Ethnic Differences in Health and Cardiovascular Risk Factors of Asians in Arizona

by

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ABSTRACT

This research is an anthology of a series of papers intended to describe the health state, healthcare experiences, healthcare preventive practice, healthcare barriers, and cardiovascular disease (CVD) risk factors of Asian Americans (AA) residing in Arizona (AZ). Asian Americans are known to be vulnerable populations and there is paucity of data on interventions to reduce CVD risk factors. An extensive literature review showed no available disaggregated health data of AA in AZ. The Neuman Systems Model guided this study. Chapter 1 elucidates the importance of conducting the research. It provides an overview of the literature, theory, and methodology of the study. Chapters 2 and 3 describe the results of a cross-sectional descriptive secondary analysis using the 2013, 2015, and 2017 Behavior Risk Factor Surveillance System (BRFSS) datasets. The outcomes demonstrate the disaggregated epidemiological phenomenon of AA. There were variations in their social determinants of health, healthcare barriers, healthcare preventive practice, CVD risk factors, and healthcare experiences based on perceived racism. It highlighted modifiable and non-modifiable predictors of hypertension (HTN) and diabetes. Chapter 4 is an integrative review of interventions implemented to reduce CVD risks tailored for Filipino Americans. Chapter 5 summarizes the research findings. The results may provide the community of practicing nurses, researchers, and clinicians the evidence to plan, prioritize, and implement comprehensive, theoretically guided, and culturally tailored community-led primary and secondary prevention programs to improve their health outcomes. The data may serve as a tool for stakeholders and policy makers to advocate for public health policies that will elevate population health of AA or communities of color in AZ to be in line with non-Hispanic White counterparts.

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I will humbly share the outcome of my research to the Filipino community in Arizona. Although the results seem sobering, with us working together as “kapwa kababayan,” we can incrementally change the CVD healthcare landscape of our kababayans.

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INTRODUCTION

Asian Americans (AA) are the largest and most racially or ethnically diverse population in the United States (U.S.). They originate from 20 different countries from the Indian subcontinent as well as East and Southeast Asia. They account for 5.6% of the total U.S. population. They are projected to grow to 38% in 50 years, which will make them the largest immigrant population (Lopez, Ruiz, & Patten, 2017). In 2015, there were 21 million AA, and among them Chinese are the fastest growing AA subgroup, followed by Asian Indian (AI), Filipinos, Vietnamese, Korean, and Japanese. Forty-five percent of AA reside in the western states, and California has the largest share of AA at 31%. Based on the 2010 Census report, all states except Hawaii showed at least a 30% growth in AA population. Arizona (AZ) experienced the second largest increase at 95%, after Nevada at 116% (Lopez et al., 2017; U.S. Census, 2010).

The socioeconomic factors depict considerable contrast among the different AA subgroups and when compared to the total U.S. households (Lopez et al., 2017). AI have the highest annual median household income ($100,000) compared to $80,000 for Filipinos. Japanese and Sri Lankans households report a $74,000 annual income. The average U.S. household earns $53,600, approximately $20,000 less than AA households ($73,060). Bangladeshi, Hmong, Nepalese, and, Burmese have incomes below the U.S. median income $53,600. Among the AA subgroups, Filipinos, AI, and Japanese have higher rates of English proficiency (80% to 84%). Bhutanese and Burmese are the recent immigrants and have lower levels of English proficiency. Regarding educational attainment, 51% of AA adults 25 years and older hold a bachelor’s degree or higher, whereas 30% of the U.S. population holds the same level of degree (Lopez et al., 2017; Ramakrishnan & Ahmed, 2014).

Although AA have higher income relative to other racial groups (Lopez et al., 2017), they remain a vulnerable and understudied population. Vulnerable populations are social groups that are at a higher risk for poor health outcomes and diminished quality of life due to lower utilization or lack of access to quality healthcare services. They are known to be medically underserved and/or disadvantaged population. These groups include uninsured women and children, homeless, individuals who are mentally ill, chronically ill and disabled, diagnosed with human immunodeficiency virus or acquired immune deficiency syndrome, live in rural areas or those who belong to a racial or ethnic population (Shi & Singh, 2013).

Despite the exponential population growth of AA, health-related research has not kept pace with their dramatic increase. There is a paucity of granular ethnic health-related research. National and state level public health surveillance surveys continue to report aggregated Asian American and Pacific Islander (AAPI) health data due to their small sample size in subgroups, therefore concealing their distinct differences in their health and wellbeing. Outcomes from these population health surveys further perpetuates a homogeneous portrayal of AA as model minority (Bolen, Rhodes, Powell-Griner, Bland, & Holtzman, 2000; Liao et al., 2011).

Importance of the Problem

The Health and Medicine Division of the Academy of Sciences, Medicine, previously known as the Institute of Medicine (IOM), recognized the existence of healthcare disparities among racial and ethnic minorities (Smedley, Stith, Nelson, 2002).

Studies have shown that individuals often receive lower quality of care, associated with poor access, and underutilize health care services. The results from these studies led to the identification of a greater number of poor health outcomes compared to non-minorities (Smedley et al., 2002). Consequently, the IOM and the National Research Council of Academies made several recommendations. One strategy was to improve data collection and monitoring of race, ethnicity, primary language, health care access, and socioeconomic status as a foundational first step in improving quality of care and achieving healthcare parity. In order to enhance individual and population health, specific ethnic granular health data of the AA subgroups is needed (Bolen et al., 2000; Clough, Lee, & Chae, 2013; Shilpi, et al., 2010; Smedley et al., 2002; Sorkin, Ngo-Metzger, & De Alba, 2010)

Theoretical Foundation

The Neuman Systems Model (NSM) served as the theoretical framework for this research (Figure 1). NSM is a comprehensive, wholistic, and wellness-based model. It encompasses the nursing metaparadigm, namely individual or human being, health, environment, and nursing. The central tenet of the NSM is the individual's response to actual and potential stressors and the application of the nursing process, which is to plan, implement, and evaluate interventions to achieve an optimal health of the individual. It recognizes that the human being is a whole person; a member of an open social system interacting with multiple stressors; and positioned along a health-illness continuum. NSM views the individual as having unique core structures composed of physiological, psychological, sociocultural, developmental, and spiritual. These structures are protected by lines of resistance (LR), which serve as a stabilizer to maintain a healthy state.

Optimal health is achieved when the structures are preserved by an equally matched line of defense. Each line of defense generates an identical reciprocated response based on the stressor. The ability of the individual to react accordingly to achieve stability, signifies a normal line of defense (NLD). The NLD is safeguarded by the flexible line of defense (FLD). An illness state occurs when stressors penetrate through the FLD. When the FLD fails to protect the NLD, it disrupts the LR resulting to an imbalance. The inability of the LR to effectively react creates an alteration in health (Butts & Rich, 2015; Chinn & Kramer, 2011; Gonzalo, 2011; Polit & Beck, 2012; Reed & Shearer, 2012).

The emphasis of nursing is to comprehensively identify the stressors and their impact on the individual's health and then examine their reaction to these stressors. The nursing goal is to plan targeted and tailored interventions, which may include primary, secondary, and tertiary prevention strategies to create a stable core structure in order to achieve optimal health. Primary intervention aims to prevent an illness from occurring by bolstering the FLD. Primary prevention strategies target modification in an individual's health behaviors to reduce stressors. This may include receiving vaccination, attending a health seminar, engagement in exercise, consuming recommended servings of fruits and vegetables, and discontinuing tobacco use. The goal for secondary prevention is to identify the stressors and safeguard the individual's core structures. The intervention focuses on treatment or elimination of the stressors and supporting the lines of resistance. Examples of secondary prevention include pharmacological management of a medical condition to slow the progression or stop the disease. Tertiary prevention level aims to minimize further disruption of the altered health state by providing supportive measures, such as rehabilitation (Butts & Rich, 2015).

By applying the NSM, the study described the state of health of AA and provided an insight into their ability to cope and sustain a stable LR to maintain a healthy cardiovascular state. The study elucidated individual, healthcare provider (HCP), and healthcare system level "stressors." The individual stressors include high cholesterol, physical inactivity, consuming less than the recommended five servings of fruits and vegetables, smoking, obesity, hypertension (HTN), diabetes type 2 (referred as diabetes moving forward), and lack of preventive health check-up within 12 months.

The healthcare provider level stressor is the biased treatment rendered during the course of obtaining medical care resulting in perceived racism causing physical and emotional symptoms. The lack of insurance, no healthcare provider as usual place of care, and inability to see provider due to financial difficulty are healthcare system stressors. These stressors may cause imbalance leading to an illness state or in this case, increase their susceptibility in developing CVD.

In order to optimize cardiovascular health or reduce risk for CVD, the purpose of nursing is to develop and implement evidence-based, theory-guided, culturally appropriate interventions that will protect the LR and strengthen the FLD. For example, by conducting annual preventive screening, individuals/patients are screened for CVD risk factors such as presence of HTN or obesity. If detected early, the individuals are educated to engage in healthy behaviors to promote healthy eating, engagement in physical activity. If the patients were prescribed anti-hypertensive medications, they are encouraged to adhere to the pharmacological management in addition to participating in lifestyle changes to manage HTN. If HTN is not diagnosed and unmanaged, it threatens the FLD, which leads to CVD such as stroke or heart attack (Center for Disease Control and Prevention [CDC], 2014).

Overview of Literature

Epidemiological data among AA reflect alarming disparities in health outcomes. The liver cancer rate among AA and Pacific Islanders (AAPI) men is 12 times the rate of non-Hispanic White (NHW) men (Kwong, Stewart, Aoki, & Chen, 2010). Compared with NHW women the mammogram and cervical screening rate is lower (30% vs. 21% and 21% vs. 5%) among AA women (Lu et al., 2012).

The mortality rate related to chronic hepatitis B infection is higher in AAPIs than in NHW, Hispanics and African Americans or Blacks (Hsu, Liu, & Yu-Wen, 2007). The mortality rates for AAPI was 7% whereas for NHW and Hispanics, it was 0.1% and for African Americans or Blacks it was 0.5%. Based on the 2014 National Health Interview Survey, the pneumococcal vaccination rates were lower among AA adults (range 41.3%-49.0% vs. 61.1%- 71.1%) when compared to NHW (Tse, Wyatt, Trinh-Shevrin, & Kwon, 2018).

CVD is the leading cause of death among AA. National data on mortality of 2003-2010 showed that the CVD proportionate mortality ratio (PMR) burden related to HTN disease was higher among major AA subgroups (AI women 1.46 and men 1.18; Chinese women 1.69 and men 1.27; Filipino women 1.50 and men 1.38; Japanese women 1.23 and men 0.95; Korean women 1.30 and men 0.94), when compared to NHW (women 1.10 and men 0.90) counterparts (Jose et al., 2014). When comparing hemorrhagic stroke, similar results were found (Jose et al., 2014). The PMR data from this study showed the following: AI women 1.78 and men 1.45; Chinese women 2.28 and men 2.19; Filipino women 2.92 and men 2.64; Japanese women 2.01 and men 1.68; Korean women 2.07 and men 1.89; Vietnamese women 3.37 and men 2.86; in comparison to lower PMRs in NHW women and men (1.06 and 0.94 respectively). Furthermore, AI had the highest (women 1.12 and men 1.43) PMR related to ischemic heart disease, followed by Filipino (men 1.15). The ischemic heart disease PMR for Chinese men (1.02), Japanese (men 1.03 and women .78), Korean (men .86 and women .87), and Vietnamese (men .75 and women .74) were lower when compared to NHW men at 1.08 and women at 0.92 (Jose et al., 2014). When comparing all cerebrovascular age-standardized mortality rates in NHW men (50.30), the rates were higher among Filipino (65.33) and Japanese (56.57), but similar in Vietnamese (51.93) men (Jose et al., 2014).

Multiple studies demonstrated heterogeneity in cardiovascular risk factors across all U.S. racial/ethnic groups. However, the results showed that Filipinos had the worse CVD risk profile when compared to other AA subgroups (Frank et al., 2014; Gujrat, Pradeepan, Weber, Narayan, & Mohan, 2013; Jih et al., 2014; Maxwell, Danao, Cayetano, Crespi, & Bastani, 2012; Ye, Rust, Baltrus, & Daniels, 2009). An analysis by Frank et al. (2014) using 2008-2011 outpatient primary care health records of Northern California showed Filipino men had the highest (73.1%) low-density lipoprotein, followed by Vietnamese men (71.3%), Hispanics (66.0%), AI (65.9%), Japanese (65.4%), Blacks (63.1%), NHW (62.2%), Koreans (55.4%), and Chinese (55.3%). Among women, it was highest among Filipino women (63.0%), followed by Blacks (57.2%), Mexicans (56.8%), Vietnamese (56.1%), AI (54.8%), Japanese (54.2), NHW (52.6%), and Koreans (51.7%). Filipino men (60.3%) and Mexican women (45.4%) had high prevalence rates of hypertriglyceridemia, while Blacks had the lowest triglyceride (29.5% and 18.2%) level (Frank et al., 2014).

Filipino (38%), Korean, (35%), and Vietnamese (31%) men had higher prevalence of smoking compared to NHW (25%) men. Among women, Blacks had higher smoking rate (26%), followed by NHW (23%), and Mexicans (18%). Among AA subgroups, it was highest among Japanese (14%), followed by Filipinos (13%), Koreans (11%). The smoking rates were lowest (2%) among Vietnamese and AI women (Frank et al., 2014). Another study showed that Filipino had higher smoking rate (17.7%), while it was lowest (ranged 7.6%-18.4%) when compared to AI, Chinese, and Other Asians (Jih et al., 2014).

A growing body of literature has identified that AA were at higher risk for CVD at lower body mass index (BMI) when using the World Health Organization (WHO) standard obesity category (≥ 30 kg/m^2). It underestimates the negative impact on their health. Therefore, the recommendation is to utilize the WHO Asian obesity cut-off point (BMI ≥ 27.5 kg/m^2) for early detection of CVD (Jih et al., 2014; Maxwell et al., 2012; Wildman, Gu, Reynolds, Duan, & He, 2004). The application of the standard obesity BMI tends to under classify AA as overweight even though they have similar body fat. The WHO Asian BMI obesity cut off point has better utility to predict adverse health outcomes among AA (Jih et al., 2014).

A 2008-2011 cross-sectional study of less than 170,000 primary care patients in Northern California showed that Blacks, Mexicans, and NHW had the highest obesity prevalence rates using standard BMI cut points. The same study showed that obesity rates ranged from 45% to 21% for men and 41% to 24% for women (Frank et al., 2014). For

AA in the same study, the obesity rates were highest among Filipinos (men 19% and women 16%), while it was lowest (men 5% and women 3%) among the Vietnamese (Frank et al., 2014).

A study by Maxwell and colleagues (Maxwell, Crespi, Alano, Sudan, & Bastani, 2012) illustrated the prevalence of overweight or obesity of AA compared to NHW using both cut-points using the 2005 California Health Interview Survey (CHIS) data (Maxwell et al., 2012). Based on the WHO overweight and obesity standard categories, NHW were more likely to be overweight or obese (NHW men 64% and women 43% versus AA men 45% and women 22%). However, when applying the Asian BMI categories, the results for men were reversed. AA men showed higher prevalence of overweight or obesity than NHW men (67% versus 64%) , while the prevalence for AA women (41%) was almost the rate of NHW (43%) women (Maxwell et al., 2012). In another study, Filipinos had the highest adjusted overweight/obesity prevalence (78.6%) using the WHO Asian BMI cut points when compared to other AA subgroups (ranged 60.6%-38.6%) and standard WHO BMI categories when compared to NHW, Hispanics, and Blacks. The overweight or obesity prevalence among non-AA racial groups ranged between 69.7% to 69.7%, with Hispanics having the highest prevalence (Jih et al., 2014).

There are differences in diabetes rates among the U.S. general population. An earlier study showed that AI had the highest diabetes rate (8.2%) when compared to Filipino (6.1%) and Chinese (5.5%) AA subgroups (Ye et al., 2009). In another study, NHW had lower rates (men 8% and women 6%), when compared to Filipino (men 23% and women 18%), AI (men 13% and women 10%), and Japanese (men 16% and women 9%). Korean women (5%) and Chinese men (8%) had low diabetes rates (Frank et al., 2014). When comparing AI against non-AA racial/ethnic groups, the prevalence of diabetes among NHW (7.8%), Blacks (13%), Hispanic (10.2%) was lower, whereas the rate is higher (17.4%) for AI (Gujrat et al., 2013).

A study from 2005 CHIS database (Maxwell et al., 2012) illustrated that AA were less likely to consume five or more servings of fruits and vegetables daily than NHW (men 50% and women 34% vs. men 59% and women 41%). Among the five AA subgroups, Chinese (47%) men and Filipino (29%) women had the lowest intake. Furthermore, 22% to 48% of AA engaged in moderate and vigorous physical activity (PA) compared to NHW at 27% to 60%. Among AA subgroups, Chinese men (42%) and Vietnamese women (38%) had the lowest rate of moderate PA, while Vietnamese men (53%) and Filipino women (52%) and had the highest participation in moderate PA. Chinese (28%) and Korean men (28%) and Korean women (16%) were less likely to engage in vigorous PA than other AA (Maxwell et al., 2012). In another study, AI were more likely to be physically active when compared to NHW (41.8% vs. 37.2%), whereas Chinese were less likely (33.3%) to be PA when compared to other AA subgroups (Ye et al., 2009). In comparison, the physical inactivity among AA subgroups in this study ranged from 38.2% to 41.8% (Ye et al., 2009).

Among population-based health surveys of AA subgroups, HTN was greater among Filipinos compared to other AA subgroups (dela Cruz & Galang, 2008; Fernandes et al., 2012; Ursua et al., 2013; Ye et al., 2009). The HTN prevalence rates among Filipinos vary between 41% to 81.5% (Fernandes et al., 2012; Ursua et al., 2013b; Wu et al., 2011). A study derived from the 2003-2005 National Health Interview Survey (NHIS) showed that Filipinos had higher rate (23.9%) of HTN when compared to other

AA subgroups such as AI, Chinese, and OA (Ye et al., 2009). In contrast, the HTN rates in this study for AI, Chinese and OA were 10.4%, 16.9% and 16.3% respectively (Ye et al., 2009). Another study using the 2009 CHIS, showed Filipinos had the second highest HTN rate (34.9%) after Blacks (36.4%). In this study, the rates of HTN among the Vietnamese, Chinese, and Korean subgroups were lowest (13.1%-21.3%) in comparison to 27.6% for NHW (Jih et al., 2014).

Racial and ethnic minorities encounter multiple healthcare barriers. These arise from various patient, healthcare provider, and systems-level sources within the healthcare industry (Smedley et al., 2002). Asian immigrants often have no health insurance and underutilize routine healthcare services when compared to NHW (18.1% vs. 11.7%). Their lack of English proficiency and the healthcare providers' lack of cultural competency keep them from fully engaging in the healthcare system (Clough et al., 2013).

Discrimination based on race or ethnicity or racism had been shown as a predictor of deleterious health leading to negative health consequences (Lyles et al., 2011; Sorkin et al., 2010). Perceived discrimination (PD) is taking an action or treating someone differently based on one's race or ethnicity. It is the perception that the individual's attributes are superior than the other person, which leads to biased treatment resulting into unfavorable economic or financial, unemployment, societal, and health outcomes (Mirriam-Webster.com, 2018).

Reports of PD in healthcare were highest among African Americans (16%), followed by Hispanics (15%), AAPI (13%). It was lowest among NHW at 1% (Lauderdale et al., 2006). Research related to PD among AA are very sparse, dating from as early as 1993 (Gee, Delva, & Takeuchi, 2007; Lauderdale, Wen, Jacobs, & Kandula, 2006). A few studies have shown that AA immigrant residing in California were more likely to self-report PD than U.S. born AA and NHW (Lauderdale et al., 2006; Lyles et al., 2011). An analysis using the 2003 CHIS depicted that Asians reported higher rates (3.9% vs. 1.5%) of PD within the past five years than NHW. Foreign-born Asians (4.6%) were more likely to report PD than U.S. born Asians (1.2%). Higher income reduced the likelihood from being discriminated among U.S. born ($p < .001$) and foreign-born individuals ($p = .03$). Higher education was not protective against PD for U.S. or foreign-born. Having access to private health insurance was protective against PD among U.S. born individuals (Lauderdale et al., 2006). In the May 2005-December 2006 Kaiser Diabetes Study of Northern California, it was demonstrated that Chinese, Japanese, Vietnamese, and Koreans (4%), Latinos (6%), Blacks (6%), and Filipinos (8%) frequently reported PD related to healthcare than NHW (2%). It was identified that individuals with limited English proficiency (OR =1.91, 95% CI: 1.32–2.78) and poor healthcare literacy (OR = 1.10, 95% CI: 1.04–1.16) were more likely to report perceived healthcare discrimination (Lyles et al., 2011).

A large body of research demonstrated negative health consequences of PD among African Americans (Lyles et al., 2011; Sorkin et al., 2010). Discrimination led to poor health outcomes among African Americans and API (Sorkin et al., 2010). A literature review of population-based community studies comparing African American women and NHW depicted that regardless of higher socioeconomic status, there was a positive association between discrimination and elevated blood pressure, cigarette smoking, and occurrence of atherosclerotic disease. Furthermore, among young to middle-aged African Americans, racial discrimination was linked to poor physical and mental health (Borrell, Kiefe, Williams, Diez-Roux, & Gordon-Larsen, 2006; Williams, Neighbors, & Jackson, 2008).

Among Asian immigrants, similar results were identified. There is a relationship between PD and the development of chronic health conditions. The first U.S. nationally representative study using 2002 and 2003 data of Chinese, Vietnamese, and Filipinos showed a positive association between perceived daily discrimination and heart disease, respiratory conditions, and pain such as headaches after controlling for sociodemographic factors and social desirability bias (Gee et al., 2007). As a result, these marginalized groups often delayed obtaining medical care and are less likely to adhere and follow-up on treatment plans (Lauderdale et al., 2006).

An in-depth meta-analysis indicated that racism influences health outcome, impacting mental and physical health. The participants' age, gender, education, and birthplace were not identified to be strong moderators; however, ethnicity was a statistically significant predictor, especially for AA and Hispanics when compared with Blacks (Paradies et al., 2015). While aggregated studies have shown the association of self-reported discrimination or racism with negative health outcomes, there is a need to further characterize the healthcare experiences of the various AA subgroups when seeking healthcare.

Achieving optimal health and healthcare parity is dependent on having health insurance to access comprehensive healthcare services, ability to afford required healthcare such as prescribed medication, and having an established personal healthcare provider (HCP) as the usual source of health care in order to receive evidence-based preventive services (Agency for Healthcare Research and Quality [AHRQ], 2018; Department of Health Services [DHHS], 2015). In 2012, the national uninsured rate among AA was between 15%-16%, while it was 12%-13% among NHW (Artiga, Orgera, & Damico, 2019; Ramakrishnan & Ahmed, 2014). Chu and colleagues (Chu, Wong, Robinson, & Finegold, 2012) identified various uninsured rates and highlighted the lack of preventive health service among AA. Among the six major AA subgroups, Japanese (6.6%), Filipinos (10.9%), AI (11.8%), Chinese (13.4%), Vietnamese (19.8%), and Koreans (25.5%) lacked health insurance. More AA (24.7%) adults than NHW (19.6%) adults did not have routine office visit in the past year (Chu et al., 2012).

The poverty level among AA is growing. According to data from 2007 to 2011, poverty rate among AA increased by 37%, when compared to 27% increase in the U.S. general population. An analysis of demographic data of AA from 2000 to 2010, showed that native born AA had a 36% growth in poverty level within the past 12 months compared to foreign born AA at 14% (Ramakrishnan & Ahmed, 2014). Filipinos, AI, and Japanese have lower poverty rates (7.5% and 8.4%) when compared to the other 19 AA subgroups. Among Hmong, Bhutanese, and Burmese, the poverty rates were higher (ranged, 28.3%-35.0%) when compared to other AA subgroups (Lopez et al., 2017; Ramakrishnan & Ahmed, 2014).

Adults who had low incomes or whose incomes were below 50% of the poverty level were less healthy and often reported fair to poor health (DHHS, 2015). They often faced daily trade-offs when paying for basic essential needs such as food or housing. Any healthcare expenses may add significant financial burden; therefore, they are more likely to opt-out from attending medical appointments requiring copayment or paying for prescription medication to manage their medical condition, leading to worsening health state (DHHS, 2015). Thirty percent of AA identified medical debt due to a very serious health problem for them and their immediate family (Ramakrishnan & Ahmed, 2014). Identifying disaggregate healthcare barriers and preventive practice among these AA subgroups are essential to improve their health outcomes.

Purpose

An extensive literature review showed no available disaggregated epidemiological CVD health data and a lack of information regarding healthcare barriers and preventive healthcare practice of AA in AZ. It is also unknown how healthcare experiences vary among the AA subgroups in AZ based on their perception of racism when they sought medical care. Because health is influenced by where individuals work, play, and live (Robert Wood Johnson Foundation, 2011), health outcomes from non-AZ population-based surveys cannot be generalized. The purpose of this study was to describe the health state, healthcare experience, healthcare barriers, healthcare preventive practice, and CVD risk factors of AA residing in AZ and describe the predictors of HTN and diabetes among these AA subgroups.

This research may be the first to characterize ethnic differences in self-reported CVD health risks, perceived health state, and healthcare experiences, preventive practice, and healthcare barriers of major AA subgroups residing in AZ. Data gleaned from this research were compared against recent AZ and national Behavior Risk Factor Surveillance System (BRFSS) reports and Healthy People 2020 leading health indicators (LHI) to assess Arizona’s and nation’s progress in achieving health equity among this vulnerable population. The disaggregated health information may inform researchers and clinicians the evidence to plan, prioritize, and implement comprehensive, theoretically guided, culturally tailored, and specific learning preferences of the AA subgroups on community-led prevention programs to improve their health outcomes. It may also provide empirical data for healthcare advocates and policy makers to enact local policies that will improve population health of vulnerable population.

Relationships among Chapters

The three manuscript chapters of the Manuscript Option Dissertation reflected a systematic application of the first three phases of the nursing process namely assessment, diagnosis, and plan. Chapter 1 is an introduction and overview. Chapter 2 identified the health state, healthcare experiences, healthcare barriers, preventive practice, and differences in CVD risk factors of the five largest AA subgroups in AZ. Chapter 3 explained the predictors of HTN and diabetes among these AA subgroups. Chapter 4 is an integrative review of an interventional research to reduce CVD risks among Filipino Americans in the U.S., because they have the highest CVD risk profile among AA subgroups and were the largest AA subgroup in AZ. The review process may aid in developing an evidence-based intervention that is comprehensive, culturally targeted, theory-based, and framed around their learning preferences to improve their cardiovascular health (Figure 2).

Methods

This research is a cross-sectional descriptive secondary analysis. The 2013, 2014, 2015, 2016, and 2017 BRFSS datasets, questionnaires, and codebooks were downloaded from the AZ Department of Health Services [DHS] public health website (AZDHS, n.d.).

Datasets prior to 2013 were not used because 2013 was the first year that AZ started collecting AA ethnic specific responses.

Calculated and weighted or imputed variables related to sociodemographic and other variables pertaining to general health state, reactions to race, CVD risk factors, preventive health practice, and healthcare barriers were selected to elucidate the objectives of this study. Skip logic analysis was conducted to assess for missing variables. The 2014 and 2016 datasets were excluded due to significant amounts of missing variables or absence of study variables. Data from 2013, 2015, and 2017 were merged and used for this study. However, datasets 2013 and 2015 were only used to analyze high cholesterol and total fruit and vegetable consumption because the 2017 cholesterol variable utilized a different calculation formula and the 2017 fruit variable did not exist in the BRFSS codebook and therefore question matching could not be verified. Prior to commencing this research, a Non-exempt Institutional Review Board approval was obtained from the Arizona State University Institutional Review Board.

Instrument

The BRFSS is a U.S. population-based telephonic survey using landline and cellular telephones. The AZ BRFSS is managed by the AZ Department of Health Services (AZDHS) and partially subsidized by the Centers for Disease Control and Prevention (CDC). It is conducted annually by a contracted provider to perform statewide randomized telephone interviews of non-institutionalized adults 18 years and older. The BRFSS questionnaire contains core, optional, and state-added questions to ascertain self-reported general health, health behaviors, health conditions, and preventive practices of the eligible household member. The interview takes an average of 25 minutes (AZDHS, n. d.).

The BRFSS questions are reviewed annually by an AZ working group to recommend additional questions to capture relevant and emerging health issues. Since 2011, AZDHS employs data raking or an iterative proportional fitting instead of post-stratification, to statistically weight BRFSS survey data to adjust for demographic variables in order to increase representation of the study population and to minimize bias from non-responders. The missing responses related to sociodemographic variables such as average age or common race were accounted for by imputation based on the replies provided by the sample population (AZDHS, n. d.; CDC, 2019).

Participants

A sample of 492 AA were included in this study. Responders included in the study were those who identified themselves as Asian, Non-Hispanic, Other Asians (AO), mixed Asian race or belonging to one of the AA subgroups such as AI, Chinese, Filipino, Japanese, Korean, Vietnamese, and OA. For the purpose of data analysis, the study sample was recategorized into five groups: Asian Indian (AI), Chinese, Filipino, Japanese, and OA. Due to a small sample size, respondents who identified themselves as Asian, Korean, or Vietnamese were combined with the OA.

Measures

Demographic characteristics. Sociodemographic variables related to ethnicity, gender, age in years, annual income, completed highest level of education, and marital status were utilized for this study.

General health. Self-reported general health state was selected for the study.

Health care experience. The variables to describe healthcare experience within the past year and reactions based on how they were treated due to their race within the past 30 days were used for this study.

Healthcare barriers and preventive practice. The variables to identify health plan or insurance, medical cost resulting to inability to see a HCP, presence of personal HCP as usual source of healthcare, and routine general health check-up within the past 12 months were included in this study.

CVD risk factors. To assess the presence of CVD risk factors, variables related to the presence of HTN, high cholesterol, diabetes, current smoking, consuming less than the recommended (five or more servings) total fruits and vegetables daily, physical inactivity, and obesity were selected. The BRFSS variables used were: "_RFHYPE5" for HTN, "_RFCHOL" for high cholesterol, "RFSMOK3" for adults who are current smokers, "DIABETE3" for diabetes, "_FRUTSUM for fruits and _VEGESUM for vegetables" for total fruit and vegetable dietary intake of five or more servings per day, "_PAREC1" for physical activity, and "_BMI5CAT," for obesity. For this research, obesity was defined using two WHO BMI cut points: 1) The standard obesity as BMI greater than 30 kg/m^2 and 2) Recommended Asian-specific BMI greater than 27.0 kg/m^2 (CDC, 2017; WHO Expert Consultation, 2004).

Data Analyses

Prior to starting the data analyses, the responses on all the selected variables labelled as "Don't know or not sure or refused" were entered as missing variables. The variable related to general health, was recoded in ascending order to coincide with numerical value of "1 being low or poor health, 2, Fair, 3-Good, 4-Very Good, 5-

Excellent." All study variables (sociodemographic, healthcare barriers, preventive practice, and CVD risk factors) were recoded into dichotomous variables for the purpose of data analyses.

Descriptive statistics were utilized to summarize the characteristics of the AA subgroups and compare differences in sociodemographic variables (marital status, educational attainment, gender, age, and income), health care experience, preventive health practice (attendance to routine HCP check-up within 12 months), healthcare barriers (lack of health insurance, absence of personal health care provider, and failure to see HCP due to cost), and CVD risk factors (high cholesterol, physical inactivity, consuming less than five servings of fruits and vegetables, smoking, obesity, HTN, and diabetes). Categorical data were reported in percentages and continuous data in means. Simple logistic regression analyses was conducted to explore the relationships between HTN and sociodemographic variables (educational attainment, gender, age, and income), preventive health practice (attendance to routine HCP check-up), healthcare barriers (lack of health insurance, absence of personal health care provider, and failure to see HCP due to cost), and health-related risk behaviors (smoking, physical inactivity, poor nutrition intake, and obesity). Similar analysis was performed to evaluate the association of these variables and diabetes. Adjusted odds ratio (OR) and 95% confidence interval (CI) were used to express the probability of having HTN and diabetes. An α level of 0.05 was used to determine significance for all analyses. Data were analyzed using Statistical Package for the Social Sciences (SPSS), version 25.0.

CHAPTER 2

ETHNIC DIFFERENCES IN HEALTH AND CARDIOVASCULAR RISK FACTORS OF ASIAN AMERICANS IN ARIZONA

Asian Americans (AA) are the largest and most racially diverse population in the United States (U.S), amounting to 18.6 million (U.S. Department Health and Human Services [DHHS], 2019; U.S. Census, 2019). They originate from 20 different countries from Indian subcontinents, East and Southeast Asia. AA account for 5.6% of the total U.S. population with projected growth to 38% in 50 years (Lopez, Ruiz, & Patten, 2017). Chinese are the fastest growing subgroup, followed by Asian Indian (AI), Filipinos, Vietnamese, Koreans, and Japanese (Lopez et al., 2017; U.S. Census, 2012). These subgroups account for 85% of the total AA population in the U.S. (Budiman, Cilluffo, & Ruiz, 2019). All states except Hawaii showed at least a 30% growth in AA population. Arizona (AZ) experienced the second largest increase at 95%, after Nevada at 116% (Lopez et al., 2017; U.S. Census, 2012).

Despite their exponential population growth, health-related research has not kept pace with their dramatic increase. Epidemiological data among AA reflect alarming disparities in health outcomes. They have the worst number of cardiovascular risk factors. Cardiovascular disease (CVD) was the leading cause of death in AA (Jose et al., 2014; Wu, Hsieh, Wang, Yao, & Oakley, 2011; Ye, Rust, Baltrus, & Daniels, 2009). When compared to non-Hispanic whites (NHW), the mortality related to CVD, hypertension, heart disease, and stroke was higher among the six major AA subgroups. (Jose et al., 2014; Narayan et al., 2010; Wu et al., 2011).

National and state level public health surveillance surveys continue to report aggregated Asian and Pacific Islander health data due to small sample size in subgroups, therefore concealing their distinct differences in their wellbeing, and further perpetuating the belief that the health of AA are in par with NHW (Bolen, Rhodes, Powell-Griner, Bland, & Holtzman, 2000; Liao et al., 2011). An extensive literature search showed no available disaggregated health report of AA in AZ. There were no studies depicting granular CVD risk profiles of major AA subgroups. It is also unknown how the healthcare experiences vary among the AA subgroups based on their perception of racism (PR) when they sought medical care. Perceived discrimination based on race or ethnicity or racism has been shown as a predictor of deleterious health affects leading to negative health consequences (Lyles et al., 2011; Sorkin et al., 2010). Racial discrimination is taking an action or treating someone differently based on one's race or ethnicity. It is the perception that the individual's attributes are superior than the other person, which leads to biased treatment resulting into unfavorable economic or financial, unemployment, societal, and health outcomes (Mirriam-Webster.com, 2018).

Purpose

The aims of this research were to describe the following among the AA subgroups: perceived health state, differences in the health care experiences based on the perception of racism, healthcare barriers, healthcare preventive practice, CVD risk factors (high cholesterol, physical inactivity, consuming less than five servings of fruits and vegetables, smoking, obesity, HTN, and diabetes), and to identify the predictors of hypertension (HTN) and diabetes type 2 (referred to as diabetes moving forward in this report). The results were compared against available AZ Behavior Risk Factor

Surveillance System (BRFSS) annual report and Healthy People 2020 Leading Health Indicators (LHI) and other national data to gauge state and national progress in eliminating health disparity. Identifying granular health data of the AA subgroups residing in AZ is essential in planning targeted, theory-based, culturally appropriate health interventions, and to measure progress towards achieving health parity.

Theoretical Foundation

The Neuman Systems Model (NSM) served as the theoretical framework that guided this research (Figure 1). NSM encompasses the nursing metaparadigm, namely individual or human being, health, environment, and nursing. It recognizes the individual as a whole person, positioned along a health-illness continuum, who is a member of an open system interacting with multiple environmental stressors. NSM views the individual as having a central structure composed of physiological, psychological, sociocultural, developmental and spiritual variables that are protected by lines of resistance (LR). A healthy state is when the central structure and normal line of defense (NLD) is preserved and safeguarded by flexible line of defense (FLD). An illness state occurs, when stressors penetrate through the FLD and activate the LR, thereby triggering disequilibrium or imbalance. The role of nursing is to identify the stressors, their impact on the individual, and plan targeted and tailored interventions, which may include primary, secondary, and tertiary prevention strategies to achieve a stable system (Chinn & Kramer, 2011; Gonzalo, 2011; Polit & Beck, 2012; Reed & Shearer, 2012).

By applying the NSM, the study will describe the state of health of AA, provide an insight on their ability to cope and sustain stable LR to maintain a normal cardiovascular health state, identify the preventive practice (check-up within 12 month), detect stressors such as CVD risk factors (high cholesterol, physical inactivity, consuming less than five servings of fruits and vegetables smoking, obesity, HTN, and diabetes), determine healthcare barriers (lack of insurance, no healthcare provider as usual place of care, and inability to see provider due to financial difficulty) that may cause imbalance leading to an illness state or in this case, increase their susceptibility in developing CVD.

In order to optimize cardiovascular health or reduce risk for CVD, the purpose of nursing is to develop, implement evidence-based, theory-guided, culturally appropriate interventions that will protect the LR and strengthen the FLD. For example, by conducting annual preventive screening, individuals/patients are screened for CVD risk factors such as presence of HTN or obesity. If detected early, the individuals are educated to engage in healthy behaviors to promote healthy eating, engagement in physical activity. If the patients were prescribed anti-hypertensive medications, they are encouraged to adhere to the pharmacological management in addition to participating in lifestyle changes to manage HTN. If HTN is not diagnosed and unmanaged, it threatens the FLD, which leads to CVD such as heart failure or heart attack (Center for Disease Control and Prevention [CDC], 2014).

Methods

A cross-sectional descriptive secondary analysis was conducted using 2013, 2015, and 2017 AZ BRFSS datasets that were downloaded from the AZ Department of Health Services [DHS] public health website (AZDHS, n.d.). The BRFSS is the longest running U.S. population-based health survey using landline and cellular telephones. The survey is conducted by a contracted provider managed by the AZDHS to perform statewide randomized telephone interviews of non-institutionalized adults 18 years and older. The BRFSS questionnaire contains core, optional, and state-added questions to ascertain self-reported general health, health behaviors, health conditions, and preventive practices of eligible household member. The BRFSS demographic data were statistically adjusted using data raking or an iterative proportional fitting instead of post-stratification in order to increase representation of the study population and to minimize bias from non-responders. The missing responses related to sociodemographic variables such as an average age or common race were accounted for by imputation method based on the replies provided by the sample population (AZDHS, n.d.; CDC, 2019).

For this study, datasets prior to 2013 were not used because specific ethnic responses were not collected. Skip logic analysis was conducted to assess for missing variables. The 2014 and 2016 datasets were excluded due to significant amounts of missing variables or absence of variables. Datasets from 2013, 2015, and 2017 were merged and used for this study. Datasets 2013 and 2015 were used to analyze high cholesterol and total fruit and vegetable consumption, because the 2017 cholesterol variable utilized a different calculation formula and the 2017 fruit variable did not exist in the BRFSS codebook and therefore question matching cannot be verified.

The BRFSS calculated and weighted or imputed variables selected for this study were: sociodemographic (ethnicity, age, gender, marital status, education, income), general health state, health care experience, CVD risk factors (current smoking, physical inactivity, consumption of less than the recommended five servings or more of fruits and vegetables, obesity, high cholesterol, HTN, and diabetes), preventive health practice, and healthcare barriers.

Participants

A sample of 492 AA were included in this study. Responders who identified themselves as "Asian, Non-Hispanic, Other Asians (OA), mixed Asian race or belonging to one of the AA subgroups such as Asian Indian (AI), Chinese, Filipino, Japanese, Korean, Vietnamese, and OA" were included in the study. Responders who identified themselves as "Asian, Korean, or Vietnamese" were combined with the "OA" subgroup due to small sample size. The analyses were limited to the major AA subgroups (i.e. AI, Chinese, Filipinos, Japanese) and OA.

Measures

Demographic characteristics. Sociodemographic variables were selected for this study: ethnicity, gender, age, income, education, and marital status.

General health. Self-reported general health state (5-point Likert scale from 1 "poor" to 5 "excellent") was selected for the study.

Health care experience. Variables related to healthcare experience within the past year and reactions based on how they were treated due to their race were selected.

Healthcare barriers and preventive practice. Variables to ascertain health plan or insurance, medical cost resulting to inability to see a healthcare provider (HCP), lack of personal HCP as usual source of healthcare, and lack of routine general health check-up within the past 12 months were utilized for this study.

CVD risk factors. Variables related to CVD risk factors were selected: HTN, high cholesterol, diabetes, smoking, consuming less than the recommended total fruits and vegetables daily, physical inactivity, and obesity.

Data Analyses

Prior to starting the data analyses, the responses on all the selected variables labelled as "Don't know or not sure or refused" were entered as missing variables. The study variables were then recoded to generate dichotomous variables: 1) gender "0" if male, "1" if female; 2) income "0" if greater than $50,000, "1" if less than $50,000; 3) education "0" if college graduate, "1" if not a college graduate; 4) age "0" if less than 45, "1" if greater than 45. The variable related to general health, was recoded in ascending order to coincide with numerical value of "1 being low or poor health, 2, Fair, 3-Good, 4-Very Good, 5- Excellent."

The healthcare barriers and preventive practice were converted into the following: 1) health plan "0" if has health plan, "1" if no health plan; 2) medical cost "0" if medical cost not an issue, "1" if medical cost an issue; 3) personal HCP "0" if has personal HCP, "1" if no personal HCP; and 4) preventive check-up "0" if preventive check-up within past year, "1" if no preventive check-up within past year." Finally, the CVD risk factors were transformed to: 1) HTN "0" if no HTN, "1" if has HTN; 2) high cholesterol "0" if no high cholesterol, "1" if has high cholesterol; 3) diabetes "0" if no diabetes, "1" if has diabetes; 4) smoking or tobacco use "0" if non-smoker, "1" if current smoker; 5) total fruit consumption "0" if met fruit daily requirement, "1" if not met fruit daily requirement; 6) total vegetable consumption "0" if met vegetable daily requirement, "1" if not met vegetable daily requirement; 7) physical inactivity "0" if met physical activity requirement, "1" if not met physical activity guideline; and 8) obesity using the WHO Body BMI cut-off point (greater than 30 $kg/m^{2)}$ "0" if not obese, "1" if obese and Asian BMI obesity category (greater than 27.0 kg/m^2) "0" if not obese, "1" if obese.

Descriptive statistics was utilized to summarize the characteristics of the AA subgroups and compare prevalence of sociodemographic variables, health state, healthcare barriers, preventive practices, and CVD risk factors. Categorical data were reported in frequencies and percentages and continuous data in means. The Statistical Package for the Social Sciences software version 25 was used to perform the analyses (SPSS, Inc., Chicago IL).

Results

The sociodemographic characteristics of the total AA and five AA subgroups are presented in Table 1. Over half (52.8%) of the responders were male with a mean age of 45.06 years. More than half of them (61.8%) were married and graduated from college or tech school (66.5%). AI, Chinese, and OA subgroups had the highest percentage of completing college (84.3%, 76%, 56.9%), whereas 47% of Filipinos were college graduates. Filipino subgroup had the highest percentages of individuals with less than high school education (4.5%). An annual household income greater than $75,000 was reported by 48.5% of AA. The groups earning more than $75,000 were AI (64.4%), OA (48.6%), and Chinese (43.7%). Based on the income (<$23,834 in 2013; <$24,250 in 2015; <$24,860 in 2017) level for a family of four living under the federal poverty level (FPL), 20.5% of AA live below the FPL (Center for American Progress, 2019). The OA subgroup had the highest percentage who had incomes under the FPL (30.7%), followed by Filipinos and Japanese (22.4% and 20%).

Table 2 depicts the health state, healthcare experience, and effects related to perceived racism among AA. The majority of the responders (90.9%) described their health as good, very good, and excellent. Filipinos reported the highest percentage of having poor health (4.5%). Only a small percentage (3%) of AA reported their healthcare experience within the past 12 months being worse than other races. The OA subgroup reported having the worse healthcare experience (20%) when compared to the total AA. AI and OA ethnic groups (12.5% and 28.6%) described having experienced physical symptoms (i.e. headache, muscle tension, stomach upset, heart palpitation) and being emotionally upset (i.e. angry and sad) within the past 30-days based on how they were treated because of their race.

AA encountered multiple healthcare barriers (Table 3 and Figures 4 and 5). Among the AA subgroups, OA faced the most obstacles: 12.5% were uninsured; 28% lack a personal healthcare provider; 13.6% were unable to see a HCP due to financial difficulties; and 36.2% had no health check-up within the past 12 months. Filipino was the second highest subgroup having no health insurance (12.3%) and the highest subgroup of being unable to see a HCP due to financial burden (16.9%). Chinese was the highest subgroup with no personal HCP (32.4%) and no health check-up for the preceding 12 months (37.6%).

The unadjusted prevalence estimates of CVD risk factors are shown in Tables 4 and 5 and Figures 6-9. Among AA subgroups, smoking prevalence in OA was the highest (9.8%), followed by Japanese (9.1%) and Filipinos (8.2%). Only 22.6% of AA met the CDC aerobic and strengthening physical activity guideline (DHHS, 2019). The AI subgroup had the highest prevalence of physical inactivity (83.8%) and lowest total mean intake of fruits and vegetables (3.17). In contrast, Japanese were more likely to be physical activity (32.4%) and had higher total mean daily consumption of fruits and vegetables (4.47) when compared to other AA subgroups. When compared to total AA, Filipinos had more than two times the rate of diabetes and obesity when using the WHO standard BMI obesity criteria (24.2% versus 10.5% and 23.8% versus 9.4%). When applying the Asian BMI criteria, the Filipino and OA subgroups had the highest prevalence (32.3% and 32.0% versus 24.5%). Japanese had the highest (43.2%) occurrence of HTN, trailed by Filipinos (36.4%). Japanese had the highest cholesterol prevalence (42.9%), followed by Chinese and Filipinos (37.9% and 35.0%).

Discussion

The findings from this study were compared to available AZ BRFSS and Healthy People 2020 LHI to gauge state and national progress in achieving health parity (AZDHS, n.d.; Department of Health and Human Services, Office of Disease Prevention and Health Promotion [HHS ODPHP], 2019). Most AA in AZ (98.4%) were high school graduates. This is higher than all AA in the U.S. (86.9%) and NHW (92.9%). Furthermore, the prevalence of college graduate is higher (66.5%) for AA residing in AZ, than all U.S. AA and NHW. The rate is lower (53.8% and 35.8%) when compared to all AA and NHW (HHS ODPHP, 2019). Based on economic measures, AI continues to be the highest income earners (Lopez et al., 2017).

The results related to poverty level depicted considerable contrast when compared to national and AZ state specific data. Compared to all U.S. AA (11.1%) and NHW (9.6%), more AA in our study (20.5%) were found to live at poverty level. They also have higher poverty rates than the total AZ at 16.4% (Center for American Progress, 2019; DHHS, 2019). Among the major AA subgroups, Filipinos and Japanese had the highest shares of poverty level (22.4% and 20%), which were higher (7.5% and 8.4%) than the U.S. national Filipino and Japanese poverty levels (Lopez et al., 2017). The national poverty rates of Koreans (12.8%), Vietnamese (14.3%), and Cambodians (29.3%) are lower than the OA subgroup at 30.7% (Pew Research Center, 2017; Ramakrishnan & Ahmed, 2014).

Overall, 90.9% of our study population versus 81.4% of Arizonans reported having better health (AZDHS, n.d.). In our study, Filipino and OA subgroups had the highest prevalence living at poverty level and described having poor health. It is well known that adults who have low incomes or whose incomes are below 50% of the poverty level are less healthy and often report fair to poor health (DHHS, 2015).

Similar to previous study, AA faced multiple healthcare barriers (Kim & Keefe, 2010). Compared to all U.S. AA (6.6%) and NHW (5.9%), the lack of health insurance rates was higher among our sample population at 9% (DHHS, 2019). The uninsured rates among OA (12.5%) and Filipino (12.3%) subgroups were higher than the rate (12.1%) of the general population in Arizona (AZDHS, n.d.). In a previous study, the six major AA subgroups, Japanese (6.7%), Filipinos (11.3%), AI (11.8%), and Chinese (13.9%), Vietnamese (20%), and Koreans (25.5%) lacked health insurance (Chu, Wong, Robinson, & Finegold, 2012). Our study showed that the uninsured rates among AI and Chinese were significantly lower (3.0% and 8.7%) due to their higher socioeconomic status.

The percentage of AA's inability to seek healthcare due to cost was lower (9.9%) compared to 13.6% of general population in Arizona (AZDHS, n.d.). However, it was highest among Filipinos at 16.9%. Among our study population, Chinese had the highest rate (32.4%) of not having a personal HCP as the usual source of care. When compared to the AZ general population rate (32.5%), 26.7% of AA had at least one healthcare provider (AZDHS, n.d.). The prevalence rate of delayed routine check-ups beyond 12 months for preventive health visits was highest (37.6%) among the Chinese subgroup, but slightly lower (31.8%) among the total AA sample population when compared to Arizonans at 32.6% (AZDHS, n.d.).

There were variations in the CVD risk profiles among our sample population, which is similar to limited U.S. AA population-based health studies. The total combined smoking prevalence among AA was significantly lower (5.9%) when compared to the AZ general population at 14.7% and U.S. general population at 12.0% (AZDHS, n.d.; HHS ODPHP, 2019). When comparing the prevalence rates of physical activity, less than a quarter (22.6%) of AA met both the aerobic and strengthening physical activity CDC guidelines, which was slightly under the rate of Arizonans (29.3%). Only 30.9% of AA met the muscle strengthening guideline, whereas more than one third (36.4%) of Arizonans reported meeting the muscle strengthening guideline (AZDHS, n.d.). However, they exceeded the Healthy People 2020 physical activity and muscle strengthening target goals of 20.1% and 24.1% respectively (HHS ODPHP, 2019). The recommended daily consumption of fruit intake is 2 cups and 3 cups of vegetables per day. Arizonans consumed a mean of 1.4 servings of fruits and 2.2 servings of vegetables or a total daily fruits and vegetable mean intake of 3.6. Compared to the AZ general population (63%), 79.2% of AA consumed less (3.58) servings of fruits and vegetables daily (AZDHS, n.d.).

The prevalence of HTN (23.8%) among AA were lower than AZ (30.8%) and national rate (30.9%). However, the rate was higher among Japanese and Filipinos at 43.2% and 36.4% respectively (AZDHS, n.d.). Compared to Arizonans (39.7%) and the U.S. general population (38.4%), AA had lower prevalence (30.5%) of having high cholesterol (AZDHS, n.d.). The prevalence of diabetes was slightly lower among AA subgroups when compared to Arizonans (10.5% vs. 10.8%). However most alarmingly, the rate among Filipinos (24.2%) was more than double the AZ rate at 10.8% (AZDHS, n.d.). Using the WHO and Asian BMI obesity cut-off points, AA were less likely to be obese than Arizonans (9.4% and 24.5% vs. 29.0%). However, Filipino and OA subgroups were more likely to be obese than Arizonans (32.3% and 32% vs. 29.0%) when using the WHO BMI category (AZDHS, n.d.). Both subgroups did not meet the Healthy People 2020 obesity reduction goal of 30.5% (HHS ODPHP, 2019).

In applying the components of the NSM, the results depicted their state of health, healthcare barriers, and the lack of preventive check-up to protect the LR to achieve a NLD or a healthy state. To maintain a healthy state, adherence to preventive practice or healthy behaviors are necessary to bolster the FLD. The results also described the healthcare experience and their reactions based on how they were treated due to their race, affecting them physically and emotionally. It elucidated their different multi-level "stressors," ranging from several healthcare barriers, lower socioeconomic status, and CVD risk factors. These stressors weakened their FLD thereby increased their susceptibility to develop CVD.

The granular results for AA's health healthcare experience, healthcare barriers, lack of preventive practice, and CVD risk factors may serve as a tool for clinicians and researches to prioritize, plan, and implement evidence-based, theoretically guided, and culturally tailored community-led interventions to improve their health outcomes to boost and strengthen their FLD and safeguard the LR to optimize their health. The outcomes may also provide empirical data for healthcare advocates and policy makers to enact changes at individual, healthcare provider, healthcare system, and health policy level to reduce CVD risks and eliminate racism among this vulnerable population.

Limitations and Strengths

This research has several limitations. Although the BRFSS is a telephonic randomized survey and has high reliability and validity (CDC, 2017), responses were based on self-report which has potential bias. The prevalence of CVD risks among AA may be underestimated, because it did not include anthropometric measurements and laboratory testing. Our study population was small and therefore it limits the reliability estimates for all subgroups. The responses on the healthcare experience was based on a very small sample size. Similarly, the results from the OA subgroup depicted an aggregated result of potential 16 other AA subgroups. Therefore, outcomes should be interpreted with caution and cannot be generalized.

This research study has significant benefits. This research described differences in health state, healthcare barriers, healthcare experiences, preventive practice, and CVD risk factors among major AA subgroups in AZ. The granular data adds new knowledge to limited studies of AA in the U.S. and will serve as foundation for future research.

Implications

This research elucidated the current state of health of AA in AZ and has data collection opportunities. Given the growth of AA in AZ, an increase in sampling of AA and its subgroups is recommended. A discussion among the community of BRFSS stakeholders to achieve a minimum of 50 study participants in order to perform and report granular health data, needs exploration. In order to track and measure progress over time, questions related to CVD risk factors and healthcare experience should be part of an annual set of core questions instead of being part of an optional CDC and AZ module. Another recommendation is to use consistent measurement units for healthcare outcomes/metric being measured between BRFSS and Health People 2020 LHI. For example, BRFSS uses mean total daily vegetable and fruit consumption, whereas Healthy People 2020 uses 1.16 cup equivalent per 1,000 calories (AZDHS, n.d.; HHS ODPHP, 2019). Similarly, using equivalent or similar racial subgroups for both BRFSS and Healthy People 2020 LHI, would be helpful for data comparison. For example, for question, "AHS-3: Persons with a usual primary care provider," the disparities overview report by race and ethnicity only depicted and compared the following racial ethnic groups: Hispanic or Latino, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native (HHS ODPHP, 2019). Additionally, mixed method research is needed to assess the health effects and moderators of perceived racism when seeking healthcare beyond ethnicity and to further explain the phenomena why the Chinese and AO subgroups had the higher rates of not having healthcare provider as usual source of care and no preventive check-up within 12 months.

Conclusion

The study depicted disaggregated epidemiological data of AA. The results substantiate that AA are not model minorities. They are a vulnerable population. There are variations in their social determinants of health, healthcare barriers, CVD risk factors, and health care experiences based on perceived racism even with opposite socioeconomic factors in income and education. Overall, when comparing the results of the CVD risk profiles of the total AA and each AA subgroups against national LHI, the outcomes related to smoking and physical activity illustrated progress towards in improving health outcomes. Considerable amount of work is needed to improve participation in preventive health check-up, reduce poverty level, healthcare barriers, and CVD risk factors related to inadequate daily consumption of recommended servings of fruits and vegetables, obesity, HTN, diabetes, and high cholesterol. The health profiles of Filipinos depicted morbid state when compared to other AA subgroups, Arizonans, and several national LHI. The granular health information about AA subgroups may provide researchers and clinicians the data to plan, prioritize, and implement evidence-based, theoretically guided specific interventions based on the disparities and needs of each AA subgroups to improve their health outcomes. The data may serve as a tool to guide community stakeholders and policy makers to advocate for public health policies that will elevate population health of AA or communities of color in Arizona to be in line with NHW counterparts.

CHAPTER 3

PREDICTORS OF HYPERTENSION AND DIABETES AMONG ASIAN AMERICANS IN ARIZONA

The United States (U.S) is home for 47 million international immigrants (United Nations [U.N.], 2015). Asian Americans (AA) are the largest and most diverse ethnic subgroup in the U.S. They migrated from 20 different countries from the Asian continent, including East and Southeast Asia and the Indian subcontinent (Lopez, Ruiz, & Patten, 2017). There are 22.2 million AA, accounting for 5.6% of the total U.S. population (Department Health and Human Services [DHHS], 2019; U.S. Census, 2019). The top six AA subgroups arranged from largest to smallest are Chinese, Asian Indians (AI), Filipinos, Vietnamese, Korea, and Japanese. In total, they make up 85% of the total AA population (Budiman, Cilluffo, & Ruiz, 2019). Forty-six percent of total AA reside in the western states, with the largest concentration (15%) in California. In 2010, almost 231,000 AA reside in Arizona (AZ), a 95% growth since 2000 (Advancing Justice, 2015; U.S. Census, 2012).

Asian Americans are a vulnerable and understudied population. Vulnerable populations are social groups that are at a higher risk for poor health outcomes and diminished quality of life due to lower utilization or lack of access to quality healthcare services. They are known to be medically underserved and/or disadvantaged population. These groups include individuals who are mentally ill, chronically ill and disabled, diagnosed with human immunodeficiency virus or acquired immune deficiency syndrome, live in rural areas, homeless, uninsured women and children, and include communities of color (Shi & Singh, 2013). Despite their exponential growth, there is paucity in disaggregated population-based study. Epidemiological data depicts significant disparities related to hypertension (HTN) and diabetes type 2 (referred to as diabetes moving forward in this report) which are both modifiable cardiovascular risk factors.

Diabetes disproportionately affect AA. Multiple large-scale U.S. population-based surveys demonstrated that in 2018, approximately 26.9 million Americans have diabetes and 2.9 million U.S. adults 20 years or older or 10.9% of total U.S. adults were diagnosed with diabetes and started insulin therapy (U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion [HHS ODPHP], 2020). Based on 2017-2018 data, the age-adjusted prevalence of diabetes among adults 18 years and over is as follows: American Indian/Alaska Native (14.7%), Hispanic (12.5%), non-Hispanic Black ([NHB]11.7%), Asians (9.2%), and non-Hispanic White ([NHW] 7.5%). Amongst the Hispanic group, Mexicans had the highest prevalence (14.4%), followed by Puerto Ricans (12.4%), Central/South Americans (8.3%), and Cubans (6.5%). Among the AA major subgroups, AI had higher prevalence of diabetes (12.6%), trailed by Filipino (10.4%), and Chinese (5.6%). The Other Asians (OA) subgroup had a rate of 9.9% (HHS, ODPHP 2020).

Using the 2007 California Health Interview Survey (CHIS) data, among AA subgroups, the age-adjusted prevalence of diabetes was highest in Filipinos, followed by Japanese, Vietnamese, Koreans, and Chinese. The rates were 8.05%, 7.07%, 7.03%, 6.3%, and 5.93% respectively (Choi, Chow, Chung, & Wong, 2011). Choi and colleagues (Choi, Liu, Palaniappan, Wang, & Wong, 2013) examined the prevalence of diabetes after adjusting for age using the 2009 CHIS data. Among men, the rate was highest among Native Americans (32.4%), followed by Filipinos (15.8%), Japanese (11.8%) and, Mexicans (10.0%). It was lowest among Chinese (5.0%) and Vietnamese (2.5%). Among women, the prevalence of diabetes was highest among Native Americans (16.0%), African Americans (13.3%), Other Hispanic (10.7%). Among AA subgroups, it was highest among Filipinos (9.4%), followed by Japanese (7.6%), and Korean (5.1%). The rates were lower (3.6% and 2.1%) for Chinese and Vietnamese (Choi et al., 2013). A study using 2003-2005 National Health Interview Survey compared the prevalence CVD risk factors among AA subgroups and NHW. It showed that AI had higher diabetes prevalence (8.2%) than NHW (6.7%) and Filipinos (6.1%). Chinese had the lowest (5.5%) prevalence (Ye, Rust, Baltrus, & Daniels, 2009).

Approximately 75 million U.S. adults 18 years and older have HTN (Merai et al., 2016). It was the leading contributing cause of death among Americans (Wang, Grosse, & Schooley, 2017). Data from 2011-2014 National Health and Nutrition Examination Survey demonstrated that the prevalence of HTN was highest among Black (41.2%), followed by NHW (28.0%), Hispanic (25.9%), and Asians (24.9%). Among men, the HTN prevalence was highest among Black (40.8%), followed by NHW (29.4%), Asians (26.5%), and Hispanic (25.4%). While among women, NHB women had the highest (41.5%), followed by NHW (26.5%), Hispanic (26.2%), and Asian (23.5%). The prevalence of HTN among adults age 40-59 is 32.2% and more than doubled (64.9%) for adults age 60 and older. Additionally, the prevalence of HTN among men and women increased with age. It was higher among adult men than women (8.4% versus 6.1% in age group 18–39 and 34.6% versus 29.9% in age group 40-59). However, the prevalence of HTN was higher among women (66.5%) than men (63.1%) among adults 60 years and over (Yoon, Carroll, & Fryar, 2015).

Among AA, there is heterogeneity in the prevalence of HTN. Among adult foreign-born Chinese, Korean, and Vietnamese in Baltimore, Washington, the HTN prevalence ranges from 13.4% to 23.2% (Jung, Lee, Thomas, & Juon, 2019). When compared to Chinese, Hmong, and Vietnamese, the HTN prevalence rate among Filipinos was 31.8% versus 22.2%, 21.9%, and 17.1% respectively (Wu, Hsieh, Wang, Yao, & Oakley, 2011). Multiple studies showed that Filipinos persistently have a high prevalence of HTN, ranging from 41% to 81.5% (dela Cruz & Galang, 2008; Fernandes et al., 2012; Ursua et al., 2013; Ursua et al., 2014b). A study using Northern California 2010-2012 data demonstrated that HTN control rates among Filipino men and women were lowest (50.2% and 53.2%) compared to 60.3% for NHW men and 60.5% for NHW women (Zhao et al., 2015). Similar poor HTN control (51.1% for stage 1 HTN and 27.1 % for stage 2 HTN) among Filipinos in New York City and Jersey City was identified by Ursua and colleagues (Ursua et al., 2013).

Based on the study results discussed in Chapter 2, titled, "Ethnic Difference in Health and Cardiovascular Risk factors of Asian Americans in Arizona," the non-age adjusted prevalence of HTN and diabetes showed a similar trend with either AI, Filipinos, and Japanese subgroups leading the other AA subgroups. Less than a quarter (23.8%) of total AA had HTN. Japanese subgroup had the highest (43.2%), followed by Filipinos (36.4%), OA (22.2%), Chinese (18.3%), and AI (17.3%). Regarding diabetes, the prevalence rate for Filipinos (24.2%) was more than double the rate of the total AA rate (10.5%). AI showed the next highest prevalence rate (9.0%), followed by Chinese (8.8%), OA (7.7%), and Japanese (6.8%).

The economic burden of diabetes and HTN is astronomical. For diabetes, approximately $237 billion was spent on the medical management and an additional $90 billion for lost productivity (Diabetes Care, 2018). Almost $51.2 billion per year was spent on HTN (Benjamin et al., 2017). It is forecasted that by 2030, 40.5% of the U.S. population will develop some type of CVD. The direct medical costs in 2030, were estimated to be $818 billion and the lost productivity to be $276 billion, which equates to a 61% increase from 2010 (Heidenreich et al., 2011).

The aim of this report was to identify the predictors of HTN and diabetes among AA in AZ. This study explored the association between HTN and age, income, education, and modifiable health-related risk behaviors (smoking, physical inactivity, consuming less than the daily recommended servings of fruits and vegetables, and obesity). The study also assessed the potential correlates between HTN and preventive health practice (attendance to routine HCP check-up), healthcare barriers (lack of health insurance and personal health care provider; failure to see HCP due to cost). Similar analyses were performed for diabetes. Any association identified at an individual, healthcare system, and health policy level is significant in preventing the onset and reducing the disabling health consequences and economic burden of HTN and diabetes, which are considered preventable health conditions.

Theoretical Foundation

The Neuman Systems Model (NSM) guided this research (Figure 1). NSM encompasses the nursing metaparadigm, namely individual or human being, health, environment, and nursing. It recognizes the individual as a whole person composed of physiological, psychological, sociocultural, developmental and spiritual structures that are protected by lines of resistance (LR) and a member of an open system interacting with multiple environmental stressors and positioned along a health-illness continuum. A healthy state is when the central structure and normal line of defense (NLD) is preserved and safeguarded by flexible line of defense (FLD). An illness state occurs, when stressors penetrate through the flexible line of defense and activate the lines of resistance, thereby triggering disequilibrium or imbalance. The role of nursing is to identify the stressors, their impact on the individual, and plan targeted and tailored interventions, which may include primary, secondary, and tertiary prevention strategies to achieve a stable system (Chinn & Kramer, 2011; Gonzalo, 2011; Polit & Beck, 2012; Reed & Shearer, 2012).

Methods

Publicly available AZ Behavior Risk Factor Surveillance System (BRFSS) datasets with accompanying questions and code book from 2013 through 2017 were downloaded from AZ public health website (AZDHS, n.d.). The BRFSS is a state-run population-based annual randomized health survey of non-institutionalized adults using landline and cellular telephones to assess self-reported state of health, health behaviors, presence of chronic conditions, and preventive health practices (AZDHS, n.d.; CDC, 2019). Only 2013, 2015, and 2017 datasets were utilized due to no ethnic responses available prior to 2013. Significant amounts of missing variables or absence of study variables from 2014 and 2016 datasets were identified after performing skip logic analysis. Non-exempt Institutional Review Board approval was obtained prior to commencing research. Detailed methodology of this study had been documented in previous report.

A total of 492 AA formed our sample population. Responders who self-identified as Asian, Non-Hispanic, OA, mixed Asian race or belonging to one of the AA subgroups such as AI, Chinese, Filipino, Japanese, Korean, Vietnamese, and OA were included in the study. Asian, Korean, or Vietnamese were combined with the "OA" category due to small sample size. The AI, Chinese, Filipinos, Japanese, and OA subgroups formed the basis of our analyses. The variables selected for this study were: sociodemographic (ethnicity, age, gender, marital status, education, income), CVD risk factors (smoking, physical inactivity, consumption of less than the recommended servings of fruits and vegetables, obesity, HTN, and diabetes), preventive health practice, and healthcare barriers.

Measures

Demographic characteristics. Sociodemographic variables related to ethnicity, gender, age, income, and education were utilized for this study.

Healthcare barriers and preventive practice. The variables to identify health plan or insurance, medical cost resulting to inability to see a healthcare provider (HCP), personal HCP as usual source of healthcare, and routine general health check-up within the past 12 months were included in this study.

CVD risk factors. To assess the presence of CVD risk factors (HTN, high cholesterol, diabetes, smoking, consuming less than the recommended total fruits and vegetables daily, physical inactivity, and obesity), multiple variables were selected for this study.

Data Analysis

A descriptive analysis was conducted to characterize the sociodemographic variables preventive health practice, healthcare barriers, and modifiable CVD risk factors. Categorical data were reported in percentages and continuous data in means.

Simple logistic regression analysis was conducted to explore the relationships between HTN and sociodemographic variables (educational attainment, gender, age, and income), preventive health practice (attendance to routine HCP check-up), healthcare barriers (lack of health insurance and personal HCP; failure to see HCP due to cost), and health-related risk behaviors (smoking, physical inactivity, poor nutrition intake, and obesity). Similar analysis was performed to evaluate the association of these variables and diabetes. Adjusted odds ratio (OR) and 95% confidence interval (CI) were used to express the probability of having HTN and diabetes. An α level of 0.05 was used to determine significance for all analyses. Data were analyzed using Statistical Package for the Social Sciences (SPSS), version 25.0 (SPSS, Inc., Chicago IL).

Results

The distribution of the sample characteristics of the AA subgroups is shown in Table 1. The participants' mean age was 45.06 (*SD*=16.58). More than half (52.8%) of the responders were male, married (61.8%) and graduated from college or tech school (66.5%). AI had the highest percentage of completing college (84.3%) and annual income greater than $75,000 (64.4%). The Filipino subgroup had the lowest percentage (47%) of graduating college and the highest percentage with less than high school education (4.5%). Based on the federal poverty level (FPL) income (<$23,834 in 2013; <$24,250 in 2015; <$24,860 in 2017) for a family of four, 20.5% of AA live below the

FPL (Center for American Progress, 2019). The OA subgroup had the highest proportion of respondents below the FLP income threshold (30.7%), followed by Filipinos and Japanese (22.4% and 20%).

The healthcare barriers encountered by AA are presented in Table 3 and Figures 4 and 5. The OA subgroup faced the most obstacles: 12.5% lack health coverage; 28% had no personal HCP; 13.6% were unable to see a healthcare provider due to cost; and 36.2% had no health check-up within the past 12 months. Filipinos were the second highest uninsured subgroup (12.3%) and had the most financial burden (16.9%) resulting to no HCP visit. Whereas, the Chinese subgroup was the group with the highest prevalence with no personal healthcare provider (32.4%) and lack of preventive check-up during the preceding 12 months (37.6%).

Tables 4 and 5 and Figures 6-9 depict the unadjusted prevalence of lifestyle and disease related CVD risk factors. The OA subgroup smoked more (9.8%) than Japanese (9.1%) and Filipinos (8.2%). Less than 25% of total AA (22.6%) met the CDC aerobic and strengthening physical activity guideline (DHHS, 2019). The AI subgroup had the highest prevalence of physical inactivity (83.8%), followed by Chinese subgroup (78.2). The AI subgroup also had the lowest total mean intake of fruits and vegetables (3.17). When compared to total AA, Filipino subgroup had more than two times the prevalence rate of diabetes (24.2% vs. 10.5%). The obesity prevalence was highest among Filipino subgroup (23.8% and 32.2%), followed by OA (10.9% and 32.%) using the World Health Organization (WHO) and Asian Body Mass Index (BMI) obesity cut-off points of >30 kg/m^2 and >27.0 kg/m^2 (CDC, 2017; WHO Expert Consultation, 2004).

This study examined the predictors of HTN and diabetes. The results revealed that among all covariates, age greater than 45 and obesity using the WHO standard and Asian BMI cut-points were significantly associated with HTN (Table 6 and Figure 10). Adults who were 45 years and older were almost four times more likely to have HTN (OR = 3.92; 95% CI = [2.48, 6.18]). Being obese using the WHO standard and Asian BMI categories, AA were two to four times more likely to develop HTN than those that were not obese (OR= 2.89; 95% CI = [1.80, 4.63] and OR = 4.58; 95% CI = [2.38, 8.81]). The lack of health insurance and lack of a personal healthcare provider were strongly associated with not having the diagnosis of HTN (OR = 0.38; 95% CI = [0.14, 0.98] and (OR= 0.49; 95% CI = [0.28, 0.83] respectively). Similarly, health check-up greater than 12 months was associated with not having the diagnosis of HTN (OR= 0.18; 95% CI = [0.09, 0.34]).

The predictors of diabetes are shown in Table 7 and Figure 11. Among sociodemographic variables, adults who were 45 years and older were almost seven times more likely to have diabetes than adults younger than 45 years (OR = 6.79; 95% CI = [3.12, 14.79]). Obesity using WHO standard and Asian BMI cut-off points was a significant predictor, resulting in more than two to three times more likely to have diabetes (OR = 2.39; 95% CI [1.28, 4.43] and OR = 3.54; 95% CI [1.64, 7.62]) than the non-obese counterparts. In contrast to the data for HTN, the inability to see a healthcare provider due to medical cost was associated with higher odds of developing diabetes by more than three times (OR = 3.08; 95% CI [1.45, 6.54]). Having health check-up greater than 12 months was a substantial predictor of not having the diagnosis of diabetes (OR = 0.16; 95% CI [0.05, 0.46]). Gender, income, education, smoking, physical activity, and daily consumption of the recommended servings of fruits and vegetables were not associated with HTN and diabetes.

Discussion

Our study results were supported by previous findings (Choi et al., 2013; Kwon et al., 2017; Ma et al., 2017; Ursua et al., 2013), but in varying differences. Our finding on the predicting role of age on HTN was supported by previous research. Ursua and colleagues (Ursua et al., 2013), identified that Filipino adults age 46-55 were close to three times more likely to have HTN. As age advanced by 10 years (56-65), the likelihood increased to seven times and over sixteen times for adults older than 66 years (Ursua et al., 2013).

Our results on the association between obesity and HTN or diabetes were supported by previous studies. Kwon et al. (2017) reported that the odds of having diabetes and HTN were greater among obese Chinese Americans than those who were not obese. The odds were 4.2 times and 5.5 times when using the WHO Asian BMI category and 5.1 times and 7.9 times when applying the standard cut-off point (Kwon et al., 2017). Similar results were identified by Choi and colleagues (Choi, Chow, Chung, & Wong, 2011), wherein the addition of BMI, the odds of having diabetes among Koreans, Japanese and Filipinos in California were 1.6-1.75 when compared to Caucasians (Choi, et al., 2011). Among obese Filipinos, the likelihood for HTN increased three fold when compared to non-obese Filipinos (Ursua et al., 2013).

Our findings related to the association between lack of health insurance and personal HCP and HTN and no preventive health check-up within 12 months and diabetes or HTN were supported by multiple studies. In this study, the lack of health insurance, personal HCP as the usual place of care, and health check-up greater than 12 months were strongly associated with not having the diagnosis of HTN. The diagnosis for HTN is made after at least two separate blood pressure readings conducted during separate medical appointments (CDC, 2014). The lack of health insurance and personal HCP as the usual place to obtain care prevents individuals from making the required and separate medical appointments for blood pressure screening (Agency for Healthcare Research and Quality [AHRQ], 2018; CDC, 2014). Individuals with undiagnosed HTN often do not have symptoms, until it leads to serious complications such as heart attack or stroke (CDC, 2014). The lack of signs and symptoms associated with undiagnosed HTN give the at-risk individual the falsehood of a healthy cardiovascular state (CDC, 2014). Furthermore, when individuals have a personal HCP as the usual source of routine care, there is an established patient and HCP professional relationship, wherein HCP and staff are more likely to conduct follow-up or notify the individual of required, missed, and/or preventive appointments (Mayo Clinic Health System, 2015). Similar with HTN, the failure to obtain health check-up at less than 12-month intervals was associated with not having the diagnosis of diabetes. This association may again be explained by the lack of screening and/or underdiagnosis of diabetes when not undergoing preventive health check-up.

Burstin and colleagues (Burstin, Swartz, O'Neil, Orav, & Brennan, 1998) found that individuals who did not have or lost their health insurance were more likely to report the lack of HCP, no follow-up visit with their HCP after four months of visiting the emergency room, and no preventive care (Burstin et al., 1998). A systematic review identified financial impact, i.e. reduced co-payment to purchase antihypertensive medication to be associated to HTN control and adherence (Maimaris et al., 2013). Moreover, the availability of health insurance and having a routine source to obtain care were also associated with better outcomes (Maimaris et al., 2013). Similar results were also identified, wherein being insured was significant factor (OR 1.4, $p < .05$ and OR 1.65, $p < .01$, respectively) in the likelihood of detecting diabetes (Choi et al., 2011, 2013). The impact of being uninsured showed poorer self-reported health state, dismal awareness of HTN and diabetes due to lack of screenings and higher mortality among NWH who had low income or had 2 CVD risk factors such as diabetes, HTN or heart disease (McWilliams, 2009).

In our study, female gender was not a significant predictor of HTN and diabetes. Multiple studies supported this finding (Choi et al., 2013; Ursua et al., 2013; Zhao et al., 2015). A study (Choi et al. 2013) reported that after adjusting for age, chronic health conditions, and modifiable lifestyle risk factors and when compared to NHW, the likelihood for diabetes ranged from two-to-seven fold and was highest among male Filipinos, South Asians, Mexicans, and Native Americans. It was also noteworthy that additional factors such as being male, living below FPL, and consuming fewer vegetables showed strong association in the likelihood of diabetes (Choi et al., 2013). Korean, Filipino, OA men had up to two times the likelihood of having diabetes than NHW men. Filipino and Vietnamese male also had higher odds of having HTN (Mui et al., 2017).

On the contrary, the study by Choi et al. (2013) showed that the female gender was a predictor for diabetes. In this study by Choi et al. (2013) Korean females had five times more the likelihood of developing diabetes when compared to NHW counterpart (Choi et al., 2013). Female gender was associated (adjusted odds ratio [AOR] = 1.4;

1.04–1.96) with having the perceived risk of developing diabetes (Fukuoka, Choi, Bender, Gonzalez, & Arai, 2015).

Physical inactivity and smoking were not significant in predicting diabetes. This finding was supported by previous research when they assessed diabetes and heart attack risk perception among Caucasian, Filipino, Korean, and Latino Americans. The study concluded that older age and CVD risk factors such as physical inactivity, tobacco use, and low high density lipoprotein were not correlated with perceived risk of developing diabetes (Fukuoka et al., 2015).

Limitations

There are notable limitations of our study. Although the BRFSS is a randomized population-based sampling survey, it has been proven to have high reliability and validity (CDC, 2017); however, the data are based on self-report, which is subject to bias. The data represented the responses of AA adults residing in AZ; therefore results cannot be generalized to a larger AA population. Due to a small sample size, study did not assess the predictors of HTN and diabetes for each of the AA subgroups, which would provide insight for tailored interventions for each subgroup.

Conclusion

The study identified heterogeneity in the CVD risk profiles among AA. It also depicted the strong association of non-modifiable and modifiable health risk behaviors, preventive practice, and healthcare barriers with HTN and diabetes. This has implications for individual/patient, healthcare professionals, researchers, and health policy makers. Future research to explore specific predictors among the AA subgroups is recommended. Similar studies can be done with other vulnerable populations in AZ using the BRFSS database. The results add new knowledge and support the few studies describing modifiable and non-modifiable predictors of HTN and diabetes among AA. The study may serve as foundation for future research to study potential moderators of HTN and diabetes and engage in community-based participatory research with AA subgroups.

In applying NSM, an individual is viewed as a whole person with core structures, affected by individual, healthcare system, health policy level stressors, and positioned along a health-illness continuum. The study results identified individual level factors such as developmental (age greater than 45) and physiological (obesity) as strong predictors of HTN and diabetes. Diabetes can be prevented by having the financial ability to see HCP. Diabetes and HTN can be averted by having health insurance to access HCP to serve as the usual source of care and receive preventive health check-up within 12 months to identify the individual's CVD risk profile and screen for these diseases. In this study, the lack of insurance and personal healthcare provider and no preventive health check-up are examples of healthcare system and healthy policy barriers that weaken the FLD, de-stabilize the NLD, and disrupt the lines of resistance, thereby increasing the susceptibility to develop HTN and diabetes.

The results from this study are a call to action for community of practicing nurses and healthcare providers to explore comprehensive, evidence-based, culturally tailored primary and secondary interventions that is based on specific AA subgroup learning preferences, and within the context of community-based participatory research to reduce CVD risks. Additionally, the first critical step in evidence-based health policymaking is to generate empirical data to advocate for public health policy changes. The study results provided early evidence. In order to reduce short-term and long-term disabling and economic consequences related to HTN and diabetes, changes in public health policies to ameliorate access to care by providing basic health coverage and eliminating the cost or making it affordable to see a HCP, require further exploration. Until there are concerted and parallel partnerships between individuals, healthcare advocates and stakeholders of the healthcare system, vulnerable population such as AA and other communities of colors may continue to experience alarming disparities in HTN and diabetes health outcomes. Any healthcare interventions and microscopic shifts in healthcare policies may result in cascading consequences impacting individuals and their environment.

CHAPTER 4

INTERVENTIONS TO REDUCE CARDIOVASCULAR RISK FACTORS AMONG FILIPINO AMERICANS: AN INTEGRATIVE REVIEW

Filipinos are also referred to as Filipino Americans (FA) and they are classified as Filipino under the Asian race subgroup (United States [U.S.] Census, 2018). They are the third largest AA subgroup. According to the 2010 U.S. Census report, there are 4 million Filipinos. This was a 44% growth from a decade ago (U.S. Census, 2019). Sixty-six percent of Filipinos reside in the western region of the U.S., with 43% living in California (U.S. Census, 2012). The Filipino population was highest among five of the 20 metropolitan areas where there was a large concentration of Asian population. They reside in Carlsbad-San Marcos, in San Diego California, Riverside-San Bernardino-Ontario, California, Las Vegas-Paradise, Nevada, Sacramento–Arden-Arcade–Roseville, California and Phoenix-Mesa-Glendale, Arizona (U.S. Census, 2012). AA account for 4% of the total AZ population. Filipinos are the largest AA subgroup in Arizona at 53,067 (Advancing Justice, 2015).

Recent reports showed Filipinos as socioeconomically advanced when compared to native born and total U.S. immigrants. Over eighty percent (82%) of Filipinos age five and older are proficient in English. Fifty percent of Filipino adults 25 years and older are college graduates. Their median annual household income is $87,000, and they have the lowest poverty level at five percent (Budiman et al., 2019; Zong & Batalova, 2018).

From economic measures, Filipinos seem to be a model minority. However, among population-based health surveys of AA subgroups and NHW, they have higher CVD risk profile (Bhimla et al., 2017; Frank et al., 2014; Jih et al., 2014; Maxwell, Danao, Cayetano, Crespi, & Bastani, 2012; Ye, Rust, Baltrus, & Daniels, 2009; Zhao et al., 2015). An analysis by Frank et al. (2014) using 2008-2011 outpatient primary care health records of Northern California showed Filipino men having the highest (73.1%) low-density lipoprotein, followed by Vietnamese men (71.3%), Hispanics (66.0%), Asian Indians ([AI], 65.9%), Japanese (65.4%), African Americans (63.1%), NHW (62.2%), Koreans (55.4%), and Chinese (55.3%). Among women, it was highest among Filipino (63.0%), trailed by African Americans (57.2%), Mexicans (56.8%), Vietnamese (56.1%), AI (54.8%), Japanese (54.2), NHW (52.6%), and Koreans (51.7%). Filipino men (60.3%) and Mexican women (45.4%) had high prevalence rates of hypertriglyceridemia, while African Americans had the lowest (men 29.5% and women 18.2%) triglyceride level (Frank et al., 2014).

Filipino men (38%) had the highest prevalence of smoking among AA, followed by Korean, (35%), and Vietnamese (31%). The smoking prevalence in Filipino men was also higher when compared to NHW men (25%). Among AA women, the prevalence of smoking was highest among Japanese (14%), followed by Filipinos (13%), and Koreans (11%). The smoking rates was lowest (2%) among Vietnamese and AI women (Frank et al., 2014). Another study showed Filipino had a high smoking rate (17.7%), while it was lower (range, 7.6-18.4%) among AI, Chinese, and Other Asians (Jih et al., 2014). Filipinos led the AA subgroups in having the highest obesity rate (men 19% and women 16%). It was lower among Japanese (men 15% and women 8%), Koreans (men 9% and women 3%), AI (men 10% and women 14%), Chinese (men 6% and women 3%), and Vietnamese (men 5% and women 3%) subgroups (Frank et al., 2014). Another study depicted Filipinos leading the overweight/obesity prevalence at 78.6%, while the major

AA subgroups ranged from 64.9% to 38.6%, with Vietnamese having the lowest obesity prevalence (Jih et al., 2014).

AI and Filipinos had the highest prevalence of diabetes (AI 8.2% and Filipino 6.1% vs. Chinese 5.5% and Other Asians 3.8%) when compared to other AA subgroups (Ye, Rust, Baltrus, & Daniels, 2009). The results generated from the 2008-2011 outpatient primary care health records of Northern California show that Filipinos had higher rates of diabetes (men 23% and women 18%) when compared to general U.S. population. The U.S. general population prevalence range of diabetes was 8% to 18% for men and 5% to 16% for women (Frank et al., 2014).

Data from 2005 California Health Interview Survey (CHIS) illustrated that Filipinos were less likely to engage in moderate and vigorous physical activity when compared to NHW (52% vs. 60% and 30% vs. 39%). Filipino women (29%) did not meet the recommended five or more servings of fruits and vegetables daily when compared to Chinese (38%), Japanese (43%), Koreans (32%), Vietnamese (31%), and NHW (41%). Among men, Filipino consumption was slightly higher than Chinese (48% vs. 47%), but significantly lower than Japanese (52%), Koreans (59%), Vietnamese (58%). Less than sixty percent (59%) of NHW met the recommended five or more servings of fruits and vegetables daily (Maxwell et al., 2012). A recent study by Bhimla et al. (2017) showed that 99.5% of Filipinos did not consume the recommended dietary guidelines and only 24.5% met the physical activity guideline (Bhimla et al., 2017).

Multiple studies consistently demonstrated that Filipinos disproportionately had higher prevalence of hypertension (HTN) when compared to other AA subgroups and NHW (dela Cruz & Galang, 2008; Fernandes et al., 2012; Ursua et al., 2013; Wu et al., 2011; Ye et al., 2009). HTN prevalence rates varied from 41% to 81.5% (dela Cruz & Galang, 2008; Fernandes et al., 2012; Ursua et al., 2013). A study derived from the 2003-2005 National Health Interview Survey showed that Filipinos had higher rate (23.9%) of HTN when compared to the other AA subgroups. The HTN prevalence rate among the other AA subgroups ranged from 10.4% to 16.3% (Ye et al., 2009). Based on the 2009 CHIS, the HTN rate among Filipinos was higher (34.9%) when compared to Vietnamese, Chinese, Korean subgroups, and NHW. The prevalence rate ranges from 13.1% to 27.6% (Jih et al., 2014). Another study by Zhao et al., 2015, showed Filipino women had the second highest (53.2%) HTN prevalence after Black women (59.1%). Among men, the HTN prevalence was higher (59.9% vs. 59.3%) among Filipino than Black men. The HTN control rates were also lower among Filipino women and men (50.2% and 53.2% vs. 60.3% and 60.5%) when compared to NHW (Zhao et al., 2015).

Numerous studies repeatedly showed strong consistent links to lifestyle related health behaviors and the predisposition to HTN as a result from Filipino's consumption of diet high in salt, saturated fat, junk, processed and fried foods (Bhimla et al., 2017; Dalusung-Angosta, 2013; dela Cruz & Galang, 2008; Ursua et al., 2013). Studies by Brooks, Leake, Parsons, & Pham, 2012 and dela Cruz, Lao, & Heinlein, 2013 showed that Filipinos demonstrated significant dietary changes since migrating to the U.S. They ate more meat and dairy products due to their increased ability to pay as a result of their improved socio-economic status. They continued to consume white rice, which was their source of grain and staple food. The consumption of rice symbolizes daily life in the Filipino culture and the sharing of food enables them to connect with family, friends and community (Brooks, Leake, Parsons, & Pham, 2012; dela Cruz, Lao, & Heinlein, 2013).

They limited their engagement in exercise or physical activity due to multiple jobs in order to provide financial support to their families in their birth country and having to maintain dual parenting and household responsibilities (Dalusung-Angosta, 2013; dela Cruz & Galang, 2008; Ursua et al., 2013).

Purpose

Multiple population-based health studies repeatedly highlighted that modifiable CVD risks factors disproportionately affect Filipinos and the mortality related to heart disease has not improved (Hastings et al., 2015). It has been recommended that interventions aimed to reduce CVD risks can improve cardiovascular health and quality of life (HHS ODPHP, 2019). A comprehensive synthesis is unknown about the outcomes of diverse research methodologies, theories, and culturally tailored interventions implemented in the U.S. Filipino community. The aim of this review was to evaluate preventive health programs tailored for Filipinos. The review specifically examined (a) use of theory guiding the interventions, (b) how Filipino culture was weaved into the design and delivery, and (c) outcomes from the interventions to reduce CVD risk factors.

Methods

The process for this integrative review followed the five-stage process for systematic review: problem identification, literature search, data evaluation, data analysis, and presentation (Whittemore & Knafl, 2005).

Problem Identification

For this review, studies that met the eligibility criteria were included. The inclusion criteria for the studies were (a) conducted in Filipino adults 18 years and older residing in the U.S., (b) interventions guided by theories or active community engagement framework, (c) incorporated culture in the intervention, (d) outcomes were reported as a result of the intervention, and (e) published in peer reviewed English print journals with no exclusion dates.

Literature Search

A computerized literature search was conducted using PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PsycInfo. Keywords used include: Filipino American, Filipino, Filipinos, hypertension, high blood pressure, diabetes, physical inactivity, obesity, high cholesterol, smoking, diet, intervention, treatment, therapy, management, prevention, community setting, community, cardiovascular risks. The search yielded a total of 383 potentially eligible articles. The abstracts were reviewed and 10 duplicate articles were removed. After reviewing the abstract of the remaining 373 articles, 336 were excluded initially and then an additional 23 articles were again eliminated, because these articles were not related to interventions to reduce CVD risks factors. After further review of the manuscripts, four additional articles were disregarded: 1) two articles documented the development and post-program evaluation employing qualitative methods to evaluate one of the CVD interventions; 2) one article documented the community decision making process to prioritize topics for diabetes intervention; and 3) one article summarized the qualitative and quantitative results of Racial and Ethnic Approaches to Community Health diabetes intervention for multiracial ethnic groups. The final review yielded 10 articles for the analysis (Figure 3 depicts the study selection process).

Data Evaluation

The data extracted from the articles were: (a) Characteristics of the studies (authors, publication year, research method, theoretical framework, sample and study location, features of the intervention, and data collection method; (b) cultural inclusion; and (c) outcomes of the interventions.

Data Analysis and Presentation

The articles reviewed examined how the Filipino culture was weaved into the intervention using two primary dimensions of cultural sensitivity: surface structure and deep structure conceptualized by Resnicow, Baranowski, Ahluwalia, and Braithwaite (1999).

Surface structure involves concerted planning, promoting, implementing, and integrating the intervention focusing on the target population. This includes use of culturally appropriate audiovisual and print materials, methods used to advertise the intervention and the locations, and the use of ethnically-matched staff in the recruitment and delivery of the intervention. Deep structure pertains to intentionally weaving the target population's culture, traditions, and beliefs that influence their health behaviors (Resnicow et al., 1999).

Additionally, the articles were reviewed for two measures to determine the outcomes of the interventions: (1) reduction of any modifiable CVD risk factors (tobacco use, poor nutrition, physical inactivity, obesity, diabetes, high cholesterol, and HTN) and (2) commitment of the participants in completing the intervention and their satisfaction. The results of the data analysis are depicted in three tables. Table 8 summarizes the study characteristics, Table 9 highlights the cultural tailoring, and Table 10 describes the outcomes of the interventions.

Results

Overview of Studies

All 10 studies employed interventions to reduce CVD risk for Filipinos. All interventions utilized formative research methods to guide the intervention (Bender, Cooper, Flowers, Ma, & Arai, 2018; Bender, Cooper, Park, Padash, & Arai, 2018; Dirige et al., 2013; Fernandes et al., 2012; Hurtado et al., 2014; Inouye, Matsuura, Li, Castro, & Leake, 2014; Leake, Bermudo, Jacob, Jacob, & Inouye, 2012; Townsend et al., 2016; Ursua et al., 2014a; Ursua et al., 2018). These studies were implemented in New York, New Jersey, California, Hawaii because of their large concentration of Filipinos (U.S. Census, 2010) and 15 other racially diverse communities across the U.S. (Hurtado et al., 2014).

Five interventions focused on diabetes reduction (Bender, Cooper, Flowers, et al., 2018; Bender, Cooper, Park, et al., 2018; Inouye et al., 2014; Leake et al., 2012; Townsend et al., 2016). Three interventions employed community health workers (CHW) to reduce HTN and other CVD risk factors (Fernandes et al., 2012; Ursua et al., 2014a; Ursua et al., 2018). One intervention focused on increasing physical activity and consumption of recommended servings of fruits and vegetables (Dirige et al., 2013). The last intervention summarized the effectiveness of the National Heart, Lung, and Blood Institute (NHLBI) CHW Health Disparities Initiative Program using a culturally tailored heart health curricula for various racial ethnic minorities (Hurtado et al., 2014).

Two-arm pilot randomized controlled trials (RCT) were employed by four diabetes interventions (Bender, Cooper, Flowers, et al., 2018; Bender, Cooper, Park, et al., 2018; Inouye et al., 2014; Leake et al., 2012) and one study used convenience sampling and pre and post testing (Townsend et al., 2016). The sample population range from 40 to 217 participants and the duration of interventions varied from 3 months up to 12 months

The HTN interventions utilized RCT with an active control group, pilot single-arm pre-post, and convenience sampling using one-group pre-post design (Fernandes et al., 2012; Ursua et al., 2014a; Ursua et al., 2018). The sample participants range from 33-207. The interventions varied in length. One workshop consisted of four 90 minute sessions. (Ursua et al., 2014a; Ursua et al., 2018). One intervention was 2 hours for 11 consecutive weeks (Fernandes et al., 2012), another study was for 2 hours for 10 weeks (Hurtado et al., 2014), and one study provided monthly interventions for 18 months (Dirige et al., 2013).

Theory or Framework Guiding the Interventions

The interventions utilized theories and/or active community engagement framework such as community-based participatory research (CBPR) principles in guiding the planning, implementation, and evaluation. The theories or framework were aimed at modifying health risk behaviors. Two studies explicitly applied the Social Cognitive Theory and Transtheoretical Model and had the eligible participants undergo a run-in trial to determine their readiness for change. These two studies employed social support by using a private online Facebook support group and encouraging family members to attend in-person office visits (Bender, Cooper, Flowers, et al., 2018; Bender, Cooper, Park, et al., 2018). Two studies adopted the five stages of change of the Transtheoretical Model to measure the progress in the nutrition and physical activity and the NHLBI heart health curricula by utilizing several questionnaires to assess what stage of change the participants were in along the stages of change continuum (Dirige et al., 2013; Hurtado et al., 2014). Two studies utilized Social Learning Theory to design the diabetes lifestyle intervention and the "Healthy Heart Healthy Family" (HHHF) health education using CHW. These interventions incorporated activities that supported active adult social learning to achieve confidence in making behavioral changes (Inouye et al., 2014; Leake et al., 2012). One study adopted Health Belief Model, Social Support Theory, and applied CBPR principles but had limited information regarding how the concepts of the theories or framework were applied in the intervention (Ursua et al., 2018). Other studies utilized CBPR in guiding their interventions (Fernandes et al., 2012; Inouye et al., 2014; Townsend et al., 2016; Ursua et al., 2014a)

Culturally Tailored Interventions

Culturally tailored interventions used components of surface and deep structure of cultural adaptation. Two diabetes interventions adopted and modified the six-months Diabetes Prevention Program (DPP) to three months and included the use of a mobile phone to reduce weight and virtual support using Facebook. This intervention included lifestyle education training materials translated in Tagalog (Philippine national language), food pamphlets depicting healthy food alternatives, and included family members (Bender, Cooper, Flowers, et al., 2018; Bender, Cooper, Park, et al., 2018).

Other interventions consisted of health education programs or workshops that were specifically tailored to the Filipino culture. However, the Active Life (Siglang

Buhay) intervention did not employ culturally tailored questions to assess dietary habits (Dirige et al., 2013). Several programs were titled in Filipino language as a way to connect the Filipino culture and the importance or value of optimizing health (Dirige et al., 2013; Inouye et al., 2014; Leake et al., 2012). The interventions using the HHHF curriculum, is a tailored health education program developed by the NHLBI to prevent and manage CVD risk factors for Filipinos. The curriculum has Tagalog translations and included culturally appropriate interactive activities, picture cards, and a healthy heart bilingual booklet. The interventions were delivered or facilitated by individuals who were from Filipino ancestry and/or trained CHW (Fernandes et al., 2012; Hurtado et al., 2014; Ursua et al., 2014a; Ursua et al., 2018). The PILI@Work (Partnership for Improving Lifestyle Intervention) is a modified Diabetes Prevention Program Lifestyle Intervention (DPPLI) worksite wellness program. It was implemented to serve the needs of multiple racial ethnic groups across 15 diverse worksites (Townsend et al., 2016). The article by Hurtado et al., 2014, summarized the effectiveness of CDC heart health curricula utilizing CHW utilized culturally tailored interventions to meet the needs of diverse racial and ethnic population (Hurtado et al. 2014).

Target Outcomes

Of the 10 studies, self-efficacy to modify health behaviors to reduce CVD risk factors was the most commonly reported outcome (Bender, Cooper, Park, et al., 2018; Dirige et al., 2013; Fernandes et al., 2012; Hurtado et al., 2014; Inouye et al., 2014; Townsend et al., 2016; Ursua et al., 2014a; Ursua et al., 2018). Nine studies measured participants rating of the interventions (Bender, Cooper, Flowers, Ma, & Arai, 2018; Bender, Cooper, Park, Padash, & Arai, 2018; Dirige et al., 2013; Fernandes et al., 2012;

Hurtado et al., 2014; Inouye, Matsuura, Li, Castro, & Leake, 2014; Townsend et al., 2016; Ursua et al., 2014a; Ursua et al., 2018). They were rated as “satisfactory or high satisfactory and beneficial.” The retention rates ranged from 78.5% to 100%. Most notably, participants of the PilAm Go4Health and Fit&Trim interventions were most engaged reporting near perfect attendance to 100% attendance (Bender, Cooper, Flowers, et al., 2018; Bender, Cooper, Park, et al., 2018). One study only measured the participants’ engagement in the intervention (Leake et al., 2012).

Seven studies combined the use of validated and reliable non-clinical survey tools and performed clinical testing to measure the benefits of the interventions (Bender, Cooper, Flowers, et al., 2018; Bender, Cooper, Park, et al., 2018; Fernandes et al., 2012; Inouye et al., 2014; Townsend et al., 2016; Ursua et al., 2014a; Ursua et al., 2018), while two studies conveyed results of self-reported data (Dirige et al., 2013; Hurtado et al., 2014). The leading CV risk health outcome reported was weight reduction (Bender, Cooper, Flowers, et al., 2018; Bender, Cooper, Park, et al., 2018; Fernandes et al., 2012; Inouye et al., 2014; Townsend et al., 2016; Ursua et al., 2014a; Ursua et al., 2018), followed by varying results related to physical activity (Bender, Cooper, Park, et al., 2018; Dirige et al., 2013; Fernandes et al., 2012; Hurtado et al., 2014; Townsend et al., 2016; Ursua et al., 2014a; Ursua et al., 2018). The studies by Dirige et. al (2013) and Hurtado et al. (2014) reported outcomes based on the theories used to determine the stage of change of the participants (Dirige et al., 2013; Hurtado et al., 2014). Four studies depicted the benefits of culturally tailored HHHF curriculum and the efficaciousness of employing CHW as health care navigators and facilitators in CVD health promotion programs for Filipinos (Fernandes et al., 2012; Hurtado et al., 2014; Ursua et al., 2014a; Ursua et al., 2018).

Discussion

The purpose of this review is to provide an integrative assessment of the preventive health programs tailored for Filipinos. This review synthesized articles describing and evaluating the interventions to reduce CVD risk factors among this AA subgroup. Specifically, the analysis examined the theories and/or framework that guided the intervention, how the Filipino culture was weaved into the design and delivery, and the outcomes of the interventions to lessen the CVD risks. The interventions were implemented as early as 2003-2004 and most recently as 2017. All 10 interventions used formative research. The study designs varied from RCT, one group pre-post, and small-scaled pilot single arm pre-post studies. The study length also differed from 90 minutes to 18 months. Seven interventions with shorter duration (less than 12 months) reported higher retention rates among the intervention groups (range, 78.9% to 95% vs. 76%) than the intervention that lasted for 18 months.

All interventions utilized theories and/or CBPR principles in the planning, design, and implementation of the interventions. All studies reported cultural appropriateness for the target population. Surface structure was evident during recruitment strategies and translating the name of the intervention into Tagalog to reflect the Filipino culture. The interventions employed multiple recruitment strategies. Word of mouth recruitment was effective. The HHHF curriculum which was designed specifically for Filipinos and the use of Filipino CHW were examples of how the Filipino culture was embedded in the content and delivery of the intervention. The HHHF curriculum was well received by study participants. They reported at least 89% satisfaction rating (Fernandes et al., 2012; Hurtado et al., 2014; Leake, Bermudo, Jacob, Jacob, & Inouye, 2012; Ursua et al., 2014a). All interventions reported improving cardiovascular health. Weight reduction up to 5% weight loss was the most common health outcome reported (Bender, Cooper, Flowers, et al., 2018; Bender, Cooper, Park, et al., 2018; Fernandes et al., 2012; Inouye et al., 2014; Townsend et al., 2016; Ursua et al., 2014a; Ursua et al., 2018), followed by varying results related to physical activity (Bender, Cooper, Park, et al., 2018; Dirige et al., 2013; Fernandes et al., 2012; Hurtado et al., 2014; Townsend et al., 2016; Ursua et al., 2014a; Ursua et al., 2018). The four interventions which utilized the HHHF taught by CHW were beneficial in increasing PA, decreasing in cholesterol, and improving fasting blood glucose, CVD knowledge, self-efficacy related to diet and weight management (Fernandes et al., 2012; Hurtado et al., 2014; Ursua et al., 2014a; Ursua et al., 2018).

Limitations and Strengths

Given that Filipinos are the 3rd largest AA subgroup in the U.S. (U.S. Census, 2019), there is very little data on interventions to improve cardiovascular health among Filipinos. For example, a review on CVD reduction in Korean Americans (KA) revealed 14 CVD interventions to reduce CVD in KA (Shin et al, 2018), even though KA are the 5th largest Asian ethnic group (Lopez et al., 2017). All interventions utilized theories and/or CBPR principles, however some studies lacked clarity in how the concepts were applied in the intervention and how the study findings were linked or supported the theory or the active community engagement framework. While most interventions utilized other validated and reliable non-clinical measurement tools to support the objective findings to assess the efficacy or benefits of the interventions, one study reported utilizing questions not culturally appropriate to Filipino dietary patterns and not evaluating all components of the intervention to measure the outcome (Dirige et al., 2013).

This review represented several strengths. The studies employed various research designs and duration of the interventions. Six studies employed RCT in states with large Filipino population. The studies highlighted the benefits of incorporating culturally appropriate components in the development, recruitment, and delivery of CVD interventions. Two studies incorporated the use of technology to achieve study goals. These studies demonstrated efficacy of culturally tailoring interventions to promote CV health among Filipinos.

Application

This review provided recommendations for planning interventions to reduce CVD risk factors among Filipinos. The analysis identified different study designs, culturally tailored evidenced-based programs (DPP and HHHF), applicable theories, and applied CBPR principles. It highlighted that interventions implemented longer than 12 months may have the potential of generating low retention rates. Interventions utilizing culturally appropriate components in the development, recruitment, and delivery were effective in improving cardiovascular health. Several studies adopted multiple validated evidence-based evaluation tools to further measure the effectiveness of the interventions, but a critical review of the quantity, appropriateness, linkage to the theoretical concepts, and also the aims of the study is equally important. The use of tech devices while enrolling in online support groups and embedding Filipino culture are innovative strategies in future CVD reduction research. When planning interventions, stakeholders may consider employing CHW and engaging in CBPR to reduce CVD risk factors among Filipinos.

Conclusion

This review documents the current state of primary and secondary prevention programs to reduce CVD risk factors among Filipinos. The result of this integrative review of intervention is sobering. The findings from this review are a call to action for healthcare professionals, researchers, the Filipino community, community healthcare advocates, and stakeholders. There is an urgent need to change the health research priorities to move forward from merely describing the prevalence of Filipinos CVD risks, their worsening health consequences and their eventual mortality, to actively reducing the CVD risk profiles by implementing comprehensive, theoretically guided, and culturally appropriate community-led prevention programs.

CHAPTER 5

CONCLUSION

This research documented the granular health data of major AA subgroups in AZ and synthesized interventions developed for Filipino Americans. The results described heterogeneity in their health state, healthcare experiences, healthcare preventive practices and barriers, and CVD risk factors. It demonstrated that AA in AZ are a vulnerable population. The study outcomes highlighted the diverse individual, HCP, and healthcare system level "stressors" experienced by the major AA subgroups. Furthermore, it highlighted that the Filipino subgroup had worse CVD risk profile than other AA subgroups. The integrative review identified 10 evidence-based culturally appropriate interventions to reduce CVD risk in Filipinos. These interventions used nursing? theories and/or CBPR along with CHW to achieve their results.

By applying the NSM, the study elucidated the state of health of AA and provided an insight into their ability to cope and sustain their stable lines of resistance to maintain a normal cardiovascular health state. The results identified predictors of HTN and diabetes, differences in preventive practice (check-up within 12 month), individual stressors or cardiovascular risk factors (high cholesterol, physical inactivity, consuming less than five servings of fruits and vegetables smoking, obesity, HTN, and diabetes), outcomes of perceived biased treatment delivered by HCP, and healthcare system barriers (lack of insurance, no healthcare provider as usual place of care, and inability to see provider due to financial difficulty) that may create an imbalance leading to an illness state, or in this case, lead to their susceptibility to developing CVD.

The purpose of nursing practice in the NSM is to create stability. In order to optimize cardiovascular health or reduce risk for CVD, the scope of nursing practice is to develop and implement evidence-based, theory-guided, culturally appropriate interventions that will protect the lines of resistance and strengthen the flexible line of defense. For example, by conducting annual preventive screening, individuals/patients are screened for CVD risk factors such as presence of HTN or obesity. If detected early, the individuals are educated to engage in healthy behaviors to promote healthy eating and engagement in physical activity. If the patients were prescribed anti-hypertensive medications, they are encouraged to adhere to the pharmacological management in addition to participate in lifestyle changes to manage HTN. If HTN is left unmanaged, it threatens the FLD, which leads to CVD such as stroke or myocardial infraction.

This research offers potential benefits. The outcomes of this study serve as foundation for future research. More importantly, the disaggregated epidemiological data may provide researchers and clinicians the substantiation to plan, prioritize, and implement evidence-based, theoretically guided, and culturally tailored community-led prevention programs to improve health outcomes of AA in AZ. The data may serve as a tool to guide community stakeholders and policy makers to advocate for public health policies that will elevate population health of AA or communities of color in AZ to be in line with NHW counterparts. Until there are concerted and parallel partnerships among individuals, healthcare advocates, and stakeholders of the healthcare system, as well as interventions at the health policy level, vulnerable population such as AA and other communities of color may continue to experience alarming disparities in HTN and diabetes health outcomes. Any primary, secondary, and tertiary interventions directed at the individual and microscopic shifts in healthcare policies will result in cascading consequences impacting the individual and their environment.

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Table 1 Sociodemographic Characteristics

Characteristics	Total Asian Americans (n=492)	Asian Indian (n= 134)	Chinese (n= 104)	Filipino (n= 66)	Japanese (n= 44)	Other Asians (n= 144)
Gender, %						
Male	52.8	56.7	60.6	34.8	40.9	55.6
Female	47.2	43.3	39.4	65.2	59.1	44.4
Age, %						
18-24	11.4	9.0	14.4	10.6	2.3	14.6
25-34	20.1	27.6	16.3	13.6	11.4	21.5
35-44	20.5	26.9	19.2	18.2	9.1	20.1
45-54	19.3	20.9	20.2	10.6	18.2	21.5
55-64	13.4	4.5	12.5	30.3	34.1	8.3
≥ 65	15.2	11.2	17.3	16.7	25.0	13.9
Mean (S.D.)	45.06 (16.58)					
Marital Status, %						
Married	61.8	79.9	52.9	60.6	45.5	56.9
Divorce	7.1	1.5	6.7	9.1	18.2	8.3
Widowed	5.1	3.7	3.8	6.1	15.9	3.5
Separated	1.4	0.0	1.9	1.5	0.0	2.8
Never married	23.2	14.2	33.7	22.7	20.5	25.0
Unmarried couple	1.4	0.7	1.0	0.0	0.0	3.5
Educational Level, %						
< high school	1.6	2.2	0.0	4.5	0.0	1.4
High school graduate	14.0	8.2	8.7	15.2	15.9	22.2
College or tech school	17.9	5.2	15.4	33.3	34.1	19.4
Graduated college	66.5	84.3	76	47	50	56.9
Annual household income, %						
< $ 10,000	5.8	6.9	5.7	6.1	0.0	6.5
$10,000-$$15,000	2.6	1.0	1.1	2.0	0.0	6.5
$15,000-$20,000	5.0	3.0	4.6	6.1	8.6	5.6
$20,000-$25,00	7.1	2.0	4.6	8.2	11.4	12.1
$25,000-$35,000	7.9	2.0	8.0	18.4	17.1	5.6
$35,000-$50,000	11.9	5.9	18.4	14.3	14.3	10.3
$50,000-$75,000	11.1	14.9	13.8	14.3	8.6	4.7
>$75,00 or more	48.5	64.4	43.7	30.6	40.0	48.6
% living in poverty level <$25,000	20.5	12.9	16	22.4	20.0	30.7

Table 2

Health Characteristics, Healthcare Experience, and Reactions by Race

Characteristics	Total Asian Americans (n=490)	Asian Indians (n=134)	Chinese (n=104)	Filipinos (n=66)	Japanese (n=44)	Other Asians (n=142)
General Health, %						
Poor	2.0	1.5	1.9	4.5	0.0	2.1
Fair	7.1	5.2	7.7	12.1	6.8	6.3
Good	33.7	28.4	33.7	37.9	31.8	37.3
Very good	33.9	36.6	37.5	22.7	40.9	31.7
Excellent	23.3	28.4	19.2	22.7	20.5	22.5
	Total Asian Americans (n=33)	Asian Indians (n=7)	Chinese (n=9)	Filipinos (n=7)	Japanese (n=5)	Other Asians (n=5)
Healthcare experience, %						
Worse than other races	3.0	0.0	0.0	0.0	0.0	20.0
The same as other races	81.8	71.4	66.7	100.0	100.0	80.0
Better than other races	15.2	28.6	33.3	0.0	0.0	0.0
	Total Asian Americans (n=37)	Asian Indians (n=8)	Chinese (n=10)	Filipinos (n=7)	Japanese (n=6)	Other Asians (n=6)
Effects of treatment, %						
Felt physical symptoms						
Yes	5.4	12.5	0.0	0.0	0.0	16.7
No	94.6	87.5	100.0	100.0	100.0	83.3
	Total Asian Americans (n=38)	Asian Indians (n=8)	Chinese (n=10)	Filipinos (n=7)	Japanese (n=6)	Other Asians (n=7)
Effects of treatment, %						
Felt emotionally upset						
Yes	7.9	12.5	0.0	0.0	0.0	28.6
No	92.1	87.5	100.0	100.0	100.0	71.4

Note. 2013 BRFSS data set was used to analyze the healthcare experience and symptoms as a result of treatment based on race. Questions were not asked in 2015 and 2017.

Table 3

Healthcare Barriers and Preventive Health Practice

	Total Asian Americans (n=489)	Asian Indians (n=133	Chinese (n=103)	Filipinos (n=65)	Japanese (n=44)	Other Asians (n=144)
Lack of health insurance %	9.0	3.0	8.7	12.3	11.4	12.5
	Total Asian Americans (n=486)	Asian Indians (n=132)	Chinese (n=102)	Filipinos (n=65)	Japanese (n=44)	Other Asians (n=143)
No personal HCP % or doctor	26.7	25.0	32.4	26.2	15.9	28.0
	Total Asian Americans (n=484)	Asian Indians (n=133)	Chinese (n=102)	Filipinos (n=65)	Japanese (n=44)	Other Asians (n=140)
Medical cost as an issue % Unable to see Dr.	9.9	8.3	5.9	16.9	2.3	13.6
	Total Asian Americans (n=478	Asian Indians (n=132)	Chinese (n=101)	Filipinos (n=64	Japanese (n=43)	Other Asians (n=138)
Preventive health practice % No check-up within 12 months	31.8	25.8	37.6	26.6	30.2	36.2

Note. HCP = healthcare provider

Table 4

Prevalence of Disease-related CVD Risk Factors

	Total Asian Americans (n=491)	Asian Indians (n=133)	Chinese (n=104)	Filipinos (n=66)	Japanese (n=44)	Other Asians (n=144)
Hypertension, %						
No	76.2	82.7	81.7	63.6	56.8	77.8
Yes	23.8	17.3	18.3	36.4	43.2	22.2
	Total Asian Americans (n=151)	Asian Indians (n=47)	Chinese (n=29)	Filipinos (n=20)	Japanese (n=21)	Other Asians (n=34)
Hyperlipidemia, %						
No	69.5	78.7	62.1	65.0	57.1	73.5
Yes	30.5	21.3	37.9	35.0	42.9	26.5
	Total Asian Americans (n=488)	Asian Indians (n=13)	Chinese (n=102)	Filipinos (n=66)	Japanese (n=44)	Other Asians (n=143)
DMT2, %						
No	89.5	91.0	91.2	75.8	93.2	92.3
Yes	10.5	9.0	8.8	24.2	6.8	7.7
	Total Asian Americans (n=449)	Asian Indians (n=121)	Chinese (n=95)	Filipinos (n=63)	Japanese (n=41)	Other Asians (n=129)
WHO Obesity criteria, % kg/m^2						
Not obese <30	90.6	94.2	96.8	76.2	92.7	89.1
Obese >30	9.4	5.8	3.2	23.8	7.3	10.9
Asian Obesity criteria, % kg/m^2						
Not obese <27	75.5	79.8	85.4	67.7	75.6	68.0
Obese >27.0	24.5	20.2	14.6	32.3	24.4	32.0

Note. DMT2 = diabetes type 2; WHO = World Health Organization

Table 5

Prevalence of Lifestyle-related CVD Risk Factors

	Total Asian Americans (n=457)	Asian Indians (n=120)	Chinese (n=99)	Filipinos (n=61)	Japanese (n=44)	Other Asians (n=133)
Smoking, %						
No	94.1	97.5	98.0	91.8	90.9	90.2
Yes	5.9	2.5	2.0	8.2	9.1	9.8

	Total Asian Americans (n=403)	Asian Indians (n=105)	Chinese (n=87	Filipinos (n=59)	Japanese (n=37)	Other Asians (n=115)
CDC Guideline Physical activity, %						
Met both or either guideline	22.6	16.2	21.8	27.1	32.4	23.5
Did not meet both or either guidelines	77.4	83.8	78.2	72.9	67.6	76.5
Did not meet muscle strengthening guideline	69.1	78.9	71.0	63.9	57.9	65

	Total Asian Americans (n=185)	Asian Indians (n=51)	Chinese (n=37)	Filipinos (n=29)	Japanese (n=23)	Other Asians (n=45)
Total Fruits consumed/day, %						
Less than 2 servings daily	83.8	90.2	83.8	79.3	69.6	86.7
More than 2 servings daily	16.2	9.8	16.2	20.7	30.4	13.3
2016 Mean 1.39 or 1.4 (1.26)	1.40	1.35	1.27	1.58	1.76	1.24
Total mean fruits per day 1.26		1.50	0.9	1.48	1.33	0.99

	Total Asian Americans (n=178)	Asian Indians (n=48)	Chinese (n=36)	Filipinos (n=28)	Japanese (n=21)	Other Asians (n=45)
Total vegetables consumed/day, %						
Less than 3 servings daily	79.2	87.5	83.3	78.6	61.9	75.6
More than 3 servings daily	20.8	12.5	16.7	21.4	38.1	24.4
2016 Mean 2.2 (1.38)	2.18	1.82	2.16	2.14	2.71	2.37
Total Mean intake fruits & Veg intake/day=3.6	3.58	3.17	3.43	3.72	4.47	3.61

Note. Mean values are used to compare across state and national

Table 6

Predictors of Hypertension

Variables	N	OR	95% CI
Sociodemographic	492		
Age greater than 45 years old		3.92**	[2.48, 6.18]
Did not graduate from college		1.10	[0.71, 1.70]
Income less than 50K		1.07	[0.67, 1.72]
Female		0.82	[0.54, 1.25]
Modifiable health risk and behaviors			
Smoking	457	0.38	[0.11, 1.29]
Physical inactivity-none adherence to CDC Guideline	403	0.67	[0.39, 1.13]
Fruit consumption less than 2 servings daily	185	0.52	[0.22, 1.23]
Vegetables consumption less than 3 servings daily	178	0.84	[0.36, 1.99]
Weight gain-obesity using WHO BMI cut-point > 30 kg/m2	449	4.58**	[2.38, 8.81]
Weight gain-obesity using Asian BMI cut-point > 27 kg/m2		2.89**	[1.80, 4.63]
Healthcare barriers			
Lack of health insurance	489	0.38*	[0.14, 0.98]
Lack of personal healthcare provider/Dr.	486	0.49**	[0.28, 0.83]
Unable to see HCP/Dr. due to medical cost	484	1.36	[0.70, 2.63]
Preventive practice			
Health check-up greater than 12 months	478	0.18**	[0.09, 0.34]

Note. CI= confidence interval; BMI= body mass index; CDC= Centers for Disease Control; WHO= World Health Organization. * $p < 0.05$ ** $p < 0.01$

Table 7

Predictors of Diabetes

Variables	N	OR	95% CI
Sociodemographic	492		
Age greater than 45 years old		3.92**	[2.48, 6.18]
Did not graduate from college		1.10	[0.71, 1.70]
Income less than 50K		1.07	[0.67, 1.72]
Female		0.82	[0.54, 1.25]
Modifiable health risk and behaviors			
Smoking	457	0.38	[0.11, 1.29]
Physical inactivity-none adherence to CDC Guideline	403	0.67	[0.39, 1.13
Fruit consumption less than 2 servings daily	185	0.52	[0.22, 1.23]
Vegetables consumption less than 3 servings daily	178	0.84	[0.36, 1.99]
Weight gain-obesity using WHO BMI cut-point > 30 kg/m2	449	4.58**	[2.38, 8.81]
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Healthcare barriers			
Lack of health insurance	489	0.38*	[0.14, 0.98]
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Preventive practice			
Health check-up greater than 12 months	478	0.18**	[0.09, 0.34]

Note. CI= confidence interval; BMI= body mass index; CDC= Centers for Disease Control; WHO= World Health Organization.

* $p < .05$ ** $p < .01$

Table 8

Study Characteristics

Authors	Theory/Framework	Design	Features of Intervention	Sample	Duration	Data Collection
Bender, Cooper, Park, Padash, & Arai, 2018	Social Cognitive Theory and Transtheoretical Model	2-arm pilot RCT; 3-month intervention and 3-month maintenance follow-up with an active waitlist control Recruitment Dec 2014- Dec 2015	70% completion of the 3-day run-in period requirements Phase 1: PilAm Go4Health-modified components of DPP; participants received and trained on using Fitbit pedometer; accessed mobile app with diary to tra steps, diet intake/calories, weekly wt enrolled to private Facebook for virtu social support and accessed educatio topics posted and facilitated by research sta weekly; in-person monthly meetings discuss short and long-term wt. management goals and received feedback and coaching based on their progress. Phase 2: Intervention participants did not receive group social support, encouraged to tracking using app; In-person visits at month 4 and 6 Waitlist control group received Fitbit and trained on the use; In-perso visit at 1 & 3 months and received H B and C training. During Phase 2: they received PilAm Go4Health intervention at 3 a monthly in-person office visits. 70% completion of 2-week run-in requirements	N = 45 (22 active and 23 waitlist) Francisco, California Mean age 57.6 Mean BMI 30.1 kg/m^2 62% female 84% immigrants Highly acculturated	Phase 1-3 months Phase 2-3 to 6 months follow-up	Clinical measures conducted at baseline, at 3 and 6 months: wt., BMI, waist circumference, FBG, hemoglobin A1C, Fitbit accelerometer and app with diary, log of calorie/food intake. Wt. loss goal

Table 8 (continued)

Authors	Theory/Framework	Design	Features of Intervention	Sample	Duration	Data Collection
Bender, Cooper, Flowers, Ma, Arai, 2018	Social Cognitive Theory	Pilot RCT 3-month intervention and 3-months follow-up with waitlist control group Occurred July 2014-Feb 2017	Phase 1: 3-month Fit&Trim modified DPP wt. loss intervention consisted of tracking steps 10 hrs. daily using Fitbit Zip, tracking daily food and drink intake and weekly home weight measurement using mobile app/diary, attendance to 5 in-person office visits, enrollment in private Facebook support group to receive weekly postings to encourage healthy eating, wt. management, and physical activity. Waitlist group received Fitbit accelerometer and received no education related to Fit&Trim or physical activity; Phase 2: Intervention group transitioned to maintenance program with in-person tailored coaching and encouraged to track health behaviors and waitlist group received Fit&Trim intervention	N = 67 (33 active and 34 waitlist) San Francisco, California Mean age 41.7 Mean BMI 30.5 kg/m^2 52.2% female 54% immigrants 96% inadequate health literacy	Phase 1:3 months Phase 2:3 to 6 months follow-up Phase 1:3 months Phase 2:3 to 6 months follow-up	Data collected at baseline and 3 and 6 months; anthropometric measurement: wt., ht. for BMI, waist and hip circumference, blood pressure BP, FBG, and hemoglobin A1C; in-person attendance; questionnaires; Fitbit accelerometer and app with diary
Inouye, Matsuura, Li, Castro, & Leake, 2014	Social Learning Theory Applied principles of CBPR	Pilot RCT with waitlist control group Time of intervention not identified	8-week flexible tailored DPP lifestyle curriculum (Kalusugan ay Kayamanan or Health is Wealth) to improve self-efficacy related to diet, exercise, 8-week flexible tailored	N = 40 (22 intervention 18 Control) From Hawaii	12 months	Conducted at baseline and 6 months for intervention group and 12 months anthropometric

Table 8 (continued)

Authors	Theory/Framework	Design	Features of Intervention	Sample	Duration	Data Collection
Inouye, Matsuura, Li, Castro, & Leake, 2014	Continued from previous page	Continued from previous page	DPP lifestyle curriculum (Kalusugan ay Kayamanan or Health is Wealth) to improve self-efficacy related to diet, exercise, weight, and fasting insulin; Curriculum consisted of 2 separate sessions on diet, exercise, self-management, and stress Management delivered in small groups on Saturdays and 4 other options were offered to encourage attendance; sessions are stand-alone; Waitlist group received intervention after 6 months and control group continued to receive intervention for additional 6 months	Continued from previous page	Continued from previous page	measurement: wt., ht., waist and hip circumference, BP, pulse; calculation of BMI, waist to hip ratio, FBG; Surveys to measure: physical, mental, QOL, depression, self-care, exercise, self-care for managing chronic disease
Dirige et al., 2013	Transtheoretical Model	RCT with active control group Occurred 2003-2004	NPA Siglang Buhay (Active Life) a health education to promote PA, fruit and vegetable, anc low-fat diet consumption; modify organizational policy to promote NPA; CE alternate intervention offered and screening; HC members of the organization attended 14-week NPA training taught by NPA guest experts; intervention delivered at least monthly by 2-3 HC members to their organization; intervention included cooking	N = 528 Filipinos from San Diego California (255 active control group From 8 organization and 273 waitlist from 6 organizations	18-months	Conducted at baseline and at 18 months: questionnaires related to consuming at least 5 servings of fruits and vegetables daily, PA, and low-fat dietary intake; PA engagement using Godin-Shephard survey; report on number and contents of

Table 8 (continued)

Authors	Theory/Framework	Design	Features of Intervention	Sample	Duration	Data Collection
Dirige et al., 2013	Continued from previous page	Continued from previous page	demonstration, portion sizes and workshops to increase PA such as dancing, aerobic, basketball tournaments; Waitlist Group: received CE training by HC.	Continued from previous page	Continued from previous page	interventions, number of HC attending and number participant, and HC questionnaire to measure satisfaction.
Fernandes et al., 2012	Application of CBPR principles	One group pre-post Recruitment June 2008 to July 2009	HHHF curriculum in partnership with NHLBI delivered by CHW incorporating facilitative teaching style for small groups offered to low-income Filipinos, HHHF tailored 11- sessions to reduce CVD risk factors, 2 trained bilingual CHW taught 2-hour sessions for 11 consecutive weeks; incentives provided to participants; healthy snacks provided during each session; community activities offered to encourage PA	N = 99 Honolulu, Hawaii Mean age 68.5 15.32% obese 83.8% female 70% living at or below federal poverty level 48.5% less than 8th grade ed. Level 15.9 mean time in U.S.	12 months	Baseline, 6 and 12 months, Anthropometric measurement: wt., ht., waist circumference, BP, BMI, blood collection for FBG and lipid profile, and Hemoglobin A1C; record of attendance, participation in exercise and activities; pre and post habit survey, 25-food consumption survey to assess sodium and fat consumption and wt.; Self-efficacy survey and QOL scale

Table 8 (continued)

Authors	Theory/Framework	Design	Features of Intervention	Sample	Duration	Data Collection
Leake, Bermudo, Jacob, Jacob, & Inouye, 2012	Social Learning Theory Application of CBPR principles	RCT with waitlist control group Time of intervention not identified	Health is Wealth a tailored 8-week DPP lifestyle curriculum based on HHHF CVD program to improve self-efficacy related to diet, exercise to prevent diabetes; Intervention consisted of Two-90-minute sessions; all session were offered 4x over the course of 6 months; participants self-select their preferred 8-week sessions; curriculum consisted of 2 separate sessions on diet, exercise, self-management, and stress management delivered in small groups; Attendees were asked to write a "pledge to myself" to increase self-efficacy; Control group received intervention after 6 months after experimental group	N = 40 (21 intervention 19 Control) Hawaii Mean age 57 32 female 37.5% only speak Filipino	6 months	Record of class attendance and size for each session Post session written program evaluation to measure participant's satisfaction
Townsend et al., 2016	Application of CBPR principles	One group pre-post test Occurred 2010-2014	PILI@Work modified DPP lifestyle Intervention (DPPLI) 8 one hour in-person sessions over 12-weeks to a group of 10-20 individuals delivered/facilitated by Trained worksite peers/ co-workers/internal facilitators during extended lunch break or after work hours to reduce obesity by incorporating behavioral change strategies; they were trained by community and academic	N = 217 15 worksites (8 Social service, 6 health centers (HC), 3 Native Hawaiian HC, 5 academic institutions) 15 worksites in Honolulu,	3 months	Started 2 weeks before intervention and 2 weeks post 3-month Sociodemographic survey; Clinical measurement: wt., ht., 6-minute walk test; multiple survey tools or questionnaires:

Table 8 (continued)

Authors	Theory/Framework	Design	Features of Intervention	Sample	Duration	Data Collection
Townsend et al., 2016	Continued from previous page	Continued from previous page	researchers; first 4 lessons delivered weekly and remaining lessons delivered every other week; topics included: motivation, problem solving, healthy eating, PA, effective communication with healthcare provider	Hawaii Mean age 46.2 Native Hawaiian 38.3% Other Pacific Islander 21.2% Asians 21.2% Caucasian 13.8% BMI 32.9 kg/m^2 BMI 32.9 87.1% Females		PA, Self-Efficacy for Exercise Scale, Eating Habits questionnaire for fat intake, wt. locus of Control Scale to assess belief how wt. is controlled, Eating Self-Efficacy Scale for ability to control the urge to eat during difficult situations, Family Support Scale to assess support system to achieve modifiable health behaviors related PA and eating
Ursua et al., 2014a	Application of CBPR principles	Pilot single arm pre-post Occurred March 2009- October 2010	Four 90-minutes monthly in-person HTN and CVD risk factors reduction workshops using HHHF curriculum delivered by trained bilingual CHW and 2x monthly phone calls and monthly in-person visits conducted by CHW CHW involved helping pt. navigate healthcare system, assist with medication adherence and appointments	N = 33 fully completed intervention and follow-up surveys from New York City, NY, and Jersey City, New Jersey 31 dropped-out, 18 partially	4 months	Conducted at baseline and 4 months for changes in BP, control, medication and appointment adherence, Clinical measures for differences in wt. and BMI change in CVD

Table 8 (continued)

Authors	Theory/Framework	Design	Features of Intervention	Sample	Duration	Data Collection
Ursua et al., 2014a	Continued from previous page	Continued from previous page	and referrals to community resourc Application of CBPR Principles involving 21 community and academic partners	completed intervention 6 did not complete follow-up survey Mean age 53.2 82% female 100% immigrants 73% uninsured 30% with poor or fair health	Continued from previous page	knowledge, wt., diet related to salt and sodium, cholesterol, and fat intake using HHHF validated tools, self-efficacy related to diet and exercise using NYU Cardiac Rehabilitation questionnaire, NHLBI CHW Activity Evaluation tool to assess social support, FA acculturation survey
Ursua et al., 2018	Health Belief Model and Social Support Theory Application of CBPR Principles	RCT with active control group Occurred 2011-2013	Four 90-minutes monthly in-person HTN and CVD risk factors reduction workshops: heart disease and heart attack, control of cholesterol, blood sugar, PA, wt. management, BP control, nutrition, and Smoking using HHHF curriculum delivered by trained 4 Filipino CHW conducted monthly in-person visits and made phone calls as needed CHW involved in helping pt. with setting healthcare goals, navigate healthcare	N = 207 (90 intervention 117 Control) from New York City, NY 64.9% female Mean age 53.9 63.7.0% completed college 10.3 average yrs. in U.S	4 months	Baseline, 4, and 8 months; baseline surveys related to sociodemographic, risk factors and CVD personal and family history, current smoking, insurance, and having a regular health care professional, Clinical measures: BP, ht., wt., BMI, adherence to

Table 8 (continued)

Authors	Theory/Framework	Design	Features of Intervention	Sample	Duration	Data Collection
Ursua et al., 2018	Continued from previous page	Continued from previous page	system, assist adherence to appointments, and referrals to community resources, i.e. tobacco cessation Control group received education related to heart disease and heart attack only	Continued from previous page	Continued from previous page	medical appointments was evaluated using Hill-Bone Compliance to High BP Therapy Scale
Hurtado et al.,	Transtheoretical Model	1-group Pre-test-post-test 2007-2010	Two-hour NHLBI 10-sessions tailored heart health curricula to reduce CVD risk factors delivered in small groups weekly or bi-weekly by trained CHW in various settings: clinics, tribal organizations, training centers, apartments	1,004 participants across 15 U.S. sites 50% Hispanic 35% African Americans, 8% Filipino, 7% American Indian; Mean age 48 75% female	10 weeks	Surveys at baseline and after completing all sessions to assess change in CVD knowledge, attitudes, and behaviors in all 5 domains using the “My Health Habits” assessment tools

Note. DPP = Diabetes Prevention Program; BMI = body mass index; Wt. = weight; Ht., = height; FBG = fasting blood glucose; BP = blood pressure; CBPR = community-based participatory research; QOL = quality of life; NPA = nutrition and physical Activity; CE = cancer education; HC = health committee; PA = physical activity; HHHF = Healthy Heart, Health Family; NHLBI = National Heart, Lung, and Blood Institute; CHW = community health workers; CVD = cardiovascular disease; HTN = hypertension; RCT = randomized control trial.

Table 9

Cultural Tailoring of Interventions

	Surface structure					
Authors	Education	Communication method	Setting	Staff	Recruitment strategies	Deep structure
Bender, Cooper, Park, Padash, & Arai, 2018	Tagalog and English	Tagalog and English	Community locations frequented by Filipinos, Filipino community faith-based health fairs and cultural events	Filipino staff recruiter and research staff	Flyers, referrals from family members, friends, community leaders	Education materials translated in Tagalog with photos of Filipino food; modifications to study design after recommendations from Filipino community members; inclusion of family members during monthly in-person visits
Bender, Cooper, Flowers, Ma, Arai, 2018	Tagalog and English	Tagalog and English	Community locations with Filipino leaders	Filipino staff recruiter and research staff	Flyers posted at ethnic stores, referrals by Filipinos, targeted mailing to zip codes with large Filipino communities	Modified intervention based on recommendations from Filipino community members and stakeholders; encouraged family members to attend in-person visits development of food pamphlet depicting healthy food options as substitute
Inouye, Matsuura, Li, Castro, & Leake, 2014	English and 2 Filipino	English and 2 Filipino dialects	Held in parks on weekends; Community Presentations with Filipino community members	Filipino recruiter partnered with local Filipino nursing organization who served as board members	2 large Catholic Churches and multiple locations frequented by Filipinos; recruitment by Filipino nurse members	Culturally tailored curriculum, Kalusugan ay Kayamanan or Health is Wealth," created with input from Filipino nurse members and reviewed during a focus group composed of Filipino community members; included examples of Filipino diet and exercise options; facilitated by Filipino healthcare worker fluent in English and 2 Filipino dialects

Table 9 (continued)

Authors	Surface structure					Deep structure
	Education	Communication method	Setting	Staff	Recruitment strategies	
Dirige et al., 2013	Tagalog and English	Tagalog and English	18 San Diego Filipino social clubs	Trained Filipino healthcare committee members delivered training	18 San Diego Filipino social clubs	Siglang Buhay (Active Life) Culturally, employed tailored education materials and activities encouraged active participation However, questions related to diet were not culturally appropriate
Fernandes et al., 2012	English with Tagalog translation	Bilingual in English and Tagalog or Ilokano (Filipino dialect)	Community with large Filipino population	2 trained bilingual Filipino CHW taught 2-hour sessions	Flyers and posters, recruited by community healthcare providers and through community events	HHHF curriculum tailored for Filipinos to reduce CVD risk factors. It includes bilingual heart-healthy booklets and use of pictures and activities to reinforce knowledge i.e. heart-health bingo
Leake, Bermudo, Jacob, Jacob, & Inouye, 2012	Tagalog and English	Tagalog and English	Held in public park located close to churches frequented by Filipinos; presentations held with members of Filipino community	Partnered with Filipino Community	Members of Filipino nursing organization recruited from Filipino churches and other congregations	Kalusugan ay Kayamanan or Health is Wealth, a modified DPP, Filipino tailored lifestyle health education based on the HHHF curriculum; session include role pay using Filipino proverbs
Townsend et al., 2016	English	English	15 worksites across Hawaii	Few sites Utilized employees as facilitators	Recruitment at 15 worksites representing different	PILI@Work is a modified DPP lifestyle Intervention with input from community leaders and stakeholders from 15 focus

Table 9 (continued)

Authors	Surface structure					Deep structure
	Education	Communication method	Setting	Staff	Recruitment strategies	
Townsend et al., 2016	Continued from previous Page	Continued from previous page	Continued from previous page	Formed Intervention Steering Committee from stakeholders Applied CBPR principles	organization: social services, health centers, Native Hawaiian Healthcare Systems, academic institutions	groups and interviews; community needs assessment of common areas. i.e. parks, eating facilities were conducted
Ursua et al., 2014a	English and Tagalog	English and Tagalog	Community centers, library, apartment buildings	21 community and academic members Filipino CHW and community members CHW hold leadership positions in local community Applied CBPR principles	Filipino community members and CHW helped with recruitment	HHHF curriculum tailored for Filipinos to reduce CVD risk factors, use of bilingual heart-healthy booklets and visual aids and activities to reinforce knowledge taught by bilingual Filipino CHW Modifications to curriculum incorporated after input from community partners
Ursua et al., 2018	English and Tagalog	English and Tagalog	Held at various locations frequented by Filipinos local businesses hosted recruitment events	Filipino CHW and CHW are also members of the local community Applied CBPR principles	Filipino community members and Filipino CHW helped with recruitment	Modified culturally tailored Healthy Heart, Health Family (HHHF) curriculum to reduce CVD risk factors, taught by bilingual Filipino CHW

Table 9 (continued)

Authors	Surface structure					Deep structure
	Education	Communication method	Setting	Staff	Recruitment strategies	
Hurtado et al., 2014	Not specified	Not specified	Local community-based organization	Application of CBPR principles	Local community members	Modified heart health curriculum tailored for Filipinos to improve health behaviors to reduce CVD risk factors taught by CHW

Note. CHW = community health workers; HHHF = Healthy Heart, Health Family; DPP = Diabetes Prevention Program; CVD = cardiovascular disease; CBPR = community-based participatory research.

Table 10

Outcomes of Interventions

Authors	BP	Weight Loss/BMI	PA	Nutrition	FBG and other measures	Engagement
Bender, Cooper, Park, Padash, & Arai, 2018	Not measured	Phase 1 Intervention Group: 18% with 5% wt. loss and 82% maintained or lost 2%-5% wt. Phase 2: 90% continued to maintain or lose 2% to 5% additional wt. Phase 1: waitlist Group 83% gained 2% to 5% additional wt. Phase 2: 70% loss or maintained 2% to 5% wt. and 30% achieved 5% wt. reduction	Significant increase in both groups	Not measured	64% self-reported enhanced confidence to manage health Improvement in waist circumference and step counts Mixed results in FBG and Hemoglobin A1C	100% study participants completed the study 95% attendance Intervention group 100% waitlist group Similar adherence using accelerometer and online logging of weight and food intake weekly
Bender, Cooper, Flowers, Ma, Arai, 2018	Not reported	Mean wt. loss of 5% difference in	Not reported	Not measured	BMI and waist circumference were statistically significant	90% completed the intervention 91% completed the 6-

Table 10 (continued)

Authors	BP	Weight Loss/BMI	PA	Nutrition	FBG and other measures	Engagement
Bender, Cooper, Flowers, Ma, Arai, 2018	Continued from previous page	group wt. loss change Cohen's *d*=.93 Phase 1: Wt. loss by both groups (68% and 36%) Phase 2: 32% wt. loss among intervention group	Continued from Previous page	Not measured	(95% CI) Mixed results in FBG and Hemoglobin A1C	months follow-up
Inouye, Matsuura, Li, Castro, & Leake, 2014	Not measured	1.52 kg Wt. loss ($p < .05$) BMI reduction loss ($p < .05$)	Not measured	Not measured	24% reduction in diabetes 5.46 cm loss in waist circumference ($p < .01$) Loss in waist to hip ratio ($p < .001$) High degree of self-efficacy related to exercise and healthy lifestyle, but possible depression 9.4 (*S.D.*=8.4); average QOL SF-36 (*S.D.*=10)	88% retention rate
Dirige et al., 2013	Not measured	Not measured	Increase in PA (B=4.04; $p < .05$)	Low fat diet intake (OR=3.72; $p < .05$)	Stage of change related to consumption of fruits and vegetables (B=0.61; $p < .05$); fat intake (B=0.67; $p < .01$); PA (B=0.80; $p < .01$)	90% HC satisfied or highly satisfied with training 76% retention rate Average 15 activities held during18 months an average of 1 to 12 activities monthly

Table 10 (continued)

Authors	BP	Weight Loss/BMI	PA	Nutrition	FBG and other measures	Engagement
Fernandes et al., 2012	BP changes not sustained at 12 months	Mean values increased at 12 months	16.7% increase from baseline and 43% at 12 months ($p = .001$)	Improvement in 9/25 food consumption	Decrease in mean: Total cholesterol ($p = .001$) LDL ($p = .013$) FBG ($p = .034$) Self-efficacy managing: Fatigue ($p = .05$) Emotional distress ($p = .01$) Preventing CVD from affecting life ($p = .013$) Correct responses in CVD knowledge at 12 months Improvement in stages of readiness: preparation, action, and maintenance ($p = .001$) 37.5% reduction in alcohol use	7 mean session attendance 65% attending at least 9 sessions 89% satisfied or very satisfied with curriculum 91% shared curriculum with family members
Leake, Bermudo, Jacob, Jacob, & Inouye, 2012	Not measured	Not measured	Not measured	Not measured	Not measured	88% completed the intervention Mean class size of 4 participants per session 93% very satisfied and 7% satisfied with flexibility of schedule when offering HHHF 100% rated diet, exercise, self-management, and stress management as “very important” content areas; 78% satisfied with Learning activities

Table 10 (continued)

Authors	BP	Weight Loss/BMI	PA	Nutrition	FBG and other measures	Engagement
Townsend et al., 2016	SBP ($p = .001$); DBP ($p < .001$)	1.2 kg average Wt. loss ($p < .001$)	6 MWT ($p < .001$) PA frequency ($p < .001$)	Decrease fat dietary intake ($p < .001$)	Increase in perception of family support ($p = .004$) Increase in eating self-efficacy ($p = .031$) Internal locus of wt. control associated with wt. loss at 3 months ($p = .003$) No significance in exercise self-efficacy No differences in effectiveness along study participants	78.9% retention rate
Ursua et al., 2014a	SBP 13.7 mmHg ($p = .001$); DBP 6.8 mmHg ($p < .01$) 84% improvement in BP control from baseline ($p = .017$)	5.7 lbs. wt. loss ($p < .001$) 1.1 kg/m^2 BMI reduction ($p < .001$) 33% participants wt. loss > 5 lbs.	No significant change in exercise self-efficacy	Significant improvements in salt, sodium, fat, and cholesterol self-efficacy	Improvement in CVD knowledge ($p < .01$) Improvement in self-efficacy related to Diet and wt. management ($p < .001$) Slight change in medication adherence for diabetic patients (mean difference .25 from baseline) No significant change in medical appointment adherence	78.9% retention rate 97% rated HHHF curriculum as very or extremely beneficial CHW very accessible and understood their needs
Ursua et al., 2018	83.3% improvement in BP among intervention group versus 42.7% among Control group at 8 months (OR =3.2,	Not significant	Not significant	Not significant	Improvement in appointment keeping ($p = .004$) among intervention group 83.5% participants in intervention group reported that they trusted their CHW “a lot” when discussing health concerns 97.9% agreed or strongly	80.4% retention rate in experimental group and 91.4% in control group

Table 10 (continued)

Authors	BP	Weight Loss/BMI	PA	Nutrition	FBG and other measures	Engagement
Ursua et al., 2018	p < .001)				agreed effectiveness of CHW changing health behaviors	
Hurtado et al., 2014	Not measured	Not measured	65% increase in PA (p < .001)	88% confidence in preparing health foods (p < .001)	Improvement in CVD knowledge (p < .01) Food-related risk behaviors related to CVD and wt. management (p < .001) 88% confidence in preparing health foods (p < .001)	13% response rates among Filipinos (1/3 sites completed pretest and posttest due to administrative issues) 97% rated heart health curriculum as satisfied or very satisfied 95% shared information with family

Note. DPP = Diabetes Prevention Program; BMI = body mass index; Wt. = weight; Ht., = height; FBG = fasting blood glucose; BP = blood pressure; CBPR = community-based participatory research; QOL = quality of life; NPA = nutrition and physical Activity; CE = cancer education; HC = health committee; PA = physical activity; HHHF = Healthy Heart, Health Family; NHLBI = National Heart, Lung, and Blood Institute; CHW = community health workers; CVD = cardiovascular disease; HTN = hypertension; RCT = randomized control trial; CI = confidence interval; OR = odds ratio; LDL = Low-density lipoprotein; MWT = minute walk test; SBP = systolic blood pressure; DBP = diastolic blood pressure; LBS. = pounds; KG = kilogram.

Figure 1. Neuman Systems Model Diagram

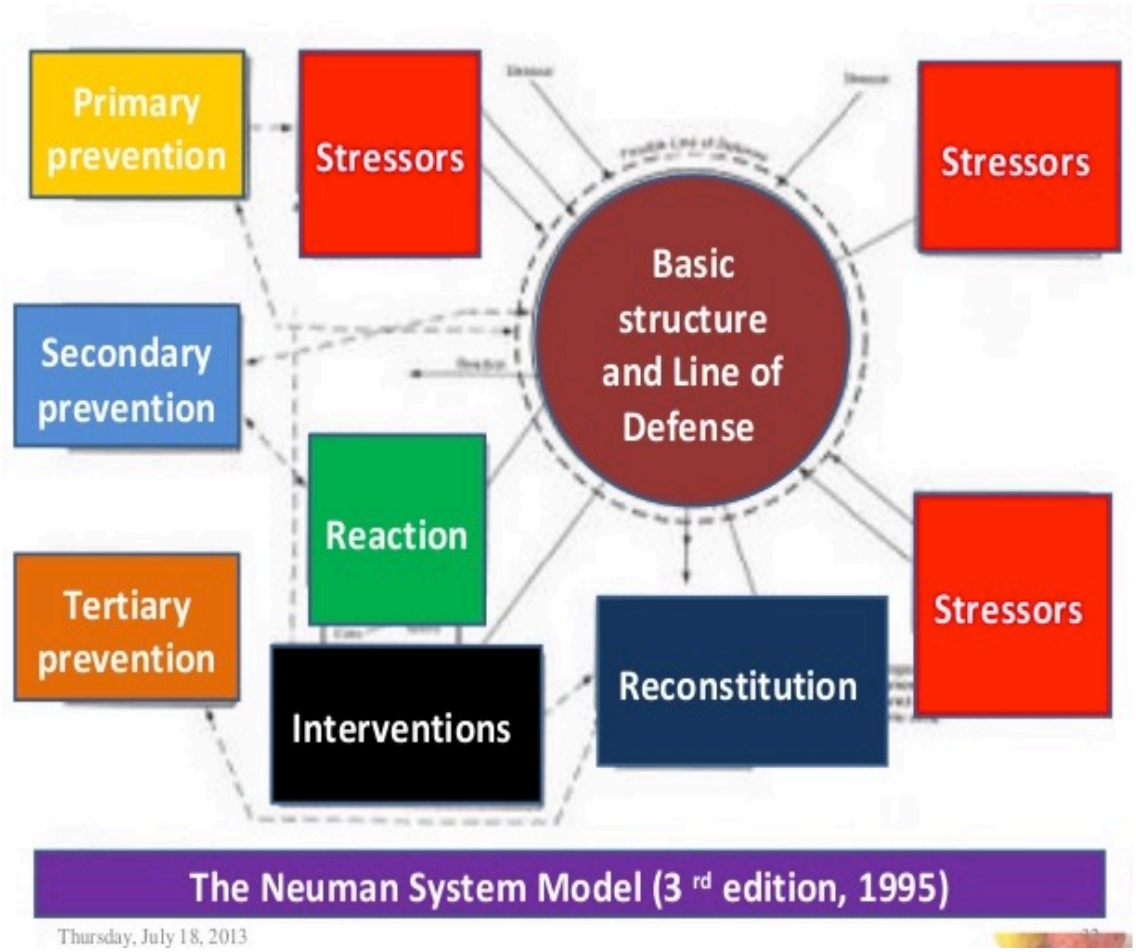

Figure 1. Neuman Systems Model. Screenshot from Neuman, B. (3rd ed.) (1995). The Neuman Systems Model. *Theoretical basis for nursing.* Lippincott Williams & Wilkins.

Figure 2. Relationships Among Chapters

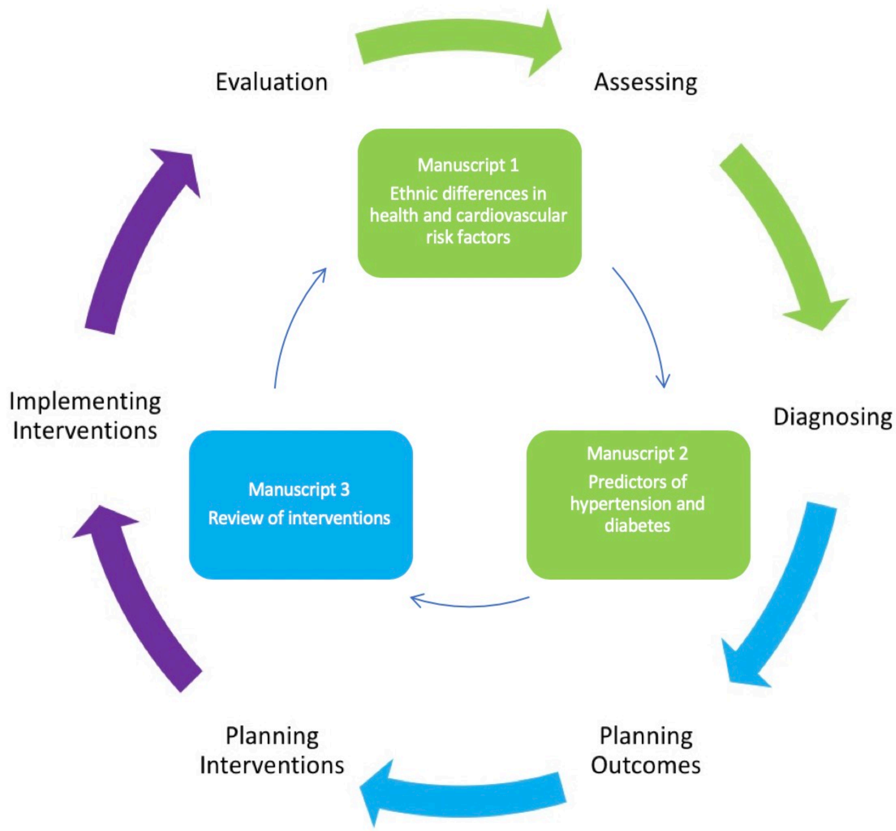

Figure 2. Diagram depicting the 3 manuscripts for the Manuscript-Option Dissertation.

Figure 3. Flow Diagram of Search Results for Integrative Review

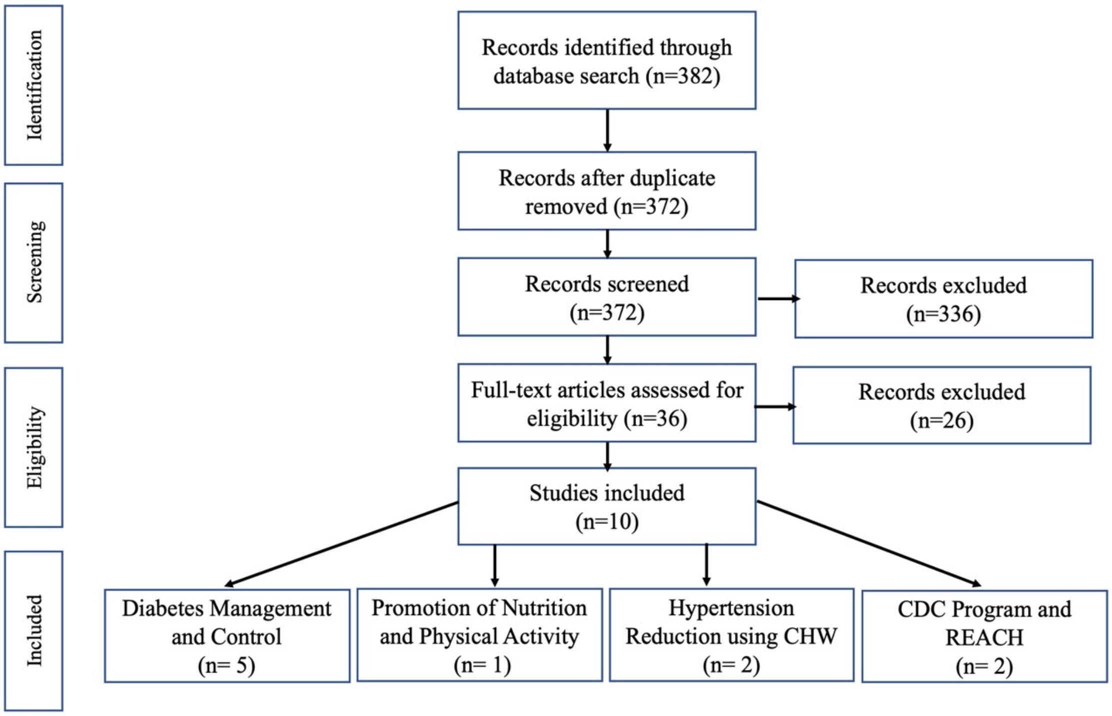

Figure 3. Diagram depicting the review selection process.

Figure 4. Healthcare Barriers and Preventive Practice 1

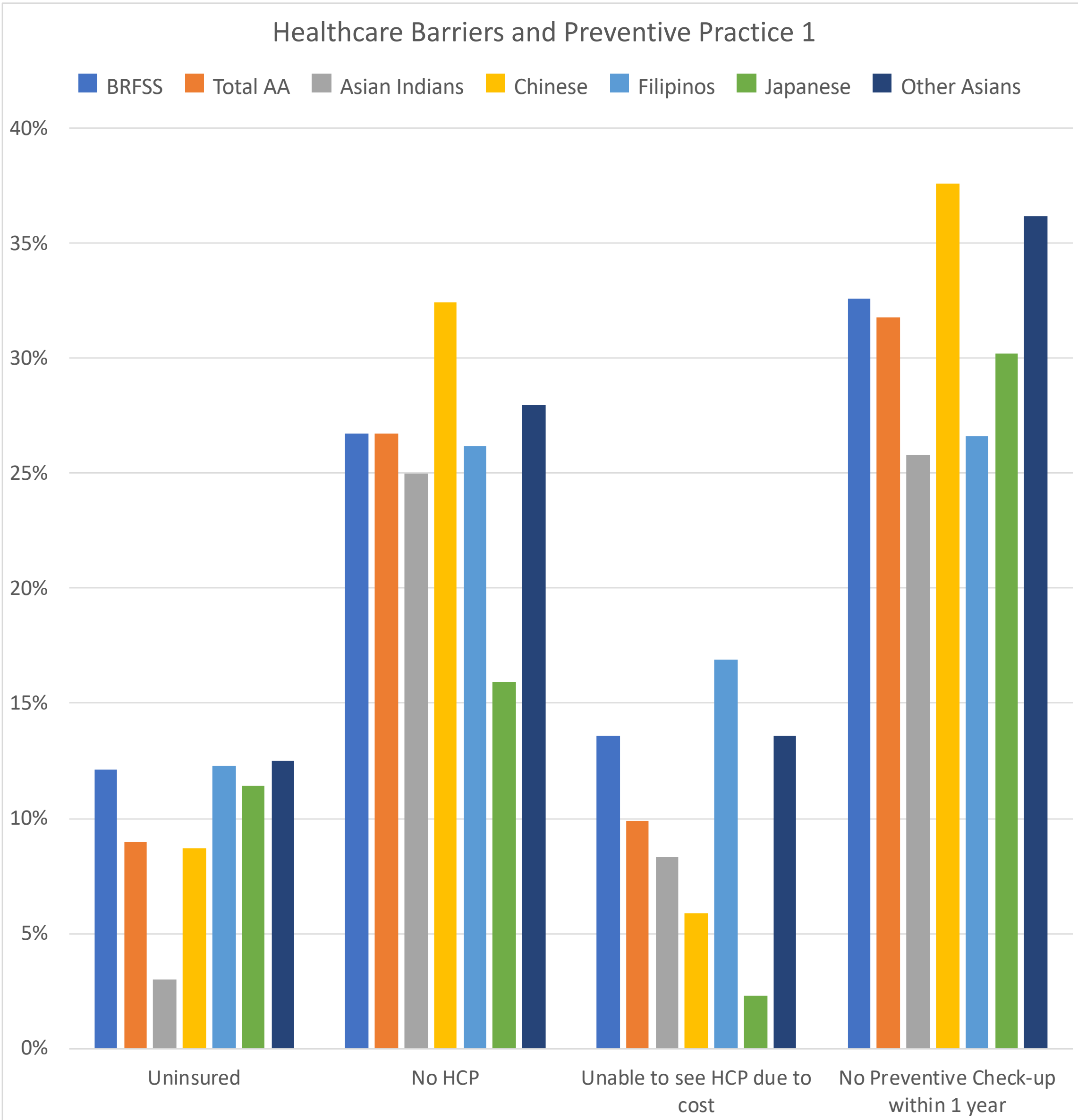

Figure 5. Healthcare Barriers and Preventive Practice 2

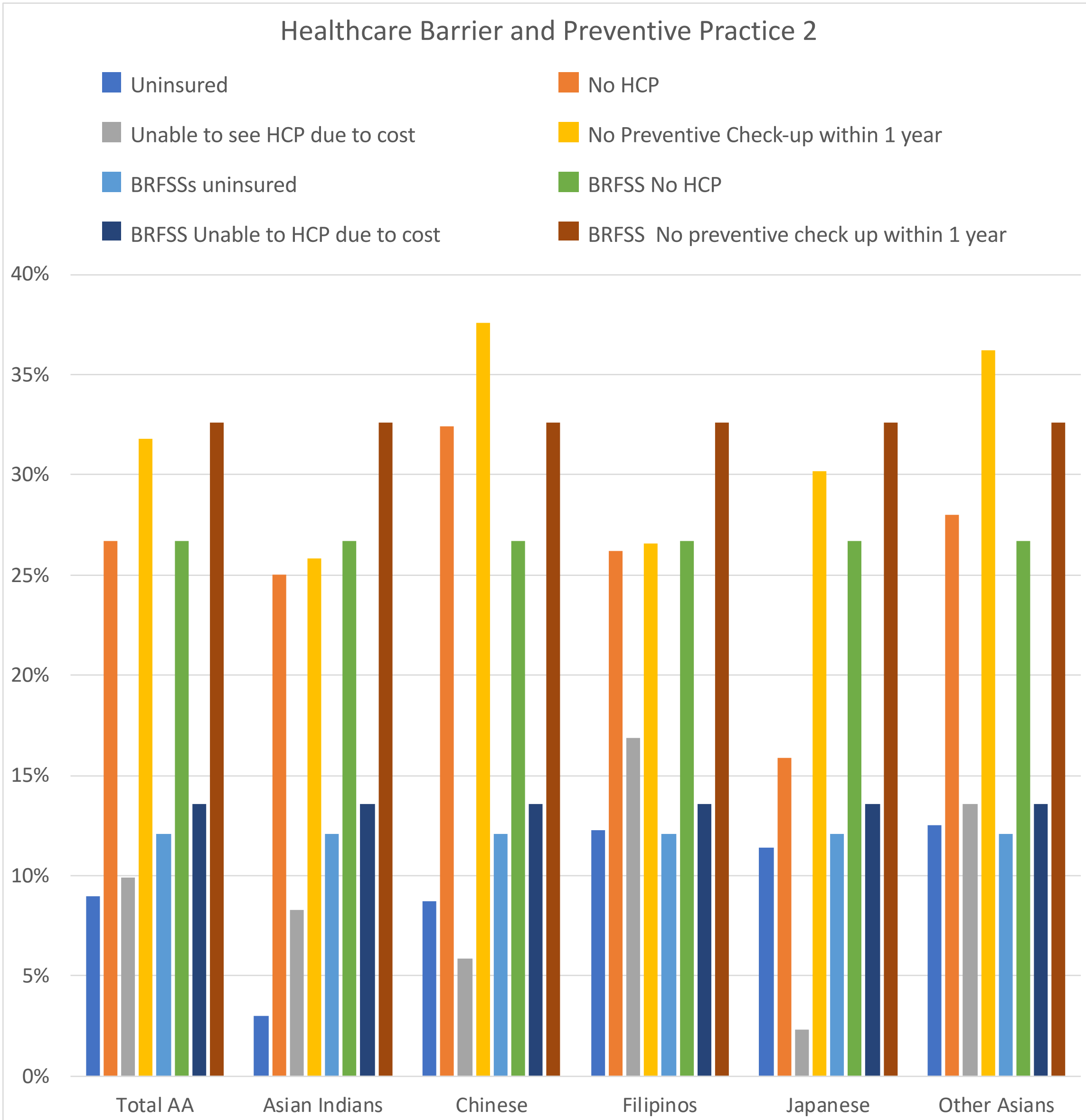

Figure 6. Prevalence of Lifestyle Related CVD Risk Factors 1

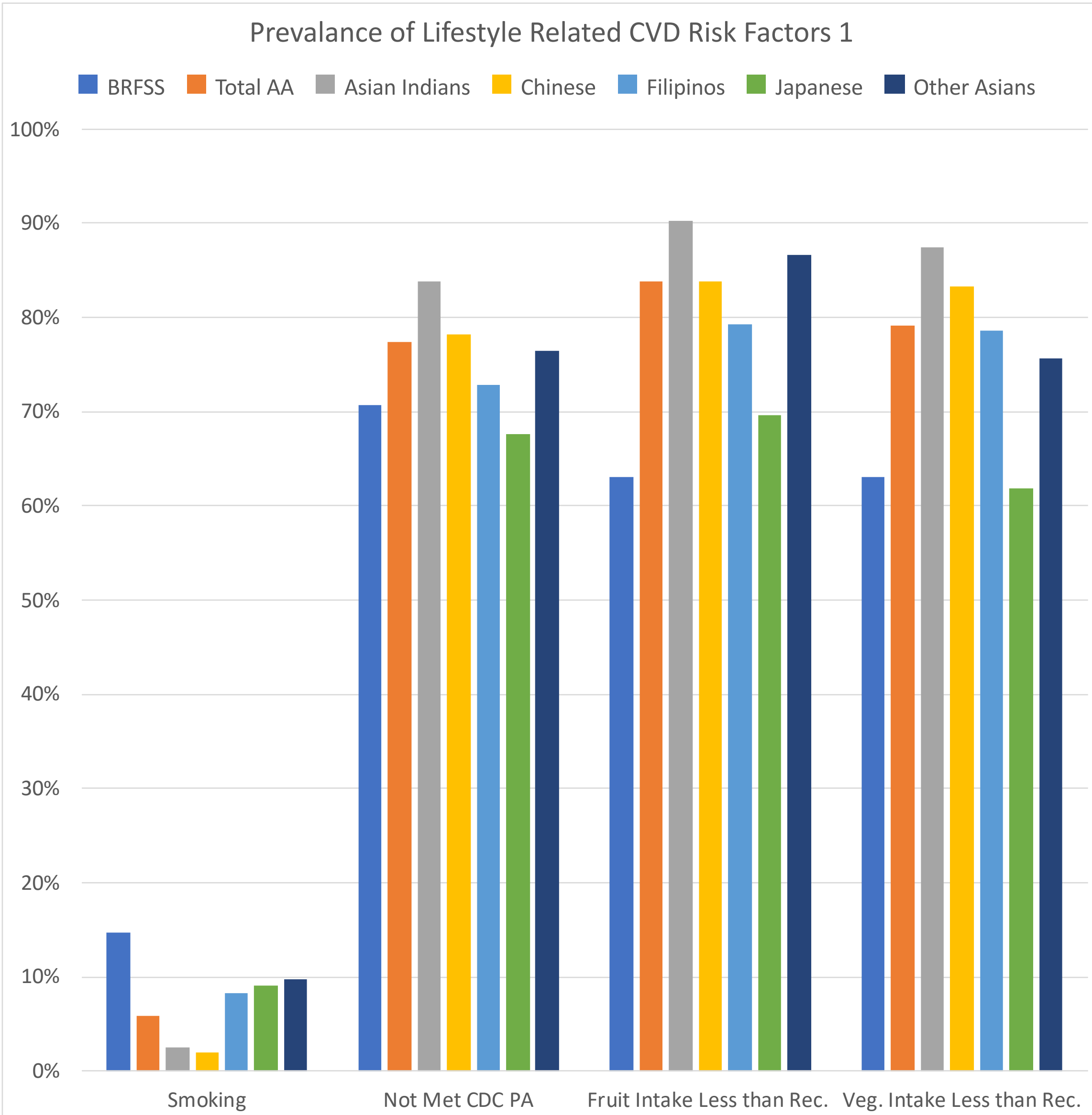

Figure 7. Prevalence of Lifestyle Related CVD Risk Factors 2

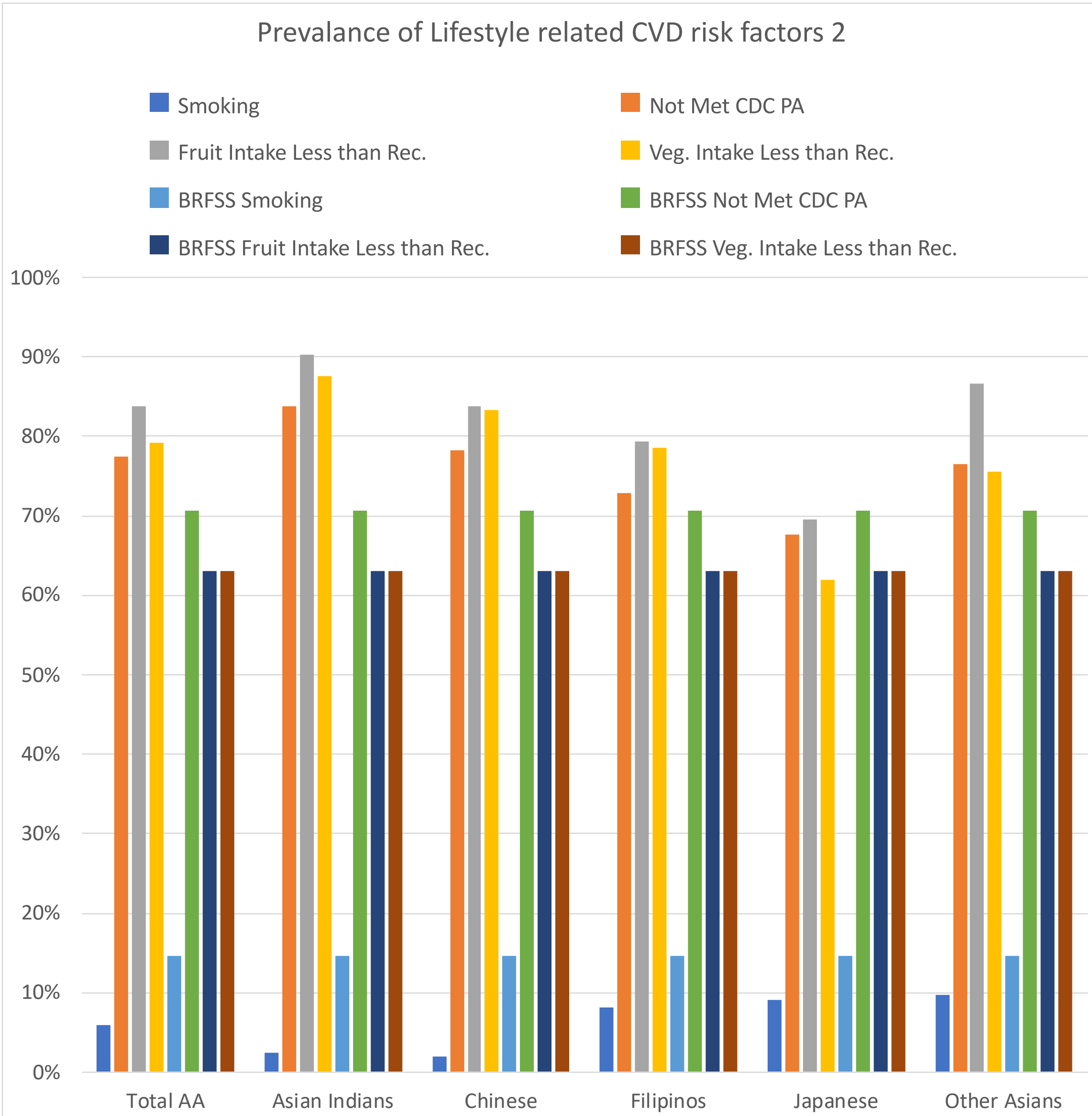

Figure 8. Prevalence of Disease Related CVD Risk Factors 1

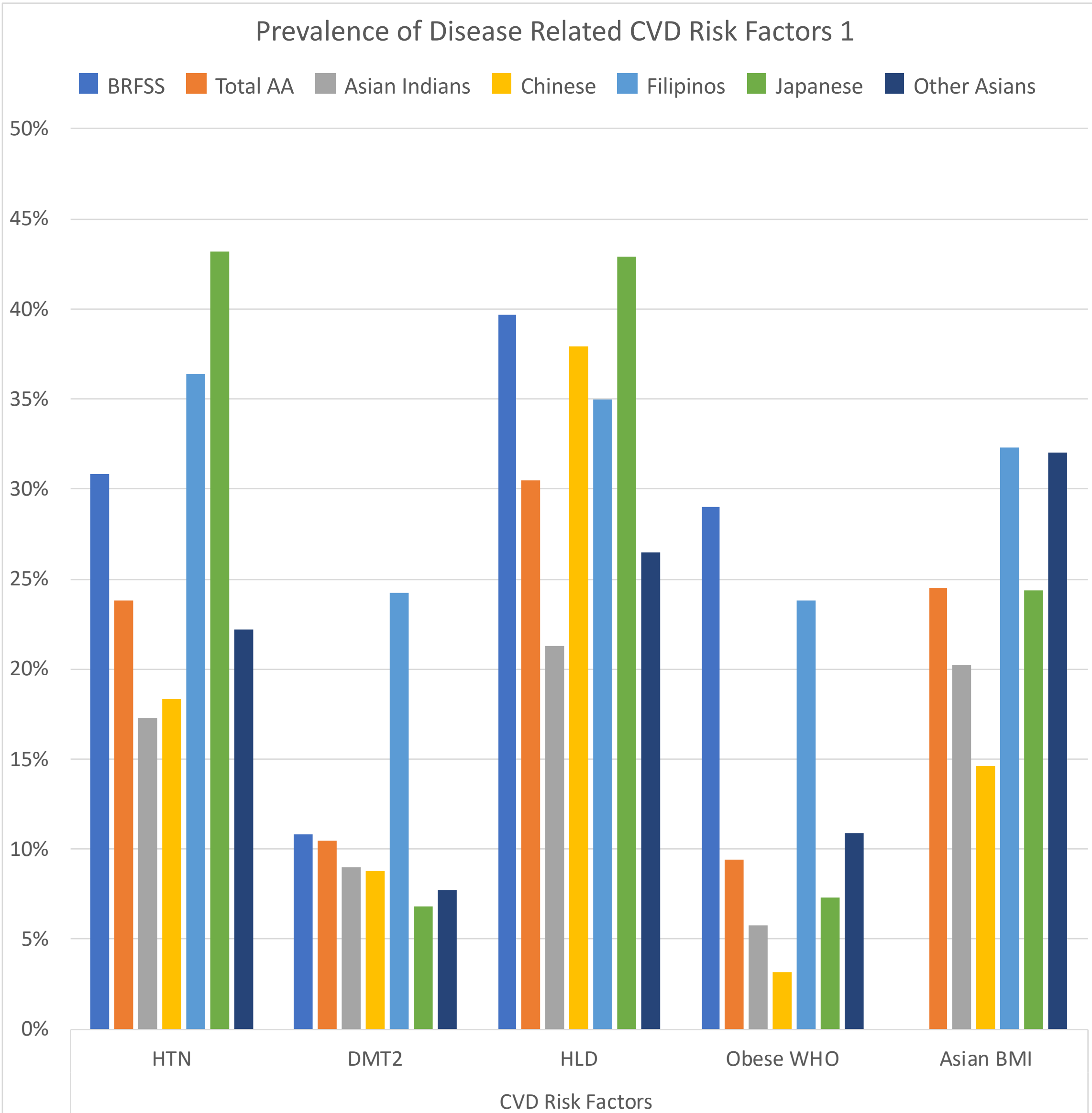

Figure 9. Prevalence of Disease Related CVD Risk Factors 2

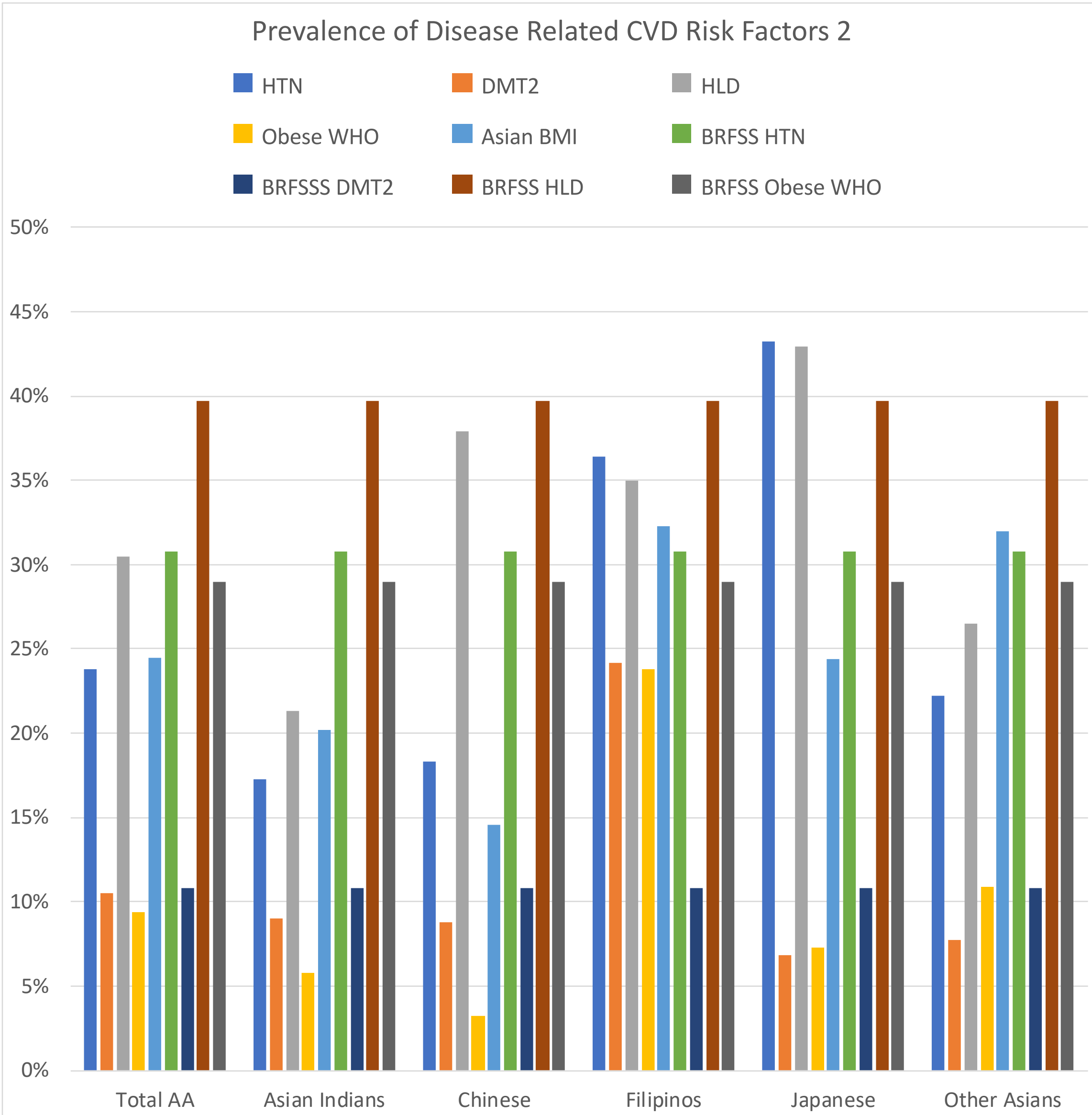

Figure 10. Predictors of Hypertension Forest Plot

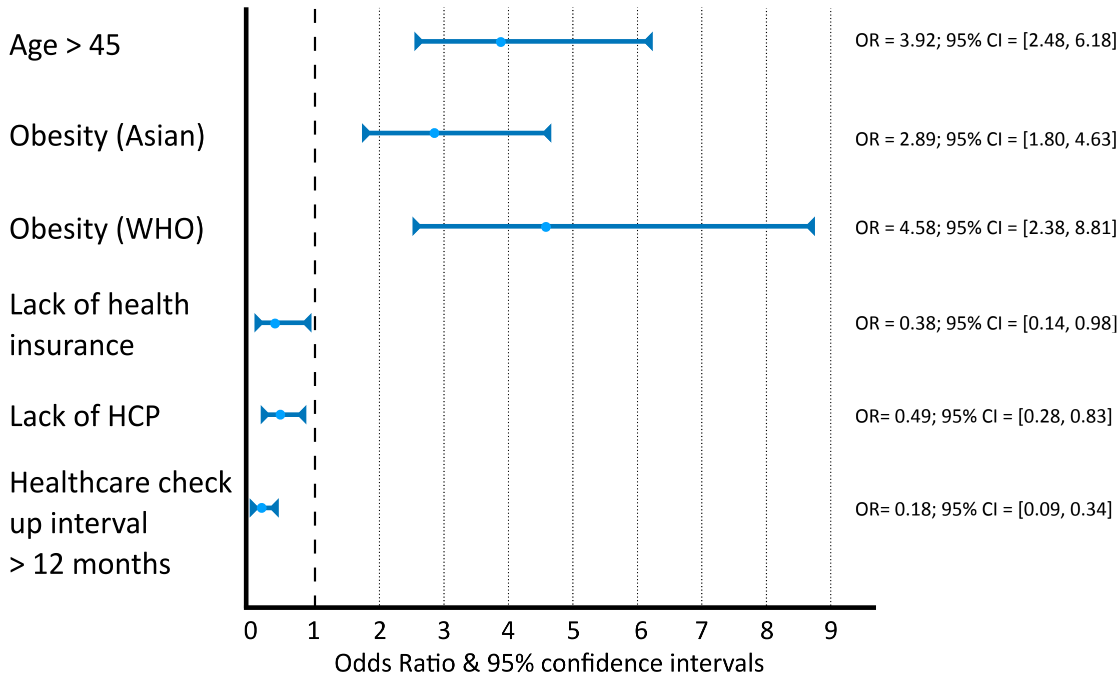

Figure 11. Predictors of Diabetes Forest Plot

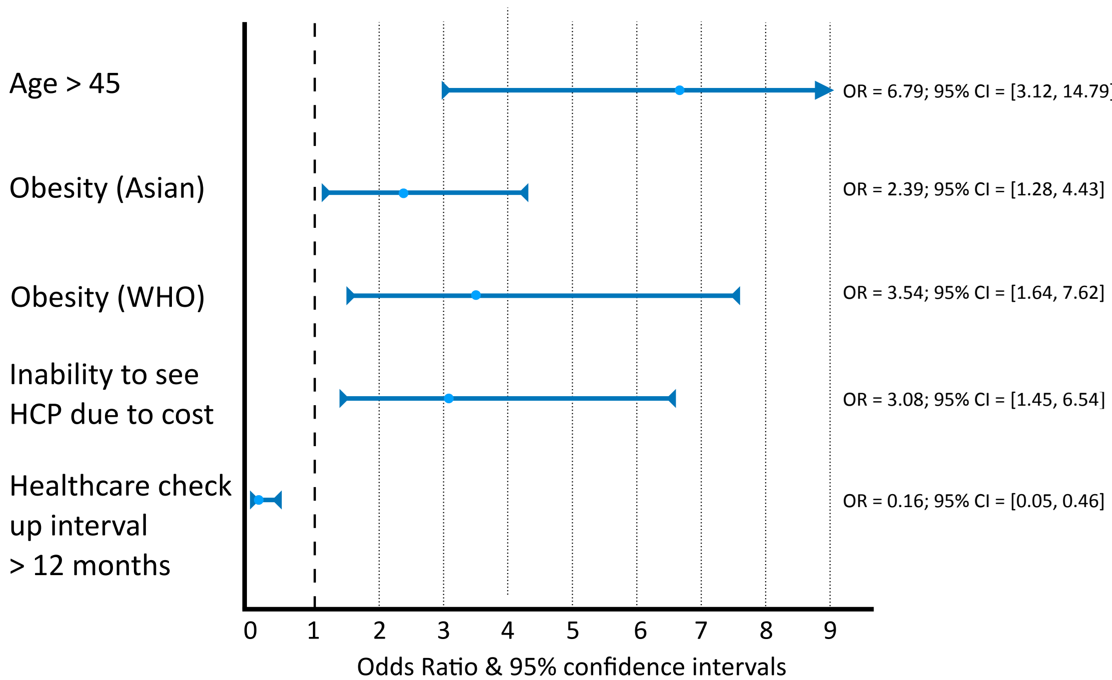

Figure 11. Confidence interval for "Age > 45"not fully plotted in order to more easily visualize the Odds Ratios/Confidence limits for "Health care check-up interval < 12 months."