

Challenges Investigating Health Outcomes in Chinese Americans Using Population-Based Survey Data

Michelle Tong BA and Tetine Sentell PhD

Insights in Public Health is a monthly solicited column from the public health community and is coordinated by HJMPH Contributing Editors Tetine L. Sentell PhD from the Office of Public Health Studies at the University of Hawai'i at Manoa and Donald Hayes MD, MPH from the Hawai'i Department of Health in collaboration with HJMPH Associate Editors Lance K. Ching PhD, MPH and Ranjani R. Starr MPH from the Hawai'i Department of Health.

Abstract

Chinese Americans constitute the largest percentage of Asian Americans. In Hawai'i, Chinese Americans make up approximately 4.7% of the total state population. Accurately assessing health disparities across specific Asian American subgroups is critically important to health research and policy, as there is often substantial variability in risk and outcomes. However, even for Chinese Americans, the largest of the Asian American subgroups, such analyses can present challenges in population-based surveys. This article considers these challenges generally and then specifically in terms of the issue of health literacy and heart disease in Chinese Americans using existing population-based survey data sets in the United States, California, and Hawai'i.

Keywords

health literacy, Chinese Americans, limited English proficiency

Chinese in the United States

The United States (US) is home to almost 15 million Asians.¹ Chinese Americans constitute the largest percentage of Asian Americans (23%),² and are the fastest growing Asian American population.³ Overall, Chinese Americans make up 1.2% of the total US population or 3.8 million individuals.⁴

Some states have much higher proportions of Chinese residents than the US average. California alone accounts for 40% of all Chinese Americans with 1.1 million individuals.⁵ Many other states have large populations of Chinese Americans and/or have seen significant recent growth in their Chinese population, including Texas, New Jersey, Massachusetts, Florida, and Pennsylvania.⁴

In Hawai'i, Chinese Americans make up approximately 4.0% of the total state population or 54,955 individuals.⁶ This accounts for 1.5% of the total US Chinese American population.^{4,6}

Distinct Characteristics

Accurately assessing health disparities across specific Asian American subgroups is critically important to health research and policy, as there is often substantial variability in risk and outcomes.^{7,8} Chinese Americans have distinct socio-demographic characteristics, including immigration patterns, history, language, and culture, that are associated with distinguishable health risk factors.

Immigration History

In the US, a significant proportion (76%) of Chinese immigrants over the age of 18 are immigrants.² In Hawai'i, this proportion is 44%.⁹ Chinese immigration to the US began with laborers seeking economic opportunities due to turmoil in their native country. Many of these immigrants were Cantonese-speaking men from the southern province of Guangdong.⁷ However, due to ethnic discrimination and concern about competition for jobs, the US government slowed migration with a series of exclusionary agreements and laws restricting immigration from China starting with the Exclusion Act of 1882.¹⁰ Until the 1970s, there was little immigration from China. When immigration into the US increased again in the 1970s, many Chinese came from Hong Kong and Taiwan. More recently, many Mandarin speakers have been emigrating from mainland China.⁷

As for migration to Hawai'i, many Chinese immigrants came for plantation work starting in the 1850s. This immigration was slowed by the exclusionary agreements mentioned above. The majority of Hawai'i's current Chinese population is Hawai'i-born. There has been an uptick of recent immigrants from China as well, often arriving for education or economic opportunities.¹¹

Language Preferences

In 2008, almost 62% of Chinese immigrants in the US reported limited English proficiency.¹² A significant portion (34%) of US-born individuals with Chinese ancestry speak some form of Chinese dialect at home.¹³ This shows that language is an important aspect to Chinese populations in the US because it continues to be passed down through the generations despite the natural acculturation process. Many of the individuals may prefer communicating in Chinese when discussing health issues. For instance, a study found that the majority of Chinese immigrants preferred to communicate in Mandarin with their physicians.¹⁴

Historically in Hawai'i, the Chinese American population mainly spoke Cantonese though the numbers who speak Mandarin have increased recently.¹¹ Approximately 60.2% or 10,450 of Chinese individuals in Hawai'i do not speak English well.¹⁵

Culture

In addition to language, the Chinese have distinct cultural practices for health, including the use of herbal medicines, Tai chi, and acupuncture.¹⁶ Many Chinese practice traditional Chinese medicine, either in place of, or along with, mainstream Western medicine.¹⁷ Among a study of Chinese, Korean, and Vietnamese immigrants, Cantonese participants reported highest usage of herbal remedies to prevent high blood pressure.¹⁸ This may be due to the bicultural system of health care in China, which includes the usage of both Western medicine and traditional Chinese medicine.¹⁹

In the US, as in Hawai'i, the Chinese community is more collectivistic compared to the more individualistic American approach.²⁰ Collectivism focuses on maintaining in-group relationships and working for the greater good of a specified group.²⁰ The Chinese community, especially recent immigrants, may be far removed from mainstream American society generally and the US health care system specifically. Chinese adults in Chicago were found to have lower insurance coverage compared to US estimates for Asian Americans overall.²¹ Furthermore, Chinese elders notably under-utilize the US health care system,¹⁹ which can be additionally hampered by confusion about eligibility and cost due to linguistic or cultural barriers.

Chinese American Health Issues

Chinese Americans experience unique health disparities, including limited access to culturally relevant care and often significant linguistic barriers.²² Chinese immigrant groups were also found to desire more accurate health information from their healthcare providers than they were receiving.¹⁸ Providers may not clearly explain conditions to them and/or may not present the information in a language they can readily understand.

These access and communication factors are associated with health consequences. While Chinese Americans often have better health outcomes compared to other Asian subgroups, this is not true across all domains. Chinese Americans have higher rates of hypertension compared to other Asian American groups and Whites.⁷ Additionally, Chinese American women are less likely than many Asian American and Pacific Islander women to report having a recent Pap smear or mammogram.^{23,24} Underuse of colon cancer screening is also seen among Chinese American men and women.²⁵ While the Chinese population in Hawai'i has the longest longevity among other Asian American and Pacific Islander groups,²⁶ they still have worse health outcomes than White comparison populations (and often other Asian groups) in varied outcomes including longer hospitalizations for mental health issues,²⁷ higher rates of obstetric trauma for vaginal deliveries compared to Whites,²⁸ and higher risk of 30-day potentially preventable hospitalizations after a stroke.²⁹

While much important groundwork exists, many aspects of Chinese Americans' health issues remain understudied. Analyzing data about Chinese Americans can be a particular challenge in population-based health surveys.

Importance of Population-Based Health Surveys

Population-based health surveys are those that seek to describe a full population, often in a large geographic location such as a city, state, or a nation, using a survey instrument. The population-based portion is in contrast to research that might consider a very specific group of people, such as those who are hospitalized or those who attend a certain health center. The survey portion is in contrast to other study methods, such as in-depth interviews and open-ended questions that might be analyzed qualitatively. Data from such surveys are extremely important to health policy as they describe critical population-level health needs to help communities design appropriate programs, identify disparities, and determine funding.

One example is the National Health and Nutrition Examination Survey (NHANES), which utilizes a combination of interviews and physical examinations to assess the health of the US population.³⁰ Another example is the cross-sectional New York City Community Health Survey, which is administered through the telephone and annually gathers a sample of approximately 8,500 randomly selected adults aged 18 and older from all five boroughs of New York City.³¹

Inherent difficulties exist with studying minority groups, such as Chinese Americans, in such population-based studies. First, while Asian Americans may be included in the sampling frame for many population-based studies as part of the population, when it comes time for analysis, their data may not be included or may be grouped with the "other" race/ethnicity. They may have numbers too small for stable estimates or for reporting of data that can still meet privacy rules. Often to have numbers large enough to include in the analyses, heterogeneous Asian Americans are classified together and sometimes combined with Pacific Islanders, leaving distinct characteristics of Asian American subgroups hidden.⁸ While detailed subgroup data may exist in the full collected data from a population-based survey, this sometimes will not be released into public access files where many analyses take place due to privacy concerns from the small sample sizes within subgroups, limiting their utility for health-related research.⁷

Another issue, as noted above, is that Chinese Americans have distinct language preferences. Some groups are not able to speak English at all. Many large population-based surveys are only offered in English or, if in another language, include only Spanish. This is because the resources required to translate, and field surveys in many different languages present a high cost burden to the researcher or agency administering the survey. Rarely do population-based surveys interview in both Mandarin and Cantonese. Thus, any Chinese American who does not speak English well, may be excluded from the population-based sample, and the health issues and challenges of a large group of people would remain hidden.

A common problem across studies involves recruiting enough participants, especially in research where the outcome is a rare disease. These challenges become compounded further when the focus is on a specific ethnic group. Even when the number of people interviewed may be large enough to consider common health issues, like the prevalence of diabetes or the average age of heart disease by gender, the number may be too small to consider very specific health issues or rarer diseases, particularly in combination.

One option that can help with the small sample sizes for subgroup analyses is to combine data across years. However, not all important health factors can be included on population-based health surveys and some that are included may only be asked some years when there is particular funding or interest in a topic. For instance, a survey may ask detailed information about cancer screening only in one year. Other relevant topics for health in Chinese and other Asian American subgroups, such as acculturation status, may not be asked at all in many population-based studies.

We consider the strengths of six population-based surveys to consider health issues in Chinese Americans: three national (the NHANES, the NHIS, and the BRFSS), two from Hawai'i (the HHS and the H-BRFSS), and one from California (the CHIS).

National Health and Nutrition Examination Surveys (NHANES)

The NHANES includes both a survey at individuals' homes as well as clinical tests, providing critical surveillance data. As this is expensive, the NHANES only interviews 5,000 individuals per year. Starting in 2011-2012, the NHANES has been oversampling Non-Hispanic Asians and also including selected survey and/or questionnaire materials translated into traditional Mandarin, simplified Mandarin, and traditional Cantonese, along with other Asian languages.³⁰ Respondents could choose their preferred language. However only "non-Hispanic Asian" is available for analysis in the public use data file variables.³⁰

The National Health Interview Survey (NHIS)

The NHIS is conducted by the US Census Bureau and collects health information continuously throughout the year through personal household interviews.³² The NHIS monitors the health of the nation, including health status, health care access, health insurance coverage and progress toward achieving national health objectives, and health disparities.³² NHIS has personal interviews from up to 51,000 households per year.³³ Even in this large data set, Chinese subgroup information is not included in the public use file for confidentiality reasons. The NHIS also only interviews in English and Spanish.

Behavior Risk Factor Surveillance System (BRFSS)

The BRFSS is a national telephone survey that collects data from all 50 states, the District of Columbia, and three US territories regarding health-related risk behaviors, chronic health conditions, and use of preventive services.³⁴ Since the BRFSS includes data from over 400,000 adult interviews each year, it is

the largest continuously conducted health survey system in the world.³⁴ The survey is administered in English and Spanish.³⁵ Homes with no English or Spanish speakers are not eligible for participation.

Hawai'i-specific Behavior Risk Factor Surveillance System (H-BRFSS)

The H-BRFSS includes health prevalence information from residents in Hawai'i and evaluates a variety of health behaviors that may result in risk factors for health issues.³⁶ The H-BRFSS interviews only in English. Besides the core questions that all states must ask, states can add questions of their own choosing of relevance to their states.

Hawai'i Health Survey (HHS)

The HHS is a continuous telephone survey that assesses the health status and demography of Hawai'i's population and is designed after the NHIS.³⁶ Weighting is done to accommodate for the difficult to reach populations in Hawai'i such as those without landline telephones and the homeless.³⁶ The HHS interviews only in English.

California Health Interview Survey (CHIS)

The CHIS is a random-digit-dial (RDD) telephone survey administered by UCLA Center for Health Policy Research and is representative of the non-institutionalized population of California.³⁷ The CHIS interviews in Mandarin and Cantonese, allowing for participation by Chinese individuals with limited English proficiency.³⁷ Enough individuals were interviewed that data from Chinese populations, including non-English speakers, is available in the public use data. The CHIS has been a critical source of health information around disparities for Asian subgroups, including non-English speakers.

Considering Heart Disease and Low Health Literacy in Chinese Americans Using Population-Based Surveys

As socioeconomic and cultural factors are associated with cardiovascular disease (CVD) and related risk factors, it is critical to understand these differences among Asian subgroups.⁷ More research is needed specifically on cardiovascular risk and incidence across Asian subgroups generally and among the Chinese specifically.^{7,38} There is reason to believe there is differential, if not higher, risk for Chinese compared to Whites and to other Asian subgroups.⁷

Heart disease is the second leading cause of mortality in Chinese Americans, after cancer.⁵¹ Chinese Americans were found to have higher prevalence of hemorrhagic strokes, poorly controlled hypertension and left ventricular hypertrophy, compared with Whites.⁷ As Chinese have lower body mass index (BMI) compared to Whites given the same body fatness, the World Health Organization and others have recommended lowering the BMI thresholds to define overweight and obesity in Asians.⁷ While the typical Chinese diet has less fat and animal protein compared to Western diets and is thus likely to be

cardio-protective, sodium intake can be high.⁷ Furthermore, BMI is a larger contributor to hypertension in Chinese than in Whites and African Americans, indicating that BMI may play an important biological role in health disparities among Chinese Americans.³⁹

As defined by the Office of Disease Prevention and Health Promotion, health literacy is “the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.”⁴⁰ Especially in older populations, individuals are more likely to suffer from low health literacy and have chronic conditions such as CVD.⁴¹ Among patients with heart failure in an integrated managed care organization, low health literacy was found to be significantly associated with higher all-cause mortality.⁴² Additionally, lower health literacy was associated with increased risk of death after hospitalization for acute heart failure.⁴³ Lower health literacy was also associated with less heart-health specific knowledge among those with heart failure.^{44,41}

Chinese Americans, particularly those with low English proficiency, have a high prevalence of low health literacy.⁴⁵ Low health literacy has been associated with poorer health outcomes across many conditions. For instance, low health literacy has been found to contribute to poorer physical and mental health, as well as affect the ability to perform tasks associated with daily living, and lowered the general quality of life.⁴⁶ Additionally, a systematic review reported higher rates of hospitalization for individuals with lower health literacy than in their counterparts who had higher health literacy.⁴⁷ Improving health literacy is a practical, important goal that holds promise to greatly diminish negative health outcomes.

It would be useful to consider cardiovascular risk by health literacy among Chinese Americans in population-based samples. However, an attempt to do so can illustrate many challenges mentioned above. As can be seen in Table 1, not all the surveys mentioned above include detailed information about Chinese racial identity. Even those that do may have sample sizes too small to make reliable estimates, especially using one year of data, and/or not have Chinese identity available in public access data due to privacy issues. While some questions about heart disease exist on all surveys (though not necessarily with

identical wording or about precisely the same heart topics), health literacy questions have not typically been included in population-based surveys. Thus, a health literacy variable is not available for analyses around the relationship of heart disease using many important national data sets, including NHANES and NHIS. Questions to measure low health literacy are available on the HHS, the H-BRFSS, and the CHIS, but only for some years. (The H-BRFSS and HHS health literacy questions are available because interested researchers were able to add onto these particular surveys in these years.) Only one of these surveys, the CHIS, includes sampling of non-English speakers. Thus, only the CHIS could consider the issue of the relationship of cardiovascular risk by health literacy among non-English-speaking Chinese respondents. However, the CHIS only included the health literacy question on one year almost a decade ago. Therefore, that data is relatively outdated and data cannot be combined over years to get sufficient sample sizes for many analyses. Also, that data is California-specific and may not be relevant to Chinese populations in other locations.

Conclusions

There is a need for population-based research that includes Chinese Americans as well as other Asian and ethnic/racial subgroups for whom similar sample size and linguistic challenges exist. Hawai‘i and California, with high populations, have useful data on Chinese Americans compared to many other states. Data from these states can provide guidance for other states with smaller but growing populations of Asian Americans. However, even in Hawai‘i and California, Chinese Americans make up only 4% and 3.4% of the state populations, respectively.^{48,49} This can still result in small numbers in samples of population-level data, making analyses of this subgroup challenging, particularly when the goal is to consider multiple health outcomes. Certainly not all important research comes from population-based surveys. However, many health decisions are made using this data along with critical public health surveillance.

A recent position paper recommended certain changes to data surveillance systems to ensure they include meaningful data around heart health for Asian American subgroups, including

	NHIS	NHANES	BRFSS-CORE	HHS	H-BRFSS	CHIS
Chinese Respondents Potentially Available for Sub-Analyses	Yes	No	Yes	Yes	Yes	Yes
Interviewed in Mandarin or Cantonese	No	Yes, since 2011-2012	No	No	No	Yes, also includes Limited English proficiency
Health Literacy Questions	No	No	Optional in Core, starting in 2016	Yes, in 2008 and 2010	Yes, in 2012	Yes, in 2007
Heart Disease Questions	Yes	Yes	Yes	Yes	Yes	Yes

Chinese.⁷ These include oversampling Asian Americans across the 6 largest subgroups of country of origin, recognizing the wide range of socioeconomic status differences among Asian American subgroups. Increased research into methods to successfully recruit diverse populations into population-based studies exist, including multimodal approaches using targeted recruitment strategies.⁵⁰

A recent report listed the federal data sets available to consider health disparities. Out of 153 listed, only 4 noted Chinese specific data and only one interviewed in Mandarin and Cantonese.³³ One notably rich resource around Asian American mental health was the National Latino and Asian American Study (NLAAS), which considered the linkages between mental disorders with language use and ethnic disparities.³³ Recently, a number of major federal surveys, including the NHIS and the BRFSS, have started to classify Asian Americans into 7 subgroups, including Chinese.⁷ There is greater recognition of the importance of considering detailed information of Asian American subgroups. This paper presents some of the challenges of putting that information into practice in the large population-based surveys with which we monitor the health of our nation and use to make health policy decisions.

Acknowledgements

The authors wish to thank Dr. Yan Yan Wu and Dr. Kathleen Kromer Baker for their generous assistance with the project that inspired this column.

Authors' Affiliation:

Office of Public Health Studies, University of Hawai'i at Manoa, Honolulu, HI

References

- US Census Bureau. (2015). *2015 American Community Survey 1-year Estimates*. Retrieved from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_15_1YR_B16001&prodType=table.
- Pew Research Center. (2016). *Chinese Americans*. Retrieved from <http://www.pewsocialtrends.org/asianamericans-graphics/chinese/>.
- Centers for Disease Control and Prevention. (2013). *Asian American Populations*. Retrieved from <http://www.cdc.gov/minorityhealth/populations/REMP/asian.html>.
- Hoeffel EM, Rastogi S, Kim M, Shahid H. (2012). The Asian Population: 2010 – 2010 Census Briefs. *US Department of Commerce – Economics and Statistics Administration*. Retrieved from <http://www.census.gov/prod/cen2010/briefs/c2010br-11.pdf>.
- Zhou M. 2003. Chinese Americans. *Asian-Nation: The Landscape of Asian America*. Retrieved from <http://www.asian-nation.org/chinese.shtml>.
- US Census Bureau. (2010). *DP-1 Profile of General Population and Housing Characteristics: 2010, 2010 Demographic Profile Data (Hawaii)*. Retrieved from <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>.
- Palaniappan LP, Araneta MRG, Assimes TL, Barrett-Connor EL, Carnethon MR, Criqui MH, Wong ND. Call to action: cardiovascular disease in Asian Americans: a science advisory from the American Heart Association. *Circulation*. 2010;122(12):1242-252. Doi: 10.1161/CIR.0b013e3181f22af4.
- Ghosh C. A national health agenda for Asian Americans and Pacific Islanders. *Journal of the American Medical Association*. 2010;304(2):1381–1382.
- Department of Business, Economic Development & Tourism. 2016. American Community Survey 2009 Hawaii Selected Population Profiles (3-Year Estimates)- Race Alone: Chinese. *US Census Bureau*. Retrieved from http://census.hawaii.gov/acs/acs2009/acs_hi_2009_pop_profiles_3yrl/.
- The US National Archives and Records Administration. (2016). *Chinese Immigration and the Chinese in the United States*. Retrieved from <https://www.archives.gov/research/chinese-americans/guide.html>.
- McDermott JF, Andrade NN. *People and Cultures of Hawaii: The Evolution of Culture and Ethnicity*. Honolulu, U of Hawaii, 2011. Print.
- Migration Policy Institute. (2016). *Chinese Immigrants in the United States*. Retrieved from <http://www.migrationpolicy.org/article/chinese-immigrants-united-states-0#8>.
- Terrazas A, Batalova J. 2010. *Chinese Immigrants in the United States*. Migration Policy Institute. Retrieved from <http://www.migrationpolicy.org/article/chinese-immigrants-united-states-0/>.
- Li W, Froelicher ES. Gender differences in Chinese immigrants: predictors for antihypertensive medication adherence. *Journal of Transcultural Nursing*. 2007;18(4):331-38.
- Research and Economic Analysis Division. (2016). *Statistical Report: Detailed Languages Spoken at Home in the State of Hawaii*. Department of Business, Economic Development & Tourism. Retrieved from http://files.hawaii.gov/dbedt/census/acs/Report/Detailed_Language_March2016.pdf.
- University of New Hampshire. (2016). *Traditional Chinese Medicine*. Retrieved from <https://www.unh.edu/health-services/onep/complementaryalternative-health-practices/traditional-chinese-medicine>.
- Wu APW, Burke A, LeBaron S. Use of traditional medicine by immigrant Chinese patients. *Family Medicine*. 2007;39(3):195-200.
- Ton T, Steinman L, Yip M, Ly KA, Sin M, Fitzpatrick AL, Tu S. Knowledge of cardiovascular health among Chinese, Korean and Vietnamese immigrants to the US. *Journal of Immigrant Minority Health*. 2011;13:127-139. Doi: 10.1007/s10903-010-9340-x.
- Miliades HB, Wu B. Factors affecting physician visits in Chinese and Chinese immigrant samples. *Social Science & Medicine*. 2008;66(3):704-714.
- Oyserman D, Coon HM, Kemmelmeier M. Rethinking individualism and collectivism: evaluation of theoretical assumptions and meta-analyses. *Psychological Bulletin*. 2002;128(1):3-72.
- Shah AM, Guo L, Magee M, Cheung W, Simon M, LaBrecche A, Liu H. Comparing selected measures of health outcomes and health-seeking behaviors in Chinese, Cambodian, and Vietnamese communities of Chicago: Results from local health surveys. *Journal of Urban Health*. 2010;87(5):813-826.
- Tsoh JY, Sentell T, Gildengorin G, Le GM, Chan E, Fung L, Nguyen TT. Healthcare communication barriers and self-rated health in older Chinese American immigrants. *Journal of Community Health*. 2016;41:741-752. Doi: 10.1007/s10900-015-0148-4.
- Kagawa-Singer M, Pourat N. Asian American and Pacific Islander breast and cervical carcinoma screening rates and Healthy People 2000 Objectives. *Cancer*. 2000;89:9696-705.
- Chen JY, Diamant AL, Kagawa-Singer M, Pourat N, Wold C. Disaggregating data on Asian and Pacific Islander women to assess cancer screening. *American Journal of Preventative Medicine*. 2004;27:139-145.
- Tang TS, Solomon LJ, McCracken LM. Barriers to fecal occult blood testing and sigmoidoscopy among older Chinese-American women. *Cancer Practice*. 2001;9:277–282.
- Park CB, Braun KL, Horiuchi BY, Tottori C, Onaka AT. (2009). Longevity disparities in multiethnic Hawaii: an analysis of 2000 life tables. *Public Health Reports*. 2009;124(4):579-84.
- Sentell T, Unick GJ, Ahn HJ, Braun KL, Miyamura J, Shumway M. Illness severity and psychiatric hospitalization rates among Asian Americans and Pacific Islanders. *Psychiatric Services*. 2013;64(11):1095-102. Doi: 10.1176/appi.ps.201200408.
- Sentell T, Chang A, Cheng Y, Miyamura J. Maternal quality and safety outcomes for Asians and Pacific Islanders in Hawaii: an observational study from five years of statewide data. *BMC Pregnancy & Childbirth*. 2014;14:298. Doi: 10.1186/1471-2393-14-298.
- Nakagawa K, Ahn HJ, Taira DA, Miyamura J, Sentell T. Ethnic Comparison of 30-Day Potentially Preventable Readmissions After Stroke in Hawaii. *Stroke*. 2016;47(10):2611-7. Doi: 10.1161/STROKEAHA.116.013669.
- CDC/National Center for Health Statistics. (2015). *National Health and Nutrition Examination Survey: NHANES 2011-2012 Overview*. Retrieved from http://www.cdc.gov/nchs/nhanes/nhanes2011-2012/overview_g.htm.
- Yi SS, Thorpe LE, Zanolwaki JM, Trinh-Shevrin C, Islam NS. Clinical characteristics and lifestyle behaviors in a population-based sample of Chinese and South Asian immigrants with hypertension. *American Journal of Hypertension*. 2016;29(8):941-947. Doi: 10.1093/ajh/hpw014.
- CDC/National Center for Health Statistics. (2016). *About the National Health Interview Survey*. Retrieved from http://www.cdc.gov/nchs/nhis/about_nhis.htm.
- US Department of Health and Human Services – Office of Minority Health. (2016). *Federal Interagency Health Equity Team Compendium of Publicly Available Datasets and Other Data-Related Resources*. Retrieved from http://www.minorityhealth.hhs.gov/NPA/Materials/FIHET_Data_Compendium_508_version_FINAL_11_28_2016.pdf.
- Centers for Disease Control and Prevention. (2015). *Behavioral Risk Factor Surveillance System*. Retrieved from <http://www.cdc.gov/BRFSS/>.
- National Center for Chronic Disease Prevention and Health Promotion. (2016). BRFSS Questionnaires. *US Department of Health & Human Services*. Retrieved from <http://www.cdc.gov/brfss/questionnaires/index.htm>.
- Hawaii State Department of Health. (2015). *Hawaii Health Survey (HHS)*. Retrieved from <http://health.hawaii.gov/hhs/>.
- UCLA Center for Health Policy Research. (2007). *CHIS 2007 Sample Design*. Retrieved from http://healthpolicy.ucla.edu/chis/design/Documents/sample_desc_2007.pdf.
- Jose PO, Frank AT, Kappahnn KI, Goldstein BA, Eggleston K, Hastings KG, Palaniappan LP. Cardiovascular disease mortality in Asian Americans. *Journal of the American College of Cardiology*. 2014;64(23):2486-94. Doi: 10.1016/j.jacc.2014.08.048.
- Chen M, Hu J. Health disparities in Chinese Americans with hypertension: A review. *International Journal of Nursing Sciences*. 2014;1(3):318-322. Doi: <http://dx.doi.org/10.1016/j.ijnss.2014.07.002>.
- Office of Disease Prevention and Health Promotion. (2015). *Health Literacy*. Retrieved from <http://www.health.gov/communication/literacy/>.
- Safer RS, Cooke CE, Keenan J. The impact of health literacy on cardiovascular disease. *Vascular Health and Risk Management Journal*. 2006;2(4):457-464.

42. Peterson PN, Shetterly SM, Clarke CL, Bekelman DB, Chan PS, Allen LA, Masoudi FA. Health literacy and outcomes among patients with heart failure. *Journal of the American Medical Association*. 2011;305(16):1695-1701. Doi: 10.1001/jama/2011.512.
43. McNaughton CD, Cawthon C, Kripalani S, Liu D, Storrow AB, Rounie CL. Health Literacy and Mortality: A Cohort Study of Patients Hospitalized for Acute Heart Failure. *Journal of the American Heart Association*. 2015;4:e001799. Doi: <http://dx.doi.org/10.1161/JAHA.115.001799>.
44. Gazmararian JA, Williams MV, Peel J, Baker DW. Health literacy and knowledge of chronic disease. *Patient Education and Counseling*. 2003;51(3):267-275.
45. Sentell T, Baker K, Onaka A, Braun K. Low health literacy and poor health status in Asian Americans and Pacific Islanders in Hawaii. *Journal of Health Communication*. 2011;16(Suppl 3):279-294. Doi: <http://dx.doi.org/10.1080/10810730.2011.604390>.
46. Wolf MS, Gazmararian JA, Baker DW. Health literacy and functional health status among older adults. *Archives of Internal Medicine*. 2005;165(17):1946-1952.
47. Taggart J, Williams A, Dennis S, Newall A, Shortus T, Zwar N, Harris MF. A systematic review of interventions in primary care to improve health literacy for chronic disease behavioral risk factors. *BMC Family Practice*. 2012;13:49.
48. US Census Bureau. (2010). *DP-1 Profile of General Population and Housing Characteristics: 2010, 2010 Demographic Profile Data (California)*. Retrieved from <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>.
49. US Census Bureau. (2010). *DP-1 Profile of General Population and Housing Characteristics: 2010, 2010 Demographic Profile Data (United States)*. Retrieved from <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>.
50. Wong CK, Horn-Ross PL, Gee GC, Shariff-Marco S, Quach T, Allen L, Gomez SL. (2016). Strategies for recruiting representative samples of Asian Americans for a population-based case-control study. *Journal of Epidemiology & Community Health*. 2016;70(10):974-982. Doi: 10.1136/jech-2015-206905.
51. Hastings KG, Jose PO, Kapphahn KI, Frank ATH, Goldstein BA, Thompson CA, Palaniappan LP. Leading causes of death among Asian American subgroups (2003-2011). *PloS One*. 2015;10(4):e0124341.