

## Acculturation and Its Influence on the Chronic Condition Prevalence in the Asian American Population

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### Abstract

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Asian Americans are considered the healthiest group among all the racial and ethnic groups in the United States. However, do they still enjoy the health advantage in terms of chronic conditions? How do the length of residence in the United States and nativity status affect the health of Asian Americans? The differences by Asian ethnicities are also explored. By using data drawn from the National Health Interview Survey, this research examines the prevalence of chronic conditions among Asian Americans as part of their adaptation process within the American mainstream culture after years of residence in the United States, as compared to their native-born counterparts. The findings suggest that the longer Asian Americans stay in the United States, the more likely that their lifestyle approaches one that reflects the mainstream American culture, and that the positive health effects gradually diminish. Some subgroups of more acculturated Asian Americans show a higher prevalence of diabetes than that of the non-Hispanic whites and the total U.S. population.

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**Keywords:** Immigrant Adaptation, Assimilation, Health Disparities, Chronic Diseases and Risk Factors, Asian American Ethnicity

### 1. Introduction

In general, Asian Americans are considered the healthiest racial and ethnic group overall. A Report “Health, United States, 2016” by the U.S. Department of Health and Human Services (2016) documents that Asian Americans enjoy health advantage over any other racial and ethnic groups. In fact, comparing to non-Hispanic whites, Asian Americans generally experience a lower mortality risk, and the foreign-born Asian Americans receive benefit of the reduced risk than the native-born counterparts (Singh & Siahpush, 2002). Now you may wonder the health conditions of Asian Americans in terms of chronic conditions. Would they still enjoy the health advantage and remain the healthiest group? It is questionable that Asian Americans can retain the current level of well-being as a consequence of acculturation when they stay in the United States and are exposed to the mainstream American lifestyle for an extended period of time.

The proportion of the native-born Asian Americans to the foreign-born Asian Americans in the total population is unique and needs to be noted. According to the 2010 U.S. Census, unlike the total American population in which 90 percent are native born, only about 30 percent of Asian Americans were born in the United States. The evidence of the positive health of Asian Americans could be a result of the high percentage of foreign-born population, 70 percent, and the decision on the part of immigrants to continue the lifestyle practices and cultural beliefs brought to the United States from their country of origin. In this research, the effect of acculturation as well as the social determinants of chronic conditions among various Asian ethnicity groups in the United States including nativity status and years of residence in the United States is documented.

The major research questions are: (1) How does settlement in the American society affect Asian Americans with chronic conditions and the risk factors by their nativity status and length of residence in the United States; (2) What are the determinants and how do they influence on health conditions of Asian Americans; and (3) How do they differ by Asian ethnic groups.

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The significance of this research is that the findings will reveal implications stemming from the development and transition in immigrant adaptation among Asian Americans. Researchers may have been disinclined from pursuing studies in this field of health because Asian Americans register the highest level of longevity among any racial and ethnic groups in the United States. This perception prevails possibly because Asians have a well-deserved health reputation and are generally regarded as a healthy group, which is also due to the insufficient availability of nationally represented samples for Asian Americans. Asians consist of heterogeneous ethnic groups but tend to be classified as a whole. The degree and trends of health disparities within Asian ethnicities will be well documented in this study. Because the topics in this research involve issues that have been rather unexpectedly overlooked, this research will hopefully help to advance the literature on immigrant adaptation of Asian Americans.

## 2. Background

Socioeconomic mobility directly affects and lowers the exposure of immigrants to infectious diseases. The overall mortality decline in recent decades has been more than offset by chronic diseases such as diabetes, stroke, and cancer (Anderson, Kochanek, & Murphy, 1997; Nathanson, 1984; Preston, 1977). Compared to the U.S. national average, the U.S. Department of Health and Human Services (2007) presents that Asian Americans should observe caution in such chronic conditions as cancer, heart disease, stroke, diabetes, and chronic lower respiratory disease because they are considered some of the ten major causes of death among Asian Americans. In case of chronic conditions, there is a positive association between immigrant adaptation and socioeconomic mobility. That is, the socioeconomic well-being of immigrants implies a rise in the prevalence of chronic conditions. The presence of obesity among foreign-born individuals increases as the years of residence in the United States increase (Goel, McCarthy, Phillips, & Wee, 2004; Kaplan, Huguot, Newsom, Farland, 2004; Lauderdale & Rathouz, 2002; Singh & Miller, 2004). A study measured the obesity of Asian Americans by their ethnicity and nativity status based on their BMI score and showed differences in levels of being overweight and obese for the six most represented Asian American subgroups by gender (Lauderdale & Rathouz, 2002). They point out that men have a higher proportion of overweight than women, and that Japanese men and Asian Indian women have the highest proportions of being overweight population in each gender group. Although they report that Asian Americans have a low obesity prevalence, native-born Asian Americans are estimated four times more likely for males and 3.5 times more likely for females to be obese when compared to their foreign-born counterparts. Acculturation substantially increases the level of total cholesterol (Lizarzaburu & Palinkas, 2002).

There is a significant and fundamental difference in chronic conditions within the Asian American ethnic subgroups (Salant & Lauderdale, 2003). To provide a few examples of the heterogeneity in chronic conditions across Asian American subgroups, the types of chronic diseases that Asian Indians are more likely to experience are hypertension and diabetes (Jonnalagadda & Diwan, 2005). Huang et al. (1996) compared the health condition of Japanese who lived in Japan with those who lived in Hawaii. Their results indicate that acculturation costs Japanese in Hawaii an elevated likelihood of obesity as well as a doubled risk of developing Type 2 diabetes. Based on the findings by Hosler and Melnik (2003), a lower prevalence of diabetes was observed among the first-generation Japanese American population residing in the suburban New York City community, because the population shows the characteristics to indicate that they are highly educated, less acculturated to American norms, and practice an ethnic diet similar to that maintained in their country of origin. However, as the years of their residence in the United States increases, their lifestyle and cultural norms tend to become more and more similar to those possessed by mainstream Americans. The native-born Asian Americans as well as those who immigrated to the United States at a younger age are more likely to become far more immersed in American mainstream culture in terms of their fluency in English and the consumption of a higher caloric diet including “fast food.” Therefore, the longer an individual remains in the U.S., the more likely it is that his or her lifestyle will approach one that reflects mainstream American culture, including, for instance, behaviors such as a heavy reliance on a car for transportation, lack of daily physical exercise, smoking, overweight, and a diet high in total calories, all of which could lead to some of the major risk factors contributing to chronic conditions. Also, genetic factors and certain lifestyle features (for example, overeating, excessive calorie intake, etc.) can lead to Type 2 diabetes.

The cases that a high percentage of foreign-born Americans contribute to the overall good health picture can be found in research among the Hispanic immigrant population in the United States, which is often referred to as the Hispanic Paradox. The paradox documents that Hispanics have a low socio-economic status but demonstrate a lower mortality rate and better health (Elo, Turra, Kestenbaum, & Fergusson, 2004; Palloni & Arias, 2004).

There are several arguments suggested in relation to this paradox. First, some researchers point to the “healthy immigrant effect,” which assumes that it is healthy people who tend to migrate to begin with (Sorlie, Backlund, Johnson, & Rogot, 1993; Palloni & Arias, 2004). Second, the “salmon bias,” suggests that many migrants tend to go back to their country of origin if they become ill (Pablos-Méndez, 1994; Abraido-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999). Also, there is the “cultural effect,” which includes ethnic diet, smoking prevalence, alcohol consumption, frequency of physical activity, as well as social and cultural norms (Palloni & Arias, 2004). Some claim that attaining a somewhat low level of acculturation to the American mainstream often helps Hispanics create an eventual health advantage in relation to the cultural effect (Gordon-Larsen, Harris, Ward, & Popkin, 2003). To support this argument, a similar positive health effect, such as a significantly lower proportion of people being overweight or obese, is found in the samples of the less acculturated first-generation Japanese Americans with a high frequency of traditional Japanese meal consumption (Hosler & Melnik, 2003).

My hypothesis is that while immigrants initially suffer and struggle because of cultural differences and a lack of English language skills, they gradually acculturate over time and eventually assimilate into the mainstream society. The effect of the acculturation on health can be reflected in eating food high in calories and/or fat content more frequently, relying heavily on driving for transportation rather than walking or riding a bicycle, smoking, overweight, and physical inactivity. The longer immigrants remain in the U.S., the more likely that their lifestyle will approach one that reflects the mainstream American culture, and health advantages should gradually diminish. I expect that the major risk factors such as obesity, smoking, and physical inactivity will increasingly prevail, and that the health risk for chronic conditions among Asian Americans will increase. The degree of acculturation among the foreign-born Asian Americans is presumed lower than the native-born Asian Americans, as the foreign born are more likely to retain the lifestyle carried over from their home country even after their arrival in the United States. Thus, I contend that the overall good health of the high percentage of foreign-born Asian Americans creates an overall positive health image, while the health of native-born Asian Americans and immigrants who have already adapted to American lifestyle has been negatively affected. Particularly in health, race and physical appearance matter. They imply how social and environmental factors, such as acculturation as well as experience and exposure to different cultures, contribute to health outcomes, because native-born and foreign-born Asian Americans are both genetically similar. This enables me to suggest that the phenomenon like the Hispanic Paradox could be true for Asian Americans.

### 3. Data and Methods

Data from the National Health Interview Survey (NHIS) were employed to assess health conditions among foreign-born and native-born Asian Americans (U.S. Department of Health and Human Services, National Center for Health Statistics, 2002a; 2002b; 2003; 2004; 2005; 2006). Due to the relatively small number of Asian American samples in datasets, the surveys conducted from the Year 2000 to Year 2005 were combined to increase the sample size. This strategy is valid because the NHIS is a cross-sectional survey. All the statistical models are age-adjusted to reflect the 2000 census population estimate. Individuals at age 18 or older are selected. Conventionally, conservative categories have been applied to Asian groups. Specifically, Asian Americans are simply categorized as Asians at the aggregate level although there are significant health disparities within the group. However, because of the significant variations across ethnicities for Asians, it is critical to categorize Asian Americans into as many ethnic subgroups as possible by their country of origin as long as the datasets allow, instead of simply treating all the people from Asian countries as “Asians,” which is commonly observed in previous studies. In this research, more detailed categories for Asian ethnicity is used; namely, Asian Americans are categorized into subgroups by their ethnicity such as Asian Indians, Chinese, Filipinos, and “Other Asians” including Japanese, Koreans, Vietnamese, and so forth. Pacific Islanders are not included for the purposes of this analysis as there are too few samples available in the datasets to make their inclusion beneficial.

I am primarily interested in Asian ethnicity, nativity status, and years of residence in the U.S. for immigrants. The prevalence of selected chronic conditions among respondents is used as the outcome variable. Specifically, it is measured by respondent’s self-reported health status with regard to various chronic diseases and whether or not doctors have ever told a respondent that he or she has one or more of chronic conditions. I incorporate indicators that reflect socio-demographic, geographic, health, behavioral, and acculturation information. Various risk factors contributing chronic conditions such as obesity, cigarette smoking, physical inactivity, and alcohol consumption are considered as part of independent variables. Since hypertension and high blood cholesterol are perceived as contributing risk factors, they are also considered.

The five most relevant chronic conditions and risk factors that appropriately reflect to my research objectives are considered to capture the health conditions. The representative types of chronic conditions are (1) hypertension / high blood pressure, (2) high blood cholesterol, (3) heart condition / heart disease, (4) stroke, and (5) diabetes. As hypertension and high blood cholesterol are perceived as contributing risk factors, I aggregate heart condition, stroke, and diabetes to form a variable to reflect the respondent's chronic conditions. This variable is initially categorized into three groups for descriptive tables: (1) no chronic conditions observed; (2) one chronic condition; and (3) two or more chronic conditions. However, for statistical analysis, this variable of the number of chronic conditions serve as the dependent variable with a continuous level of measurement.

BMI is the well-known measure to determine weight status and to correlate with body fat. Based on the U.S. definition by the NHLBI Obesity Education Initiative Expert Panel of the National Institutes of Health (1998), Body Mass Index (BMI): (1) Underweight ( $BMI < 18.5$ ); (2) Normal weight ( $18.5 \leq BMI < 25.0$ ); (3) Overweight ( $25.0 \leq BMI < 30.0$ ); (4) Obese ( $BMI \geq 30.0$ ). However, for Asian Americans, due to the difference in physical features, it may be reasonable to consider implementing an appropriate measure of the BMI category as a supplement. A research team from the World Health Organization (2004) suggested an appropriate measure of BMI for Asian populations, which follows the criteria as: (1) Underweight ( $BMI < 18.5$ ); (2) Normal weight ( $18.5 \leq BMI < 23.0$ ); (3) Overweight ( $23.0 \leq BMI < 27.5$ ); (4) Obese ( $BMI \geq 27.5$ ).

The degree and frequency of alcohol consumption are arranged into four groups: (1) the category "lifetime abstainer," meaning males and females who have never consumed alcohol; (2) "light drinker," indicating an alcohol consumption of less than 7 glasses a week, for males, and less than 3 glasses for females; (3) "moderate drinker," meaning a person who consumes 7 to 14 glasses of alcohol beverages per week for males and 3-7 glasses per week for females; and (4) a "heavy drinker," meaning men who consume more than 14 glasses and women who consume more than 7 glasses of alcoholic beverages in a week. The definition of these categorizations is based on the guideline set by the U.S. Department of Agriculture (2000) that alcohol consumption should not exceed 2 drinks a day for male and 1 drink a day for female. Likewise, the National Institute on Alcohol Abuse and Alcoholism (1995) suggests a similar level of alcohol consumption – no more than 14 drinks a week for male and no more than 7 drinks for female.

To capture the frequency of respondent's weekly physical activity, three categories are considered: (1) a high level of exercise, indicating that a respondent engages in either (a) twice or more times a week of vigorous activity or (b) four or more times a week of moderate activity; (2) a moderate level of exercise, indicating that a respondent engages (a) in vigorous physical exercise once a week or (b) in a moderate level of activity 1 to 3 times a week; and, lastly (3) sedentary, referring to a respondent who does not engage in vigorous or moderate physical activity.

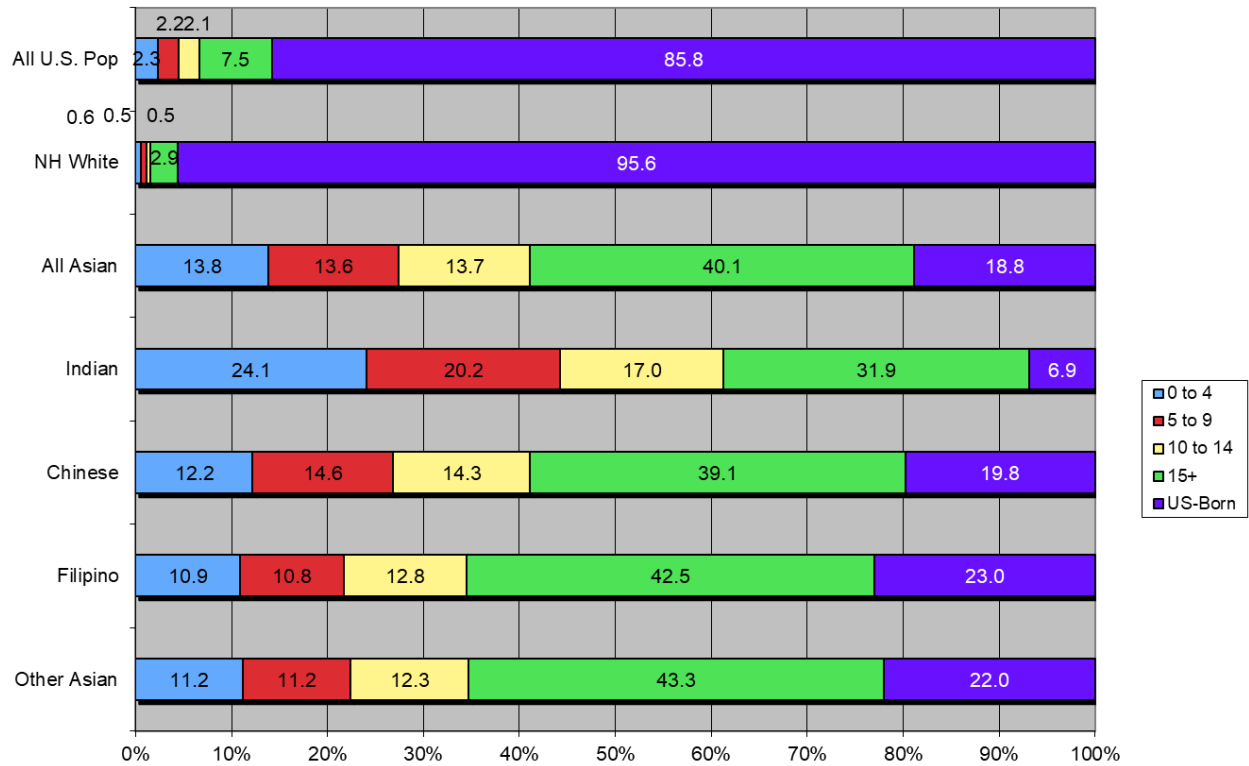
As for the level of income, individual income is not available in the dataset. The only income level variable available shows the three categories that a household annually makes (1) less than \$20,000, (2) \$20,000 to \$44,999, and (3) \$45,000 or more. This may be sufficient for measuring poverty status. Because the considerable percentage of cases show that income information is missing, another special category "N/A" within the income variable will be added to prevent the potential problem of a significant reduction of the sample size in statistical analysis due to a large number of missing cases. Therefore, the household income variable contains the total of four categories. These are the major limitations and potential problems involving this proposed research in addition to somewhat small sample size.

Descriptive statistics and multiple regression analysis are performed to measure the effect of socio-demographic and health related characteristics on the prevalence of chronic conditions. Regression models with and without the two contributing factors along with other socio-demographic and health related variables are considered. That is, the base models are initially estimated and then the hypertension status variable as well as the high blood cholesterol status is included.

#### 4. Findings

Figure 1 shows the proportion of native-born and foreign-born populations for each race and ethnic group considered for this study. The foreign-born Americans are categorized into four groups by their years of residency in the United States. The two bars on the top represent the entire U.S. population and the non-Hispanic whites. Asian groups have a low percentage of the native-born population and a high percentage of the foreign-born population.

**Figure 1. Length of Residence in the U.S. and Nativity Status by Race/Ethnic Groups**



The distributions of socio-demographic characteristics and health behaviors, as well as the frequencies of the native-born and foreign-born Asian Americans for each available ethnic group are shown in Table 1 and Table 2, respectively.

**Table 1 Distribution of Socio-Demographic Characteristics of US-Born Asian Americans**

Variables	All Asian	Indian	Chinese	Filipino	Other Asian
<b>Gender</b>					
Male	52.1	55.3	56.5	45.6	53.0
Female	47.9	44.7	43.5	54.4	47.0
<b>Age</b>					
18-44 years old	63.7	95.1	68.2	69.5	53.9
45-64 years old	22.7	4.9	23.5	21.3	25.6
65+ years old	13.7	0.0	8.3	9.2	20.5
<b>Marital status</b>					
Not married	56.8	74.2	55.6	55.5	55.5
Married	43.2	25.8	44.4	44.5	44.5
<b>Educational attainment level</b>					
Less than high school	6.0	8.9	1.6	6.8	7.1
High school	17.0	7.7	7.8	25.8	17.8
Some college	36.8	40.6	29.5	39.2	38.2
Bachelor's or higher degree	40.2	42.9	61.2	28.3	36.9
<b>Region of residence</b>					
Northeast	11.7	23.7	15.6	9.8	9.1
Midwest	7.9	18.8	8.5	8.1	5.8

South	15.0	28.6	10.7	46.7	13.8
West	65.5	28.9	65.2	65.4	71.2
<b>Household income</b>					
\$45,000 or above	39.2	22.1	52.0	33.8	38.9
\$20,000 - \$44,999	32.4	32.7	27.4	34.6	33.5
Below \$20,000	28.4	45.3	20.7	31.6	27.6
<b>Smoking status</b>					
No smoker	69.4	89.0	76.4	62.2	67.1
Current smoker	15.4	7.8	10.5	22.0	15.4
Former smoker	15.2	3.2	13.1	15.8	17.5
<b># Cigarettes per day</b>					
1-10 cigarettes	83.2	100.0	90.1	84.2	79.1
11+ cigarettes	16.8	0.0	9.9	15.8	20.9
<b>Physical activity</b>					
Vigorous	55.8	58.4	61.8	52.8	54.3
Moderate	18.0	11.9	15.5	17.8	20.1
Sedentary	26.3	29.8	22.8	29.5	25.7
<b>Alcohol use</b>					
No drink (Lifetime abstainer)	29.2	39.2	28.1	19.8	33.1
Light drinker	55.0	44.9	58.1	61.6	51.7
Moderate drinker	12.3	13.4	13.0	15.5	10.3
Heavy drinker	3.5	2.5	0.8	3.1	4.9
<b>BMI - U.S. definition</b>					
Underweight	6.6	13.0	8.4	2.1	7.2
Normal weight	51.6	57.1	50.8	49.9	51.9
Overweight	29.8	28.1	29.5	32.0	29.0
Obese	12.1	1.8	11.3	16.1	11.8
<b>BMI - Asian definition</b>					
Underweight	6.6	13.0	8.4	2.1	7.2
Normal weight	33.7	42.1	37.3	28.6	33.5
Overweight	37.3	33.8	35.7	37.9	38.2
Obese	22.4	11.1	18.6	31.5	21.1
<b>Chronic disease status</b>					
None	70.3	90.7	71.1	71.5	66.1
One	21.4	9.3	21.8	20.8	23.3
Two or more	8.4	0.0	7.1	7.7	10.6
<b>Self-reported health status</b>					
Excellent	35.8	61.5	35.1	38.0	31.1
Very good	33.7	26.4	38.2	28.6	35.4
Good	23.8	9.8	23.0	26.6	24.8
Fair	5.8	0.3	3.3	6.0	7.3
Poor	0.9	0.0	0.5	0.8	1.3
All persons	1,631	133	330	420	748

Source: National Health Interview Survey, 2000-2005 Combined.

**Table 2 Distribution of Socio-Demographic Characteristics of Foreign-Born Asian Americans**

Variables	All Asian	Indian	Chinese	Filipino	Other Asian
<b>Length of residence in the U.S.</b>					
0-4 years	17.0	25.8	15.2	14.2	14.4
5-9 years	15.7	21.7	18.2	14.1	14.4
10-14 years	18.9	18.3	17.9	16.7	15.8
15 or more years	36.6	34.2	48.8	55.1	55.5
<b>Gender</b>					
Male	50.4	54.7	51.7	46.5	49.1
Female	49.6	45.3	48.3	53.5	50.9
<b>Age</b>					
18-44 years old	61.2	68.8	56.4	53.4	63.2
45-64 years old	29.9	26.9	31.0	35.3	28.4
65+ years old	8.9	4.4	12.6	11.3	8.4
<b>Marital status</b>					
Not married	30.9	23.9	28.1	31.4	36.1
Married	69.1	76.1	71.9	68.6	63.9
<b>Educational attainment level</b>					
Less than high school	12.9	9.6	14.5	8.3	16.3
High school	17.8	11.7	16.5	14.0	24.0
Some college	20.9	14.9	13.8	29.3	23.9
Bachelor's or higher degree	48.3	63.9	55.1	48.5	35.9
<b>Region of residence</b>					
Northeast	22.7	30.6	28.5	14.5	19.2
Midwest	14.9	16.5	13.8	11.9	15.9
South	22.1	33.0	15.9	13.9	23.2
West	40.3	19.9	41.8	59.6	41.8
<b>Household income</b>					
\$45,000 or above	34.3	43.7	39.7	31.6	27.0
\$20,000 - \$44,999	36.3	30.7	30.8	41.0	40.0
Below \$20,000	29.5	25.6	29.6	27.4	32.9
<b>Citizenship status</b>					
U.S. citizen	55.4	44.8	58.6	67.1	54.3
Non-U.S. citizen	44.6	55.3	41.4	32.9	45.7
<b>Smoking status</b>					
No smoker	76.6	85.9	80.0	72.7	71.4
Current smoker	12.4	7.2	9.8	11.0	17.5
Former smoker	11.0	6.9	10.2	16.3	11.1
<b># Cigarettes per day</b>					
1-10 cigarettes	82.5	83.1	79.8	84.6	80.7
11+ cigarettes	18.5	16.9	20.2	15.4	19.3
<b>Physical activity</b>					
Vigorous	39.9	40.8	40.2	42.3	38.1
Moderate	16.8	16.7	16.0	18.0	16.7
Sedentary	43.3	42.5	43.8	39.7	45.2
<b>Alcohol use</b>					
No drink (Lifetime abstainer)	51.9	59.6	46.0	45.5	53.7
Light drinker	40.6	34.7	47.4	47.9	36.9
Moderate drinker	5.9	4.9	5.5	4.7	7.4

Heavy drinker	1.5	0.8	1.1	1.9	2.0
<b>BMI - U.S. definition</b>					
Underweight	6.0	6.4	5.3	2.4	7.8
Normal weight	62.6	54.1	74.6	56.7	64.4
Overweight	25.8	33.8	17.5	31.6	22.6
Obese	5.6	5.7	2.6	9.3	5.3
<b>BMI - Asian definition</b>					
Underweight	6.0	6.4	5.3	2.4	7.8
Normal weight	40.8	34.3	50.0	34.0	43.4
Overweight	40.8	43.6	38.5	46.6	37.5
Obese	12.4	15.7	6.3	17.1	11.3
<b>Chronic disease status</b>					
None	77.7	80.1	77.8	68.7	0.6
One	16.0	15.0	15.0	21.3	14.4
Two or more	6.4	5.0	7.2	10.0	5.1
<b>Self-reported health status</b>					
Excellent	34.9	41.7	28.7	33.7	34.9
Very good	32.4	30.9	35.5	34.7	30.4
Good	25.2	22.3	28.6	23.7	25.8
Fair	5.9	4.2	5.4	6.0	6.9
Poor	1.7	0.9	1.8	1.8	2.1
All persons	6,903	1,456	1,460	1,304	2,683

*Source:* National Health Interview Survey, 2000-2005 Combined.

The three most prevalent chronic conditions for each racial and Asian ethnicity group by nativity status and immigrant generations have been listed in Tables 3 and Table 4. Table 3 shows the information on individuals who were 45 to 64 years old. Likewise, Table 4 includes individuals at age 65 and over. The types of chronic conditions considered in these descriptive tables are: hypertension or high blood pressure; high blood cholesterol; heart condition or heart disease; stroke; and diabetes. These chronic conditions have the relevance to capture the degree of acculturation to the United States. The explicit chronic health disparities have been captured by categorizing Asian Americans into smaller subgroups while retaining Asian Americans as a whole. From the findings, hypertension and high cholesterol are the two most prevalent chronic conditions among almost all racial and ethnic groups. Generally, it is followed by diabetes in the third, heart conditions in the fourth, and stroke in the fifth prevalent chronic conditions; however, the order may differ by groups. It is noteworthy to point out that diabetes is ranked high among Asian Americans.

The chronic condition prevalence level elevates for ages 45 to 64. The native-born Asian Americans show a higher chronic condition prevalence than the native-born non-Hispanic whites and the U.S. population in high cholesterol (36.1% for the native-born Asian Americans, 33.7% for the native-born non-Hispanic whites, 32.7% for the U.S. population) and hypertension (34.3% for the native-born Asian Americans, 31.9% for the native-born non-Hispanic whites, 33.3% for the U.S. population). The prevalence of other chronic conditions has reached comparable level as the U.S. population and the native-born non-Hispanic whites, and the health advantages of Asian Americans have disappeared. Specifically, the prevalence of diabetes for the native-born Asian Americans is 9.3 percent (10.7% for the U.S. population and 9.3% for the native-born non-Hispanic whites). Likewise, the prevalence of heart condition and stroke for the native-born Asian Americans is 8.1 percent (8.2% for the all U.S. population and 8.9% for the native-born non-Hispanic whites) and 2.8 percent (2.3% for the U.S. population and 2.1% for the native-born non-Hispanic whites), respectively.

Focusing on the disparities by Asian ethnic groups, the native-born Chinese Americans indicate the highest prevalence of high cholesterol with 44.8 percent (36.1% for the native-born Asian Americans), hypertension with 36.4 percent (34.3% for the native-born Asian Americans), diabetes with 11.9 percent (9.3% for the native-born Asian Americans), and heart conditions with 10.6 percent (8.1% for the native-born Asian Americans).



The native-born Filipino Americans also show the prevalence of 40.2 percent for high cholesterol, 12.0 percent for diabetes, and 6.0 percent for stroke. The prevalence of those chronic conditions among the native-born Chinese and Filipino Americans is higher than the prevalence of the U.S. population and the native-born non-Hispanic whites. The Other Asians show the similar or a slightly higher prevalence of hypertension (36.0%) and high cholesterol (33.3%) as compared with the U.S. population and the native-born non-Hispanic whites, a lower prevalence is documented for the other three chronic conditions.

For the foreign-born population, the prevalence of chronic conditions is generally lower than that of native-born Asian Americans as well as the U.S. population and the native-born non-Hispanic whites. The prevalence of heart conditions is particularly lower. However, by observing the prevalence of chronic conditions among Asian Americans into ethnic subgroups, some unique patterns are captured. The foreign-born Filipino Americans show the higher likelihood of having hypertension (36.1%), high cholesterol level (30.5%), heart condition (6.9%), and stroke (3.8%) than the foreign-born Asian Americans on average (26.4% for high cholesterol, 25.5% for hypertension, 3.9% for heart condition, and 1.7% for stroke). In addition to hypertension and stroke, the prevalence of diabetes (11.4%) among the foreign-born Filipino Americans is also higher than those of the U.S. population and the native-born non-Hispanic whites. Chinese Americans have a higher likelihood of having high cholesterol (28.9%) than the foreign-born Asian Americans on average but not as high as the U.S. population and the native-born non-Hispanic whites. Asian Indians have the diabetes prevalence of 21.2 percent, which is nearly double the percentages for the foreign-born Asian Americans (11.5%) and the U.S. population (10.7%) for this age group.

**Table 3 Prevalence of Chronic Conditions for Each Group (Ages 45-64)**

	First	%	Second	%	Third	%
<b>All US Population</b>	<b>Hypertension</b>	<b>33.3</b>	<b>High Cholesterol</b>	<b>32.7</b>	<b>Diabetes</b>	<b>10.7</b>
<b>All Asian</b>	<b>High Cholesterol</b>	<b>28.4</b>	<b>Hypertension</b>	<b>26.9</b>	<b>Diabetes</b>	<b>11.2</b>
Indian	Hypertension	25.5	High Cholesterol	22.9	Diabetes	20.8
Chinese	High Cholesterol	30.4	Hypertension	22.5	Diabetes	9.4
Filipino	Hypertension	35.0	High Cholesterol	31.5	Diabetes	11.5
Other Asian	High Cholesterol	28.2	Hypertension	25.3	Diabetes	7.7
<b>US-Born NH White</b>	<b>High Cholesterol</b>	<b>33.7</b>	<b>Hypertension</b>	<b>31.9</b>	<b>Diabetes</b>	<b>9.3</b>
<b>US-Born Asian</b>	<b>High Cholesterol</b>	<b>36.1</b>	<b>Hypertension</b>	<b>34.3</b>	<b>Diabetes</b>	<b>9.3</b>
Indian	Hypertension	33.5				
Chinese	High Cholesterol	44.8	Hypertension	36.4	Diabetes	11.9
Filipino	High Cholesterol	40.2	Hypertension	28.5	Diabetes	12.0
Other Asian	Hypertension	36.0	High Cholesterol	33.3	Heart Condition	7.6
<b>Foreign-Born Asian</b>	<b>High Cholesterol</b>	<b>26.4</b>	<b>Hypertension</b>	<b>25.5</b>	<b>Diabetes</b>	<b>11.5</b>
Indian	Hypertension	25.1	High Cholesterol	22.9	Diabetes	21.2
Chinese	High Cholesterol	28.9	Hypertension	20.2	Diabetes	9.0
Filipino	Hypertension	36.1	High Cholesterol	30.5	Diabetes	11.4
Other Asian	High Cholesterol	24.7	Hypertension	22.2	Diabetes	7.8

In the prevalence of chronic conditions for the age group of 65 years old and over (Table 4), it is indeed higher than the two other age groups. In particular, an increase in the prevalence of hypertension is remarkable. Among nearly all the racial and ethnic groups, more than half of the respondents 65 years and over indicated that their doctor had told them that they had hypertension. Also, about 40 percent of 65 years old and over have high cholesterol. Overall, the native-born Asian Americans have a comparable level of chronic condition prevalence. The native-born Chinese Americans show a higher prevalence of hypertension (56.9%), high cholesterol (46.3%), and diabetes (35.1%) than the U.S. population and the native-born non-Hispanic whites. The diabetes prevalence is conspicuous and is nearly double the rates of the U.S. population (18.0%) and the native-born non-Hispanic whites (16.6%). However, the prevalence of heart condition and stroke is lower than the U.S. population and the native-born non-Hispanic whites.

The native-born Filipino Americans show a significantly higher prevalence of hypertension (62.7%) and stroke (12.2%), a moderately higher prevalence of diabetes (23.0%) and heart condition (19.1%), and drastically lower rates of high cholesterol (23.5%). Native-born Other Asian Americans show the higher high cholesterol and stroke prevalence, the lower heart condition and diabetes prevalence, and the similar prevalence of hypertension as the U.S. population and the native-born non-Hispanic whites.

The foreign-born Asian Americans in this age group generally tend to have a higher prevalence of hypertension, diabetes, and stroke and a lower prevalence of high cholesterol and heart condition than the native-born counterpart. Even compared to the U.S. population and the native-born non-Hispanic whites, so much of the health advantages of Asian Americans in chronic conditions seem not to exist except for heart condition. Of course, there are differences by Asian ethnic groups. For example, the foreign-born Chinese Americans show a slightly higher prevalence of hypertension (58.2%) and heart condition (12.2%) and a significantly higher stroke prevalence than the native-born counterpart. The prevalence of high cholesterol (36.6%) and diabetes (16.3%) is much lower than the native-born. For Filipino Americans, the foreign-born population shows a higher prevalence of high cholesterol (43.9%) and stroke (13.9%) and a lower prevalence of diabetes (14.0%) and heart condition (11.9%). Other than diabetes and heart conditions, the foreign-born Filipino Americans have a higher chronic condition prevalence than the U.S. population and the native-born non-Hispanic whites. The foreign-born Other Asian Americans have a higher hypertension (61.4%) and diabetes (16.7%) prevalence than the native-born but lower in high cholesterol (41.7%), heart condition (8.0%), and stroke (8.3%) than the native-born. When compared with the U.S. population and the native-born non-Hispanic whites of this age group, the foreign-born Other Asian Americans show a higher prevalence of hypertension and a lower prevalence of diabetes and heart condition, and the rest of the conditions are about the same.

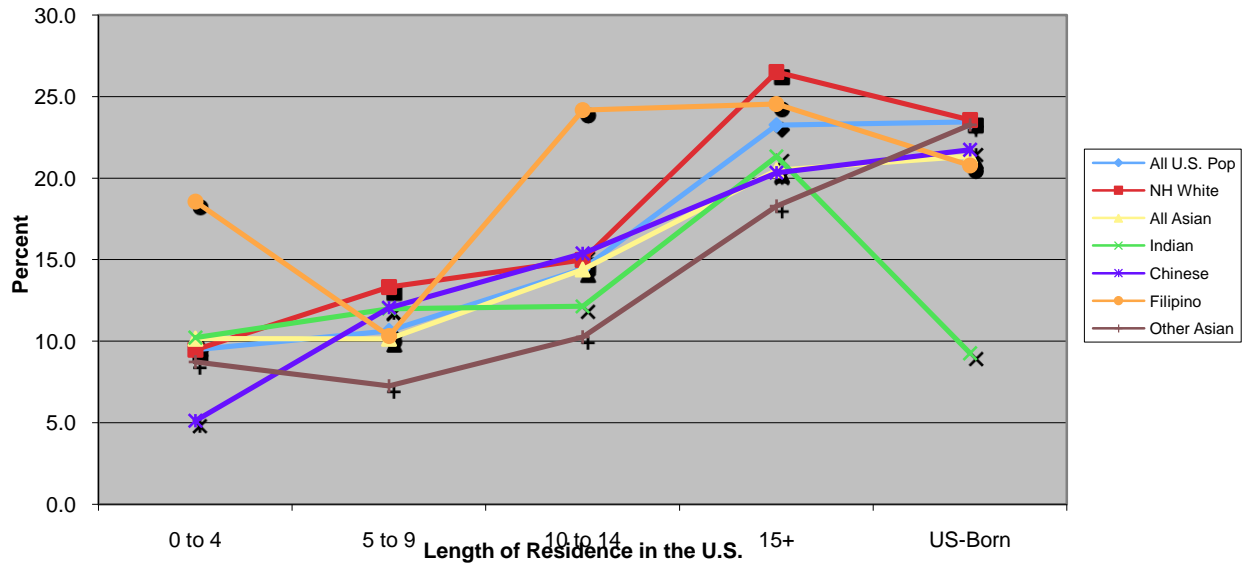
**Table 4 Prevalence of Chronic Conditions for Each Group (Ages 65+)**

	First	%	Second	%	Third	%
<b>All US Population</b>	<b>Hypertension</b>	<b>55.0</b>	<b>High Cholesterol</b>	<b>40.9</b>	<b>Diabetes</b>	<b>18.0</b>
<b>All Asian</b>	<b>Hypertension</b>	<b>58.2</b>	<b>High Cholesterol</b>	<b>40.7</b>	<b>Diabetes</b>	<b>16.8</b>
Indian	Hypertension	46.4	Diabetes	27.0	High Cholesterol	23.8
Chinese	Hypertension	58.0	High Cholesterol	38.2	Diabetes	18.8
Filipino	Hypertension	62.5	High Cholesterol	41.8	Diabetes	15.7
Other Asian	Hypertension	58.3	High Cholesterol	44.4	Diabetes	14.6
<b>US-Born NH White</b>	<b>Hypertension</b>	<b>53.8</b>	<b>High Cholesterol</b>	<b>42.0</b>	<b>Heart Condition</b>	<b>18.8</b>
<b>US-Born Asian</b>	<b>Hypertension</b>	<b>56.5</b>	<b>High Cholesterol</b>	<b>45.5</b>	<b>Diabetes</b>	<b>16.3</b>
Indian						
Chinese	Hypertension	56.9	High Cholesterol	46.3	Diabetes	35.1
Filipino	Hypertension	62.7	High Cholesterol	23.5	Diabetes	23.0
Other Asian	Hypertension	54.9	High Cholesterol	48.8	Heart Condition	15.0
<b>Foreign-Born Asian</b>	<b>Hypertension</b>	<b>58.7</b>	<b>High Cholesterol</b>	<b>39.3</b>	<b>Diabetes</b>	<b>17.0</b>
Indian	Hypertension	46.4	Diabetes	27.0	High Cholesterol	23.8
Chinese	Hypertension	58.2	High Cholesterol	36.6	Diabetes	16.3
Filipino	Hypertension	62.4	High Cholesterol	43.9	Diabetes	14.0
Other Asian	Hypertension	60.4	High Cholesterol	41.7	Diabetes	16.7

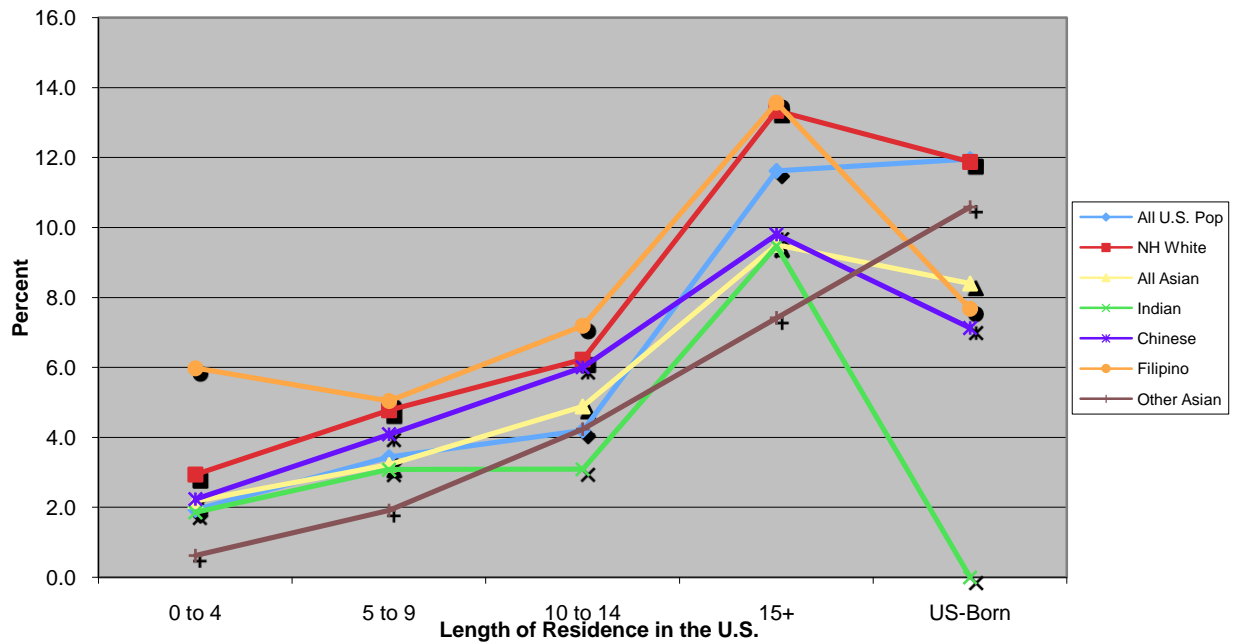
Figure 2 displays the prevalence of chronic conditions in which a respondent has reported chronic conditions in the vertical dimension and years of residency in the United States and nativity status in the horizontal dimension. As shown in Figure 2, as years of residency in the United States increases for the foreign-born Americans, the upward progression tendency of the prevalence is observed. Note that the pattern of Filipino Americans is slightly different, which shows a decline among those whose length of residence in the United States is between 5 and 9 years. For all racial and ethnic groups, immigrants who have been in the United States for 15 or more years indicate the highest prevalence.

Furthermore, the prevalence of the native-born Americans is at the similar levels as the foreign-born Americans with 15 or more years of residency in the United States, except for Asian Indians. The similar patterns have been presented in Figure 3, which shows the prevalence of those who have two or more chronic conditions. The difference is that the percentages of the prevalence have become smaller.

**Figure 2 Chronic Condition Status, 1 Condition**

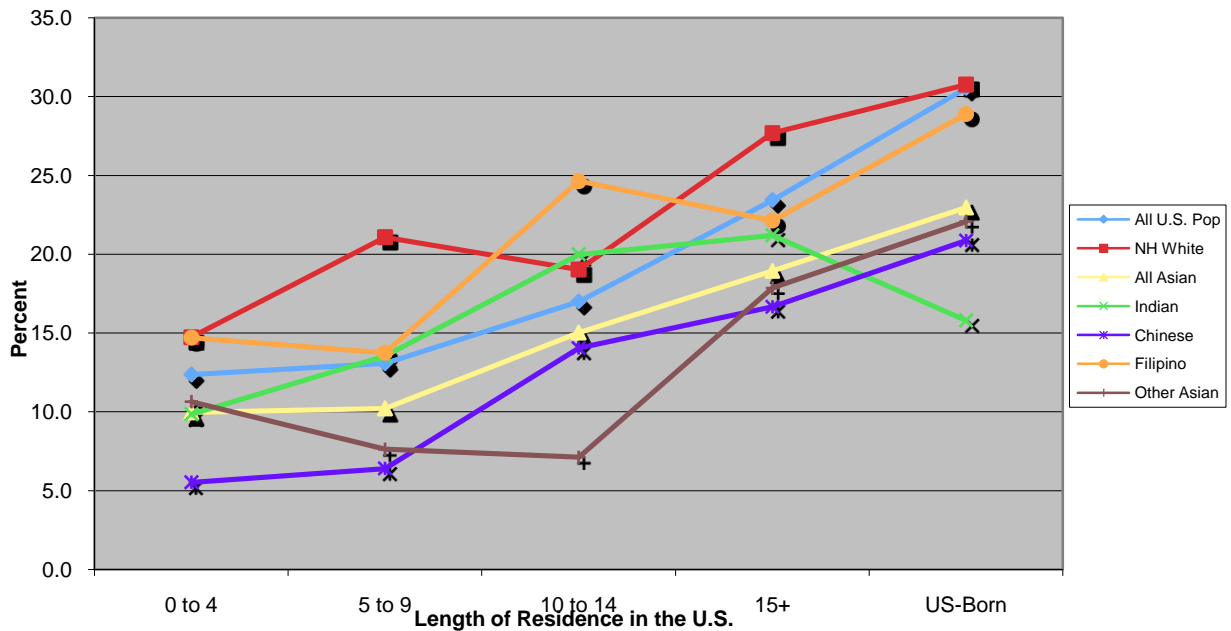


**Figure 3 Chronic Condition Status, 2+ Conditions**

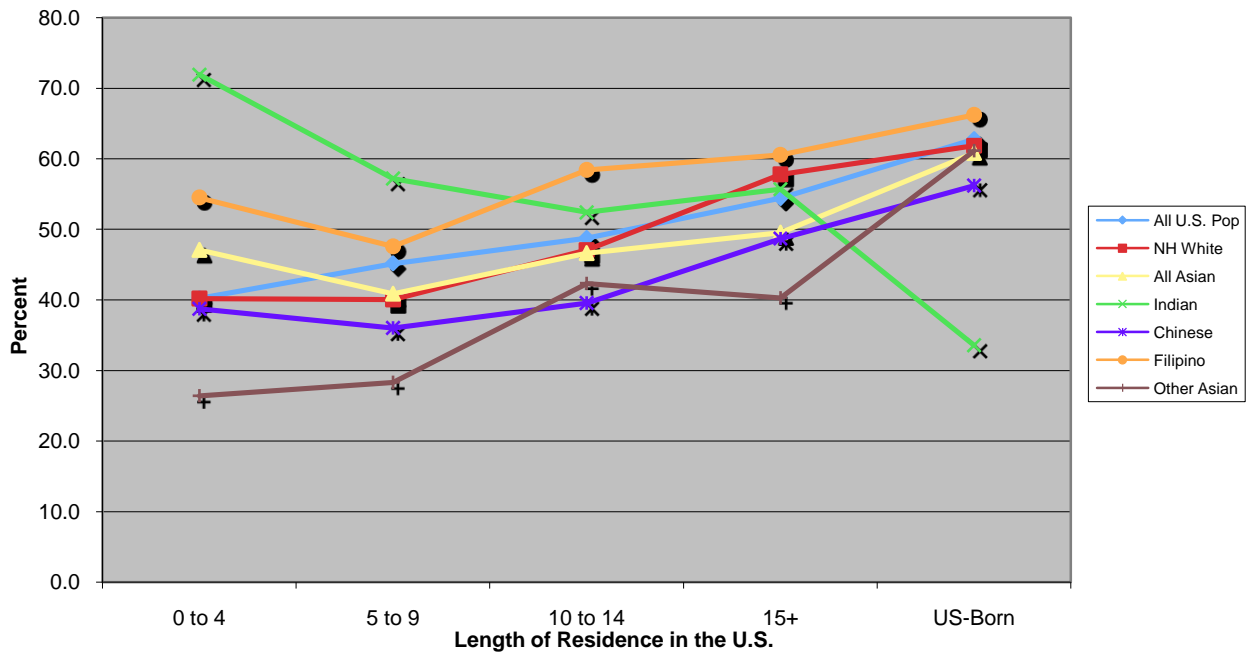


The prevalence of chronic conditions for 18 to 44 years old by the length of residence and nativity status is shown in Figure 4, and that for 45 to 64 years old is shown in Figure 5. The overall picture is that the chronic condition prevalence increases as the length of residence in the United States increases. Except for Asian Indians, the native-born population of each group demonstrates a higher prevalence than the foreign-born population of any residency categories. The trend for Asian Indians follows a somewhat unique pattern with the native-born group having the lowest chronic condition prevalence; however, it may be attributed to a possible lack of sample size in datasets for the native-born Asian Indians.

**Figure 4. Chronic Disease Health Status (18-44 yrs old)**



**Figure 5. Chronic Disease Health Status (45-64 yrs old)**



Through multivariate analysis, I am interested in finding out what kind of socioeconomic and demographic as well as health related factors greatly contribute to the prevalence of chronic conditions. The dependent variable in this case is a combination of respondent’s self-reported chronic conditions such as stroke, heart condition, and diabetes. These chronic conditions can serve as the U.S. acculturation indicator. It is a continuous variable ranging from 0 for no chronic conditions observed to 3 for diagnosed all the three chronic conditions. The regression coefficients are presented in Table 5. All statistical models are age-adjusted based on the 2000 U.S. Standard population. Model 1 through Model 4 serve as the base models. Other than the common socioeconomic and health characteristics, Model 1 is controlled for immigrant generation and smoking status (current/former smoker), while Model 2 is controlled for immigrant generation and the number of cigarettes per day.

Model 3 and Model 4 are the similar except that the former is controlled for the length of residence in the United States and smoking status (current/former smoker), and that the latter is controlled for the length of residence in the United States and the number of cigarettes per day. Based on the regression models, the characteristics leading to an increase in the prevalence of the three chronic conditions emerge as follows: Asian Americans of any ethnic groups; those who make low (less than \$20,000) or medium (\$20,000 to \$44,999) level of income; the foreign-born Asian Americans when controlled for smoking status; high BMI values; both current and former smoker; the more cigarettes consumed per day; light alcohol drinker; and sedentary or moderate level of physical activity. On the other hand, individuals who belong to the following categories – female, college graduates, living in the West, and foreign-born Americans who have been in the United States for 5 years or more – have a lower likelihood of having chronic conditions. As to the length of residence in the United States, the longer the foreign-born Asian Americans stay, their advantage seem to decrease slightly as compared to the native-born counterparts.

Because hypertension and high cholesterol are considered contributing factors rather than outcome factors of chronic conditions, the two variables are added in Model 5 to Model 8 of the regression analysis. Model 6 is essentially Model 1 with the hypertension status and the high cholesterol status variables added. Similarly, Model 8 is Model 3 with the hypertension status and the high cholesterol status variables added. By adding the contributing risk factors, the regression models show that making a low or medium level income, high BMI, a current and former smoker, the more cigarettes consumed per day, sedentary level of physical activity, the diagnosis of hypertension and high cholesterol elevate the likelihood of chronic conditions. Also, being a member of Asian Indians related to chronic conditions when controlled for smoking status. To the contrary, being the foreign-born Asian Americans when controlled for smoking status, any categories of the length of residence in the United States, a residence in the West, and moderate or heavy level of alcohol consumption are negatively associated with the likelihood of having chronic conditions.

Table 5 Regression Models Predicting Number of Chronic Conditions†

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	b	b	b	b	b	b
<b>Asian ethnicity (Ref=NH white)</b>						
Asian Indian	0.06 (0.02)	** 0.11 (0.07)	0.05 (0.02)	* 0.10 (0.07)	0.02 (0.02)	0.02 (0.02)
Chinese	0.06 (0.06)	** -0.05 (0.06)	0.06 (0.02)	** -0.06 (0.06)	0.01 (0.02)	0.01 (0.02)
Filipino	0.08 (0.08)	*** 0.02 (0.05)	0.08 (0.02)	*** 0.02 (0.05)	0.01 (0.02)	0.01 (0.02)
Other Asian	0.05 (0.02)	** 0.01 (0.03)	0.05 (0.02)	** 0.01 (0.03)	0.02 (0.01)	0.01 (0.01)
<b>Nativity (Ref=NB)</b>						
Foreign-born	0.06 (0.01)	*** -0.06 (0.03)	*		-0.02 (0.01)	
<b>Length of residence in the U.S. (Ref=NB)</b>						
0-4 years			-0.05 (0.03)	-0.05 (0.05)		-0.01 (0.02)
5-9 years			-0.06 (0.02)	* -0.09 (0.05)		-0.03 (0.02)
10-14 years			-0.05 (0.02)	* -0.01 (0.05)		-0.02 (0.02)
15 years+			-0.04 (0.01)	** -0.03 (0.02)		-0.01 (0.01)
<b>Hypertension</b>					0.07 (0.00)	*** 0.07 (0.00)
<b>High cholesterol</b>					0.03 (0.00)	*** 0.03 (0.00)
<i>Intercept</i>	-1.00 (0.04)	*** -0.74 (0.07)	*** -1.00 (0.04)	*** -0.74 (0.07)	*** 0.29 (0.03)	*** 0.29 (0.03)
<i>R-square</i>	0.16	0.12	0.16	0.12	0.08	0.08
<i>Number of observations</i>	54,587	14,370	54,594	14,373	18,106	18,112

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

†Stroke, Heart Disease, and Diabetes.

-Standard errors are in the parentheses.

-Models are also controlled for the level of education, gender, citizenship status, income level, region, BMI, marital status, smoking status, the level of alcohol consumption, the level of physical activity.

## 5. Conclusion and Discussion

The findings from this research suggest that, in terms of developing chronic conditions, as the length of residence increases and immigrants become more settled in the United States, the positive health effects seem to diminish. The threshold appropriate to be considered acculturated to the American lifestyle appears to be ten or more years of residence in the United States. That is, the likelihood of having chronic conditions significantly increase as the consequence of acculturation, as Asian Americans spend ten or more years in the United States. There is a disparity between the native-born and foreign-born groups. The native-born Asian Americans of all groups clearly have a higher obesity rate than the foreign-born counterparts. Within the Asian ethnicity, Asian Indians and Filipino consistently show a higher obesity rate than the overall Asian average. Its explanations can vary, but it is more likely due to the lifestyle lacking physical activity as well as the quality and quantity of food consumption. Moreover, physical environment surrounding life of Asian Americans is another important factor that induces a high prevalence of obesity, particularly among more settled groups who have been exposed to the American lifestyle for a long period of time. Other than residents of the major U.S. cities such as New York City and San Francisco, Americans generally have limited access to public transportations, and it is not customary for them to use public transportations especially if they live in the suburbs, unlike lifestyles to which Asian Americans were accustomed in cities in Asian countries. In fact, the majority of Americans commute to work or school by car. Americans drive to go shopping and run errands, as supermarkets and shopping mall are more likely to be located in the suburbs.

Do the findings from this research support an argument that the Hispanic Paradox applies to the context of Asian Americans? Although the Asian American version does not necessarily follow the exactly same conditions as the Hispanic Paradox, it should be essentially similar. Asian Americans overall attain high socio-economic status and boast a relatively low mortality rate and a better health. As for the healthy immigrant effect, it may be true that the foreign-born Asian Americans eager to migrate to the United States from Asia is indeed healthy in the first place. At least based on the findings, the foreign-born Asian Americans normally have the better health outcome than their respective native-born groups. Nevertheless, I cannot provide evidence to substantiate the salmon bias. I speculate that the majority of the foreign-born Asian Americans return their home country for treatment if they become ill. Asian Americans tend not to complain of their symptom of physical illness so easily. Perhaps partly due to strong endurance and being humble, they normally underestimate their own physical conditions and consequently report “fair” or “poor” health in national health surveys by comparison with other race and ethnic groups (Frisbie, Cho, & Hummer, 2001; McGee, Liao, Cao, & Cooper, 1999). Sometimes the chronic conditions of foreign-born Asian Americans worsen as they have a propensity not to visit doctors as often as they should due to language and cultural barriers. Medical terminologies can be often difficult to understand for those not fluent in English, and making an appointment for medical services over the phone can be intimidating. It may be because of the high cost of medical services in the United States, and they may not have adequate health insurance plans or may not even have health insurance at all. Also, they may be afraid of the revelation of their legal status in the United States.

Although an influx of immigration to the United States from Asian countries is expected to continue, more and more Asian Americans will be eventually exposed to the American lifestyle as their length of residence in the United States increases. Furthermore, the ratio of the native-born to the foreign-born Asian Americans will be gradually higher than the current ratio as time passes, because there will be more absolute numbers and a wider variety of native-born Asian Americans such as third- and fourth-, and later-generation Asian Americans. When the proportions of native-born Asian Americans become higher than the foreign-born Asian Americans in near future, it is expected that good health outcomes and behaviors among Asian Americans in chronic conditions can become lower than the current rates, though the degree of decline is, at this point, undetermined.

This research has several limitations. First, Asian ethnic groups other than Asian Indians, Chinese, and Filipinos are aggregated as “Other Asians.” The “Other Asian” category includes Japanese, Vietnamese, Indonesians, and so forth that have different culture and lifestyle; therefore, a wide range of health disparities is expected within the Other Asians. Second, the questions on high cholesterol were only available in the 2002 and 2003 NHIS questionnaires; thus, it resulted in a drastic reduction of sample size in statistical analysis.

Third, for former smokers, how many years and how many cigarettes an individual used to smoke a day before quitting smoking could not be specified. Fourth, no information about the frequency of the consumption of an ethnic diet is provided in the NHIS, which I believe would serve as one of the great indicators of the degree of the U.S. acculturation. Also, questionnaires on English language ability of respondents as well as the means of going to work (by private car, on foot, or by public transportations such as train and bus) may reinforce to depict the settlement pattern of Asian Americans, particularly useful for the foreign-born population. These are just a few of suggestions that should be added to the NHIS for future survey years. Finally, the NHIS is cross-sectional survey so that no causal relationships between factors are determined. Specifically, I cannot predict which factors cause the chronic conditions among Asian Americans.

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