13% of Filipino, and 19.66% Asian Indian older adults visited a doctor or other health care professional. During the past 12 months, the percentages of hospital overnight stays are 11.68%, 9.63%, and 9.90% for Chinese, Filipino, and Asian Indian respectively. In summary, in terms of health care utilization, there were no significant differences among three ethnic groups of Asian American older adults.

Summary of results related to Research Question 1

Majority (three quarters) of older Asian Americans were in good health and without any activity limitation. Health status varied among these three groups with Chinese group had the lowest self-reported health rating. However, activity limitation status did not vary among these three groups of Asian older adults.

All three groups of Asian older adults had quite high health insurance coverage in general, only less than 5% of Chinese, less than 4% of Filipino, and around 13% of Asian Indian older adults did not have any health insurance coverage. Majority of Asian older adults have Medicare coverage (Chinese: 75.7%; Filipino: 76.04%; Asian Indian: 61.23%), while much lower coverage of Medicaid (Chinese: 23.38%; Filipino: 22.44%; Asian Indian: 21.18%) and private insurance (Chinese: 41.06%; Filipino: 33.5%; Asian Indian: 39.69%). Health insurance in general and Medicare coverage varied among these three groups with Asian Indian had the lowest coverage. However, Medicaid and private health insurance coverage did not vary among these three groups of Asian older adults.

Table 5.1 Sociodemographic Characteristics of Asian American Older Adults (United States, 1998-2006)

	Chinese % (95% CI)	Filipino % (95% CI)	Asian Indian % (95% CI)	All % (95% CI)	Test
Categorical variables					
Region[1]					
Northeast	24.91(19.08-31.84)	8.33(5.49-12.46)	27.91(21.44-35.46)	18.65(15.43-22.37)	F(6,285)=17.84
Middle west	7.39(4.45-12.02)	9.64(6.61-13.86)	16.25(11.06-23.22)	9.69(7.68-12.16)	p=0.0000
South	7.29(4.76-11.02)	8.67(5.96-12.45)	33.45(26.14-41.67)	11.95(9.65-14.7)	
West	60.4(52.23-68.03)	73.35(66.94-78.91)	22.39(16.08-30.27)	59.71(54.73-64.5)	
Gender					
Male	45.47(42.2-48.78)	40.19(36.43-44.07)	60.53(55.31-65.52)	45.68(43.65-47.73)	F(2,289)=19.95
Female	54.53(51.22-57.8)	59.81(55.93-63.57)	39.47(34.48-44.69)	54.32(52.27-56.35)	p=0.0000
Marital Status					
Married	68.9(63.7-73.67)	58.78(53.92-63.48)	69.96(62.8-76.26)	64.96(62.12-67.69)	F(2,289)=5.47
Not Married	31.1(26.33-36.3)	41.22(36.52-46.08)	30.04(23.74-37.2)	35.04(32.31-37.88)	p=0.0046
Education					
< High School	37.58(32.04-43.47)	24.57(20.32-29.73)	29.52(23.21-36.73)	31.04(27.54-34.77)	F(2,289)=7.63
High School graduate	20.95(17.44-24.96)	23.05(19.13-27.49)	16.80(12.1-22.85)	21.15(18.65-23.9)	p=0.0006
> High School	41.47(36.59-46.52)	52.39(45.73-58.96)	53.68(45.65-61.52)	47.81(43.85-51.8)	
Live Arrangement					
Live alone	16.29(12.04-21.66)	17.17(12.83-22.59)	9.06(5.73-14.04)	15.51(12.86-18.59)	F(2,289)=3.07
Live with others	83.71(78.34-87.96)	82.83(77.41-87.17)	90.94(85.96-94.27)	84.49(81.41-87.14)	p=0.0481

[1] Northeast: New England Division (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut) and Middle Atlantic Division (New York, New Jersey, and Pennsylvania)

North Central/Midwest: East North Central Division (Michigan, Ohio, Indiana, Illinois, Wisconsin) and West North Central Division (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, and Nebraska)

South: South Atlantic Division (Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida), East South Central Division (Kentucky, Tennessee, Mississippi, and Alabama), and West South Central Division (Texas, Arkansas, Oklahoma, and Louisiana)

West: Pacific Division (Washington, Alaska, Oregon, California, and Hawaii) and Mountain Division (Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada).

Poverty Status					
Poor	14.29(10.69-18.85)	13.02(10.12-16.59)	10.82(6.3-17.97)	13.23(10.98-15.87)	F(2,289)=3.71
Near poor	29.24(25.11-33.75)	24.56(19.37-30.61)	17.9(13.33-23.61)	25.57(22.37-29.05)	p=0.0257
Not poor	56.47(50.57-62.19)	62.42(55.14-69.19)	71.28(64.07-77.55)	61.2(56.95-65.29)	
Citizenship					
US Citizen	74.13(68.7-78.91)	83.45(79.62-86.67)	64.71(57.36-71.43)	76.44(73.15-79.44)	F(2,289)=13.32
Non-US citizen	25.87(21.1-31.28)	16.55(13.34-20.37)	35.29(28.59-42.63)	23.56(20.56-26.84)	p=0.0000
Nativity					
US born	20.1(14.95-26.47)	20.43(16.12-25.54)	7.13(3.89-12.72)	18.21(15.16-21.7)	F(2,289)=5.73
Foreign born	79.9(73.53-85.05)	79.57(74.46-83.88)	92.87(87.28-96.11)	81.79(78.3-84.84)	p=0.0036
Years in US (foreign born only)					
<1 year	0.82(0.29-2.28)	0.76(0.24-2.41)	1.75(0.42-7.03)	0.96(0.48-1.92)	F(2,263)=0.66
1 year to <5 years	4.97(2.92-8.34)	4.67(3.03-7.15)	5.81(2.83-11.53)	5.00(3.73-6.67)	p=0.5164
5 years to <10 years	9.22(6.14-13.62)	9.78(6.78-13.92)	9.06(5.63-14.27)	9.41(7.47-11.79)	
10 years to <15 years	13.61(10.44-17.56)	13.33(10.03-17.5)	17.1(11.7-24.3)	14.12(11.89-16.69)	
>= 15 years	71.38(65.72-76.45)	71.45(65.87-76.44)	66.28(58.37-73.38)	70.5(67.3-73.52)	
Numeric variables	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	
Age, y	73.67(73.07-74.27)	72.84(72.15-73.53)	71.22(70.46-71.99)	72.95(72.53-73.37)	F(2,289)=10.60 p=0.0000
Family size	2.74(2.54-2.93)	3.22(2.95-3.50)	3.51(3.18-3.84)	3.06(2.89-3.22)	F(2,289)=9.28 p=0.0001
Education, y	11.44(10.91-11.98)	12.57(12.19-12.96)	12.34(11.67-13.00)	12.04(11.73-12.36)	F(2,289)=7.90 p=0.0005
Poverty ratio	5.92(5.55-6.30)	6.15(5.75-6.54)	6.77(6.23-7.32)	6.15(5.90-6.39)	F(2,289)=3.04 p=0.0492

Table 5.2 Health Insurance of Asian American Older Adults (United States, 1998-2006)

	Chinese % (95% CI)	Filipino % (95% CI)	Asian Indian % (95% CI)	All % (95% CI)	Test
Health insurance coverage					
Covered	95.51(92.97-97.16)	96.16(93.74-97.67)	87.44(82.1-91.35)	94.51(92.86-95.8)	F(2,289)=9.95
Not Covered	4.49(2.84-7.03)	3.84(2.33-6.26)	12.56(8.65-17.9)	5.49(4.2-7.14)	p=0.001
Medicare status					
Covered	75.7(70.8-80.01)	76.03(70.85-80.54)	61.23(53.31-68.59)	73.57(70.04-76.82)	F(2,289)=6.91
Not covered	24.3(19.99-29.2)	23.97(19.46-29.15)	38.77(31.41-46.69)	26.43(23.18-29.96)	p=0.0012
Medicaid status					
Covered	23.38(18.8-28.69)	22.44(18.39-27.1)	21.18(15.09-28.9)	22.66(19.77-25.83)	F(2,289)=0.12
Not covered	76.62(71.31-81.2)	77.56(72.9-81.61)	78.82(71.1-84.91)	77.34(74.17-80.23)	p=0.8853
Private insurance status					
Covered	41.06(36.08-46.23)	33.5(27.82-39.71)	39.69(32.38-47.49)	37.78(34.32-41.36)	F(2,289)=1.84
Not covered	58.94(53.77-63.92)	66.5(60.29-72.18)	60.31(52.51-67.62)	62.22(58.64-65.68)	p=0.1601

Table 5.3 Health Status of Asian American Older Adults (United States, 1998-2006)

	Chinese % (95% CI)	Filipino % (95% CI)	Asian Indian % (95% CI)	All % (95% CI)	Test
Self-rated health					
Excellent	8.05(5.66-11.32)	15.49(12.12-19.58)	17.99(12.79-24.7)	12.62(10.47-15.15)	$F(2.289)=3.98$
Very good	22.34(18.65-26.52)	22.23(18.85-26.01)	23.26(17.25-30.59)	22.44(20.14-24.92)	$p=0.0198$
Good	42.84(38.47-47.32)	38.66(34.28-43.23)	34.77(28.05-42.16)	39.88(36.97-42.86)	
Fair	19.52(15.73-23.96)	19.28(15.09-24.29)	13.62(9.14-19.8)	18.5(15.9-21.41)	
Poor	7.26(5.29-9.9)	4.35(2.65-7.06)	10.36(6.75-15.59)	6.56(5.18-8.28)	
Activity limitation					
Yes	28.37(23.84-33.39)	23.74(19.3-28.83)	21.39(16.42-27.37)	25.4(22.56-28.45)	$F(2,289)=1.66$
No	71.63(66.61-76.16)	76.26(71.17-80.7)	78.61(72.63-83.58)	74.6(71.55-77.44)	$p=0.1926$

Table 5.4 Health Services Utilization Characteristics of Asian American Older Adults (United States, 1998-2006)

	Chinese % (95% CI)	Filipino % (95% CI)	Asian Indian % (95% CI)	All % (95% CI)	Test
Health profession visit					
Yes	22.5(19.36-25.98)	22.13(18.6-26.11)	19.66(14.23-26.51)	21.9(19.58-24.42)	$F(2,289)=0.35$
No	77.5(74.02-80.64)	77.87(73.89-81.4)	79.86(73.78-85.94)	78.1(75.58-80.42)	$p=0.7071$
Hospital overnight					
Yes	11.68(9.36-14.49)	9.63(7.42-12.41)	9.90(6.43-14.94)	10.57(8.97-12.41)	$F(2,289)=0.72$
No	88.32(85.51-90.64)	90.37(87.59-92.58)	90.10(85.06-93.57)	89.43(87.59-91.03)	$p=0.4868$

Research Question 2: What predisposing factors, enabling factors, need factors and

immigrant-related factors are associated with health service utilization?

Path models – doctor visits

Based on the proposed adapted Andersen Model, dependent variable doctor visits

was first regressed on eleven variables representing four factors (Table 5.5). In order to

achieve analysis efficiency, only variables that were statistically significant related to

doctor visits at bivariate level were included in the initial model fitting: family size,

health insurance, citizenship, poor health status, and activity limitation. The relationship

between poor health status and activity was included in the model as a covariance term to

account for covariance between these two independent variables due to a mutual

influence.

Table 5.5 Bivariate Logistic Regression with Dependent Variable – Doctor visits

	Doctor visits	
Ethnicity	$F(2,289)=0.71$	$p=0.7071$
Age	$F(1,290)=2.42$	$p=0.1206$
Gender	$F(1,290)=0.02$	$p=0.8866$
Marital status	$F(1,290)=0.61$	$p=0.4342$
Family size	$F(1,290)=8.15$	$p=0.0046**$
Education	$F(1,290)=0.34$	$p=0.5603$
Poverty status	$F(1,290)=0.08$	$p=0.7714$
Poor health insurance	$F(1,290)=18.69$	$p=0.0000***$
Citizenship	$F(1,290)=11.60$	$p=0.0008**$
Nativity	$F(1,290)=0.42$	$P=0.5155$
Health status	$F(1,290)=33.46$	$p=0.0000***$
Activity limitation	$F(1,290)=28.04$	$p=0.0000***$

*<0.05, **<0.01, ***<0.001

Six paths were removed to obtain a model where all of the remaining paths were

statistically significant at p<0.05 level (Table 5.6), except p value of path family size to

activity limitation was 0.101. If this path was moved, the Mplus cannot calculate chi-

square difference test because the H0 model is not nested in the H1 model. Therefore, the family size to activity limitation was included in the final path model. The final path model of doctor visits was summarized in Table 5.7 and illustrated in Figure 5.1. The model chi-square for doctor visits was not statistically significant (χ^2 = 5.668, df=5, p= 0.3398), which suggests a good fit of model to the sample data. The RMSEA was 0.010, which further indicates that the model is well specified.

The final doctor visits model has nine parameters (eight paths and one correlation). Among all the variables in the model, three variables – health insurance, health status and activity limitation have direct effects on doctor visit and all are positive effects. In other words, older adults having health insurance (β=0.407, p<0.001), in poor health status (β=0.133, p=0.040) and having activity limitation (β=0.179, p=0.022) were more likely to have doctor visits.

Family size has negative effects on health insurance (β=-0.136, p=0.007), citizenship (β=-0.282, p<0.001). Smaller family size is associated with higher likelihood of having health insurance and US citizenship among older Asian Americans. Citizenship has a positive effect on health insurance (β=0.594, p<0.001), and a negative effect on health status (β=-0.08, p=0.036). In other words, being US citizen, older Asian Americans are more likely to have health insurance coverage and better health status.

Table 5.6 Paths Removed – Doctor visits

	Path Removed	Estimate (b)	S.E.	Estimate(β)	p value
Step 1	Activity limitation to Health insurance	0.031	0.155	0.023	0.844
Step 2	Family size to Doctor visit	0.007	0.029	0.011	0.810
Step 3	Citizenship to Doctor visit	-0.135	0.141	-0.119	0.339
Step 4	Poor health status to Health insurance	0.081	0.066	0.065	0.223
Step 5	Citizenship to Activity limitation	-0.062	0.055	-0.064	0.261
Step 6	Family size to Poor health status	-0.025	0.017	-0.043	0.158

Table 5.7 Final Model – Doctor visits

Path	Estimate (b)	S.E.	Estimate(β)	p value
Health insurance to Doctor visits	0.357	0.066	0.407	0.000
Poor health status to Doctor visits	0.142	0.069	0.133	0.040
Activity limitation to Doctor visits	0.206	0.090	0.179	0.022
Family size to Health insurance	-0.096	0.036	-0.136	0.007
Citizenship to Health insurance	0.746	0.102	0.594	0.000
Family size to Activity limitation	-0.036	0.022	-0.067	0.101
Citizenship to Poor health status	-0.082	0.039	-0.080	0.036
Family size to Citizenship	-0.158	0.019	-0.282	0.000
Activity limitation with Poor health status	0.701	0.034	0.656	0.000

χ^2 = 5.668, df=5, p= 0.3398; RMSEA= 0.010

Figure 5.1 Final Path Model – Doctor visits (full sample, N=1412)
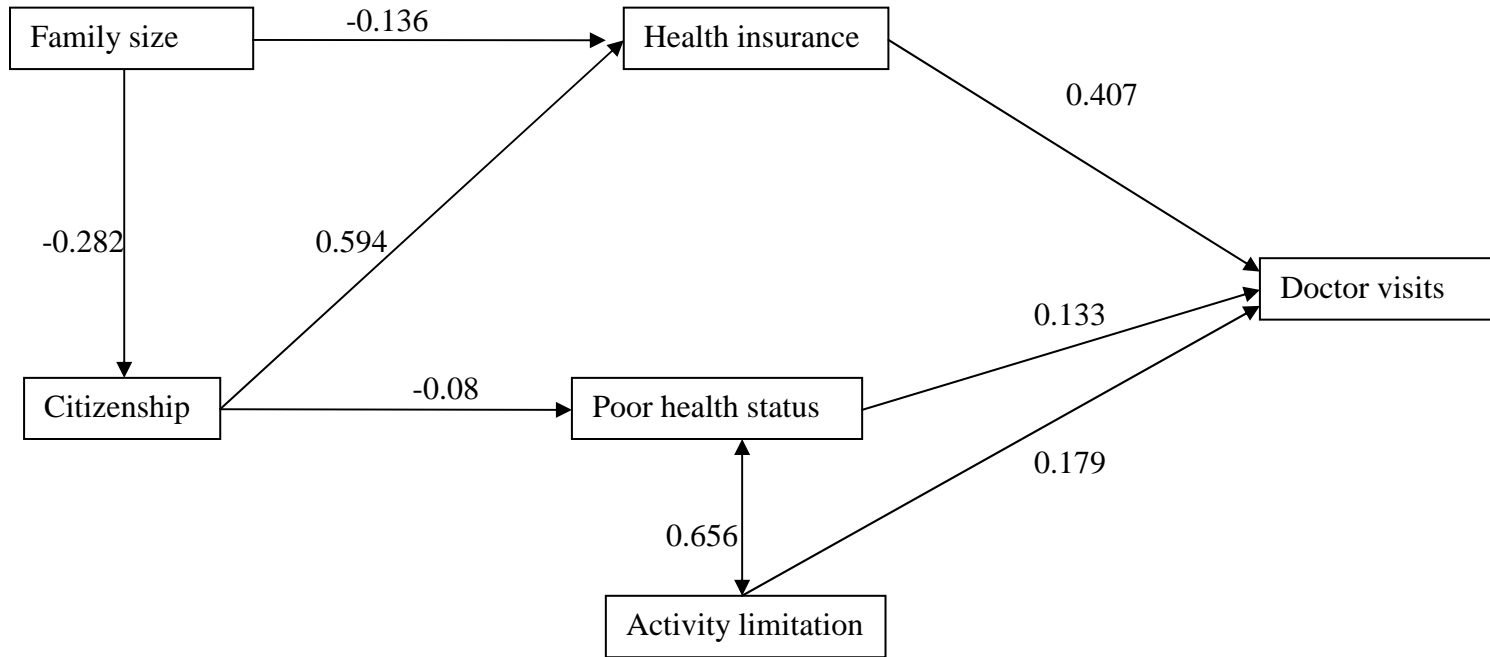
Path models– hospital stays

Besides hospital stays, six variables that were statistically significant related to hospital stays at bivariate level were included in the initial model fitting: age, marital status, education, health insurance, poor health status, and activity limitation (Table 5.8). The relationship between poor health status and activity was included in the model as a covariance term to account for covariance between these two independent variables due to a mutual influence.

Table 5.8 Bivariate Logistic Regression with Dependent Variable – Hospital stays

	Hospital stays	
Ethnicity	F(2,289)=0.72	p=0.4868
Age	F(1,290)=13.81	p=0.0002***
Gender	F(1,290)=0.62	p=0.4310
Marital status	F(1,290)=8.45	p=0.0039**
Family size	F(1,290)=0.55	p=0.4601
Education	F(1,290)=3.95	p=0.0478*
Poverty status	F(1,290)=0.00	p=0.9489
Health insurance	F(1,290)=5.25	p=0.0226*
Citizenship	F(1,290)=1.38	p=0.2418
Nativity	F(1,290)=0.88	P=0.3489
Poor health status	F(1,290)=40.13	p=0.0000***
Activity limitation	F(1,290)=38.44	p=0.0000***

*<0.05, **<0.01, ***<0.001

Six paths were removed to obtain a model where all of the remaining paths were statistically significant at p<0.05 level (Table 5.9).The final path model of hospital stays was summarized in Table 5.10 and illustrated in Figure 5.2. The model chi-square for hospital stays was not statistically significant (χ^2 =5.061, df=6, p=0.5360), which suggests a good fit of model to the sample data. The RMSEA was 0.000, which further indicates that the model is well specified.

The final hospital stays model has fourteen parameters (thirteen paths and one correlation). Among all the variables in the model, four variables have direct effects on hospital stays: marital status, health insurance, health status, and activity limitation. In details, married older adults are less likely to have hospital stays (β=-0.12, p=0.041); while older adults having health insurance (β=0.209, p=0.031), in worse health status (β=0.140, p=0.045) and having activity limitation (β=0.222, p=0.011) were more likely to have hospital stays.

In addition, age has negative effects on marital status (β=-0.311, p<0.001) and education (β=-0.162, p<0.001), while positive effects on health insurance (β=0.333, p<0.001), health status (β=0.168, p<0.001) and activity limitation (β=0.305, p<0.001). In other words, an increase in age is associated with lower education level, poorer health status, and less likely to be married, while increase in the likelihood of having health insurance among older Asian Americans. Education has negative effects on health status (β=-0.197, p<0.001) and activity limitation (β=-0.152, p<0.001), while positive effects on health insurance (β=0.166, p=0.002) and marital status (β=0.168, p<0.001). An increase in education level is associated with better health status, less activity limitation, having health insurance and being married.

Summary of results related to Research Question 2

Five hypotheses were proposed based on the literature and conceptual model to answer research question 2 (see Appendix 2).

Hypothesis A: In regard to predisposing factors, being older, female, lower educated, and not married, and bigger family size are associated with higher likelihood of health service utilization.

For dependent variable doctor visits, all predisposing factors were not statistically significant at bivariate level and not included in the path model. Therefore, being older, female, lower educated, and not married, and bigger family size are not associated with higher likelihood of doctor visits. For dependent variable hospital stays, marital status has a negative direct effect with married older adults less likely to have hospital stays. Thus, hypothesis A is partially supported.

Hypothesis B: In regard to enabling factors, having health insurance and not poor are associated with higher likelihood of health service utilization.

For both dependent variables doctor visits and hospital stays, health insurance has positive direct effects. Therefore, having health insurance is associated with higher likelihood of doctor visits and hospital stays. However, poverty status is not associated with either doctor visits or hospital stays. Thus, hypothesis B is partially supported.

Hypothesis C: In regard to need factors, lower self-reported health and more activities limitations are associated with higher likelihood of health service utilization.

Both self-reported health and activity limitation have directed positive effects on doctor visits and hospital stays. In other words, lower self-reported health and more activities limitations are associated with higher likelihood of doctor visits and hospital stays. Thus, hypothesis C is supported.

Hypothesis D: In regard to immigrant-related factors, being U.S. citizen and U.S. born are associated with higher likelihood of health service utilization. (Direct effect)

Citizenship and nativity do not have direct effects on doctor visits or hospital stays. Thus, hypothesis D is not supported.

Hypothesis E: Enabling factors and need factors each mediate the relationship between immigrant-related factors and health service utilization.

Citizenship has an indirect effect on doctor visits but not hospital stays. Citizenship has a positive effect on health insurance and a negative effect on health status. In other words, being US citizen, older Asian Americans are more likely to have health insurance coverage and better health status. Furthermore, having health insurance increases the likelihood of doctor visits, while better health status decreases the likelihood of doctor visits. For both dependent variables, nativity was not statistically significant at bivariate level and not included in the path model. Thus, hypothesis E is partially supported.

In conclusion, for Asian American older adults, more doctor visits are associated with having health insurance, poorer health, and greater activity limitation, while more hospital stays are associated with being not married, heaving health insurance, poorer health, and greater activity limitation.

Table 5.9 Paths Removed –Hospital stays

	Path Removed	Estimate (b)	S.E.	Estimate(β)	p value
Step 1	Poor health status to Health insurance	0.013	0.090	0.013	0.883
Step 2	Marital status to Health insurance	0.026	0.087	0.026	0.763
Step 3	Marital status to Poor health status	-0.019	0.038	-0.019	0.613
Step 4	Education to Hospital stays	-0.008	0.015	-0.027	0.619
Step 5	Activity limitation to Health insurance	-0.050	0.076	-0.050	0.509
Step 6	Age to Hospital stays	-0.016	0.013	-0.089	0.195

Table 5.10 Final Model – Hospital stays

Path	Estimate (b)	S.E.	Estimate(β)	p value
Marital status to Hospital stays	-0.124	0.061	-0.120	0.041
Health insurance to Hospital stays	0.218	0.101	0.209	0.031
Poor health status to Hospital stays	0.145	0.073	0.140	0.045
Activity limitation to Hospital stays	0.230	0.090	0.222	0.011
Age to Health insurance	0.057	0.011	0.333	0.000
Education to Health insurance	0.044	0.014	0.166	0.002
Age to Marital status	-0.054	0.006	-0.311	0.000
Education to Marital status	0.045	0.009	0.168	0.000
Age to Education	-0.106	0.018	-0.162	0.000
Age to Health status	0.029	0.005	0.168	0.000
Education to Poor health status	-0.052	0.007	-0.197	0.000
Age to Activity limitation	0.053	0.006	0.305	0.000
Education to Activity limitation	-0.040	0.010	-0.152	0.000
Activity limitation with Poor health status	0.639	0.033	0.620	0.000

χ^2=5.061, df=6, p=0.5360; RMSEA=0.000

Figure 5.2 Final Path Model – Hospital stays (full sample, N=1412)
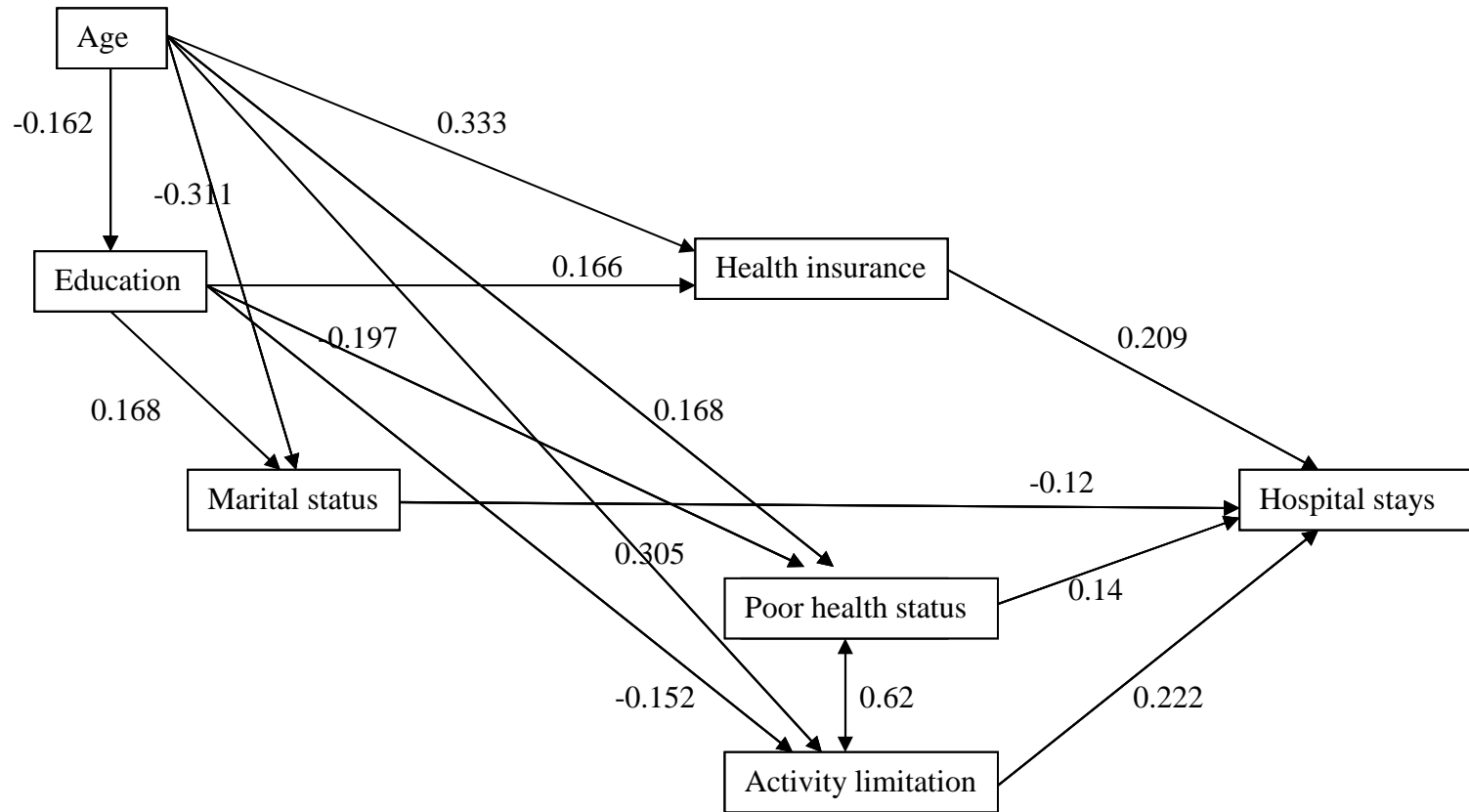
Research Question 3*:* Does the relation between these predisposing factors, enabling factors, need factors, and immigrant-related factors and health service utilization vary by ethnic groups?

Multiple group analyses – Doctor Visits

After the final model of doctor visits was fitted, a multiple group analysis was conducted to test whether differences exist in terms of path coefficients across three ethnic groups: Chinese, Filipino, and Asian Indian. The chi-square test of multiple group analysis was not statistically significant ($\chi^2 = 20.663$, df=15, p= 0.1479), indicating the single-group model fits. Therefore there was no evidence of path coefficients being different across the three ethnic groups.

Multiple group analyses – Hospital Stays

After the final model of hospital stays was fitted, a multiple group analysis was conducted to test whether differences exist in terms of path coefficients across three ethnic groups: Chinese, Filipino, and Asian Indian. The chi-square test of multiple group analysis was not statistically significant ($\chi^2 = 15.041$, df=16, p= 0.5217), indicating the model fits. Therefore there was no evidence of path coefficients being different across the three ethnic groups.

Summary of results related to Research Question 3

Multiple group analysis results reveal that path models of both types of health service utilization are configural invariance for three Asian ethnic groups. Therefore, the relation between these predisposing factors, enabling factors, need factors, and immigrant-related factor and health service utilization does not vary by ethnic groups.

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CHAPTER VI: DISCUSSION

Limitations of the Study

This dissertation explores health status, health insurance coverage and factors related to health service utilization among Chinese, Filipino, and Asian Indian older adults. In spite of its strengths, it is important to consider the findings in light of the following limitations.

Theoretical Model

As mentioned in the previous chapters, lack of theory is a prominent limitation in the literature on health service utilization among Asian American older adults. The conceptual framework of this study is based on Andersen's Behavioral Model of Health Service Utilization. In order to examine the health service utilization among Asian American older adults, this dissertation modified Andersen's model by adding immigration status. Andersen's model became the most frequently used and widely applied framework in service utilization research due to its easy application and breadth of predicting variables. Although the Behavioral Model has been widely tested and found to be useful in identifying factors that enable or restrict service utilization, it has its weaknesses. First, the model explains only a little variance related to service use in large-scale multivariate studies (Aday & Awe, 1997; Mechanic, 1979). Second, the model has been criticized for its lack of sensitivity to diverse cultural and structural barriers which both play important roles among the Asian American older adult population.

There are other conceptual models available to explain health service utilization, and provide different views of the processes and contingencies that influence the service

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utilization. In addition to the Behavior Model, the Health Belief Model (Rosenstock, 1966) examines the interaction between individual, social, and structural factors that facilitate or restrict individuals' use of health services. It also attempts to explain and predict individuals' service utilization behavior by focusing on the attitudes and beliefs of individuals, including individual perception, modifying factors, and likelihood of action. The Network Episode Model (Pescosolido, 1991) focuses on the social processes of how individuals and their socially supportive networks make decisions to seek health services. Although these two models also have their weaknesses, the conceptual framework of this study would be improved by including important variables that capturing attitudes and beliefs, social network of Asian American older adults.

Another limitation of Andersen's behavior model is that it only specifies three factors that predict health service utilization – predisposing, enabling, and need factors. However, it does not provide any clear predictions about how variables are related and how they may interact with other factors. As a result, the theoretical justification for path analysis in this study is weak and the adapted conceptual model mainly serves as a base for variable selection.

One of the important strengths of this dissertation is the use of Andersen's Behavior Model as a conceptual framework to guide analyses. However, the limitations related to the Andersen's behavior model also call for more theory building efforts in future research.

Data and Measurement

In addition to the theoretical limitation, there are also limitations related to data and measurement. Nationally-based data for Asian American older adults is sparse. When data on Asian Americans are collected, it is often not broken down for subethnic groups. In cases when information on subgroups was gathered, most previous research has analyzed the Asian population as a whole because of a lack of a subsample big enough to enable intraethnic distinctions to be made in multivariate analyses, especially for older populations. In order to investigate population specific information on patterns of health service utilization among major subgroups of Asian American older adults, NHIS was the first choice because of its large sample size, consistency, rich information on service utilization, and detailed information on subgroups of Asian Americans. However, the NHIS public use data sets only contain information regarding three population groups: Chinese, Filipino, Asian Indian, and an aggregated category "other Asian and Pacific Islander" beginning in 1997. Although NHIS has a large annual sample size, the Asian older adult subpopulation is still very small. Therefore, nine years of data (1998-2006) were pooled to yield sufficient statistical power. Even though there were no big social or health policies implemented or changed during the time period, results based on nine years of combined data provided a source in which to attempt to address the patterns of health service utilization across different ethnic groups of Asian older adults.

The extent and patterns of missing data on certain variables are also a limitation of this study. For example, poverty status has close to 30% missing cases, and Asian older adults have much higher missing cases in education and immigration-related variables – citizenship and length of stay. An analysis of the missing data indicates that

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respondents who did not answer the immigration-related information were older, more likely to be married, less educated, poorer, healthier, less likely to use health services, and more likely to be Asian.

Additionally, other important constructs that could explain the health services utilization pattern among older Asian Americans are not available in the NHIS. It has been documented that cultural background, health beliefs, pre-immigration experience, age at immigration, degree of acculturation, and language ability are very important factors influencing older adults' health service utilization, especially among older immigrants. However, there are no constructs in the NHIS that capture these important aspects of respondents. Although length of stay in the U.S. is an available immigration-related variable besides citizenship status in NHIS, it was omitted due to the frequency discrepancy with citizenship status after the multiple imputation.

Since unmet service needs is not available in the NHIS, self-reported health status and activity limitation were included as need factors. This also may raise measurement issues. For example, self-reported health status measures a respondent's subjective perception of his/her health status. However, an older adult with low self-reported health status does not necessarily mean that he or she has higher unmet needs. In addition, other important health need measures for older adults, such as medical conditions and chronic conditions, are also not available.

The health service utilization measures in the NHIS are also very limited. Three questions were asked measuring three types of health service: if the respondent has (1) seen a doctor or other health care professional at a doctor's office, a clinic, an emergency room, or some other place, during the past two weeks; (2) had hospital overnight stay

during the past 12 months; (3) received care at home from a nurse or other health care professional during the past two weeks. Only the first two measures are included in this dissertation because of the highly skewed responses towards no of receiving care at home. Other types of health services, such as preventive, alternative, and mental health, are also very important services but were unable to be addressed in this study. An additional limitation is that the observational period of two weeks for a physician visit used in NHIS is a measurement issue, especially for older adults. A visit to the physician is regarded as a relatively trivial life event compared to hospitalization; efforts to narrow the reference period have been made to increase the accuracy of recalls for the past visits (Schwarz, 1999). However, the two weeks observational period of physician visit would be too short to capture health service utilization for some older adults. For example, older adults with managed chronic conditions may not have visited a physician in the past two weeks, but they may visit a physician or other health professional regularly such as every month.

Despite limitations related to data and measurement, to my knowledge this study is the first study to examine the health service utilization patterns of Chinese, Filipino, and Asian Indian older adults using a nationally representative sample. In order to better understand the basic characteristics and service needs of Asian American older adults, large sample size surveys and national census data are needed. Future nationwide public data sets should include more specific race categories for Asian Americans to reflect the diversity of this population. Particularly, in order to study specific subgroups of Asian American older adults, each group should be oversampled to reach an adequate sample size for analysis.

Analysis

The methodological limitations embedded in the cross-sectional nature of this study prevent us from understanding the causal factors influencing service utilization among Asian American older adult, and changes over time. The need for longitudinal service utilization studies is obvious if we want to understand the changing needs of Asian American older adults over a period of time.

Although it was planned to combine five different imputed datasets for the analyses, the range of the bivariate analyses that could have been conducted using MIM in STATA was limited. It was further discovered that although Mplus has the capacity to handle multiple imputed datasets, chi-square statistics cannot be computed on combined datasets. As a result, only one of the five imputed datasets was used. Moreover, during the process of model building and analyzing, the analysis shows that chi-square statistics cannot be trusted after adjusting for design effects because many strata contain no subpopulation members. Therefore, only the domain of interest (subpopulation) of this dissertation – older adults (65 and older) from three Asian ethnic groups (Chinese, Filipino, and Asian Indian) – was used for the path analysis with weighted variables. It is possible that some of the findings might differ slightly had the five datasets been combined.

In spite of limitations related to analysis, this dissertation uses state of the art methodology to fill the substantial knowledge gaps regarding the state of Asian American older adults by examining health status, health insurance coverage and factors related to service utilization. Furthermore, this study builds on current literature by providing up to

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date and population specific information on patterns of health service utilization among three major Asian American older adult populations: Chinese, Filipino, and Asian Indian.

Discussion of Findings

Research Question 1

In summary, the descriptive and bivariate results indicate that sociodemograhic characteristics, health needs, and health insurance status vary among Chinese, Filipino, and Asian Indian older adults. Specifically, Asian Indian older adults were different from Chinese and Filipino older adults in many aspects of sociodemographic characteristics and health insurance status. They are younger, more often male, less likely to live alone, larger family size, have higher levels of education, are less likely to be poor, more likely to be non-citizens and foreign born, and significantly less likely to have health insurance coverage in general and Medicare coverage. In terms of health needs, Chinese older adults had significantly lower self-rated health than Filipino and Asian Indian older adults.

The findings of research question 1 are not surprising. Under the Asian American label, there are more than 30 ethnic groups. Each group has a unique language and culture tradition and a different history in the United States. As a group, Chinese has the longest history in the U.S., while Asian Indian compose the largest Asian immigrant group in the 21st century. Therefore, generalizations about Asian older adults are difficult. In fact, the findings support the heterogeneity of Asian older adults in the United States with respect to ethnic composition, immigration history, language, religion, and other sociodemographic variables.

Furthermore, the findings indicate that the majority of these three ethnic groups of Asian older adults were foreign-born. Literature on older immigrants classifies the older foreign-born population into two categories based on their migration pathways. The "invited elderly" refers to late-life immigrants invited to reunite with their adult children and/or family members; while "the immigrated elderly" refers to those who immigrated in their 30s and 40s and have grown older in the U.S.(P. G. Min, 1998). Since "the immigrated elderly" have grown older in the U.S., they will likely have better English skills, a higher degree of acculturation, and more access to health insurance. Different pathways to immigration among Asian older adults contribute to the heterogeneity of this population. For example, due to the longest immigration history in the U.S., the Chinese have higher proportion of "the immigrated elderly" than other Asian groups. On the contrary, Asian Indians have a much higher percentage of "the invited elderly."

Research Question 2

Path analyses results show that there are different factors associated with two types of health services utilization – doctor visits and hospital stays. Health insurance status, health status, and activity limitation have positive effects on both types of health services utilization. More specifically, having health insurance, poorer self-reported health and more activities limitations are associated with a higher likelihood of doctor visits and hospital stays. In addition, marital status has a negative direct effect on hospital stays – married older adults are less likely to have hospital stays.

The above findings indicate two specific hypotheses (for doctor visits and hospital stays respectively) are better than one general hypothesis for health service utilizations

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because these two types of health services operate differently. Considering the degree of choice one can make on the part of individuals, Andersen (1968) made a distinction between discretionary and non-discretionary utilization. The distinction is important because Andersen assumes that the level of discretion of service use behavior determines the contribution of each of the three factors as a predictor. Andersen indicates that when there is little discretion to be exercised due to severe health conditions or hospitalization, need tends to be a primary indicator of service use behavior. On the other hand, the more discretionary the behavior, the more important the predisposing and enabling factors become in explaining service use behavior (Andersen, 1968). Physician visits was classified as more discretionary than hospitalization. The findings from path models support the distinction between discretionary and non-discretionary utilization. In the path model of doctor visits, health insurance ($\beta=0.407$) has a much higher standard estimate than need factors (health status: $\beta=0.133$; activity limitation: $\beta=0.179$). In the path model of hospital stays, the standard estimates of need factors increase to 0.140 and 0.222 respectively, while the standard estimate of health insurance decreases to 0.209.

Andersen's model proposes that the presence of predisposing and enabling conditions is necessary, but not sufficient in service use. The predisposing factors are classified as indicators of a greater propensity toward service use (Andersen, 1968) and are not directly responsible for service use, which explains the findings that marital status is the only predisposing variable that has a direct effect in both path models. The need factors are considered a more immediate and powerful predictor of service use (Andersen, 1995). Along with previous studies on health service use among older adults, this study also found that need factors are the most important and have a direct impact in explaining

older adults' health service use. However, the findings from path models indicate that health insurance as an enabling factor is also significantly related to Asian older adults' health service use. In the doctor visits model, health insurance is the strongest direct predictor ($\beta=0.407$); while health insurance ($\beta=0.209$) is the second strongest direct predictor right after activity limitation ($\beta=0.222$) in the hospital stays model.

Furthermore, the findings about effects of health insurance on health service use in this study have been intensively discussed in the health economics literature. In insurance literature, medical insurance may increase usage by lowering the marginal cost of care to the individual and this characteristic has been termed a "moral hazard". There are different explanations about this prospect that the increase in consumption of medical care that occurs when one becomes insured. Arrow (1963) considered a moral hazard as an imperfection, a defect in physician control, rather than as a simple response to price reduction. Pauly (1968) also argued that the response of seeking more medical care with insurance than in its absence is a result not of moral perfidy, but of rational economic behavior.

This study's findings regarding the different effects of health insurance on different types of health services are consistent with the health economics literature. Health economists have found an association between price effects of health insurance cost sharing and health care service use. The RAND Health Insurance Experiment (Newhouse, 1993) found that the more families had to pay out of pocket, the fewer medical services they used. Hospitalization has higher co-pays than doctor visits; therefore, health insurance has stronger effects on doctor visits than hospitalization. In

other words, having health insurance enables people to use doctor services more than hospital services due to the lower cost.

Citizenship does not have a direct effect on doctor visits, while it has indirect effects on doctor visits through health insurance and health status. Being U.S. citizens, older Asian Americans are more likely to have health insurance coverage and better health status. The finding that being a U.S. citizen is associated with being more likely to have health insurance can be explained by the public insurance policy restrictions on non-citizens since the passage of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) in 1996. The law bars most public assistance and social services for non-citizen immigrants, unless the individual is willing to pay the costs. Eligibility to public assistance such as Medicaid, SSI, and food stamps after PRWORA is determined by citizenship status and date of entry into the U.S. Although the majority of Asian American older adults has health insurance coverage, the significant relationship between citizenship and health insurance implies higher vulnerability in health service use among newly arrived older immigrants. According to U.S. Citizenship and Immigration Services (USCIS, 2008), to become a U.S. citizen, a person should have been lawfully admitted for permanent residence and have resided continuously as a lawful permanent resident in the U.S. for at least five years prior to filing, with no single absence from the U.S. of more than one year. In addition, other general naturalization requirements include English ability, a basic knowledge of U.S. history and government (also known as "civics"), and passing the U.S. naturalization test. For immigrants, having citizenship implies that they have been in the U.S. for at least five years, met the language and civics requirements and passed the naturalization test. Since citizenship is

the only immigrant related variable included in the path model of doctor visits, citizenship is a possible proxy for acculturation, length of stay in US, and entitlement to welfare programs.

In the immigrant and health literature, the healthy immigrant effect refers to an observed time path in which the health of immigrants just after migration is substantially better than that of comparable native-born people, but subsequently declines and converges toward the native-born population (McDonald & Kennedy, 2004; Newbold, 2005). Much of the literature on immigrant health has focused on identifying the presence and magnitude of the healthy immigrant effect. Although this effect has been supported among younger immigrants, less is known about the healthy immigrant effect among older adults. Data from the Canadian Community Health Survey indicated that the healthy immigrant effect applied to later mid-life immigrants (Gee, Kobayashi, & Prus, 2004).

Researchers in the immigrant and health literature often attribute healthy immigrant effect to a number of factors such as immigrant self-selection and under-reported health conditions among recent immigrants (Jasso, Massey, Rosenzweig, & Smith, 2004; McDonald & Kennedy, 2004). Immigrant self-selection refers to healthier potential immigrants who are more likely to be physically or financially able to migrate. In addition to this, health screening and medical exams required before admittance to permanent residence in the U.S. may give rise to relatively healthier immigrants. Jasso and colleagues (2004) developed a migration model of initial health selectivity in which the decision to migrate can be viewed as a balance between the gains and costs of migration. Labor market considerations are important for young immigrants but less so

for older immigrants who may have either short or no remaining tenure in the labor market. In contrast, the better health care available in the United States may be of far greater concern among older immigrants, which indicates that health selection effects may be quite different among older immigrants (Jasso et al., 2004). Furthermore, different health selection effects may exist for two groups of older immigrants: "immigrated elderly" – those who have migrated at a much younger age and who were presumably positively selected on their health, and "invited elderly" – those who immigrated at much older age when the migration selection may have been reversed. The finding in this study that being a U.S. citizen is associated with better health status does not support the healthy immigrant effect; however, it provides evidence of the possible existence of the reversed health selection among older immigrants.

Family size only has indirect effects on doctor visits through health insurance status and health status. Smaller family size is associated with higher likelihood of having health insurance and U.S. citizenship among older Asian Americans. This finding is surprising. It was hypothesized that older adults who have a larger family would be more likely to have health insurance and citizenship. One possible explanation of this finding is that the family size is a proxy for acculturation in the analysis. Since there is no acculturation variable included in the doctor visits path model, such as length of stay in the U.S. and English ability, larger family size is a possible indicator of lower acculturation. Therefore, smaller family size implies a higher degree of acculturation and is associated with being more likely to have health insurance and citizenship. Also, research suggests that household composition and living arrangements are critical factors in analyzing welfare program participation among older immigrants (Nam & Jung, 2008);

therefore, family size is a possible proxy for economic status in this study. A qualitative study found that as resources were collected and consumed communally, and adapting to structural changes created by the host society is eased, a household becomes a critical institution for survival among immigrants (Kibria, 1993). Older immigrants are more likely than their native counterparts to live in extended families and in larger households (Glick & Van Hook, 2002). Accordingly, smaller family size implies a better economic situation and is associated with being more likely to have health insurance and citizenship.

Age and education only have indirect effects on hospital stays through health insurance status, health status, and activity limitation. An increase in age predicts a decrease in education level, health status, and the likelihood of being married. An increase in age also predicts an increase in the likelihood of having health insurance among older Asian Americans. An increase in education level predicts better health status, a decrease in the likelihood of having activity limitations, being more likely to have health insurance and being married. Marital status has a negative direct effect on hospital stays – married older adults are less likely to have hospital stays. The result regarding marital status is consistent with previous studies on the relationship between marital status and the use of health services – use of health services is higher among divorced, separated, widowed, and never-married persons than among those who are married across different age groups (Cafferata, 1987; Verbrugge, 1979).

Previous research using multiple regression, generalized linear models, or logistical regression has identified the significant variables in explaining doctor visits and hospital stays among non-institutionalized older adults, older immigrants and Asian Americans (S. Choi, 2006; Ryu et al., 2002; Wolinsky & Coe, 1984). The significant

variables include gender, marital status, living arrangement, education, insurance, health status, and activity limitation, and vary by different types of health services and across different ethnic subgroups. Previous studies also document that need factors are the most important elements in explaining older adults' health service use and account for the majority of the variance explained in doctor visits and hospital utilization (Strain, 1991; Wolinsky & Coe, 1984; Wolinsky & Johnson, 1991). In addition, health insurance status is the major barrier to service use, especially among vulnerable populations such as immigrants. The findings from this dissertation support the importance of need factors and health insurance in explaining doctor visits and hospital stays among Asian American older adults. Moreover, using path analysis, this dissertation is able to illuminate the paths of how predisposing, enabling, need, and immigrant-related factors affect doctor visits and hospital stays among Asian American older adults.

Research Question 3

Multiple group analyses results reveal that path models of both types of health service utilization are configural invariance for three Asian ethnic groups. Therefore, the relationship between predisposing factors, enabling factors, need factors, immigrant-related factors and health service utilization does not vary by ethnic group. Results of this dissertation document the homogeneity in health service utilization patterns of Chinese, Filipino, and Asian Indian older adults in spite of the heterogeneity in sociodemographic characteristics, health insurance, and health needs of these three groups of Asian American older adults.

It is well documented that minority elders in general have a higher need for health and social services, yet lower utilization rates (Blendon, Aiken, Freeman, & Corey, 1989; Lacayo, 1980). Damron-Rodriguez and colleagues (1994) conducted a review of service utilization and minority older adults. It demonstrates that there were clear racial and ethnic differences in utilization rates for many health care services and suggests that for many services, minority older adults are not obtaining health care services as readily as White elders.

The majority of the research on service utilization among Asian American older adults as a whole group documents the utilization rates of different services and explores the factors related to service utilization. As a whole group, Asian American older adults are often compared with the majority of the older adults in the U.S. (Whites or Caucasians) or other minority older adult groups (African Americans, Hispanic Americans). Sometimes, research also compares foreign-born Asian American older adults with their U.S.-born Asian American older adult counterparts. In sum, as a whole group, Asian American older adults from different countries of origin have some similar characteristics in service utilization due to common immigration policy influence, similar socioeconomic status, and related cultural background for certain geographic areas. There is evidence to show that Asian American older adults tend to have lower level of formal service utilization and higher preference for informal service across different subgroups compared to White older adults.

However, the aggregated approach has its limitations. The term *Asian American* represents an extreme example of combining diverse groups under one label. This approach obscures the extent of variation present within each group and can lead to

spurious conclusions about the needs and status of significant ethnic subgroups (Tanjasiri et al., 1995). Frisbie et al. (2001) documented the great diversity in demographic and socioeconomic characteristics of the Asian and Pacific Islander populations and compared this population with Whites. Limited research on ethnic group differences in health service utilization among Asian Americans has showed distinctly different demographic and socioeconomic characteristics between six Asian American ethnic groups that affect health insurance coverage and health service utilization (Ryu et al., 2002). Although research question 3 is exploratory, it was expected that there would be group differences in the path model of health service utilization due to the heterogeneity of Asian older adults in the United States with respect to ethnic composition, immigration history, cultural characteristics, language, religion, health beliefs, and other sociodemographic variables.

One possible explanation for the non-significant multiple group analyses results is the invariance due to the type of service and the level of discretion of service use behavior. The dependent variables in this study are doctor visits and hospital stays, which are both formal medical services falling into the western medical system. For older immigrants there is little discretion to be exercised due to severe health conditions or in case of hospitalization; therefore, need tends to be a primary indicator of service use behavior. The results from multiple group analysis of doctor visits and hospital stays provide some evidence for this explanation. The chi-square tests of multiple group analysis of both health services were not statistically significant, but more discretionary health service doctor visits ($\chi^2 = 20.663$, df=15, p= 0.1479) have a smaller non-significant p value than hospital stays ($\chi^2 = 15.041$, df=16, p= 0.5217). It is possible that other more

discretionary health services, such as preventive health service or alternative medicine use, would reveal more variance.

Another possible explanation for these non-significant findings is that some important variables (health beliefs and cultural characteristics) which could possibly predict the different service utilization patterns were not included in the framework used in the study. According to Sussman (1996), the context of the health-seeking process is shaped by the interaction of the individual's social group, sub-cultural norms, and societal characteristics. Immigrants move to a new country with their old culture and traditions. The context of the health-seeking process is shaped by the interaction of individual social group, sub-cultural norms, and societal characteristics. Cultural characteristics include shared group norms of thought, behavior, value, and preferences, as well as shared history. Some culture components relevant to the health-seeking process include medical belief system, social structure, organization, values regarding individual attributes, individual behavior, characteristics of social interaction, spiritual or religious obligation, and history (Sussman, 1996). Strain (1991) examined the influence of health beliefs on health service utilization in later life, and found that individuals who were more skeptical of medicine tended to have fewer physician visits while stronger belief in the value of health maintenance activities was associated with the use of a greater number of services overall.

Implications of the Study

This study identified some important differences in terms of sociodemographic characteristics across three major Asian American older adult groups in the United States

– Chinese, Filipino, and Asian Indian. Additionally, in terms of health service utilization, this study identifies the different patterns of doctor visits and hospital stays. However, there is no evidence that patterns of health service utilization are different across the three ethnic groups. These findings have important implications for social work practice, policy and research.

Implications for Social Work Practice and Policy

Recognizing the heterogeneity of Asian older adults in the United States with respect to ethnic composition, immigration history, language, religion, and other sociodemographic characteristics is important for social workers working with this population. The rapid growth in Asian American older adult groups, with their diverse economic, health, mental health, and other social service needs, dictates that social workers become culturally competent if they are to work with these elders and their families.

As expected, need factor is a more immediate and powerful predictor of service use. Therefore, understanding the basic health needs of different groups of Asian American older adults is very important and a possible first step for social work professionals to further help this diverse population.

Like many other studies, the results of this study point out the important role of health insurance on health service utilization. Having health insurance coverage enables older adults to obtain health services and may increase service use. Additionally, the results of this study, along with other previous studies on health service use, suggest that health insurance status mediates the relationship between immigration status and doctor

visits. The strongest path exists from citizenship status through health insurance status to doctor visits. This mediating relationship reflects the importance of immigration status in accessing health care among older Asian Americans.

Immigrants have been identified as a vulnerable population. Older immigrants potentially face double jeopardy because of age and status as immigrants. Derose, Escarce and Lurie (2007) examined the factors that affect immigrants' vulnerability, including socioeconomic background, immigration status, limited English proficiency policies on access to publicly funded health care, location, stigma, and marginalization. Although there are differences among immigrants based on immigration status, duration in the U.S., and country of origin, immigrants have consistently lower rates of health insurance coverage compared to the U.S. born population (Derose et al., 2007; Prentice et al., 2005; Thamer et al., 1997).

Lack of health insurance, which compromises the ability of immigrants to access health care, is one of the important structural barriers to health service utilization. The U.S. system of medical care has historically been based on a fee-for-services model, and the social welfare system is notoriously limited in comparison to other industrialized nations (Damron-Rodriguez et al., 1994). The main sources of health insurance in the United States include employment-based health insurance, private health insurance, Medicare, and Medicaid. Past research suggests that older immigrants have less insurance coverage primarily because of their socioeconomic circumstances and work experience which make them unlikely to have employment-based insurance, private insurance, or Medicare (R. J. Angel et al., 2002; Prentice et al., 2005). Considering the limited employment history in the U.S. among Asian American older adults, especially among

some ethnic groups with higher percentages of newer-arrived older immigrants, they are more likely to rely on Medicaid and less likely to have Medicare or private insurance. The findings of this study provide evidence for the above conclusions.

Historically, legally admitted immigrants were eligible for Medicaid and other benefits on the same terms as citizens were, but the 1996 federal welfare reform law (PRWORA) dramatically limited immigrants' access to public health insurance in two ways: by denying Medicaid benefits to immigrants who arrived in the U.S. after August 1996, and by denying or limiting immigrant participation in Temporary Aid to Needy Families (TANF) (Kaushal & Kaestner, 2005; Ku & Matani, 2001). As a result, newly arrived older immigrants are no longer eligible for SSI and Medicaid benefits during their first five years in the United States – although some states, including California, have used state funds to fill the gap. Social workers working with older immigrants need to be aware that newer-arrived older immigrants and non-citizens would be more likely to be uninsured and should pay special attention to the health insurance policies that apply to this population.

However, the five-year restriction and disqualification of noncitizen immigrants from Medicaid only delay their eligibility for Medicaid for a certain period of time. Since one study has found that older immigrants are unlikely to return to their native countries (Tan & Kagotho, 2009), the need for Medicaid benefits among them would be greater after they obtain their citizenship. In the long run, the lack of health insurance results in more expensive forms of health service use and increases the burden on the nation's economy (Davis & Schoen, 2003; Rivers & Patino, 2006).

On the policy level, there are policy options to reduce immigrants' limited access to health care. Policies are needed to expand access to health insurance, community clinics and other care venues (Derose et al., 2007). First, current public health insurance coverage must be expanded to the most vulnerable immigrant subpopulations. There are a few previously proposed options to expand Medicaid coverage to the vulnerable populations, such as providing government subsidies to uninsured, low-income individuals suffering from certain chronic health conditions (Baker et al., 2006), a waiver of premium payment requirements for public insurance in the first of few years of immigration until older immigrants settle in a new country (Siddharthan, 1991), and providing limited Medicaid benefits to income-qualified late-life immigrants with no insurance (S. Choi, 2006),

Second, the availability of alternative health insurance options for older immigrants needs to be increased. Affordable private insurance plans, such as tax credits for premiums exceeding a certain percentage of income and local health insurance to immigrants who are otherwise not eligible for public health care benefits, have been proposed (Davis & Schoen, 2003; Hirota et al., 2006). Researchers also proposed policies aimed at increasing employer-based health insurance among immigrants, such as including employer mandates that make insurance more affordable for employees, as well as educating those eligible about the value of insurance (Derose et al., 2007) .

Third, other types of health care services venues must be promoted. Many older immigrants seek Western medical services and indigenous health services in their ethnic communities (Moon & Rhee, 2006). Policies are needed to promote inexpensive alternative health care services such as community clinics and health centers (Derose et

al., 2007; Ginzberg & Ostow, 1991). Although private philanthropy has made contributions in these areas, a federal role in improving services for immigrants has been suggested, whether by building and staffing more community health centers and public health systems or by developing capabilities and resources within immigrant communities (Derose et al., 2007).

Implications for Social Work Research

The findings of this study document the heterogeneity in sociodemographic characteristics, health insurance, and health needs of Chinese, Filipino, and Asian Indian older adults, which highlights the importance of collecting specific ethnic identification information in larger data sets. Furthermore, due to the high proportion of immigrants among Asian American older adults, systematically tracking immigrant-related information will enable researchers to better understand the influence of immigrant-related factors on health services utilization among older immigrants.

Since information about the basic characteristics and service needs of Asian American older adults is scarce, large sample surveys and national census data are needed. The current national public data sets should set more detailed race categories for Asian Americans to accurately reflect the composition of this population. Particularly, in order to study specific subgroups of Asian American older adults, each group should be oversampled to reach an adequate sample size for future analysis.

Also, important constructs that might explain the health services utilization patterns among older Asian Americans should be added as core questions for data collection, such as cultural background, health beliefs, pre-immigration experience,

nativity, country of origin, citizenship, age at immigration, length of stay, visa type, degree of acculturation, and language ability. Other quality measures of health status, unmet needs, and health services should also be included in the data to better understand the mechanism of health service utilization among Asian American older adults.

Path analyses results show that there are different factors associated with two types of health services utilization – doctor visits and hospital stays, which indicate the different underlying mechanisms of these two types of health services behaviors. Thus, different hypotheses for doctor visits and hospital stays respectively should be proposed in research rather than one general hypothesis for health service utilizations. Using path analysis, this study illustrates the direct and indirect effects of independent variables on health service utilization thus clarifying the relationship between the independent variables. These results also indicate the importance of specifying the relationships among and within predisposing, enabling, and need factors for future studies in using Andersen's Behavior Model.

Results of this study reveal the homogeneity in health service utilization patterns (doctor visits and hospital stays) of Chinese, Filipino, and Asian Indian older adults, implying a similar mechanism for these three groups of older adults in seeking health services. In addition, this study identifies health needs and health insurance as factors that have direct effects on doctor visits and hospital stays. Therefore, research on doctor visits and hospital stays among these three groups of older adults can group them together and focus on how their health needs and health insurance influence their utilization of health services.

As mentioned earlier, lack of theory is a prominent limitation in the literature on service utilization among Asian American older adults. There are several theoretical models available and potentially useful to study this topic, but a fundamental problem is that none of the models accounts for the variation in factors that facilitate or impede service utilization. Also, the models and evidence have not been put together to provide new insights in explaining the phenomena in question. More efforts are needed to construct a model with identified constructs that explain how those constructs affect service utilization for Asian American older adults. For example, more ethnographic research is needed to understand the effects of cultural background and beliefs on service utilization among this population. Ethnographic research can provide the epistemological and methodological tools to gain in-depth knowledge and look in the sociocultural worlds of Asian American elders' everyday lives. In addition, grounded theory can emerge from ethnographic research, which could guide future directions for research.

Furthermore, the majority of current studies on service utilization are cross-sectional. The methodological limitations prevent us from understanding the causal factors influencing service utilization among Asian American older adults, their dynamic status, or changes over time. The need for longitudinal service utilization studies is important if we want to understand how Asian American older adults utilize services and how service use changes over time.

Appendix 1. Summary of empirical studies on health service utilization among Asian American older adults

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
Asian American Older Adults as a Whole Group						
(E. S. H. Yu & Cypress, 1982)	1979 National Ambulatory Medical Care Survey (NAMCS) N=45351 442 Asian/Pacific Islander (API) All ages	None	Resident area, type of therapeutic services rendered, type of diagnostic services rendered, age, physician specialty, principal diagnosis	Office-based physician visit	Estimates and rates of office-based physicians	In every age group, the visit rate to office-based physicians is lower for APIs when compared with white Americans. For older adults 65 and over, the visit rate is 1.94, compared with 4.08 for white, 2.71 for black, and 3.96 for all races. A significantly smaller percentage of APIs, in contrast to other specified race/ethnic groups, had visited a physician for injury or poisoning, and a substantial proportion of their visits were apparently made for preventive care. Significantly fewer visits were made by API to the office of a surgeon or a psychiatrist.
(W. T. Liu & Yu, 1985)	1976-1979 NHIS Age: 65 and older	None	Income, age, race	Use of health service	Physician visits, dentist visit, hospital episodes, ER/outpatient clinic	In the population 65 and older, the office-based physicians rate for API is only half that reported by White. APIs have the highest rate of use emergency room services (30%) compared to any other groups. There is very little difference between Asians and white in the number of physician visits. However, the percentage of dentist visit for Asian is 28.5%; compare 32.9% for white, 17.1% for black, and 21.0% for Hispanic.
(Boult & Boult, 1995)	N=624 older recipients of Medicaid in Minnesota 201 Asian Age: 65 and older	None	Age, sex, race, risk group	Physician services	Physician visits and hospital admissions in the previous year	Asian Americans had visited physicians less frequently than whites: 43% versus 15.1%, 0 to 1 time; 42.5% versus 49.4%, 2 to 6 times; 14.5% versus 35.5%, 7+ times. After adjusted for the effects of age and gender, Asian race was a highly significant predictor of infrequent visits to physicians.
(Coughlin & Uhler, 2000)	N=6015 API women 2873 aged 40 and over for analysis of screening mammogram	None	Age, marital status, education, income, employment, general health status, saw physician within past	Breast and cervical cancer screening	Clinical breast exam, ever and in past 2 years; Pap test, ever and in past 3 years;	About 71.7% of women who aged 50 and over had a mammogram in the past 2 years, and 69.5% had a clinical breast exam in the past 2 years. About 73.7% of women aged 18 and over who had not undergone a hysterectomy had a Pap test in the past 3 years. Women

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
	and clinic breast exam 5254 aged 18 and over and without hysterectomy for analysis of Pap test		year, health insurance coverage, cigarette smoker, alcohol use			with health insurance and those who had seen a physician in the past year were more likely to have been screened.
(O'mara & Arenella, 2001)	Case study of the Hospice of North Virginia N=3191 57 Asians All age	None	Race and ethnicity, ten leading causes of death,	Utilization of comprehensive hospice care	Calculated the number of visits per patient	When hospice deaths were compared with regional deaths, the hospice provided services to 30% of Caucasians, 20% of Asians, 19% of Hispanics, and 18% of African-Americans. When break down different services, Asian used more R.N, social work, Physician and less home health aides and chaplain than Caucasians. The total visits per patient are 20.8 for Asians, 23.1 for African-Americans, 26.8 for Hispanics, and 19.8 for Caucasians.
(N. G. Choi, 2001a)	N=2687 173 Asian Americans, 545 African Americans, 77 Hispanic Americans 1,892 White Age: 50 and older	Andersen model	<u>Predisposing</u>: age, gender, race, marital status <u>Enabling:</u> income, home ownership, type of housing, US citizenship, language <u>Need</u>: nutrition screening score, IADL, ADL, BMI, type of diet	Utilization of nutrition supplement programs	Determinants of participation in home-delivered meals versus participation in congregate meals	Being Asian American and lacking English language proficiency decreased the likelihood of participation in home-delivered meal programs, even when nutrition and health statuses were controlled for.
(J. S. Lee & Peng, 2001)	N=2888 elderly home health care patients 408 API and 2,480 White Age: over 64	None	ADL/IADL, Dually eligible for Medicare and Medicaid, eligible for Medicaid only, Live alone	Use of health care services	Patient administrative records: total number of skilled nursing visit, social work visit, hours of home health aide	Overall, API elders were more likely to be dually eligible for Medicare and Medicaid; entered with greater dependencies; and received more home health aide services than White elders. For patients with CVD, API elders received a greater number of skilled nursing visits as well.
(Ryu et al., 2002)	1992-1994 NHIS N=5847 1591 Chinese, 1382 Filipino, 628 Korean, 670 Vietnamese, 782	Andersen model	<u>Predisposing</u>: age, gender, education, marital status, family size <u>Enabling</u>: Family income, employment,	Health service utilization	Number of physician visits in previous year	Age, sex, education, marital status, employment, years in US, health insurance, self-reported health and number of conditions were statistically significant in explaining health service utilization for the aggregate Asian American sample. However, the disaggregated ethnic

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
	Japanese, and 794 Asian Indian. Age: 18 and over		years in US, health insurance <u>Need:</u> respondent-assessed health status			group results varied among six Asian ethnic groups.
(Ngo-Metzger et al., 2003)	N=184081 cancer patients who died between 1988 and 1998 8614 API and 175467 Whites Age: 65 and over	None	Immigrant status (US born, foreign born) Demographic factors, Primary cancer type Stage at diagnosis Number of months from diagnosis to death	Medicare hospice service use	Medicare Hospice File: yes, no	Of the 184,081 patients, 5% (n = 8614) were Asian Americans, of whom 45% (n=3847) were foreign born. Compared with whites, Asian Americans were more likely to be male, married, and enrolled in managed care. Compared with U.S.-born Asian Americans, foreign-born Asian Americans were more likely to reside in low-income areas. After adjustment, patients who were Asian American and born abroad were less likely to use hospice care than were white patients. These results were consistent across the six cancer diagnoses that were examined.
(Peng et al., 2003)	N=7,394 home health recipients 5,086 White, no-Hispanic, 1,305 Black, 781 Hispanic, and 222 Asian Age: 75 or older	None	Demographic characteristics, general health, insurance status, presence of additional care (formal and informal), physical functioning, psychological functioning	Home health service utilization	Computed all home health skilled services visits: skilled nursing, physical and occupational therapists, and social work	Similar levels of skilled service utilization were observed across racial or ethnic groups. Variables related to increased skilled service utilization include having a greater number of cormobid conditions, intractable pain and more ADL dependencies at admission, women, and the dually eligible. In contrast, the presence of additional formal care was associated with lower skilled service utilization.
(J. Y. Chen et al., 2005)	2001 CHIS N=10724 9064 Whites, 485 Blacks, 560 Latinos, 489 Asian American, 126 AIAN Age: 65 and over	None	Race/ethnicity, health insurance, age, gender, marital status, education, household income, place of birth, healthcare access, health status, and health risk behavior	Receipt of preventive services	Influenza vaccine within the preceding year, receipt of mammogram within the preceding 2 year for women, colorectal cancer screening	African American and Latinos were significantly less likely to be vaccinated for influenza, and Asian Americans were significantly less likely to obtain a mammogram compared to whites, while controlling for other explanatory factors. Moreover, those with Medicare plus Medicaid coverage were significantly less likely to use all four preventive services compared to those with Medicare plus private supplemental insurance.

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
Individual Asian American Older Adults Subgroups						
(Maxwell et al., 1997)	N=218 Filipino women in LA Age: 50 and over	None	Knowledge of screening guidelines, MD recommended, attitude towards to breast cancer, social support, concerns, difficulty to get facility, intervention preferences, embarrassment	Breast cancer screening	Ever having obtained a screening mammogram, had in past 12 months, in past 2 years	66% had ever had a screening mammogram, 42% in the past 12 months, and 54% in the past 2 years. The factors positively related to the outcome: doctor's recommendation, very likely to obtain if physician recommended, felt comfortable request the test, had friends and relatives who had obtained, friends and relative supportive and said worthwhile. Negatively related: concern the cost, only needed when symptom present, inconvenience and difficulties to get to the facility, and embarrassment.
(Tsai & Lopez, 1997)	N=93 elderly Chinese immigrants in LA county Age: 65 and over	None	Demographic characteristics. Composition and extent of social support network, obstacles to service utilization	Social service utilization, including home health services	A checklist of 16 types of formal social services, including home health services	Results showed that family and kin were perceived as the most satisfying sources of support. Barriers to utilization of formal services and agencies were lack of knowledge of services, language differences and lack of transportation.
(M. Jang et al., 1998)	N=1808 Chinese American in San Francisco Age: 18 and over	None	Gender, age, marital status, # of health insurance coverage,	Health care access and utilization	Usual source of health care, classify the source, types of practices, regular checkups, dental exams, and early detection tests.	Poverty, limited English skills, and noncitizenship status all serve as significant barriers to access and use. Although most uninsured respondents relied on Western doctors first, a larger percentage used herbalists and Chinese medicine doctors. Proportionately, insured respondents typically received two or three times more regular checkups, dental exams, and early detection tests than the uninsured respondents.
(Maxwell et al., 1998)	N=229 Korean women in LA Age: 50 and over	None	Knowledge of screening guidelines, MD recommended, attitude towards to breast cancer, social support, concerns, difficulty to get facility, intervention preferences, embarrassment	Mammography utilization	Ever had a mammogram, in past 12 months, 1-2 years, 2-5 years, more than 5 years	49% had ever had a mammogram, 24% in the past 12 months, and 36% in the past 2 years. Variables positively related to "ever have a screening mammogram" included: having health insurance; income >=$25,000; having received a physician's recommendation; holding positive group norms; longer duration of residency in the US; and greater acculturation. Variables negatively related to screening

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
						included: concerns about finding cancer; taking time to get a mammogram; transportation; embarrassment; and discomfort requesting the procedure from the physician.
(Moon et al., 1998)	N=414 213 Korean 201 non-Hispanic White Age: 65 and over	None	Gender, Marital Status, self-rated health, age, years in the US, education, income	Community long-term care service utilization	A checklist of 15 community-based long-term care services	It found extremely low levels of awareness and utilization of long-term health and social services among Korean Americans, in both absolute and relative terms. Korean Americans had never used 9 out of the 15 services, compared to only one never used by non-Hispanic White.
(Ma, 1999)	N=105 75 Chinese consumers and 30 Chinese health professionals from Houston and LA Age: 25 and over	None Mix methods	Gender, place of origin, length of residence in US, education, family income, health insurance, self-assessment of health condition	Health-seeking behavior; Utilization of western health services	Pattern of health-seeking behaviors within last 2 years; Last time used western health services in the US: within last 12 months, 2 years, 3 years, 4 or more years ago, and never.	High rates of self-treatment and home remedies; medium rates of utilization of integrated western and traditional health service, including travel to country of origin for care; and low rates of exclusive utilization of western or traditional Chinese treatments.
(Pourat et al., 1999)	N=223 Korean American elders in LA Age: 65 and over	Andersen model	Predisposing: age, gender, education, marital status, live alone, years in US Enabling: Family income, health insurance Need: self-assessed health status, physical symptoms, chronic condition, psychological health Social Network	Utilization of traditional healers	Use a traditional healer in the past year	The results revealed that chronic conditions such as arthritis, lung disease, and stomach pain, fewer depressive symptoms, availability of health insurance, and stronger social networks were significant predictors of use of traditional healers
(Maxwell et al., 2000)	N=447 218 Filipino and 229 Korean female	None	Age, % lifetime in US, education, marital status, health insurance,	Cancer screening	Has and adherence to screening for three cancer sites:	14% of Filipino and 10% of Korean women were adherent to cancer-screening guideline for all three sites. These differences were significant for the combined

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
	immigrants in LA Age: 50 and over		employment, ever had a checkup		cervix, breast, colon/rectum	sample, controlling for all demographic characteristics. The two variables that were most consistently independently associated with outcome in both samples were higher % of lifetime spent in the US and ever having had a checkup when no symptoms were present.
(Shin et al., 2000)	N= 205 older Korean Americans in Baltimore. Age: 60 and over	Andersen model for vulnerable population	Predisposing: age, gender, education, marital status, English fluency, % lifetime in US, acculturation Enabling: Regular source of care, insurance, public assistance, community health services Need: perceived health status, medical history Health behavior: smoking, exercise	Utilization of health care facilities	Number of physician visits, hospitalizations, visits to Oriental medicine doctors, hospital outpatient visits, emergency room visits during the last 6 months	Koran American elderly grossly underutilized ambulatory health facilities. About 71% of respondents visited a physician and 25% used oriental medicine at least once during the previous 6 months. Only 8% visited an emergency room. Enabling factors such as public insurance and having a regular physician were important to the utilization of physician care and hospitalization, whereas perceived or evaluated needs were crucial to the utilization of oriental medicine. The level of acculturation was not significant.
(Tang et al., 2000)	N=100 Chinese American women Age: 60 and over	None	Demographics, health history, health insurance coverage, common and cultural barriers to screening, and acculturation	Breast cancer screening	Screening utilization at least once and regular adherence to mammography, clinical breast exam, and breast self-exam	Insurance coverage for mammography and acculturation to be significant predictors of having had a test at least once. Low perceived need/lack of physician recommendation and recency of physical examination were significant predictors of having had a mammogram in the past year. Acculturation and modesty were significant predictors of having had a clinical breast exam at least once, while recency of physical examination was a significant predictor of having had a clinical breast examine the past year. Reliance on medical professionals for screening and forgetting were significant predictors of having performed breast self-exam at least once, and forgetting was a significant predictor of regular performance of breast self-exam.
(Pourat et al., 2000)	N=424 Korean and white elders	Andersen model	Predisposing: age, gender, education,	Use of ambulatory	Number of office visits to Western	Descriptive findings showed older Koreans had more ambulatory physician visits, poorer functioning, and

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
	223 Korean American and 201 white elders in LA Age: 65 and over		marital status <u>Culture(beliefs):</u> years in US, language, perceptions of health or other beliefs <u>Enabling:</u> income, insurance, social support <u>Need:</u> health, functioning	care	medical doctors within the past year	poorer perceptions of their health than Whites. Multivariate findings showed that positive perceptions of health independently reduced office visits for both Koreans and Whites, but the effect was significantly smaller for Koreans. Other cultural differences also affected use.
(Frisbie et al., 2001)	1992-1995 NHIS N=216642 8,249 API: 1015 Japanese, 1965 Chinese, 1753 Filipino, 773 Korean, 997 Asian Indian, 264 PI, 785 Vietnamese, and 697 other Asian. 208393 White Age: 25 or up	None	Immigrant status National origin	Annual visits to physicians	Physician visit: no, 1 or 2 times, 3 or more times	Age-adjusted percentages of no annual physician visits among white, Japanese, Chinese, Filipino, Korean, Asian Indian, Pacific Islander, Vietnamese, other Asian are 22.7, 25.1, 33.8, 25.3, 36.4, 29.4, 25.2, 26.0 and 32.6. Compared to native born, physician visits were less common among immigrants. Vietnamese and Koreans provided a striking contrast. The odds of visiting a physician 3 or more were 50% higher for Vietnamese. Conversely, Koreans were significantly less likely to visit a physician at all.
(Kuo & Torres-Gil, 2001)	N=240 Taiwanese American elderly in south California Age: 65 and over	a modified Andersen model that included cultural and structural variables	<u>Predisposing:</u> age, gender, education, years since immigrated, MS, LA, medical belief, services provided by same culture professionals. <u>Enabling:</u> health insurance, public insurance, contacts with friends/family, children close, English-speaking ability. <u>Need:</u> health status, functional limitation, heart conditions	Utilization of health service and home-and community-based care programs	Doctoral visits during the past 12 months (yes, no) , hospital stays during the past 12 months (yes, no) ,home- and community-based programs (yes, no)	16% did not visit a doctor in the past year, 17% were hospitalized with an average stay of one day. Significant variables included health needs, cultural beliefs, and socioeconomic and structural variables; however, variables predicting utilization of health services and HCBC programs were different. For doctor visit, predictors of higher use include having arthritis, having children living by, poor health status, using alternative medicine and preferring same cultural professionals. For hospital stays, predictors include English-speak ability and education.

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
(Kim et al., 2002)	N=205 older Korean immigrants in Baltimore. Age: 60 and over	None	Gender, age, Marital status, education level, length of residence in US, income, health insurance, regular checkup	Use of traditional and western medicine	Type of Medicine Used: use Western medicine only, use traditional medicine only, use both, use none.	The findings revealed that health service utilization among Korean American elderly covered a broad spectrum of health resources, including the use of Western medicine, the traditional Korean medicine (hanbang), or both Western and traditional clinics. In addition, health insurance status and the source of health care were found to relate to the types of health service that Korean American elderly chose to utilize.
(Nguyen et al., 2002)	N=1566 Vietnamese American from California and Texas Age: 18 and over	None	sociodemographics, healthcare system access and attitudes, Pap test awareness, attitudes, intentions	Cervical Pap smear screening	Have ever had a Pap smear	74% had heard of the Pap test, and 76% had had at least one. Only 42% of those who never had a Pap test had considered obtaining one. There were no significant differences between the two sites. Women aged 65+ had the lowest rates for all three outcomes. Being married, higher level of education, having a female doctor, having a respectful doctor, having requested the test, and physician recommendation were associated with Pap test receipt.
(Juon et al., 2003)	N=459 Korean American women from Maryland Age: 40 and over	PRECEDE/ PROCEED model	Age, education, marital status, health status, chronic conditions, acculturation, predisposing factors, enabling factors, reinforcing factors	Regular cervical cancer screening	Have regular Pap smears annually	39% of women had regular Pap smears. Regular Pap smears rates varied with age, with women 65 years and older least likely to have regular Pap smears. The strongest correlate of regular Pap smear was knowledge of guidelines. Physician recommendation, having health insurance, and having friends or family members receiving Pap smears were also important facilitators. Spoken English proficiency interacted with education for an outcome; women with a low level of education and low English proficiency had lower rates of Pap smears than those who had a high level of education and high proficiency.
(Y. L. Liu, 2003)	N=29 Chinese seniors from New York Age: 60 and over	Empirical generalizations	The diversified study population, Diversified service need and use patterns	Use of community-based aging services founded	A checklist of 15 types of mainstream aging services	First, Chinese American seniors are internally diversified, and consist of several subgroups, which can be identified largely through immigration timing and status, work history, current living situations, and language and driving ability. Second, each subgroup has

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
				through OAA		particular service need and use patterns. Third, service need and use variations are related to the characteristics that define the subgroups, to perceptions of service need, availability, accessibility and to service source preference.
(M. Yu et al., 2003)	N=180 women from Michigan 117 Chinese, 63 Korean Age: 40 and over	None	Age, language, years in the US, health insurance, knowledge about mammogram and breast cancer	Utilization of breast cancer screening	Received mammography screening in the past 2 years	Approximately 56% of the women had received mammograms in the past 2 years, about 21% lower than the statewide rate for Michigan. Women's mammography use was significantly associated with their ability to speak English, availability of health insurance, and knowledge of mammography. Similarities and differences between sampled Chinese and Korean women existed in terms of their socio-demographic characteristics and the factors influencing their use of breast cancer screening.
(Juon et al., 2004)	N=459 Korean American in Maryland Age: 40 and over	PRE CEDE/PR OCEED model	Age, education, marital status, health status, chronic conditions, acculturation, predisposing factors, enabling factors, reinforcing factors	Adherence to screening mammography	Self-reported recognition, receipt, recency, and adherence to screening mammography	About 33% had regular mammograms. In multiple logistic regression analyses, the strongest correlate of regular mammograms was knowledge of screening guidelines. Age, spoken English proficiency, and physician recommendations were associated with regular mammograms. Employment interacted with insurance: Employed women without insurance had lower rates of mammograms than those employed with insurance.
(Y. Jang et al., 2005)	N=230 older Korean American in Florida Age: 60 and older	Andersen model	Predisposing: age, gender, education, Enabling: health insurance, English speaking ability, transportation, living arrangement, trust in Western medicine, and reported experience of disrespect in medical	Healthcare utilization	Hospital visits during the previous 6 months	After controlling for predisposing and need factors, health insurance coverage was found to be a significant enabling factor for hospital visits. Subjective perception of health was found to be significant not only for healthcare utilization, but also for satisfaction with service. A greater likelihood of satisfaction was also observed in individuals with health insurance, better English-speaking ability, and greater trust in Western medical care. The reported experience of disrespect or discrimination in medical settings significantly reduced

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
			settings Need: chronic conditions, functional disability, number of sick days			the odds of satisfaction with service.
(Aroian et al., 2005)	N=27 Chinese immigrant elders in Boston Age: 62 and older	Qualitative content analysis	Demographic characteristics,	Health and social service use	Western biomedicine service use, traditional Chinese service use	Content analysis of these data indicated that participants across groups agreed that Chinese elders underutilize services because of problems related to language, transportation, cost, long waits for appointments, and because of cultural norms/values related to need for care, preference for self-over professional care, fear, and distrust of western biomedicine, and the obligation to refrain from using formal services
(Miltiades & Wu, 2008)	N=177 Chinese elders in Boston Age: 60 and older	Andersen model	Predisposing: age, gender, education marital status, year in US. Enabling: health insurance, income, social network Need: health status, depression, chronic conditions	Western physician utilization	visiting a Western physician in past 12 months	Predictors of physician visits for the Boston sample are insurance status, health, and social network. Older adults who reported larger social networks and poorer health had higher levels of physician utilization. Older adults without health insurance had lower levels of physician utilization than those with insurance. Access to care variables significantly affects physician utilization for immigrant elders
(Ngo-Metzger, Phillips, & McCarthy, 2008)	N=184081 cancer patients who died between 1988 and 1998 , 8614 API and 175467 Whites 2145 Chinese, 3510 Japanese, 1781 Filipino, 856 Hawaiian/Pacific Inlanders, 322 other Asians Age: 65 and over	None	age and marital status at diagnosis, sex, race or ethnicity, place of birth, year of diagnosis, and SEER area of residence	Medicare hospice service use	time to hospice enrollment and length of stay in hospice care	All API subgroups studied had lower rates of hospice use than white patients, adjusting for patient demographic and clinical characteristics. Of those who enrolled in hospice (approximately 20% of the total sample), Japanese Americans had a shorter median length of stay (21days), and Filipino Americans had a longer median length of stay (32 days) than white patients (26 days). Overall, approximately 20% of patients enrolled within 7 days of death, and only 6% had hospice stays that were longer than 2 months, with no significant differences across racial or ethnic groups.
(Shibusawa & Mui,	N=100 older Asian Indian immigrants in	Andersen model	Predisposing: age, gender, living alone,	Health service use	Physician visit(s), inpatient hospital	The number of medical conditions is significant in predicting the likelihood of physician visits while age

Authors	Sample	Theory	IVs	DVs	Measure of DVs	Findings
2008)	New York Age: 65 and older		English proficiency <u>Enabling</u>: health insurance, finical status <u>Need</u>: number of medical conditions		care, use of emergency department services, and use of traditional medicine.	and having medical insurance predicted the likelihood of hospital stays. Having medical insurance was also a significant predictor for the use of emergency department services while poor English proficiency was associated with the use of traditional medicine.

Appendix 2. Summary of hypotheses test results of research question 2

		Doctor visits	Hospital stays
Hypothesis A (predisposing factors)	Partially supported		Being not married →more hospital stays
Hypothesis B (enabling factors)	Partially supported	heaving health insurance→more doctor visits	heaving health insurance→more hospital stays
Hypothesis C (need factors)	Supported	1)poorer self-reported health→more doctor visits 2)greater activity limitation →more doctor visits	1)poorer self-reported health→more hospital stays 2)greater activity limitation →more hospital stays
Hypothesis D (immigrant-related factors)	Not supported		
Hypothesis E (mediating)	Partially supported	1)Being US citizen → having insurance → more doctor visits 2)Being US citizen →better self-reported health →less doctor visits	

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