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UNIVERSITY OF SAN DIEGO

Hahn School of Nursing and Health Science

DOCTOR OF PHILOSOPHY IN NURSING

KNOWLEDGE OF STROKE SYMPTOM AND RISK FACTORS AND
ACCULTURATION AMONG CAMBODIAN IMMIGRANTS LIVING
IN SOUTHERN CALIFORNIA

By

Samantha N. Sangsanoi-Terkchareon, PhDc, RN

A dissertation presented to the

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Requirements for the degree

DOCTOR OF PHILOSOPHY IN NURSING

April 2015

Dissertation Committee

Dr. Jane Georges, PhD, RN

Dr. Cynthia Connelly, PhD, RN, FAAN

Dr. Ann Mayo, DNSc, RN, FAAN

Abstract

The purpose of this quantitative study was to describe and examine the relationships between age, gender, educational level, health insurance status, and income to level of acculturation and knowledge of stroke symptom and risk factors recognition among Cambodian immigrants ($n=200$) living in Southern California. The data were analyzed using Pearson correlation, Kendal Tau, Chi-Square, and multiple regression to determine the relationship between dependent and independent variables. The results of this study were that Cambodian participants' mean age was 46.07 ($SD= \pm 17.51$), average years of education were 8.95 ($SD= \pm 5.26$) and the mean number of people in each household was 4.65 ($SD= \pm 2.13$). These participants gravitate more toward Cambodian culture and tradition than American with a mean acculturation score of 2.3 (measured by the SL-ASIA tool; $SD= \pm .73$). Cambodian immigrants were able to recognize a majority of stroke symptoms (measured by the SRQ tool; mean score $M=6.45$, $SD= \pm 3.45$) and stroke risk factors ($M= 6.01$, $SD= \pm 3.16$). Participants' own mean stroke risk was 4.61 ($SD= \pm 2.86$), and they perceived themselves somewhat sure about stroke symptom recognition in another person ($M=2.58$, $SD= \pm 1.39$). This study also included a small qualitative component to explore the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants. The results of the dissertation research are organized by aims.

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Dedication

This dissertation is dedicated to my mother, Plang Sangsanoi, who has sacrificed for her nine children, sixteen grandchildren, and fourteen great grandchildren for the last sixty-five years. My mother, who was recently diagnosed with Alzheimer's disease, is strong, wise, resilient, and hardworking. She managed to keep our family together and alive despite living through early part of communism during Khmer Rouge and the death of my father, Reung Lath, and numerous relatives in the war. She made sure that we all had everything we needed for school and to achieve our highest potential.

This dissertation is also dedicated to my husband, Somkied Terkchareon, who is very active in the Thai communities of San Diego and Los Angeles. He has made it his life goal to help provide free prosthetic limbs to the people of Thailand and its border countries. He has been very supportive and instrumental in my journey in obtaining my PhD, sacrificing many days and weekends over the last two years to drive me around to speak to gatekeepers, conduct blood pressure screenings, and conduct research in different cities.

Finally, this dissertation is dedicated to my two brothers, six sisters, and sixteen nieces and nephews, all of whom have been active in the Cambodian community. Their presence and testimony throughout the community of being trustworthy, helpful, and kind-hearted made it much easier to conduct this research.

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CHAPTER I

INTRODUCTION

A large number of former Southeast Asian refugees suffer mental and physical health problems due to sudden and involuntary transplantation to a foreign culture, experiences in refugee camps, and/or witnessed genocide (Kirmayer et al., 2011). These problems affect both immigrants and their children, who are at a greater risk for poor physical health, internalizing problems, and inadequate relationships compared to Caucasians (Huang, Calzada, Cheng, & Brotman, 2011). In addition to the stressors of acculturation and adaptation to Western life, the numerous stressors of refugee migration can contribute to high blood pressure and hypertension, which are associated with risk of stroke (Kirmayer et al., 2011).

A stroke occurs when there is a change in the normal blood supply to the brain. The brain cannot store oxygen or glucose and must receive a constant flow of blood to maintain normal function. Constant blood flow out of the brain is important for the removal of metabolic waste. If blood supply to any part of the brain is interrupted for more than a few minutes, cerebral tissues will die (Ignatavicius & Workman, 2013).

Stroke is a worldwide medical event that affects people with increasing age. Every year, 15 million people worldwide experience a stroke (Wolfe & Rudd, 2007;

World Health Organization [WHO], 2013). Of these, 5 million die from stroke or stroke-related complications, and another 5 million are permanently disabled (WHO, 2013; Go et al., 2013). WHO (2004) estimated the number of patients surviving a stroke was 4.4 million in South East Asia and 9.1 million in the Western Pacific region. The incidence of this debilitating condition has not greatly changed from 5.7 million deaths (9.7%) worldwide in 2004 (WHO, 2004) to 5 million in 2013.

In the United States, stroke is the fourth leading cause of death and results in more serious and prolonged disability than any other condition. According to the National Institute of Neurological Disorders and Stroke (NINDS; 2013), approximately 75% of all stroke cases occur in people over the age of 65, and the risk of having a stroke more than doubles for each decade after age 55. Each year, approximately 780,000 Americans suffer severe disabling symptomatic strokes and consequences of strokes are devastating (The University Hospital in New Jersey, 2013; Ennen & Zerwic, 2010). More disturbingly, an estimated 136,000 Americans die each year from stroke and approximately 200,000 people experience recurrent strokes despite the advantages of modern medicine (Centers for Disease Control and Prevention [CDC], 2011). The total cost of strokes is estimated at \$43 billion per year, and the direct costs of medical care and therapy are estimated at \$28 billion. Indirect costs from lost productivity and other factors are estimated at \$15 million per year (University Hospital, 2012). According to the American Heart Association (AHA) and Stroke Association, the cost of US stroke care is predicted to double by the year 2030 (AHA, 2013; Lloyd-Jones et al., 2010).

Stroke, like many health problems, is caused by a combination of genetic and environmental risk factors. Stroke risk increases in individuals who have a strong family history of hypertension or atherosclerotic diseases (Ignatavicius, 2013). Atherosclerosis is the strongest contributing factor for ischemic stroke. Atherosclerosis begins with a fatty streak located in the intimal layer of larger arteries. These fatty streaks may be in existence for many years before forming fatty plaques, which grow over years. These plaques eventually disrupt the integrity of the arterial lining and form thrombi, resulting in the obstruction of cerebral blood vessels that leads to ischemia and causes injury at the cellular level due to lack of blood supply to the tissue. Ischemia of the brain, if left untreated, will result in tissue death or infarct (Osborn, Wraa, Watson, & Holleran, 2014).

Ischemic infarction accounts for four out of five strokes. Unfortunately, current therapies for acute ischemic stroke are extremely limited in their effectiveness (NINDS, 2013; University of California Los Angeles Health System, 2010). Further, according to Jauch et al. (2010), fewer than half of patients with stroke are seen in the emergency department within the first three hours. This is believed to be the result of lack of knowledge and recognition of stroke symptoms (Jauch et al., 2010; Kothari et al., 2012), a known problem among Asian populations in the United States (Nguyen et al., 2009). Advances in diagnostic tests, management, and treatment of acute stroke present healthcare providers with challenges of delivering care to populations who have poor stroke knowledge. Due to lack of knowledge of stroke and stroke management, stroke victims typically seek emergent medical care hours and even days after a stroke event. In the past, the healthcare system did not respond urgently to stroke because the lack of

early treatment interventions offered no incentive for patients to seek immediate care. However, recent evidence indicates that early intervention for stroke increases the chance for recovery and restoration of function in stroke victims. Further, immediate treatment can prevent neurological deficit and permanent disability (Ignatavicius, 2013). Therefore, early recognition of signs and symptoms of stroke is essential in seeking treatment to preserve blood flow to the brain.

Stroke and Asian Populations

Foreign-born Asian Americans are the fastest growing minority group in America, and it is projected the US Asian population will grow to 37.6 million by 2050 (CDC, 2010). Cambodians are among the fastest-growing Asian subpopulations. According to the US Census Bureau, in the year 2000 there were 276,667 people of Cambodian descent in the United States, an increase from 206,052 in 2000 (United States Census Bureau, 2010).

Little is known about stroke incidence in Asians, especially Cambodians in the United States, where regional heterogeneity in Asian subpopulations is great. Indeed, prevalence rates for stroke among Asian American subgroups in California are not available (Hoy, Rao, Hoa, Suhardi, & Lwin, 2012; Nguyen-Huynh & Johnston, 2005; Lloyd-Jones et al., 2010). However, a national epidemiologic study of 169,386 stroke hospitalizations indicated the prevalence of stroke among Asians or Pacific Islanders varied up to threefold depending on place of residence in the US, with higher incidence in the West (Nguyen-Huynh & Johnston, 2005). According to Holland, Wong, Lauderdale, Palaniappan (2011), age-adjusted prevalence rates for stroke range from 0.3% to 1.8% for Asians in California.

In Cambodia, stroke is not ranked among the top ten leading causes of death because to date, neither the prevalence nor the incidence of stroke in Cambodia has been nationally recorded. This underreporting dilemma is the result of either small-scale studies or community-based surveys on stroke that have only been conducted in the past few decades (WHO, 2010). The only study of stroke in the entire country was the 2012 survey, Prevalence of Non-Communicable Disease Risk Factors in Cambodia (Loo & Gan, 2012).

Accurate stroke recognition is an important factor in obtaining early treatment and improving prognosis. However, there is very limited knowledge regarding stroke knowledge among immigrant Asian populations. Asian Americans who immigrated to the United States after the age of 18 have a lower rate of stroke symptom recognition than those who immigrated at younger ages. Further, Asian ethnic groups may employ home or herbal remedies and other traditional remedies such as coin rubbing or coining, cupping or therapeutic burning, and acupuncture to control hypertension and hypercholesterolemia and prevent heart disease and stroke. The use of these home remedies can lengthen the time before seeking proper medical treatment, thereby increasing the severity of stroke disability.

Hypertension and Cardiovascular Disease

Healthcare providers and researchers cannot fully explain all factors that affect hypertension. There is increasing evidence suggesting psychosocial factors may play an important role, including exposure to chronic stress, occupational stress, stressful aspects of the social environment, and low socioeconomic status; however, more studies are needed to support the causal relationships (Spruill, 2010). A meta-analysis of various

stress reduction interventions including biofeedback, progressive muscle relaxation, stress management training, and transcendental meditation found that only transcendental meditation was associated with significant blood pressure reduction (Rainforth et al., 2007).

Cardiovascular diseases (CVD) such as coronary artery disease and stroke are two of the top leading causes of death among foreign-born Asian Americans. CVD can lead to death and disability, which can be very taxing economically (CDC, 2010). Presently, research on risk factors and rate of stroke or CVD is sparse and incomplete among specific Asian immigrant populations. Poor diet, lack of exercise, older age, and high cholesterol are frequently discussed as contributing factors. Previous studies suggested more research and a deeper understanding of beliefs and barriers faced by Asian immigrants will help guide health promotion efforts for this population (Ton et al., 2011).

Acculturation and Stroke Risk Factors

There is an association between higher acculturation and decreased prevalence of smoking in men. A study conducted with current and former Asian American smokers using the 2003 California Health Interview Survey found smoke-free home rule and immigrating to the US were associated with status of a former smoker and lighter smoking. The study found recent Asian immigrants who had resided in the US for more than 10 years and long-term residents who were born in the US or immigrated to the US before the age of 10 had a smoke-free home rule and were associated with status as a former smoker (OR 14.19, 95% CI=4.46, 45.12; OR 3.25, 95% CI 1.79, 5.90, respectively). This association was stronger for immigrants ($p=0.02$) having a smoke-free

home rule and lighter smoking habits only for long term immigrant residents (OR 5.37, 95% CI 2.79, 10.31; Tong, Nguyen, Vittinghoff, & Perez-Stable, 2008).

Conceptual Framework

According to Ravitch and Riggan (2012), a conceptual framework is a group of concepts that are broadly defined and systematically organized to provide a focus, a rationale, and a tool for the integration of information. The main purpose of a conceptual framework is to clearly articulate reasons for the research questions, variables, and the methodological approach researchers choose throughout their study.

The conceptual framework used for this study included the concepts of acculturation and select demographics and a portion of the Health Belief Model (HBM; see Figure 1). The HBM is a psychosocial model used as a theoretical underpinning to explain and predict health-related behaviors. This model focuses on individuals' attitudes and beliefs and evolved from the premise that an individual's perception of the world determines what he or she will do. According to Janz and Becker (1984), the theory was developed to explain preventive health behaviors.

Figure 1. Health belief model.

The HBM was first developed in the 1950s by social psychologists Hochbaum, Rosenstock, and Kegels of the US Public Health Services (Janz & Becker, 1984; Rosenstock, 1974) in response to the failure of free tuberculosis (TB) health screening programs to attract participants from targeted high-risk populations. Since then, the HBM has been adapted to explore a variety of long-term and short-term health behaviors such as sexual risk behaviors and transmission of HIV/AIDS.

The HBM uses four constructs representing the perceived threat of a condition and net benefits of health promotion behaviors. The four constructs of perceived susceptibility, perceived severity, perceived benefits, and perceived barriers were proposed as accounting for individuals' "readiness to act." An added concept, "cues to action" would activate that readiness and motivate behaviors. A more recent addition to the HBM is the concept of self-efficacy, or confidence in one's ability to successfully

perform an action. Rosenstock (1988) added this concept and others to help the HBM better fit the challenges of changing habitual unhealthy behaviors such as sedentary lifestyle, smoking, or overeating.

The second focus of the Health Belief Model is “illness behavior,” described by Kasal, Kobb, and Kirscht as a person’s actions when faced with acute symptoms (Janz & Becker, 1984; Rosenstock, 1974; Bach, 1996). Illness behaviors include recognizing symptoms and deciding whether to self-treat or seek medical care. The HBM represents a universal view of health behaviors and links psychological theories of decision-making that attempt to explain actions in a situation presenting choices about alternative health behaviors. The HBM provides a framework for determining the predictive variables that influence healthcare choices of persons who experience signs and symptoms of an acute stroke.

Using parts of the HBM within the conceptual framework (see Figure 2), this research will explore related factors such as age, sex, ethnicity, education, socioeconomic status, and acculturation to better understand stroke knowledge and behaviors of the Cambodian population residing in Southern California. In a study conducted with participants ages 18-74, Shelley et al. (2004) found a positive correlation between never smoking for Chinese Americans younger than 35 years and having a high level of tobacco use-related knowledge. There is no previous study available specifically for stroke knowledge and acculturation. This proposed research explored the effect of level of acculturation on stroke knowledge, focusing on education, age, sex, ethnicity, and socioeconomic status (SES). Future studies will explore other constructs of the HBM such as perceived susceptibility, perceived threat, perceived benefits, and perceived

barriers.

Figure 2. Conceptual model for study (circled); adapted health belief model.

Theoretical Definition: Acculturation

The concept of acculturation deals broadly with changes in cultural attitudes between two distinct cultures. The focus is on the group rather than the individual. The concept also focuses on how minority or immigrant groups relate to the dominant society. Ethnic identity is thought to be an aspect of acculturation in which the focus is how individuals relate to their own group and a subgroup of the larger society (Phinney,

Madden, & Santos, 1998; Piontkowski, Florack, Hoelker, & Obdrzalek, 2000).

Acculturation is a complex concept. There are two distinct models that guide its definition: a linear model and a two-dimensional model. The linear model is based on the assumption that a strong ethnic identity is not possible for those who become involved in the mainstream society, and that acculturation is inevitably accompanied by weakening of ethnic identity. Alternatively, the two-dimensional model suggests that relationships with traditional culture and the new or dominant culture both have vital roles in the process. The two-dimensional model proposes four possible outcomes of the acculturation process: assimilation, integration, rejection, and marginalization (Berry, 1986). In assimilation, the non-dominant group moves toward adopting the new dominant culture; in contrast, integration incorporates both cultures. Rejection, on the other hand, reaffirms the traditional culture, and marginalization alienates both the dominant and traditional cultures.

More recent understanding suggests acculturation is bi-dimensional or multidimensional (Matsudaira, 2006). The bi-dimensional model holds that individuals can maintain their cultures of origin even when they acculturate to new cultures. There are two types of bi-dimensional acculturation scales, both of which hypothesize that acculturation is determined by individuals' selective adoption of the new culture and selective retention of the culture of origin. Experts have proposed four acculturation strategies supporting maintenance of one's native culture and one's contact with the mainstream group in the new culture. Those who are more comfortable with the new culture and pull away from their native culture are considered assimilated. Those who are high in maintenance of and contact with both cultures are considered integrated. Those

who are low in contact with the new culture and high in maintenance of their native culture are considered separated. Finally, those who are low in maintenance and contact in both cultures are considered marginalized (Berry, 1980; Berry & Kim, 1988; Berry & Sam, 1992).

Suinn-Lew's Asian Self-Identification Acculturation Scale (SL-ASIA; Suinn, 1994) was used to measure acculturation in this study. Many factors contribute to variation in acculturation that may include but are not limited to levels of acculturation of a particular group. Therefore, it is imperative to have a reliable instrument to measure acculturation. The process of measuring acculturation involves evaluating an individual's behaviors, values, and beliefs. All scales that are currently used to measure acculturation consist of items addressing second language proficiency because it is believed that being able to communicate in the language of the dominant culture is a requirement to learn the culture. Some scales also assess patterns of language use, friendship choices, food, music, or movie preferences, cultural awareness, ethnic pride, place of birth, and contact with one's homeland. Acculturation scales have been developed for various ethnic groups, including Hispanic, Filipino, Asian American, and some Southeast Asian immigrant groups.

Purpose of the Study

The purpose of this quantitative method study was to examine the relationships between select demographic variables, level of acculturation, and knowledge of stroke symptoms and risk factors among adult Cambodian immigrants living in Southern California. This study also included a small qualitative component exploring the shared

beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants.

The study addressed the following specific aims.

1. Aim 1: Describe select demographic variables (age, gender, educational level, health insurance status, and socioeconomic status) level of acculturation, stroke risk factor knowledge, and symptom recognition in a group of Cambodian adults in southern California.
2. Aim 2: Examine the relationships between select demographic variables, level of acculturation, stroke risk factor knowledge, and symptom recognition in this group.
3. Aim 3: Explore the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants.

Summary

Stroke prevalence continues to escalate despite better living conditions, improved social economic status, better access to healthcare, and up-to-date treatments for chronic medical conditions. Asians have the highest numbers of deaths from stroke, and, stroke is ranked as the second leading cause of death versus the sixth leading cause of death among other populations (Hoy et al., 2012). Because the Asian population is among the fastest-growing minority groups in the US, it is imperative the incidence of stroke and stroke-related mortality be reduced in this population through better understanding of their lifestyles, baseline knowledge of chronic illnesses and stroke, and cultural and medical practices. The Health Belief Model and assimilation model guided this research

study of knowledge of stroke symptom and risk factors among Cambodian immigrants living in Southern California with the eventual outcome of earlier treatment of this debilitating illness.

CHAPTER II

REVIEW OF LITERATURE

This chapter reviews and summarizes relevant literature on the topic of stroke in the United States as well as Cambodia. Because there is no stroke research conducted specifically in the Cambodian population, literature review of stroke conducted in United States and California is reviewed and summarized. General information about stroke recognition in California and the concept of acculturation are also addressed, with consideration of the fact that more Cambodians are likely to maintain diet and exercise practices similar to those in their native country. The researcher also examines cultural traditions that may interfere with stroke symptom and risk factor recognition in this population. Previous studies have shown there are two main groups of risk factors for stroke: modifiable and not modifiable. This chapter focuses on modifiable risk factors for stroke such as controlled hypertension, diet, obesity, and smoking.

Stroke Recognition

Stroke Recognition in the United States

Studies of stroke knowledge in Cincinnati, Ohio, were initiated in 1998. Based on 1,880 telephone interviews with Caucasian respondents, 27% of participants were unable to name any symptoms of stroke and 14% could not identify stroke risk factors (Pancioli

et al., 1998). Other studies reported similar levels of poor knowledge of stroke symptoms. A decade later, a study conducted by Goldstein, Silberberg, Miller, and Yaggy (2009) with 76 Latinos in a community-based health program showed 29% of participants could not name stroke risk factors and 57% could not identify any stroke symptoms. Other studies have reported similar results. In a 2010 study, 34% to 57% of rural male and female participants were not able to identify any stroke symptoms and 10% to 29% were not able to identify any stroke risk factors (Ennen & Zerwic, 2010).

Recently, a stroke knowledge study by the AHA (2012) randomly sampled 1,205 English-speaking American women living in the United States and found 51% were able to identify sudden weakness and numbness of face and limb on one side as a stroke warning sign. There was no variation by race or ethnicity. Further, 36%-48% were able to identify loss of or trouble producing or understanding speech as symptomatic of stroke (48% for Caucasian women and 36% for Hispanic women). Less than 25% of these women were able to identify severe headache, unexplained dizziness, or sudden loss of vision as warning sign of stroke (Mochari-Greenberger, Towfighi, & Mosca, 2014). This research indicated that the public's knowledge of stroke has minimally changed since the beginning of stroke knowledge research in 1998.

Stroke Recognition in California

The literature on stroke recognition in California is sparse, but what few studies exist indicate that public knowledge about stroke has not changed significantly since the beginning of stroke research. DeLemos, Atkinson, Croopnick, Wentworth, and Akins (2003) conducted a study at Mercy Stroke Center in Sacramento, California, using stroke screening, counseling, and education of 78 participants in an attempt to improve stroke

knowledge and prevention. Following the intervention, participants' knowledge of stroke symptoms increased from 59% to 94%, but after three months, participants' knowledge decreased to 73% despite screening, counseling, interventions, and education. The results suggest that people without counseling education have poor recognition of stroke knowledge.

There are no data or research available for stroke and stroke risk factors knowledge for Cambodian population. This lack of research supports the conclusion that Cambodian public knowledge of stroke is inadequate.

Cultural Tradition, Health Beliefs, and Practices

Southeast Asia is a subregion of Asia that includes countries geographically south of China, east of India, west of New Guinea, and north of Australia. Southeast Asia's two geographic regions are mainland Southeast Asia or Indochina and maritime Southeast Asia. Indochina consists of people from Cambodia, Laos, Myanmar (previously known as Burma), Thailand, Vietnam, and Peninsular Malaysia. Maritime Southeast Asia comprises people from Brunei, East Malaysia, East Timor, Indonesia, the Philippines, Christmas Island, and Singapore. The major religions are Islam and Buddhism, followed by Christianity. However, a wide variety of other religions such as Hinduism and animist-influenced practices are also found in these areas (Kleinmeyer, 2004). Published research focuses on mainland Southeast Asian or Indochinese populations including Cambodians, Laotians, Thai, and Vietnamese. There are numerous similarities between these four countries, such as food, culture, religion, health practices, and health problems.

Acculturation

The term *acculturation* was first used in anthropology in the late 1800s. Early

studies in Central and South America dealt with patterns of assimilation. Researchers concluded that assimilation and acculturation evolved over time as the result of interaction between Native American tribes and Whites (Hoxie, 1984).

Acculturation is defined as a process in which the attitudes or behaviors of people from one culture are modified as a result of contact with a different culture (Phinney, Madden, & Santos 1998). Acculturation implies a mutual influence in which two cultures fuse and merge. In order for acculturation to occur, some relative cultural equality has to exist between the giving and the receiving culture. In contrast, *assimilation* is a process of cultural absorption of a minority group into a dominant culture. In assimilation, the tendency is for the dominant cultural group to enforce adoption of its values rather than a blending of values. It is difficult to differentiate between acculturation and assimilation due to the inability to determine whether people are free or forced to choose one or another aspect of a culture (Piontkowski, Florack, Hoelker, & Obdržálek, 2000).

The term *ethnic identity* has sometimes been used in association with acculturation, but this term should be clearly defined. Definitions of ethnic identity vary according to the underlying theory embraced by researchers or scholars who are intent on resolving its conceptual meanings. To date, there is no consensus regarding the definition of this term (Suinn, 1994). According to Trimble and Dickson (2005), ethnic identity is an affiliate construct, where an individual views him or herself as belonging to a certain ethnic or cultural group. Individuals can also choose to associate with a group, particularly if they are of mixed ethnic or racial heritage.

Asian American Health Promotion

Significant increases in maintaining or adopting healthy behaviors including physical activity, nutrition, smoking cessation, stress management, regular preventive physician visits, and health screening could substantially improve the health of Southeast Asians. Smoking cessation campaigns for Southeast Asian males can eliminate bad smoking role models for younger members and lessen the burden of asthma, lung and other cancers, and other respiratory and cardiovascular conditions for family members who have been exposed to passive smoking.

It appears that acculturation and adoption of unhealthy American lifestyle habits and rejection of healthy traditional habits may be particularly harmful for Southeast Asian older adults (Yee, 1999). Barrett (1997) and Loue, Lane, Lloyd, and Loh (1999) suggested that incorporating Buddhist values and concepts into health promotion and intervention programs might increase the acceptability and impact of prevention programs for the Asian American population.

Cambodians

In Cambodia, stroke is not ranked among the top ten leading causes of death. To date, neither the prevalence nor the incidence of stroke in Cambodia has been nationally documented. This underreporting is compounded because neither small-scale studies nor community-based surveys on stroke have been conducted in the past few decades (WHO, 2010). This finding could be attributed to the lack of awareness among Cambodians of signs and symptoms of stroke, poor reporting, incomplete data, lack of healthcare specialists (e.g neurologists and neurosurgeons), or limited access to hospitals.

The only study of stroke in Cambodia is the Prevalence of Non-Communicable Disease Risk Factors in Cambodia Survey (Loo & Gan, 2012). This research identified several stroke-related risk factors such as tobacco chewing and smoking. Traditional therapies, including *oyt pleung* (moxibustion) and *jup* (cupping) were widely practiced for stroke rehabilitation. The study also indicated there were few neurologists and diagnostic equipment such as magnetic resonance imaging (MRI) or computer tomography (CT) scanners available in Cambodia (Loo & Gan, 2012).

Cambodian Americans

Prior to 1975, most of the Cambodians who immigrated to the United States were children of upper income families or those who had funded scholarships and were sent abroad to attend school. After the fall of Phnom Penh to the communist Khmer Rouge in 1975, many Cambodians escaped to Thailand and eventually immigrated to the United States, England, France, Canada, and other industrialized countries. In 1979, the Khmer Rouge was overthrown and large waves of Cambodians began immigrating to the United States as refugees. To facilitate quick assimilation into American culture and to minimize the burden for any one locale, the US government settled the 150,000 refugees in various towns and cities throughout the country.

Once this group of refugees was able to effectively communicate and travel, many Cambodians began migrating within the United States to certain locations where the climate was more like the climate of their home country. Other reasons for in-country migration were to be reunited with family and friends or to seek familiar employment or better government benefits assistance. As a result, communities of Cambodians now reside in Los Angeles and San Diego metropolitan areas, and larger communities of

Cambodians reside in Fresno, Stockton, and Long Beach, California. In fact, Long Beach is known as the Cambodian capital of the United States with the second largest population of Cambodian immigrants outside of the Southeast Asia. It is estimated over 20,000 residents of Cambodian descent (or approximately four percent of the city's population) live in Long Beach.

Cambodians often raise large families, with extended family members living together or nearby (Culture Care Connection, 2013). Traditionally, women have been responsible for the family's finances. They are the caregivers and often work outside the home. Children are taught early to respect the authority of parents and older siblings. Elders are respected and often viewed as important members in decision-making. However, these roles are changing as Cambodians become more acculturated. According to Culture Care Connection (2013), men are now recognized as the head of the family.

According to Stanford University (Portner, 2014a), Cambodian Americans overall have high rates of chronic illnesses (e.g., hypertension, diabetes, and heart disease), which put this population at high risk for stroke. Notably, the Behavioral Risk Factor Surveillance System's age-adjusted prevalence of stroke among non-institutionalized Asian adults residing in the United States, measuring the rate of stroke from 2006 to 2010, showed a decrease in stroke prevalence from 2.3% to 1.5% (Liao et al., 2011). Regardless, these rates of stroke have not improved significantly despite advancement in treatment options.

Traditional Medicine

Cambodians often attribute good health to equilibrium of the *yin* and *yang* or hot and cold, concepts adopted from Chinese philosophy. According to the Culture Care

Connection (2013), Cambodians who subscribe to traditional beliefs attribute illness to natural or supernatural powers. Illness may be considered punishment for sins committed in a past life. Many believe evil spirits or ancestors cause mental illness. Older Cambodians, who are most at risk for chronic and debilitating illnesses, are often committed to traditional medicine and healers (Lewis, 2007). They will often use traditional medicine first and then use a Western practitioner if necessary for further treatment. Common traditional treatments for pain include herbal medicines, Tiger Balm, acupuncture, acupressure, cupping, coining, and moxibustion (Cultural Care Connection, 2013).

Traditional healers are called *Kruu Khmer*, and they base their treatments on either a spiritual or magical system. It is believed that illness may be attributed to an imbalance in natural forces, including the influence of “wind” or *kchall* on circulation. *Koo kchall* or “coining” may be used to treat fever, nausea, and heart problems. It involves dipping a coin or spoon into medicine and rubbing it on oiled skin in a symmetrical pattern. *Jup kchall* or “cupping” is used to treat headaches and depression. It is performed using a heated cupped object placed against the skin to create a vacuum. As air cools down, it contracts and pulls on the skin, leaving a purple mark. In cupping and coining, cutaneous hematomas are made on the face and trunk. Moxibustion is often combined with acupuncture. This is a process of making circular superficial burns on the skin with ignited incense or other material placed directly on the skin. Traditional healers also use massage, a variety of natural plants and herbs, amulets, strings, and tattoos as therapeutic treatments and protection against harm or illness (Cultural Care Connection, 2013).

Risk Factors for Stroke

Based on a stroke survey conducted by the World Health Organization, there are two main groups of risk factors for stroke. The first group is categorized as behavioral and metabolic risk factors (WHO, 2011). Behavioral risk factors are diet, smoking, alcohol consumption, and physical inactivity. Metabolic risk factors are overweight, uncontrolled blood glucose, high cholesterol, and high blood pressure.

Diet

A prospective longitudinal cohort study was conducted (Diet Approach to Stop Hypertension [DASH]) to evaluate the association between diet and risk of coronary heart disease and stroke in 88,517 women between the ages of 34 to 59 (Fung et al., 2008). The study, conducted from 1980 to 2004, analyzed the effect of diet including fruits, vegetables, whole grains, nuts and legumes, low fat dairy, red and processed meat, sweetened beverages, and sodium on cardiovascular diseases. Lifestyle and medical information was collected biannually with a questionnaire. This study found 2,129 cases of incident of nonfatal myocardial infarction, 976 coronary heart disease deaths, and 3,105 cases of stroke. The study concluded that adherence to the DASH-style diet was related to a lower risk for coronary heart disease and stroke among middle-aged women during a 24-year follow-up (Fung et al., 2008).

Smoking

Cigarette smoking is one of the well-known and well-established risk factors for both ischemic and hemorrhagic stroke. Although both global health and general public health are aware of the vascular risk and vascular changes associated with smoking, the rate of tobacco use has remained relatively unchanged over the last 25 years, with a small

decline of 3% in incidences of smoking for the last 10 years (CDC, 2009; Shah & Cole, 2011). According to the CDC, 20.8% of US adults smoke cigarettes. To date, adult males have a far greater rate of smoking than adult females, at 23% to 19%, respectively. The prevalence of African-American and Caucasians smokers is approximately 21%. Hispanic and Asian individuals are half as likely as others to smoke (CDC, 2009).

Numerous studies conducted across various ethnicities and populations found evidence linking smoking to stroke. These studies concluded the rate of stroke increases to least two to four fold in those who smoke compared to lifelong nonsmokers or individuals who had quit smoking more than 10 years prior (Shah & Cole, 2011). In a study conducted by Qureshi, Suri, Kirmani, and Divani (2005), the risk increased to sixfold when the smoker population was compared with nonsmokers who had never been exposed to environmental tobacco smoke.

Alcohol Consumption

A comprehensive systematic review and meta-analysis of 4,235 studies was conducted by Ronksley and colleagues (2011) to assess the effect of alcohol intake on cardiovascular problems between 1950 and 2009. Out of 4,235 studies, 84 were included in the final analysis. The prospective cohort studies of the association between alcohol consumption and overall mortality from cardiovascular disease. The incidences of coronary disease and mortality of the heart disease, and mortality of stroke increases with increasing alcohol consumption. From the 21 meta-analyses, pooled adjusted relative risks for alcohol drinkers and non-alcohol drinkers in random effects models for the outcomes of interest were 0.75 with 95% confidence interval of 0.70-0.80 for cardiovascular mortality. Another 29 studies found the relative risk to be 0.71 with a

range of 0.66-.77 for incidences of coronary heart disease with 95% confidence interval. Thirty-one studies found a relative risk of 0.75 with a range from 0.68 to 0.81 for coronary heart disease mortality with a 95% confidence interval. Another 17 studies conducted and found a relative risk of 0.98 with a range from 0.91 to 1.06 for incidences of stroke with a 95% confidence interval. The last 10 studies evaluated relative risk of 1.06 with a range of 0.91 to 1.23 for incidences stroke mortality with 95% confidence interval (Ronksley, Brien, Turner, Mukamal, & Ghali, 2011). This meta-analysis revealed the lowest risk of coronary heart disease mortality occurred with 1 to 2 drinks per day. For stroke mortality, this occurred with a drink or more per day. Overall, light to moderate alcohol consumption was associated with cardiovascular risk.

Blood Glucose

Studies on Cambodians and diabetes have suggested many factors contributed to an increase in the incidence of diabetes among Cambodian population. The prevalence of diabetes in a semi-urban community and in a rural community was 11% and 5%, respectively (Raguenaud et al., 2009), with mean fasting blood glucose levels of 4.7 mmol/l and 5.2 mmol/l for males and females, respectively. The authors of that study estimated an additional 19% of Cambodians are living with undiagnosed diabetes. Another report suggested better standard of living contributed to the change from eating hand-husked rice to white polished rice, which may play an important role in the incidence of diabetes because polished rice has a higher glycemic index (WHO, 2011). In addition, the National Institute of Diabetes and Digestive and Kidney Diseases reported that diabetes at a younger age doubles the risk of stroke occurrence (US Department of Health and Human Services, 2012).

Hypercholesterolemia

Untreated hypercholesterolemia can lead to coronary atherosclerosis and risk of premature myocardial infarction. Atherosclerosis can cause the narrowing of the carotid artery and risk of ischemic brain infarct. Prior to the use of statin, stroke may have been even 20 times more frequent among the general population. Recent studies and MRI results suggest the occurrence of ischemic brain damage is not increased among older patients. From a recent meta-analysis of controlled statin trials, lower incidences of stroke among familial and non-familial hypercholesterolemia patients were found (Vuorio & Kovanen, 2011).

Hypertension

Hypertension is a well-known major risk factor for both cerebral infarction and intracranial hemorrhage. The relationship between blood pressure and stroke is strong, continuous, predictive, and etiologically significant with a 95% confidence interval, the relative risk of 0.90. For the usual range of blood pressure, including the nonhypertensive range, the higher the blood pressure, the greater the risk of stroke with a 95% confidence interval, the relative risk of 0.91. Due to increased in stroke incidences with increased blood pressure, the American Heart Association and American Stroke Association recommend individuals maintain a blood pressure level below the current drug treatment thresholds (Goldstein et al., 2011). The prevalence of hypertension is high and increasing as incidence of obesity increases, especially in the US (Cutler et al., 2008).

Obesity

Based upon previous studies, waist circumference is a better predictor of cardiovascular risk than body mass index (BMI). A study of 1,137 participants concluded

there is a positive correlation between abdominal adipose tissues and cardiovascular diseases and a significant independent association between risks of stroke and transient ischemic attack and physical of inactivity, smoking, hypertension, and diabetes with an odds ratio of 1.18 (confidence interval 95%, 0.77 to 1.79). Waist circumference and hip ratio can predict cerebrovascular events better than BMI (Yaroslav, 2008).

Physical Inactivity

According to a report presented at the American Stroke Association's 2014 International Stroke Conference, moderate intensity exercises have been shown to decrease stroke risk. This moderate-intensity exercise includes speed walking or playing tennis. A study conducted between 1996 to 2010 on 133, 479 women in California found moderate physical activity was most strongly associated with a reduction of stroke risk. It also found more strenuous activity such as running did not further reduce women's stroke risk (Wang et al., 2014).

Stroke Risk Factors for Cambodians Residing in the United States

Alcohol

The prevalence of alcohol consumption among Cambodians in both rural and urban areas in Asia was 3.4% for males and 0.4% for females (WHO, 2010). Results from the STEPS survey indicated that 53.5% of participants ($n=2,907$) were current drinkers or had consumed alcohol in the past 30 days, while 26.5% ($n=1,440$) had never used alcohol (WHO, 2010). The detailed breakdown of this data showed among Cambodian adult drinkers, 61% drank spirits, 38% drank beer, and 1% drank wine. This contributes to an estimated prevalence of cardiovascular disease (CVD) morbidity of 0.35% among male drinkers and 0.11% among female drinkers (WHO, 2011). A recent

study concluded irrespective of drinking patterns, alcohol consumption increases the risk for hypertension and hemorrhagic stroke (Loo & Gan, 2012).

The recent cross-sectional study using face-to-face interviews of 490 participants to examine the prevalence of drinking among Cambodians in the United States found low alcohol use problems. Only 26% of participants reported any alcohol consumption in the last 30 days and 2% of participants reported any heavy drinking in the last 30 days. The study also reported that younger participants and men were more likely to report recent drinking (D'Amico, Schell, Marshall, & Hambarsoomians, 2007).

Mental Health

Cambodians are among one of the groups at highest risk for mental health problems, especially post-traumatic stress syndrome (PTSD) and depression. Many of these mental health problems originated from exposure to genocide during the Vietnam War, under the Khmer Rouge rule. According to prior research, approximately 45% of Cambodians surveyed reported they had symptoms consistent with PTSD. Chronic symptoms of PTSD lead to hypertension, placing this population at risk for stroke.

Nutrition

A traditional Cambodian diet often includes rice, fish, meat, vegetables, and fruits. Breakfast is often a combination of rice porridge or rice noodles. Lunch and dinner may include broth with fish or meat and vegetables eaten with a fermented fish-based paste, which is high in sodium content, and stir-fried vegetables with chopped meat. In a non-acculturated family, meals often are eaten in shifts according to status. For example, adult males and guests eat first, and females eat last. Many Cambodians believe in the inherent properties of balancing hot and cold foods. They believe food is deemed hot,

cold, or neutral, similar to the Chinese belief (Kleimeyer, 2014). Many Cambodian Americans now live in a culture with easy access to unhealthy foods. The American culture of a sedentary lifestyle and a surplus of convenient high-fat, high-calorie, and low-cost foods may contribute to weight gain and high blood pressure (Timme & Huong, 2009).

Physical Activity

An exploratory study conducted by Taylor et al. (2012) used a telephone survey of Cambodian American living in Central California, Northern California, and the Pacific Northwest during the year 2010 to explore the physical activity levels of 222 participants using the International Physical Activity Questionnaire (IPAQ) short version. Survey items addressed demographic characteristics, knowledge about the health benefits of physical activity, social norms, supports with respect to physical activity, the availability of neighborhood recreational facilities, and neighborhood characteristics. The study findings indicated 12% of Cambodians reported low levels of physical activity, 40% reported moderate activity level, and 48% reported high activity level. A strong association between physical activity and availability of neighborhood recreational facilities such as parks was found; there was no correlation between neighborhood characteristics such as heavy traffic. Investigators concluded the majority of Cambodian Americans are adherent to current physical activity guidelines. Neighborhood recreational facilities that provide opportunities for leisure time physical activity were associated with higher levels of physical activity among this population (Taylor et al., 2012).

Overweight and Obesity

Overweight is defined as having a BMI between 25-30, while a BMI of 30 or higher is classified as *obese*. The data from the STEPS survey ($n= 5,212$) revealed 12.3% of all Cambodian participants were underweight, 72.4% were normal weight, 13.5% were overweight, and 1.9% were classified as obese (WHO, 2010). The data also showed the ratio of overweight for female to male participants was 6 to 1. This may explain the higher mortality rate among Cambodian female stroke patients (Lee et al., 2011).

Smoking

Cambodian American males' and other Southeast Asian American males' incidence of smoking rates are much higher than national incident rates compared to Asian American males in general. The rate of smoking for Cambodian American males ranges from 39% to 71% compared to a smoking rate of 17.5% among other Asian males (WHO, 2010).

Muula, Rudatsikira, and Siziya (2010) conducted a cross-sectional study among school-aged adolescents ($n=1,956$), 13 to 15 years of age. They found 67.2% of the participants were exposed to environmental tobacco smoke (ETS). The study concluded Cambodian children whose parents smoked were more likely to be exposed to ETS (odds ratio 4.86; CI 3.55-6.64), putting them at a higher risk for mortality from cardiovascular diseases, cancer, and stroke.

Another study examining the prevalence of cigarette smoking among Cambodian Americans in Long Beach, California, found a smoking rate of 13%. The rate of smoking among Cambodian American males was 24.4% compared to 5.4% for females. The

prevalence of smoking among Cambodian American males was higher than among other males in California (Friis et al., 2012).

Stroke Risk Factors for Cambodians Residing in Cambodia

High Cholesterol

According to the Stroke Foundation (2012), excess cholesterol deposits on the endothelium of the blood vessels leads to atherosclerosis and can lead to ischemic stroke and cardiac embolism. Cambodian females have higher mean total cholesterol levels than males, at 4.60mmol/L versus 4.40mmol/L, respectively (WHO, 2010). This difference in cholesterol levels is another possible reason for the higher mortality rate among female patients with stroke in the Cambodian population.

High Blood Pressure

Among the Cambodian population, 51% have never had their blood pressure taken or checked, while 40.8% had their blood pressure taken without having formal diagnosis of hypertension or knowing the meaning of the reading. A small number (3.1%) were hypertensive and received treatment within one year, while 5.1% were hypertensive but only received treatment a year after diagnosis (WHO, 2012). This lack of treatment indicates a large number of Cambodians are not aware of the importance of blood pressure monitoring and screening, which can lead to serious medical problems since hypertension is one of the stroke risk factors for the general population.

Participants in a stroke survey conducted in Cambodia utilized multiple efforts to control blood pressure. Eleven percent (11%) of the 596 participants in the research attempted to reduce their blood pressure, 63.1% tried reducing their salt intake, 56.2% began an exercise program, 48.5% quit smoking, 45.2% tried to lose weight, and 39.3%

had taken blood pressure (BP) lowering medicine more than one time in their lives. Another 15.3% of participants sought traditional healers (WHO, 2012), a widely used alternative treatment practice, especially for people who reside in rural areas or who are familiar with this alternative treatment.

Physical Activity

Physical activity is often classified as high, moderate, or low based on the metabolic equivalent of the task (MET). MET is a reliable marker for habitual physical activity and is a significant, independent mortality predictor for cardiovascular disease and stroke. Prior research has concluded that each level of MET improvement over the past 6.3 years was associated with a 19% lower risk of stroke and cardiovascular disease-related death (Lee et al., 2011). The ratio of females to males who were not involved in vigorous physical activities was 1 to 8, which potentially explains the higher mortality rate reported among female Cambodian stroke sufferers (WHO, 2010).

Smoking

In 2008, the estimated prevalence for daily tobacco smoking in Cambodia was 23.7%. A nationwide survey of Cambodian adult tobacco smoking behaviors in 2010 indicated there was an increased trend of smoking with an estimated prevalence of 26.4%. Among Cambodian females, 13.8% chewed tobacco. Among Cambodian males, the rate of tobacco chewing increased by 0.8% over four years (WHO, 2011). This data is from a randomized, cross-sectional STEPS survey with 5,433 respondents between the ages of 25 and 64. The survey showed 29.4% of participants were current tobacco smokers, while 37% were current tobacco chewers (WHO, 2010). The survey also

reported 55.2% of respondents were passive smokers or secondhand smokers, indicating tolerance of smoking among this population.

Socioeconomic Status and Traditional Role Conflicts

According to the Asian and Pacific Islander American Health Forum (2011), despite tremendous growth in the Asian American population in the United States, Asian Americans remain largely neglected or “invisible” in educational literature. The Asian American population is commonly viewed as a homogeneous group, resulting in less attention to emerging ethnic subgroups such as Cambodian Americans (Reyes, 2007). While Asian Americans are commonly perceived to be highly educated, Cambodian Americans continue to face tremendous challenges. According to a 2006 American Community Survey, nearly one out of four Asian students had limited English proficiency and lived in a linguistically isolated household where parents also had limited English proficiency. High school dropout rates for Southeast Asian Americans are 40% among Hmong, 38% among Laotians, and 35% among Cambodians (Advisory Commission on Asian Americans and Pacific Islanders [AAPI], 2013). Compared to the whole United States, over half of Cambodian Americans living in California (56%) have less than a high school education, while only 9% have earned a college degree. These disturbing patterns among Cambodian Americans contradict the notion of Asian Americans being a “model minority” who have collectively adapted or integrated well into US society (Chou & Feagin, 2008; Ng, Lee, & Pak, 2007; Reyes, 2007). Unfortunately, while the success story of high educational attainment certainly applies to many individuals, it has also led to stereotypes and overgeneralization, where the relative success of some ethnic subgroups tends to overshadow the hardships and challenges

faced by other ethnic subgroups. Overgeneralization related to the Cambodian population leads to the assumption they are well educated and able to navigate through healthcare systems for chronic illnesses such as stroke.

When Cambodian American children experience intergenerational conflicts, the problem can manifest in numerous ways, including differences in gender role expectations. The tension between family obligations versus individual interests can indirectly influence the educational achievement of Cambodian American youths. In many Southeast Asian populations, traditional values clearly define the roles and responsibilities along gender lines. According to Park (2000), Southeast Asian parents may have higher educational or economic aspirations for their sons because males are expected to “assume the instrumental roles involving task accomplishment” (Segal, 2002 p. 188). On the other hand, Cambodian daughters are pressured to get married and start families, leading to relatively high high-school dropout rates (Ng & Lee, 2007; Tang & Kao, 2012).

These traditional norms may help to explain the gender disparities in educational achievement. According to the National Commission on Asian American and Pacific Islanders Research in Education, in 2008, only one-third of Cambodian females aged 25 or older had a high school degree, compared to over half of their male counterparts (AAPI, 2013). Due to high poverty rates among the Cambodian population, boys may be expected to work to support their families, which may distract them from focusing on their education. This promotes a vicious cycle of a high dropout rates and high rates of people living at or below the poverty level with poor knowledge of diseases, disease prevention, and treatments.

Cambodians and Health Disparities

Despite the recent implementation of the Affordable Care Act (ACA), access to healthcare remains a problem for Cambodian immigrants living in California. According to Mietphoum Khmer Spirit Center in the heart of Long Beach's Cambodia Town, the talk is always about healthcare insurance (Sieng, 2014). The common theme that emerges from this meeting is Cambodian people are not visiting primary physicians because they lack insurance. This leads to disabilities and early death. Due to poor socioeconomic status, these individuals pay cash for care, but with the high cost of healthcare, there are services they do not utilize. Even with resources available, Cambodian Americans usually have difficulty accessing services due to a language barrier. In January 2014, Mietphoum Khmer Spirit Center partnered with Long Beach Health Department's Healthy Families Outreach program and the United Cambodian Community to launch an aggressive signup campaign to boost ACA enrollment by the March 2015 deadline. The goal of Long Beach City's Community Health Improvement Plan is to bring the rate of uninsured residents down from 20% to 10% over the next 10 years (Portner, 2014b). Prior to the launch of this campaign, this agency helped only 100 Cambodian residents of Long Beach access ACA resources (Portner, 2014b).

Cambodian Americans do not always receive treatments for their illnesses due to low income; many work minimum wage jobs at companies that do not offer medical insurance. Moreover, the barrier to obtaining health insurance can also be cultural. Many Cambodian Americans do not have the technological skills to use the Internet and many struggle to speak English. Healthcare reform offers materials in Khmer but the information is also too technical and thus needs to be interpreted (Portner, 2014b). Other

barriers for Cambodian immigrants are 1) fear of losing their Social Security income, 2) pay penalties, and 3) litigation with signing up for insurance.

Cambodians and Acculturation

Vast differences exist between Asian American subgroups. For example, individuals' status and well being or the conditions under which they came to the United States often define their immigration experiences. Many Asian Americans came to the US as "voluntary" immigrants seeking better professional or educational opportunities or to be reunited with family members (Ogbu & Simons, 1998; Portes & Rumbaut, 1996; Takaki, 1998). In contrast, early generation Cambodian Americans and other refugee groups such as Vietnamese, Laotians, and others, are often referred to as "involuntary" immigrants (Tang & Kao, 2012) because they were forced to leave their countries to escape persecution or mass genocide and seek refuge in another country. The first generation of Cambodian Americans immigrated to United States following very traumatic experiences and their adjustment to U.S. culture was more challenging. After two decades, many Cambodian Americans continue to face significant challenges and lag behind other groups in terms of socioeconomic status.

Because Cambodian Americans were forced to leave their homes, many continue to hold strong allegiances to Cambodia and maintain their culture and traditional values and beliefs (Takaki, 1998). In contrast, their children and grandchildren who were either born in the United States or immigrated at a young age may be more able and willing to adopt the mainstream culture and values (Earm, 2013). As a consequence, like other immigrant and refugee groups, many Cambodian families struggle with an increasing cultural gap between the foreign-born parents and U.S-born children. Cambodian

American children generally find themselves “straddling different worlds” (Earm, 2013). Due to poor and limited English language utilization and traditional cultural practices, values and beliefs, this population is at risk for inappropriate use of healthcare or delayed activation of emergent treatment needed for stroke.

Summary

This chapter explored modifiable risk factors for stroke among Cambodian populations, including treated hypertension, diet, obesity, and smoking. Due to a lack of research conducted on stroke recognition among Cambodians in general, this chapter also summarized relevant literature related to risk factors associated with the general US population, Californians, Cambodians living in California, and Cambodians residing in Southeast Asia. The literature review helps to identify how stroke affects people all over the world with similar risk factors and chronic medical conditions including diabetes, obesity, and hypertension. Despite limited research conducted on the Cambodian population in California, there is some information available regarding dietary habit, alcohol consumption, stress, and smoking habits that will assist with the current research.

Literature reviewed on acculturation shows inconsistent findings on disease symptom recognition and adherence to treatments. Notably, previous research indicated acculturation has an adverse affect on smoking among women; for example, women who score high on an acculturation scale are more likely to smoke and drink alcohol in contrast to men who are less likely to be habitual drinkers and smokers when they are more acculturated.

After an exhaustive literature review, empirical studies were identified regarding stroke among Cambodians residing in Cambodia or California. Of the research reports

available, data were either incomplete or had different study foci. The very few published studies addressing stroke were conducted with small samples of Cambodians. Therefore, these studies were classified under the categories of “other minorities” or “Asians” in the data analyses, making it impossible to identify the specific needs of the Cambodian population. For these reasons, it is imperative that Cambodians be represented in research as an individual group to gain a more thorough interpretation of their heterogeneity from other Asian groups.

CHAPTER III

METHODOLOGY

This chapter addresses the methodology used in this study. The purpose of the study, research design, research questions, specific aims, hypotheses, and procedures for data collection and analysis are presented.

Purpose

The purpose of this quantitative method study was to examine the relationships between select demographic variables, level of acculturation, and knowledge of stroke symptoms and risk factors among adult Cambodian immigrants living in Southern California. This study also includes a small qualitative component exploring the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants.

The specific aims of the study were:

1. Aim 1: Describe select demographic variables (age, gender, educational level, health insurance status, and socioeconomic status) level of acculturation, stroke risk factor knowledge, and symptom recognition in a group of Cambodian adults in southern California.

2. Aim 2: Examine the relationships between select demographic variables, level of acculturation, stroke risk factor knowledge, and symptom recognition in this group.
3. Aim 3: Explore the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants.

Research Questions

This study addresses the following research questions congruent with the above specific aims:

1. What are the characteristics of selected demographic variables (age, gender, educational level, health insurance status, and socioeconomic status,) level of acculturation, stroke risk factor knowledge, and symptom recognition in a group of Cambodian adults in southern California?
2. What are the relationships between selected demographic variables, level of acculturation, stroke risk factor knowledge, and symptom recognition in this group?
3. What are the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants?

Methods

The quantitative portion of the study was conducted using a self-administered survey to 200 participants through purposive random sampling. The data were analyzed using descriptive, correlation, chi-square, and multiple regression to determine to what

degree the independent variables account for the variance in the dependent variable. The second part of this study was conducted with a small subset of participants to describe the shared beliefs, values, practices, and rituals surrounding stroke. The third study aim is exploratory and may support future qualitative studies or may generate hypotheses for future quantitative studies.

The self-administered Stroke Recognition Questionnaire (SRQ; Appendix A) was used to describe knowledge of stroke symptoms and risk factors. The Asian Self-Identification Acculturation Scale (SL-ASIA; Appendix B) was used to describe acculturation to American culture. This study collaborated with an advisory group of Cambodian community leaders who work with health, social services, and religious organizations. The advisory group provided advice about sampling approach and survey implementation procedures. The study was conducted over a two-month period during January 2014 to February 2015 in Southern California with large concentration of Cambodian Americans.

Sample and Sampling

The group of interest for this research was the southern California Cambodian population. The following criteria were used to select the study sample: a) adults at least 18 years of age and b) adults who are alert and able to answer survey questions in English or Khmer. Exclusion criteria included those with self-revealed diagnoses of mental disorders, confusion, aphasia, or verbal communication barriers. The investigator recruited 200 participants from areas most concentrated with Cambodian populations, such as Long Beach and San Diego.

According to Polit and Beck (2012), power analysis is used to reduce the risk of Type I and Type II errors and to strengthen statistical conclusion validity by estimating in advance how large a sample is needed. A larger sample size increases power and generalizability. Effect size is a measurement of the strength of a phenomenon. An effect size calculated from data is a descriptive statistic that conveys the estimated magnitude of a relationship between the independent and dependent variables without making any statement about whether the apparent relationship in the data reflects a true relationship in the population. Effect size must be estimated using available evidence, whether from a pilot study or based on findings from earlier studies of a similar problem. When there is no relevant earlier finding, researchers use conventions based on expectations of a small, medium, or large effect. In this research, the goal is to begin with a small effect size because this type of research has never been conducted on this population (Cohen, 1988). To achieve an effect size of .35 with a power of .90 and a Cronbach's alpha and probability of .05, the researcher needed 172 Cambodian participants.

The formula utilized to calculate the needed sample size requires knowledge of the variance or proportion in the population and a determination of the maximum desirable errors as well as the acceptable Type I error risk or the confidence level. To achieve a confidence level of 99%, the required sample size is 199 participants. Therefore, the sample size of 200 adults from the Cambodian population was utilized in this research study to achieve a confidence level between 95-99%. The lone similar study to this effect is being conducted on stroke symptoms recognition and activation of emergency services at UCLA on the older Korean population with a sample size of 200

participants. Due to the community standard of ranging from 76 to 1,205 participants for stroke recognition in the United States, the researcher surveyed 200 Cambodian adults.

Recruitment

A purposive sample of adult Cambodians residing in southern California was recruited with study oversight provided by the University of San Diego Institutional Review Board (IRB; Appendix C). The participants were adult Cambodian males and females who attended Buddhist temples located in East San Diego, Escondido, Los Angeles, and Long Beach between the months of January and February 2015. Access to participants was granted after initial contact with the head Buddhist monk of each temple. An initial introduction letter (Appendix D) was sent to southern California Buddhist temples with at least 200 members to introduce the researcher as a doctoral student and request a formal meeting with temple gatekeepers to solicit permission to conduct research on stroke symptoms and risk factors recognition among temple goers. The investigator met with each head temple monk and gatekeeper in person after the letter of introduction was sent to inquire about a letter of support. After the letter of support, free blood pressure screenings were offered to gain access to these communities, obtain potential participants' trust, and provide a culturally sensitive route of access for study recruitment. Recruitment for the study began once IRB oversight had been obtained. The recruitment took place from booths set up at religious and non-religious gatherings at these temples and participants who were interested in the research were encouraged to contact the principal investigator in person or via phone between January and February 2015.

Data Collection

The researcher surveyed the largest temples with the most members first to achieve an optimal number of participants in a shorter period. All participants that met all inclusion eligibility criteria were given an IRB-reviewed brochure describing the study in English or their respective languages. Surveys were conducted at the temple or participants' places of residence. The researcher collected data in San Diego the first two weeks of the study and in Long Beach the next two weeks. In the last week, the researcher collected data from participants in Los Angeles. A total of 200 Cambodian participants were surveyed in Southern California. Concurrently, a face-to-face or telephonic qualitative interview was conducted with a subset of 10 subjects who agreed to participate between January 2015 and February 2015.

Those wishing to participate in the study spoke to the principal investigator or research nurse to discuss the study. Research personnel consisted of the nursing researcher and a volunteer research assistant who spoke fluent Cambodian. The primary researcher or research assistant assigned to respective participants started the survey after written or verbal informed consent was obtained.

Once a participant agreed to be in the study, he or she signed an IRB-reviewed consent form (Appendix E), which was witnessed by the research nurse, or gave a verbal consent (witnessed by the research nurse and research assistant) if he or she did not read or write English or Cambodian. Prior to conducting the research, the primary investigator verbally explained the study to potential participants and provided all pertinent information such as the purpose, procedures, risks, benefits, alternatives to participation,

and treatment resources, etc. Research participants were informed of the volunteer nature of participation and their right to not answer any question and withdraw from the study at any time. If participants experienced negative emotions or anxiety, stress, or discomfort, they were provided with the direct contact number for the Department of Mental Health on the informed consent for additional emotional support if necessary.

Participants were compensated for their time with a small stipend of \$10. The participants also qualified and were enrolled in a raffle for a \$100 and a \$50 prize regardless of whether they completed their surveys in entirety. Raffle numbers were assigned as participants' identification numbers.

The first phase of this research was completion of the self-reported survey of SRQ and SL-ASIA in the adult Cambodian population in Southern California. The SRQ also contains items regarding the selected demographic characteristics of age, gender, educational level, health insurance status, and socioeconomic status. Following informed written consent, the research nurse provided participants with the SRQ and SL-ASIA surveys. For participants who did not write or read, a nursing researcher fluent in the Cambodian language assisted in completing the surveys.

The second phase of this study was the qualitative data collection. The data were obtained using stratified sampling from a subset of 10 subjects who agreed to participate in a face-to-face or telephone interview. Stratified sampling is a probability sampling procedure in which the target population is first separated into mutually exclusive, homogeneous segments and then a simple random sample is selected from each segment (Polit & Beck, 2012). Stratified random sampling is a technique used to restrict the possible samples that are "less extreme" by ensuring that all parts of the population are

represented in the sample in order to increase the efficiency and decrease cost.

Stratification often produces a gain in precision of the estimates of characteristics of the whole population. For this study, stratification was based on age, gender, and place of residence between 18 to 30, 31 to 50, and 51 to 80 years.

This small sample population varied in age, sex, education, length of time in the United States, and lived experiences with healthcare. The face-to-face or telephone interview focused on a narrative descriptive discovery regarding the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants (Polit & Beck, 2012; Appendix F). This approach yielded insight into the participants' understanding of the stroke experience from persons outside the dominant North American culture.

Measures

The approach utilized to measure a specific concept or variable is identified as its operational definition (Waltz & Strickland, 2010). To operationalize acculturation and knowledge concepts, each variable was defined and measured.

Acculturation. Suinn-Lew's Asian Self-Identification Acculturation Scale (SL-ASIA) was utilized to measure level of acculturation or rejection. The SL-ASIA is a self-administered survey that measures the extent to which attitudes or behaviors of people from one culture are modified as a result of contact with a different culture. This instrument contains 26 items that use a Likert-type scale of 1 to 5, with 1 indicating, "do not believe" to 5 indicating, "strongly believe." A mean acculturation score was calculated by dividing the summed item scores by 26 with a possible score range from 1.00 (low level of acculturation) to 5.00 (high level of acculturation). High acculturation

scores reflect high Western identification, while low scores reflect Asian identification. The original SL-ASIA instrument had 21 items, but five new items were added to address values, perceived behavioral competency, and self-identification (Suinn, 1994). This study only utilized the 21 items of the original acculturation scale. Validity for the English version of the scale was obtained from confirmatory factor analysis. Structural equation modeling techniques with asymptotic distribution free estimation was used for the original acculturation scale. The study followed a two-stage approach to avoid interpretational confounding (Bagozzi, 1981). Cultural fractures, possession centrality, and lifestyle were used in the confirmatory factor analysis. The thresholds in all three models resulted as three-factor cultural fracture: GFI= .98; CFI= .90; one factor possession centrality GFI= .98, CFI= .90 and one factor lifestyle: GFI= .99, CFI .97) (Bagozzi, 1981). Chronbach's alpha was also used to determine reliability of the original acculturation scale and Chronbach's alpha values were 0.91-0.93 (Suinn, 1994).

According to Dr. Suinn (1994), another way of interpreting the total scores relies upon recent discussions that there are actually three dimensions to acculturation. Thus, a person may entirely assimilate into the new culture in all ways. For example, as a person becomes completely identified as a part of the dominant Western culture, this person would be labeled "Western identified" or "assimilated" and would be represented in a SL-ASIA score of "5." Another person may retain identification with their ethnic heritage and refuse to become integrated into Western culture; that person would be labeled "Asian identified" and represented in a SL-ASIA score of "1." Finally, there is now recognition that a person may be capable of assuming the better of both cultures with denial of neither. The term used here is *bicultural* and would be reflected by a SL-ASIA

score of “3.” In addition to such an analysis of the total score, item 20 on the scale presents subjects with the opportunity to identify themselves as “Very Asian,” “bicultural,” or “Very Anglicized.”

For the purposes of this study, a certified translator translated the Khmer language version of the SL-ASIA. Back translation involved a different certified person to translate Khmer version to English version. These certified professional translators had expertise in the subject areas and were native speakers in the target language or languages. Every translation was proofread by at least one equally qualified translator to assure accuracy and language fluidity of the translated tools from English to Cambodian language to enhance reliability for the translated Khmer language version of the scale and increase the validity of the data. The original SL-ASIA instrument has demonstrated reliability with Chronbach alpha coefficient of .91-.93. The new reliability from this small feasibility group of Cambodian immigrants has a Chronbach coefficient of .91.

Stroke symptoms and risk factors recognition. The Stroke Recognition Questionnaire (SRQ) is a 56-item, self-reported survey used to determine whether participants could identify risk factors or symptoms related to stroke. The English version of the Stroke Recognition Questionnaire (SRQ) was developed by Ennen and Zerwic (2010). Prior to development of this tool, there were no structured self-administered tools to measure knowledge of stroke symptoms and risk factors (Ennen & Zerwic, 2010). The SRQ provides a list of 10 stroke symptoms, 10-non-stroke symptoms and 10 stroke and 10 non-stroke risk factors taken from the American Heart Association (AHA, 2001; Goldstein et al., 2001).

Participants indicate by marking “yes” or “no” whether items on the list are stroke or non-stroke symptoms or risk factors. Items 3, 5, 6, 8, 10, 11, 12, 14, 18, and 20 reflect stroke symptoms (confusion, double vision, and weakness on one side of body, loss of balance, trouble walking, sudden headache, slurred or garbled speech, sudden unexplained dizziness, and trouble with coordination). Items 1, 2, 4, 7, 9, 13, 15, 16, 17, and 19 are not stroke symptoms (diarrhea, difficulty breathing, chest pain, swollen ankles, heartburn, fever, cough, and sudden pain in one arm, leg cramps, and extreme tiredness).

Items 21 to 40 address potential risk factors for stroke. The risk factors for stroke are items 22, 23, 24, 25, 26, 32, 34, 35, and 39 (alcohol use greater than 2 drinks per day, irregular heartbeat such as atrial fibrillation, high blood pressure, diabetes, high blood cholesterol, lack of physical activity, being 20 pounds overweight, history of heart attack, smoking cigarettes, and history of neck vein disease or carotid artery disease). Items 21, 27, 28, 29, 31, 33, 36, 37, 38, and 40 are nonstroke risk factors (Lyme disease, iron deficiency, Alzheimer’s disease, travel to foreign countries, trouble sleeping, low levels of calcium in the diet, varicose veins, living close to a power plants, exposure to too much sunlight, and hypoglycemia or low blood glucose). Each correct answer is scored as one point and each incorrect answer as zero points for a possible range of 0-10 points for knowledge of actual stroke risk factors, 0-10 for non-stroke risk factors and 0-10 points for knowledge of stroke symptoms, and 0-10 non-stroke risk factors.

Item 41 is a visual analogue with a 10-point Likert scale asking the individual to rate his or her own risk for stroke by placing an “x” on the scale, with 1 being “very low perceived risk” and 10 being “very high risk.” Items 42 and 43 ask if the participant

would be able to recognize symptoms of stroke in another person, and item 43 inquires whether the participant knows what to do if someone is having a stroke. Item 44 asks whether any of the participants' family members or close friends have had a stroke. Items 45 to 53 and 55 to 56 address demographic information such as age, gender, race, marital status, education, employment, place of residence, income, and health insurance status. Finally, item 54 inquires about participants' sources of health information.

According to Ennen (2010), eight nationally recognized physician and nurse experts specializing in research and care of stroke patients reviewed the SRQ for content validity. Content validity was determined by using the content validity index (CVI) Walt, Strickland & Lenz, (1991). The original SRQ was found to have good content validity for both the symptoms item list (CVI=.90) and the risk factor item list (CVI=1.00). The entire questionnaire has a CVI of .95 (Ennen & Zerwic, 2010).

Administering the SRQ to a convenience sample of 34 members of the lay public on two occasions two weeks apart initially assessed the original SRQ's reliability. The test-retest correlations for subscales of the SRQ were stroke symptoms $r=.80$, nonstroke symptoms $r=.75$, stroke risk factor $r=.44$ and nonstroke risk factor $r=.44$. Internal consistency reliability was computed for stroke symptoms and stroke risk factors in this data set ($n=566$) using the Kuder-Richardson Formula 20 (KR20). The stroke risk factor subscale and stroke symptom subscale alphas were 0.71 and 0.82, respectively. The KR20 was not calculated for the nonstroke symptom and nonstroke risk factor subscales because these were comprised of distractor items that did not have meaningful connections with each other (Ennen & Zerwic, 2010).

A certified Cambodian translator translated the Khmer language version of the SRQ. The word “Lyme Disease” does not exist in the Cambodian vocabulary and thus, it was translated as “disease caused by tick bite.” Back translation involved a different certified person to translate Khmer back to English. These certified professional translators had expertise in the subject areas and were native speakers in the target language or languages. Every translation was proofread by at least one equally qualified translator to assure accuracy and language fluidity of the translated tools from English to Khmer. These tools were translated and then back translated from the native languages to English to increase validity and reliability for the translated Khmer language. The new reliability for SRQ in this small feasibility study of Cambodian immigrants resulted with a Chronbach coefficient of 0.86.

Access to healthcare. Access to healthcare is defined as a person’s ability to utilize medical care. The participants were to select from a list of healthcare insurance options such private pay, government assistance, private medical insurance, or others. Access to healthcare level of measurement was nominal.

Socioeconomic status (SES). Socioeconomic status (SES) is used in this study to mean as an individual’s or group’s position within a hierarchical social structure. SES depends on a combination of variables such as occupation, education, income, wealth, and place of residence. SES level of measurement varies from nominal to interval. For example, income level of measurement was ordinal. Education level was also ordinal with options to self-select from “never attended school” to “doctoral degree completed.” Finally, gender was a nominal level of measurement with an option to self-select “male

or “female.” An ordinal scale of measurement represents an ordered series of relationships or rank order.

Protection of Human Subjects

The Institutional Review Board of University of San Diego reviewed the application for this study and provided study oversight. Prior to conducting the survey, the participants received written and verbal information describing the study and were offered an opportunity to ask questions. A copy of the informed consent was given to potential participants to review before agreeing to participate. These informed consents were written in English and Khmer.

Statistical Analysis Plan

Study Aim 1

Study Aim #1: Describe selected demographic variables (age, gender, educational level, health insurance status, and socioeconomic status) level of acculturation, stroke risk factor knowledge, and symptom recognition in a group of Cambodian adults in southern California.

Descriptive statistical data provided a simple summary of the sample and variables. The summary included participants’ age, gender, income, education, and insurance. Descriptive statistical data illuminated the participants’ characteristics through exploratory data analysis. Univariate analysis was used to describe the distribution of variable that includes central tendency analyzing mean, median, and mode. This analysis provided dispersion that included data range, quartiles, variance, and standard deviation.

Study Aim 2

Study Aim #2: Examine the relationships between select demographic variables, level of acculturation, stroke risk factor knowledge, and symptom recognition in this group.

Pearson's r correlation coefficient is a parametric statistic used to determine the magnitude of the relationship between two variables measured on at least an interval level scale (Polit & Beck, 2012). This statistical test was used to determine relationships between stroke symptoms, risk factors, and acculturation because the level of measurement for both variables is interval level. When the assumptions for a parametric test were violated, or when the data was ordinal level, then the appropriate coefficient of correlation was either Spearman's rho (ρ) or Kendall's tau. Spearman's rho correlation coefficient analysis was also used to compare a ranked variable and a continuous variable if the sample size is less than 30. Thus, Kendall's tau was used for the correlation of SES and stroke recognition because the sample size was 200 participants.

Point-bi-serial correlation coefficient was also utilized to compare discrete dichotomous variables such as gender, with the continuous variable of stroke recognition. An example of point bi-serial is cases of scored multiple-choice items in which the data can take on a value of 1 for a correct response and 0 for an incorrect response. The calculation of a point bi-serial coefficient is a little simpler than for the Pearson coefficient, but the result of coefficients and its meaning are the same. According to Varma (2014), a point bi-serial coefficient, computed for every multiple-choice item, is considered useful in the analysis of stroke recognition tool because it can "discriminate" items from correct response with higher total scores and incorrect responses to lower total

scores. This statistical test can differentiate between low-performing participants and high-performing or more knowledgeable participants. Very low or negative point bi-serial coefficients that are computed after the survey is taken can help to identify items that are flawed. One negative aspect to using point bi-serial coefficient is it is participant-dependent; administering this survey to different groups or to participants in different locations may result in different values (Varma, 2014).

Phi coefficient or Cramer's V was used to measure the magnitude of the relationships among nominal-level data. Phi coefficient is an index that can be used to describe the relationship between two dichotomous variables (Field, 2005; Polit & Beck, 2012). Phi coefficient was utilized to correlate gender and stroke recognition.

A chi-square statistical test was deployed to determine association or proportion of non-parametric data (age, gender, educational level, and income). Chi-square is a statistical test commonly used to compare observed data with data expected according to a specific hypothesis. The goal of this test is to determine "goodness to fit" between the observed and expected, or to answer whether the deviations or differences between observed and expected data were the result of chance due to other factors (Polit & Beck, 2012).

Lastly, simultaneous multiple regression was utilized to determine the amount of variance in the dependent variable attributable to the independent variables. There are several alternative strategies for entering independent variables into regression for aim number two of the research. According to Polit and Beck (2012), multiple regression involves empirically selecting the combination of independent variables with the most predictive power, or it can be used to determine the correlation or relationship. This

method of statistical analysis is most appropriate when correlating dependent and independent variables in importance. Simultaneous multiple regression analysis was conducted to evaluate how independent variables of SES and acculturation relate to dependent variables of stroke symptoms and risk factor recognition to determine which variables produce greatest significance of R^2 (R square) since there are no previous studies conducted on these topics.

Study Aim 3

Study Aim # 3: Explore the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants.

The qualitative interview (Appendix F) that involved a subset of 10 subjects focused on a narrative descriptive content analysis approach. Open-ended interviews were conducted regarding the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants. Questions were derived and analysis conducted using the work of Spradley (Spradley, 1979; Spradley, 1980) based on the assumption that language is the primary means that relates cultural meaning in a culture. This content analysis was performed to extract significant statements, formulate meanings or themes, and then cluster data to identify the emerging patterns (Holloway & Wheeler, 2010; Polit & Beck, 2012).

The final evaluation stage of data collection was the interpretative integration. This involved comparing qualitative and quantitative data to establish any relationship between the results (Polit & Beck, 2013). The comparison for this study was done at a group level from different cities. Comparison of qualitative themes and quantitative data

may suggest the development of future directions for healthcare research in the Cambodian population from different cities in California.

Study Limitations

Prior research has shown that Asian groups have more difficulty completing Likert scales than other groups, and many first generation Cambodian immigrants have little formal education. The survey instruments selected have simple response options for most of the answers. The SRQ has simple answers (“yes” or “no”) with an exception of one Likert question on the likelihood of getting a stroke. Since this population may have difficulty with this type of question, follow up stroke qualitative questions were included in the study.

Another limitation is the use of the research assistant. This research assistant’s primary goal was to read the survey to participants and transcribe their answers. These questionnaires required no interpretation or evaluation of answers. An inter-rater check was performed to assess for accuracy on ten patients, which gave 100% accuracy due to lack of judgment required to perform this task.

A major limitation of this study concerns the reliability of the translated instruments and the validity of the data produced by the translated instruments. Certified professional translators translated the self-administered Stroke Recognition Questionnaire (SRQ) and the Suinn-Lew Asian Self Identification Scale (SL-ASIA) and every translation was proofread by at least one equally qualified translator to assure accuracy and language fluidity of the translated tools. These tools were translated and then back translated from the native languages to English. Despite having these survey questionnaires translated and back translated, limitations may exist because it is very

difficult to translate across all cultures with the use of medical terminology. Additionally, no reliability or validity testing was performed to ascertain whether the translated instruments were reliable and produced valid data.

Summary

This research of stroke recognition and acculturation among Cambodian adults in Southern California was conducted with oversight provided by the IRB at University of San Diego between January and February 2015. The research had three aims. First, descriptive analysis was utilized to evaluate demographic characteristics of age, gender, educational level, health insurance status, and socioeconomic status (SES). Second, statistical tests (Pearson correlation, Kendal Tau, chi-square, and multiple regressions) were used to determine the amount of variation in the dependent variable (stroke knowledge) by the independent variables (age, gender, SES, and acculturation). Previous studies have not conclusively determined the effect of acculturation on symptom recognition; some studies showed positive effect of acculturation on symptom recognition, while other studies showed opposite effect. There was no previous study involving Cambodian adults in Southern California. Third, the study aimed to explore the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants.

It was imperative to study the Cambodian population to gain more valid knowledge on this population to fill the research gap. First, this research helped to determine the appropriateness of the SRQ and SL-ASIA self-administered tools for Cambodians residing in Southern California. Second, this research helped to fill in gap in the knowledge of this population's stroke risk recognition. Third, it also contributed

knowledge of Cambodian immigrants' acculturation to American culture, as acculturation is more difficult for those with traumatic immigration experiences. Finally, this research added to the exploration of Cambodian immigrants' shared beliefs, values, practices, language, norms, and rituals for stroke through content qualitative analysis with a small subset sample.

CHAPTER IV

RESULTS

This chapter provides a detailed analysis of study data examining the relationship between select demographic variables, level of acculturation, and knowledge of stroke symptom and risk factor among ($N=200$) Cambodian immigrants living in Southern California. A summary of the participant demographic and descriptive data is presented in detail. A detailed summary will also include a small qualitative study, exploring the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants ($n=10$). The study findings are organized around the study's specific aims:

1. Aim #1: Describe select demographic variables (age, gender, educational level, health insurance status, and socioeconomic status,) level of acculturation, stroke risk factor knowledge, and symptom recognition in a group of Cambodian adults in southern California.
2. Aim #2: Examine the relationships between select demographic variables, level of acculturation, stroke risk factor knowledge, and symptom recognition in this group.

3. Aim #3: Explore the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants.

Sample Description

The purposive study sample included 200 Cambodian immigrants aged 18 years and older residing in southern California who were able to read, write, and understand English or Khmer. Data were collected at local Buddhist temples from January 2015 to February 2015.

Demographics

Characteristics of the Cambodian immigrant participants included 52.5% female and 47.5% male. Participants had a mean education of 8.9 years and reported educational levels of no school attendance (11.5%) grade school education (15%), high school diploma (28.5%), and master's degree (1.5 %). The majority of participants (57%) were married, while 26% were single, 9% were widowed, and 7.5% were divorced or separated. The participants' ages ranged from 18 to 88 years, with an average age of 45.87 ± 1.93 for males and 46.25 ± 1.6 for females. Thirty-seven percent (37%) of participants' annual incomes were reported at less than \$14,000.00 with annual income ranging from \$0 to more than \$ 60,000.00 for the average family size of 4.65 people. The participants' employment statuses were unemployed, employed, and retired. Fewer than half of participants (47.5%) were employed; 40% were either unemployed or homemakers and the remaining 12.5% were retired. A majority of participants (37%) had

either private or commercial HMO or PPO insurance, while 31.5% had Medicare or MediCal, and 13.5% were without insurance. Because Cambodian immigrants have strong ties to the native country, some of these participants gravitated toward more traditional or cultural treatment of illness. Others included traditional medicine or Eastern Medicine as a source of prevention or treatment of illnesses (Table 1).

Table 1

Frequency Distributions for Demographic Data (N = 200)

Variables	Count	Percentage	Cumulative Percentage
Gender			
Male	95	47.5%	47.5%
Female	105	52.5%	100.0%
Total	200	100.0%	
Educational level			
Never att. school	23	11.5%	11.5%
Elementary/grade	30	15.0%	26.5%
Junior high	23	11.5%	38.0%
High school	57	28.5%	66.5%
Technical school	13	6.5%	73.0%
Community	32	16.0%	89.0%
Four year	19	9.5%	98.5%
Master's degree	3	1.5%	100.0%
Total	200	100.0%	
Relational Status			
Married	114	57.0%	57.0%
Never Married	52	26.0%	83.0%
Divorced	7	3.5%	86.5%
Separated	8	4.0%	90.5%
Widowed	18	9.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	

Variables	Count	Percentage	Cumulative Percentage
Income			
Less than 14,000	74	37.0%	37.4%
14001 - 22,200	22	11.0%	48.0%
22,201 - 28,400	15	7.5%	55.1%
28,401 - 35,600	22	11.0%	66.5%
35,601 - 60,000	36	18.0%	84.5%
More than 60,000	29	14.5%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	
Health Insurance			
Private/Comer.	23	11.5%	11.5%
HMO	36	18.0%	29.5%
PPO	11	5.5%	35.0%
Medicare	63	31.5%	66.5%
Medicaid	4	2.0%	68.5%
No health ins.	27	13.5%	82.5%
Other	35	17.5%	100.0%
Total	200	100.0%	

Level of Acculturation

Seventy-two percent (72%) of Cambodian immigrants in the study are first-generation Cambodians and they are extremely proud of being Asian. These participants perceived themselves as Asian persons even though they live and work in America. These immigrants are moderately acculturated but rated themselves as being very Asian. The majority had a strong belief in Asian values with moderate belief in Westernized values. Most were raised primarily in Asia with some periods of time in America. Their parents' are primarily Asian and their childhood friends from ages 1 to 18 were mostly Asian. They reported associating and preferring to associate with other Asians more than with Americans but the majority occasionally or rarely connected with people back in Asia. They had a strong fit with other Asians. These immigrants identified themselves as

Asian American or Cambodian American. A majority preferred to eat more Asian food than American food at home as well as in restaurants. They reported speaking mostly in Asian languages and preferred to communicate more in Khmer than English. They reported reading and writing more in English than in an Asian language. For entertainment, Cambodian immigrants preferred to listen to more Asian music than American music but their movie preferences were equally divided between Asian and English movies (Table 2).

Table 2

Frequency Distributions of Acculturation (SL-ASIA)

Variable	Count	Percentage	Cumulative Percentage
Language Speak			
Only Asian Language	35	17.5%	17.5%
Mostly Asian, Some English	69	34.5%	52.0%
Asian And English Equally	49	24.5%	76.5%
Mostly English, Some Asian	42	21.0%	97.5%
Only English	4	2.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Prefer Language			
Only Asian Language	51	25.5%	25.5%
Mostly Asian, Some English	38	19.0%	44.5%
Asian And English Equally	44	22.0%	66.5%
Mostly English, Some Asian	41	20.5%	87.0%
Only English	25	12.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Self-Ethnicity			
Asian	67	33.5%	33.5%
Asian-American	57	28.5%	62.0%
Camb-Am, Chin-Am, Laos-Am, Thai-Am	74	37.0%	99.0%
American	1	0.5%	99.5%
Total	200	100.0%	100.0%

Variables	Count	Percentage	Cumulative Percentage
Mother-Ethnicity			
Oriental	29	14.5%	14.5%
Asian	108	54.0%	69.5%
Asian-American	14	7.0%	76.5%
Camb-Am, Chin-Am, Laos-Am, Thai-Am	49	24.5%	100.0%
Total	200	100.0%	
Father-Ethnicity			
Oriental	28	14.0%	14.0%
Asian	112	56.0%	70.0%
Asian-American	7	3.5%	73.5%
Camb-Am, Chin-Am, Laos-Am, Thai-Am	52	26.0%	99.5%
American	1	0.5%	100.0%
Total	200	100.0%	
Peers 6-18			
Nearly all Asians, Asian- Am, Oriental	90	45.0%	45.0%
Mostly Asians, Asian-Am, Oriental	56	28.0%	73.0%
Equal Asians and Anglo	34	17.0%	90.0%
Mostly Anglo, Black, Hisp, or non-Asian	14	7.0%	97.0%
Nearly all Anglo, Blk, Hisp, or non-Asian	5	2.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Associate Community			
Nearly all Asians, Asian- Am, Oriental	65	32.5%	32.5%
Mostly Asians, Asian-Am, Oriental	71	35.5%	68.0%
Equal Asians and Anglo	45	22.5%	90.5%
Mostly Anglo, Black, Hisp, or non-Asian	12	6.0%	96.5%
Nearly all Anglo, Blk, Hisp, or non-Asian	6	3.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Prefer Community			
Nearly all Asians, Asian- Am, Oriental	54	27.0%	27.0%
Mostly Asians, Asian-Am, Oriental	57	28.5%	55.5%
Equal Asians and Anglo	73	36.5%	92.0%
Mostly Anglo, Black, Hisp, or non-Asian	8	4.0%	96.0%
Nearly all Anglo, Blk, Hisp, or non-Asian	6	3.0%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	

Variables	Count	Percentage	Cumulative Percentage
Prefer Music			
Only Asian	68	34.0%	34.0%
Mostly Asian	24	12.0%	46.0%
Equal Asian & English	63	31.5%	77.5%
Mostly English	31	15.5%	93.0%
Only English	13	6.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Prefer Movie			
Only Asian	54	27.0%	27.0%
Mostly Asian	22	11.0%	38.0%
Equal Asian & English	70	35.0%	73.0%
Mostly English	31	15.5%	88.5%
Only English	22	11.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Generation			
1 st Generation	145	72.5%	72.5%
2 nd Generation	46	23.0%	95.5%
3 rd Generation	6	3.0%	98.5%
4 th Generation	2	1.0%	99.5%
Don't know	1	0.5%	100.0%
Total	200	100.0%	
Where Raised			
Only Asia	55	27.5%	27.5%
Mostly Asia, some in U.S.	42	21.0%	48.5%
Equal in Asia & U.S.	15	7.5%	56.0%
Mostly in U.S. some in Asia	37	18.5%	74.5%
U.S. only	51	25.5%	100.0%
Total	200	100.0%	
Connection with Asia			
Raised >1 year	61	30.5%	30.5%
Lived <1 year	17	8.5%	39.0%
Occasional visit	34	17.0%	56.0%
Occasional communication	52	26.0%	82.0%
No connection	36	18.0%	100.0%
Total	200	100.0%	

Variable	Count	Percentage	Cumulative Percentage
Prefer Home Food			
Only Asian Food	72	36.0%	36.0%
Mostly Asian, some American	64	32.0%	68.0%
Equal Asian & American	52	26.0%	94.0%
Mostly American	9	4.5%	98.5%
Only American	3	1.5%	100.0%
Total	200	100.0%	
Prefer Restaurant Food			
Only Asian Food	60	30.0%	30.0%
Mostly Asian, some American	54	27.0%	57.0%
Equal Asian & American	72	36.0%	93.0%
Mostly American	11	5.5%	98.5%
Only American	3	1.5%	100.0%
Total	200	100.0%	
Language Read			
Only Asian	Error	0.0%	0.0%
Asian better than English	68	34.0%	34.0%
Both Asian & English equally	27	13.5%	47.5%
English better than Asian	32	16.0%	63.5%
English only	72	36.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Written language			
Only Asian	46	23.0%	23.0%
Asian better than English	34	17.0%	40.0%
Both Asian & English equally	16	8.0%	48.0%
English better than Asian	32	16.0%	64.0%
English only	72	36.0%	100.0%
Total	200	100.0%	
Pride			
Extremely proud	116	58.0%	
Moderately proud	61	30.5%	58.0%
Little pride	13	6.5%	88.5%
No pride but no negative feeling	6	3.0%	95.0%
No pride with negative feeling	3	1.5%	98.0%
Missing	1	0.5%	99.5%
Total	200	100.0%	100.0%

Variable	Count	Percentage	Cumulative Percentage
Rate self			
Very Asian	82	41.0%	41.0%
Mostly Asian	51	25.5%	66.5%
Bicultural	54	27.0%	93.5%
Mostly Westernized	9	4.5%	98.0%
Very Westernized	3	1.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Participate in Asian Events			
Nearly all	69	34.5%	4.5%
Most of them	52	26.0%	60.5%
Some of them	57	28.5%	89.0%
A few of them	15	7.5%	96.5%
None at all	5	2.5%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	
American Value			
1	29	14.5%	14.5%
2	16	8.0%	22.5%
3	62	31.0%	53.5%
4	44	22.0%	75.5%
5	46	23.0%	98.5%
Missing	3	1.5%	100.0%
Total	200	100.0%	
Asian Fit-in			
1	8	4.0%	4.0%
2	11	5.5%	9.5%
3	35	17.5%	27.0%
4	44	22.0%	49.0%
5	99	49.5%	98.5%
Missing	3	1.5%	100.0%
Total	200	100.0%	
Westernized Fit			
1	27	13.5%	13.5%
2	27	13.5%	27.0%
3	51	25.5%	52.5%
4	40	20.0%	73.5%
5	52	25.0%	98.5%
Missing	3	1.5%	100.0%
Total	200	100.0%	

Variables	Count	Percentage	Cumulative Percentage
Self View			
Asian	119	59.5%	59.5%
American	21	10.5%	70.0%
Bicultural - Asian	37	18.5%	88.5%
Bicultural - American	1	0.5%	89.0%
Bicultural - equal	22	11.0%	100.0%
Total	200	100.0%	

Stroke Symptoms Recognition

Approximately 72% to 78 % of participants recognized actual stroke symptoms like weakness and numbness to the body. Sixty to sixtyeight percent (60%-68%) also selected slurred or garbled speech, loss of balance, trouble walking and coordination, and unexplained dizziness as stroke symptoms. Lastly, 54% to 56% perceived confusion, double vision, and sudden severe headache as stroke symptoms (Table 3).

Table 3

Summary of Actual Stroke Symptoms Results from SRQ (n=200)

Variables	Count	Percentage	Cumulative Percentage
Confusion			
Yes	113	56.5%	56.5%
No	85	42.5%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	
Double vision			
Yes	109	54.5%	54.5%
No	90	45.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Weakness on one side of body			
Yes	157	78.5%	78.5%
No	42	21.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	

Variables	Count	Percentage	Cumulative Percentage
Numbness on one side of face	144	72.0%	72.0%
Yes	54	27.0%	99.0%
No	2	1.0%	100.0%
Missing	200	100.0%	
Total			
Loss of balance			
Yes	136	68.0%	68.0%
No	63	31.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Trouble walking			
Yes	134	67.0%	67.0%
No	65	32.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Sudden severe headache			
Yes	109	54.5%	54.5%
No	91	45.5%	100.0%
Total	200	100.0%	
Slurred or garbled speech			
Yes	126	63.0%	63.0%
No	74	37.0%	100.0%
Total	200	100.0%	
Sudden unexplained dizziness			
Yes	124	62.0%	62.0%
No	76	38.0%	100.0%
Total	200	100.0%	
Trouble with coordination			
Yes	137	68.5%	
No	63	31.5%	68.5%
Total	200	100.0%	100.0%

SRQ Non-Stroke Symptoms

An overwhelming 85% of Cambodian immigrant participants correctly selected diarrhea as a non-stroke symptom, and 74% to 77% correctly identified fever and cough as non-stroke. Swollen ankles and heartburn were recognized as nonstroke by 63% to 66% of participants, while 40% to 48% recognized difficulty breathing, chest pain,

sudden pain to one arm, leg cramps, and extreme tiredness as non-stroke symptoms.

Therefore, more than 50% of Cambodian immigrant participants were not able to recognize five out of ten non-stroke symptoms (Table 4).

Table 4

Summary of Non-Stroke Symptoms Results from SRQ (n=200)

Variables	Count	Percentage	Cumulative Percentage
Diarrhea			
Yes	28	14.0%	14.0%
No	170	85.0%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	
Difficulty breathing			
Yes	113	56.5%	56.5%
No	86	43.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Chest pain			
Yes	102	51.0%	51.0%
No	96	48.0%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	
Swollen ankles			
Yes	65	32.5%	32.5%
No	133	66.5%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	
Heartburn			
Yes	72	36.0%	36.0%
No	126	63.0%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	
Fever			
Yes	52	26.0%	26.0%
No	148	74.0%	100.0%
Total	200	100.0%	
Cough			
Yes	45	22.5%	22.5%
No	155	77.5%	100.0%
Total	200	100.0%	

Variables	Count	Percentage	Cumulative Percentage
Sudden pain in one arm			
Yes	107	53.5%	53.5%
No	91	45.5%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	
Leg cramps			
Yes	120	60.0%	60.0%
No	80	40.0%	100.0%
Total	200	100.0%	
Extreme tiredness			
Yes	104	52.0%	52.0%
No	96	48.0%	100.0%
Total	200	100.0%	

SRQ Stroke Risk Factors Recognition

From 10 selected risk factors for stroke, 80% of Cambodian immigrants recognized high blood pressure as one of the risk factors. Seventy-six percent (76%) of participants selected high cholesterol as a risk factor for stroke. A majority (60% to 66%) identified physical inactivity, more than 20 pounds overweight, and history of a heart attack as stroke risk factors. Fifty-three to fifty-six percent (53% to 56%) of participants selected irregular heartbeat such as atrial fibrillation, diabetes, and smoking cigarettes as stroke risk factors. Lastly, only 40% to 48% perceived alcohol and history of neck vein disease to cause stroke. Hence, more than 45% of participants were not able to recognize half of stroke risk factors.

Table 5

Summary of Stroke Risk Factors Results from SRQ (n=200)

Variables	Count	Percentage	Cumulative Percentage
Alcohol >2			
Yes	80	40.0%	40.0%
No	120	60.0%	60.0%
Total	200	100.0%	100.0%

Variables	Count	Percentage	Cumulative Percentage
Irregular heartbeat ie a-fibrillation	113	56.5%	56.5%
Yes	86	43.0%	99.5%
No	1	0.5%	100.0%
Missing	200	100.0%	
Total			
High blood pressure			
Yes	161	80.5%	80.5%
No	39	19.5%	100.0%
Total	200	100.0%	
Diabetes			
Yes	119	59.5%	59.5%
No	80	40.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
High cholesterol			
Yes	133	76.5%	76.5%
No	27	23.5%	100.0%
Total	200	100.0%	
Physical inactivity			
Yes	120	60.0%	60.0%
No	80	40.0%	100.0%
Total	200	100.0%	
More than 20 pounds overweight	120	60.0%	60.0%
Yes	80	40.0%	100.0%
No	200	100.0%	
Total			
Hx of heart attack			
Yes	122	66.0%	66.0%
No	68	34.0%	100.0%
Total	200	100.0%	
Smoking cigarettes			
Yes	107	53.5%	53.5%
No	92	46.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Hx of neck vein disease/carotid			
Yes	96	48.0%	48.0%
No	103	51.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	

SRQ Non-Stroke Risk Factors Recognition

A majority of Cambodian immigrant participants (81% to 82%) correctly selected Lyme disease and travel to another country as non-stroke risk factors. Alzheimer's disease and exposure to sunlight were also recognized as non-stroke risk by 72% to 75% of participants. These participants (65% to 69%) recognized that iron deficiency, low calcium diet, varicose veins, and living near power plant are not risk factors for stroke. Trouble sleeping and hypoglycemic are two nonstroke risk factors that only 55% to 57% of participants recognized (Table 6.). In total, 40% to 45% of participants were not able to correctly select non-stroke risk factors.

Table 6

Summary of Non-Stroke Risk Factors Results from SRQ (n=200)

Variables	Count	Percentage	Cumulative Percentage
Lyme disease			
Yes	31	15.5%	15.5%
No	164	82.0%	97.5%
Missing	5	2.5%	100.0%
Total	200	100.0%	
Iron deficiency			
Yes	71	35.5%	35.5%
No	128	64.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Alzheimer's disease			
Yes	54	27.0%	27.0%
No	145	72.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Travel to foreign countries	38	19.0%	19.0%
Yes	162	81.0%	100.0%
No	200	100.0%	
Total			

Variables	Count	Percentage	Cumulative Percentage
Trouble sleeping			
Yes	85	42.5%	42.5%
No	115	57.5%	100.0%
Total	200	100.0%	
Low calcium diet			
Yes	69	34.5%	34.5%
No	130	65.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Varicose veins			
Yes	68	34.0%	34.0%
No	131	65.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Living near power plant			
Yes	61	30.5%	69.0%
No	138	69.0%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	
Exposure to sunlight			
Yes	47	23.5%	75.5%
No	151	75.5%	99.0%
Missing	2	1.0%	100.0%
Total	200	100.0%	
Hypoglycemic			
Yes	88	44.0%	55.5%
No	111	55.5%	99.5%
Missing	1	0.5%	100.0%
Total	200	100.0%	

Results of Descriptive Statistics for Assessment of Demographic

This study was conducted with (n=200) Cambodian immigrants in southern California. The mean age of participants was 46.07 (SD= ± 17.51) and the mean number of people in each household (M=4.65, SD= ± 2.13). These participants had less than 9 years of formal education (M=8.95, SD= ± 5.26). They rated their mean stroke risk below 5 on a Likert like (M=4.61, SD= ± 2.86) and perceived themselves somewhat sure about stroke symptom recognition in another person (M=2.58, SD= ± 1.39 ; Table 7.).

Table 7

Descriptive Statistics for Assessment of Demographics of SRQ (N = 200)

	Mean $\pm$ SD	SE
Rate stroke risk	4.61 $\pm$ 2.86	0.21
Stroke recognize	2.58 $\pm$ 1.39	0.10
Age	46.07 $\pm$ 17.51	1.25
Years of education	8.95 $\pm$ 5.26	0.38
Number of people in household	4.65 $\pm$ 2.13	0.15

Descriptive Statistics for Assessment of SRQ and SL-ASIA

The SL-ASIA scores were calculated for 200 participants. Table 9 presents the descriptive statistical results based on 21 questions about Asian acculturation, which were scored on a 1 – 5 scale. Overall, the SL-ASIA score mean revealed below average level of acculturation ($M = 2.3$, $SD = \pm .73$).

Next, the SRQ tool was also used to analyze the total actual stroke symptoms recognized from the list of 10 actual and 10 non-actual stroke symptoms given and with 10 actual and 10 non-actual risk factors. These scale and subscale were calculated separately. The stroke symptoms scores range 0-10 and non-stroke symptoms score 0-10. Stroke risk factor scores range 1-10 with subscale of non-risk factors score 0-10. The stroke symptoms recognition total mean score ($M=6.45$, $SD=\pm 3.45$) and stroke risk factor recognition total mean score was also above average ($M= 6.01$, $SD=\pm 3.16$). The sub scale of non-stroke symptoms recognition was above average ($M= 6.15$, $SD= \pm 2.94$) and non-stroke risk factors was also above average ($M=6.88$, $SD=\pm 2.90$) (Table 8).

Table 8

Descriptive Statistics for Assessment of SRQ and SL-ASIA 21 (N = 200)

	Mean $\pm$ SD	SE
SL-ASIA (1-21)	2.30 $\pm$ 0.73	0.05
SRQ Recognize Stroke Sub-scales		
Stroke Symptoms	6.45 $\pm$ 3.45	0.24
Stroke Risk Factor	6.01 $\pm$ 3.16	0.22
SRQ Recognize Non-Stroke Sub-scales		
Non-Stroke Symptoms	6.15 $\pm$ 2.94	0.21
Non-Stroke Risk Factor	6.88 $\pm$ 2.90	0.20

Pearson Correlation Findings

Through Pearson correlation finding from this group of Cambodian immigrants, only significant relationship are discussed. There is a small but highly significant relationship between stroke symptoms recognition and family with stroke ($r_s(1, 198) = .24, p = .01$). Thus, participants who had a family or friend with stroke incidence were likely to recognize stroke symptoms. There is also small but highly significant relationship between family with stroke and stroke risk factors recognition ($r_s(1, 198) = .22, p = .01$). Therefore, Cambodian immigrants with family with stroke were able to recognize stroke symptoms and stroke risk factors.

There is a small negative but significant relationship between age and stroke risk factors ($r_s(1, 198) = -.18, p < .05$). Hence, the older the participants were, the less likely they were able to recognize stroke risk factors. There is a large and highly significant inverse relationship between age and acculturation ($r_s(1, 198) = -.82, p = .01$).

Therefore, the older the participants were, the less Americanized or Westernized they were.

There is a small but highly significant relationship between acculturation and stroke risk factors recognition ($r_s(1, 198) = .24, p = .01$). Thus, the more Westernized the Cambodian participants were, the more stroke risk factors they were able to recognize. Lastly, there is a medium but highly significant relationship between stroke symptoms and stroke risk factors recognition ($r_s(1, 198) = .53, p = .01$). Thus, this significant relationship is due to the stroke symptoms and stroke risk factors subscales from the SRQ measure (Table 9).

Table 9

Pearson Correlations

Variable	1	2	3	4	5	6
1 Gender						
2 Family w/stroke	.12					
3 Age	.01	-.05				
4 Stroke Symp Score	.10	.24**	.05			
5 Stroke Risk Fac. Score	-.07	.22**	-.18*	.53**		
6 SL-ASIA (1-21)	-.09	.09	-.82**	-.06	.24**	

** Correlation is sig. at .01 level (2-tail)

* Correlation is sig. at .05 level (2-tail)

Kendal Tau Correlation Results

Other correlations were conducted by using Kendal Tau for non-parametric data and for participants greater than 30. There is a medium highly significant relationship ($r_s(1, 198) = .33, p = .00$) between income and educational level, which indicates the more educated Cambodian immigrant participants were, the more income they earned. There is a medium but highly significant relationship between income and acculturation ($r_s(1,$

198) = .30, $p = .00$). Cambodian immigrants who have money are more Westernized than those who have less money. Lastly, there is a medium and highly significant correlation ($r_s(1, 198) = .57, p = .00$) with acculturation (SL-ASIA 1-21) and education. Hence, educated Cambodian immigrants in southern California are more acculturated in American cultures than those who are less educated (Table 10)

Table 10

Kendal Tau Correlations (n=200)

	Income	Educational Level
Income		
Educational level	.33**	
Stroke Symp Score	-.02	.01
Stroke Risk Fac. Score	.01	-.05
SL-ASIA (1-21)	.30**	.40**

** Correlation is sig. at .01 level (2-tail)

*Correlation is sig. at .05 level (2-tail)

Chi-Square

Chi-square was used to determine association and proportion between non-parametric data. The sample included 198 respondents, 94 who were male, 104 who were female. These frequencies were significantly different, $\chi^2(5, N = 198) = 12.0, p = .035$. As can be seen by the frequencies cross-tabulated in table 11, there is a highly significant relationship between income and gender, $\chi^2(5, N = 198) = 4.4, p = .035$. There is an association between income and gender. Even in a minority inequality of pay still persist. Among Cambodian immigrants population, males have higher yearly income than females.

Table 11

Income Category by Gender (%)

Income	Gender		Total
	Male	Female	
Less than 14,000	14.6	22.7	37.4
14,001 – 22,200	3	8.1	11.1
22,201 - 28,400	5.6	2.0	7.6
28,401 - 35,600	6.6	4.5	11.1
35,601 - 60,000	10.1	8.1	18.2
More than 60,000	7.6	7.1	14.7
Total	47.5	52.5	100
(N)	94	105	198

The sample included 192 respondents of 3 age groups: 45 participants aged 18-30, 102 participants aged 31-59, and 45 participants older than 60 years of age. These frequencies were significantly different, $\chi^2 (10, N = 192) = 10.0, p = .001$. As can be seen by the frequencies cross-tabulated in Table 12, there is a highly significant relationship between income and age, $\chi^2 (1, N = 192) = 5.17, p \leq .023$. There is an association between age and income among Cambodian Americans; the older the participants, the higher the income until participants reached retirement age, when income trended down. Only 2% of participants older than 60 years of age had an annual income <\$60, 000.

Table 12

<i>Income Category by Age Group (%)</i>				
Income	Age Groups			Total
	18-30	31-59	60 +	
Less than 14,000	7.3	15.1	14.1	36.5
14,001 – 22,200	3.1	5.2	3.1	11.5
22,201 - 28,400	2.6	3.1	1.6	7.3
28,401 - 35,600	4.2	5.2	2.1	11.5
35,601 - 60,000	5.2	12.5	0.5	18.2
More than 60,000	1.0	12.0	2.1	15.1
Total	23.4	53.1	23.4	100
(N)	45	102	45	192

Of the sample's 194 participants and 6 missing respondents, 22 participants who completed surveys never attended school, 28 attended grade/elementary school, 23 attended junior high or middle school, 56 attended high school, 13 attended technical school, 32 acquired a community college education, 17 attended a four-year college, and 3 received a master's degree education. These frequencies were significantly different, $\chi^2 (14, N = 194) = 65.72, p = .000$. As can be seen by the frequencies cross-tabulated in table 13, there is a highly significant relationship between educational level and age, $\chi^2 (1, N = 194) = 2$.

Table 13

Educational Level by Age Group (%)

Educational Level	Age Groups			Total
	18-30	31-59	60 +	
Never attended school	0.0	6.7	4.6	11.3
Elem/Grade school	0.0	6.7	7.7	14.4
Middle/Jr. High	1.5	4.6	5.7	11.9
High schoolgrad.	13.9	12.4	2.6	28.9
Technical school	1.0	4.6	1.0	6.7
Community college	4.1	10.3	2.1	16.5
Four year college	2.6	6.2	0.0	8.8
Master degree	0.0	0.0	0.0	1.5
Total	23.2	53.1	23.7	100
(N)	45	103	46	194

The sample included 198 respondents whose annual income ranged from less than \$14,000 to greater than \$60,000. There are 74 participants who income is less than \$14,000, 22 has annual income \$14, 001- \$22,200, 15 with income \$22,201- \$ 28,400, 22 income \$28,401-\$35,600, 36 people have yearly income of \$35,601- \$60,000, and last 29 people in this study had income greater than \$60,000. These frequencies were significantly different, $\chi^2 (35, N = 198) = 88.89, p = .000$. As can be seen by the frequencies cross-tabulated in Table 14, there is a highly significant relationship between income and education, $\chi^2 (1, N = 198) = 34.99, p = .000$. The more educated the participants, the higher income they earned.

Educational Level by Income Category (%)

Educational Level	Income						Total
	< 14,000	14,001 – 22,200	22,201 – 28,400	28,401 – 35,600	35,601 – 60,000	> 60,000	
Never atten. school	5.1	4.0	1.0	0.0	0.5	1.0	11.6
Elem/Grade school	9.6	0.5	0.5	1.5	1.5	1.5	15.2
Middle/Junior high	6.1	2.0	0.5	2.0	0.5	0.5	11.6
High school	11.6	1.0	4.0	3.5	6.6	1.5	28.3
Graduate							
Technical school	1.0	1.0	0.5	0.5	1.5	2.0	6.6
Community college	2.0	2.5	0.5	3.0	4.0	3.5	15.7
Four year college	2.0	0.0	0.5	0.5	3.5	3.0	9.6
Master degree	0.0	0.0	0.0	0.0	0.0	1.5	1.5
Total	37.4	11.1	7.6	11.1	18.2	14.6	100
(N)	74	22	15	22	36	29	198

Multiple regression was used to determine the amount of variance in the dependent variable attributable to the independent variables. This study analyzed three multiple regression models. The first multiple regression model was to determine a relationship between the dependent variable of acculturation and independent variable of SES. The second multiple regression model was used to determine the dependent variable of stroke symptoms recognition and independent variable of SES. The third model measured the constant variable of stroke risk factors and independent variable of SES.

Multiple Regression Model of Acculturation

Multiple regression was used to determine the relationship of these variables and best fit model. In the first model with acculturation as the dependent variable, there are

six independent variables: gender, age, income, education, total stroke symptoms score, and total stroke risk factors score. From model one, all six independent variables were included into the multiple regression model with one dependent variable of acculturation. All variables were analyzed to assess for interception of acculturation. The first independent variable analyzed was age with $T = -14.85$ and $p = .00$ (significant). The second variable analyzed was income with $T = 2.13$, $p = .04$ (significant). The third independent variable evaluated was gender with $T = -1.48$, $p = .14$ (non-significant). The fourth variable was educational level with $T = 3.27$, $p = .00$ (significant). The fifth variable, stroke symptoms recognition, produced $T = -1.04$, $p = .30$ (non-significant). Lastly, stroke risk factors was analyzed and resulted $T = 1.23$, $p = .22$ (non-significant). From multiple regression model of acculturation, there is a significant relationship between age, income, and educational level to determine best-fit model (Table 15).

Table 15

Multiple Regression of Acculturation

Variable	Standard B	SE	Beta	Sig	95% CI	
					Lower	Upper
Model 1						
(Constant)	3.42	0.19		0.00	3.05	3.79
Age	-0.03	0.01	-0.70	0.00	-0.03	-0.03
Income 2014	0.04	0.02	0.09	0.04	0.00	0.07
Gender	-0.09	0.06	-0.06	0.14	-0.20	0.03
SRQ Symptom Score	-0.01	0.01	-0.06	0.30	-0.04	0.01
SRQ Risk Factor Score	0.02	0.01	0.07	0.22	-0.01	0.04
Education Level	0.06	0.02	0.16	0.00	0.03	0.10

Dependent Variable: SLA 1-21

Collinearity and Correlation for Acculturation

After analyzing all data on acculturation, VIF are low ranging from 1.03-1.9.

Tolerance was scrutinized to check for potential collinearity. If all tolerance is less than one, collinearity is not a problem. This model has no tolerance greater than .97; therefore,

collinearity is not a concern. In summary, data are not problematic for collinearity through visual check. Through the use of simultaneous multiple regression and visual inspection, this model is a good fit in attempt to examine relationship of acculturation (Table 16).

Table 16

Correlation and Collinearity Statistics for Acculturation

Variable	Correlations			Collinearity Statistics	
	Zero-Order	Partial	Part	Tolerance	VIF
Model 1					
(Constant)					
Age	-0.82	-0.74	-0.58	0.69	1.45
Income 2014	0.40	0.15	0.08	0.78	1.28
Gender	-0.09	-0.11	-0.06	0.97	1.03
SRQ Symptom Total Score	-0.07	-0.08	-0.04	0.53	1.89
SRQ Risk Factor Total	-0.05	0.09	0.05	0.53	1.90
Score	0.59	0.23	0.13	0.62	1.61
Education Level					

Model Summary of Acculturation

This model provides R^2 (R square)= .715. Model one, all six variables or predictors (age, gender, income, education, total SRQ symptoms, and total SRQ risk factors) together account for 71.5% of the variance in the acculturation. The “Adjusted R Square” corrects for the number of variables in the analysis. Each predictor explains some variances are due to chance. Thus, the more variables there are in the analysis, the higher the “R Square” due to chance. From the six predictors from model 1, Adjusted R Square is .705.

ANOVA

Simultaneous multiple regression was conducted to examine the level of acculturation. Ultimately, these three predictors were entered simultaneously to examine their relationship. The last three predictors are age, income, and educational level. The

overall variance explained by the three predictors was 71.5% with ($R^2 = .72$). Age was the only variable negatively related to the outcome variable of acculturation. A linear regression analysis revealed that age was a highly significant predictor of acculturation $F(6,185) = 11.72, p = .000$ accounting for 72% of the variance in acculturation. This linear regression analysis also showed that educational level was a highly significant predictor for acculturation ($\beta = -.16, p = .000$). This variable accounted for 16.3% of the variance for the dependent variable. Lastly, income is also a significant predictor in acculturation ($\beta = -.09, p = .039$) and it accounted for 9.4% of the variance. The three other independent variables of gender ($\beta = -.06, p = .142$), stroke symptoms recognition ($\beta = -.06, p = .301$), and stroke risk factors recognition ($\beta = .07, p = .222$) were not significant predictors for acculturation.

Model of Stroke Symptoms Knowledge

Simultaneous multiple regression was utilized to determine independent variables such as SES and the dependent variable of stroke symptoms knowledge. These five variables are gender with $t = .94, p = .35$ (non-significant), age $t = .27, p = .79$ (non-significant), income $t = -.18, p = .86$ (non-significant), education $t = .09, p = .93$ (non-significant), and acculturation $t = -.28, p = .78$ (non-significant). From model one with all variables included, these variables are not a good fit in predicting stroke symptoms recognition (Table 17).

Table 17

Multiple Regression of Stroke Symptoms Recognition (n=200)

Variable	Standard B	SE	Beta	Sig.	95% CI	
					Lower	Upper
Model 1						
(Constant)	5.88	2.70		0.03	0.56	11.21
SL-ASIA 1-21	0.18	0.64	-0.04	0.78	-1.44	1.08
Age	0.01	0.03	0.04	0.79	-0.04	0.06
Income	-0.03	0.15	-0.02	0.86	-0.32	0.27
Gender	0.48	0.51	0.07	0.35	-0.53	1.49
Educational level	0.02	0.18	0.01	0.93	-0.33	0.36

Collinearity and Correlation for Stroke Symptoms Knowledge

After analyzing all data on stroke knowledge recognition, VIF are low ranging from 1.04-3.46. Tolerance was also scrutinized to check for potential collinearity. This model has no tolerance greater than .97, therefore, collinearity is not a concern. In summary, data are not problematic for collinearity through visual check (table 18).

Table 18

Correlation and Collinearity Statistics for Stroke Symptoms Recognition

Variable	Correlations			Collinearity Statistics	
	Zero-Order	Partial	Part	Tolerance	VIF
Model 1					
(Constant)					
SL-ASIA 1-21	-0.07	-0.02	-0.02	0.29	3.46
Age	0.07	0.02	0.02	0.32	3.16
Income 2014	0.05	-0.01	-0.01	0.77	1.31
Gender	0.08	0.07	0.07	0.97	1.04
Education Level	-0.04	0.01	0.01	0.60	1.68

Model Summary for Stroke Knowledge

This model resulted with R^2 (R square) = .011. All five variables or predictors (age, gender, income, education, and SL-ASIA) were entered with one dependent variable of stroke knowledge recognition. All independent variables accounted for 1 % of the variance in stroke knowledge. The adjusted R square for stroke symptoms recognition from the five independent variables is -.016.

ANOVA

Simultaneous multiple regression was conducted to predict the level of stroke knowledge recognition. Five independent variables were entered simultaneously to examine this relationship. These five variables were not significant $F(5,185) = .10$, $p = .85$, able to explain less than 1% of the relationship. From the ANOVA output, acculturation results were $\beta = .10$, $p = .48$ (non-significant), age $\beta = .04$, $p = .79$ (non-significant), income $\beta = -.02$, $p = .86$ (non-significant), gender $\beta = .07$, $p = .35$ (non-significant.) and education $\beta = .01$, $p = .93$ (non-significant). There is no best -fit model since there is no significant relationship. This model had $F = .40$, $p = .85$.

Model for Stroke Risk Factors

Simultaneous multiple regression was utilized to determine the relationship between the independent variables (gender, age, income, educational, and acculturation) to the dependent variable of stroke risk factors knowledge recognition. These five variables are gender with $t = .91$, $p = .36$ (non-significant), age $t = .54$, $p = .59$ (non-significant), income $t = .91$, $p = .36$ (non-significant), education $t = -1.02$, $p = .31$ (non-significant), and acculturation $t = .71$, $p = .48$ (non-significant). From model one with all

variables included, these variables were not a good fit in predicting stroke risk factors recognition for this group of Cambodian immigrants in southern California because there was no significant relationship (Table 19).

Table 19

Multiple Regression of Stroke Risk Factors (n=200)

Variable	Standard B	SE	Beta	Sig.	95% CI	
					Lower	Upper
Model 1						
(Constant)	3.90	2.45		0.11	-0.92	8.73
SL-ASIA 1-21	0.41	0.58	0.10	0.48	-0.73	1.55
Age	0.02	0.02	0.12	0.36	-0.02	0.07
Income	0.07	0.13	0.05	0.59	-0.19	0.34
Gender	0.42	0.47	0.07	0.36	-0.49	1.34
Educational level	-0.16	0.16	-0.10	0.31	-0.47	0.15

Correlation and Collinearity for Stroke Risk Factors

After analyzing all data on stroke risk factors recognition, VIF are low ranging from 1.04-3.46. Tolerance was also scrutinized to check for potential collinearity. This model has no tolerance greater than .97, therefore, collinearity is not a concern. In summary, data are not problematic for collinearity through visual check (Table 20.).

Table 20

Correlation and Collinearity Statistics for Non-Stroke Risk Factors Recognition

Variable	Correlations			Collinearity Statistics	
	Zero-Order	Partial	Part	Tolerance	VIF
Model 1					
(Constant)					
SL-ASIA 1-21	-0.07	-0.02	-0.02	0.29	3.46
Age	0.07	0.02	0.02	0.32	3.16
Income 2014	0.05	- 0.01	-0.01	0.77	1.31
Gender	0.08	0.07	0.07	0.97	1.04
Education Level	-0.04	0.01	0.01	0.60	1.68

Model Summary

Model summary determined first model provides R^2 (R square)= .017. All five variables or predictors (age, gender, income, education, and SL-ASIA) together account for 1.7 % of the variation; therefore, the more variables in the analysis, the higher the “R Square” due to chance. From five predictors in model 1, adjusted R Square is .009.

ANOVA

Simultaneous multiple regression was conducted to predict the level of stroke risk factors recognition knowledge. Five independent variables were entered simultaneously to examine this relationship. These five variables were non-significant and able to explain less than 2 % of the relationship $F(5,186) = .02, p = .66$. From the ANOVA output, acculturation results were $\beta = .10, p = .48$ (non-significant), age $\beta = .12, p = .36$ (non-significant), income $\beta = .05, p = .59$ (non-significant), gender $\beta = .07, p = .36$ (not significant.) and education $\beta = -.10, p = .31$ (non-significant). There is no best-fit model since there is no relationship to depend variables except acculturation with p value of .03.

Qualitative Portion

A small sample of Cambodian immigrants was surveyed using eleven questions about stroke to satisfy aim #3: *Explore the shared beliefs, values, practices, language, norms, and rituals surrounding stroke recognition in the Cambodian immigrant communities with a small subset of participants.*

Through this survey, several themes emerged as the meaning of stroke to the Cambodian immigrants. The participants viewed stroke as having devastating effects on the body such as inability to ambulate or speak, paralysis, and even death. Beliefs about the cause of stroke ranged from “anything can cause stroke” to food to lifestyles. This narrative piece of the study concurs with the results of stroke knowledge in which 70% to 80% of participants recognize neuromuscular deficits such as paralysis of the body as a symptom of stroke. Twenty to thirty percent of the participants did not know symptoms or causes of stroke. The majority (60%) believed stroke is caused by unhealthy diet—defined by participants as diets consisting of fatty and sugary foods—and unhealthy lifestyle—defined by participants as including stress, little exercise, and inadequate sleep.

Lastly, Cambodian participants did not perceive a disparity in care. They reported good and great experiences with healthcare providers. One participant stated that the overall experiences were good but occasionally, diagnosing disease is a lengthy process and requires additional visits. All participants stated that their waiting time varied from 15 to 30 minutes.

Summary

Cambodian immigrants population are difficult to study in general for many reasons. Several major reasons are fear of losing benefits or economic support, lack of proficiency in reading and writing both English and Khmer, and lack of trust. These groups of Cambodian Americans' who participated in the study has a mean age of 46 years of age with mean educational level of less than ninth grade. Thirty-seven (37%) percent of participants have an average household income of less than \$14,000 for family of five. These participants are less acculturated and they preferred more Cambodian culture and tradition than American. These participants were able to recognize six actual stroke symptoms and six actual stroke risk factors. They rated their own mean stroke risk of less than 5 on a Likert like scale and they are somewhat sure about stroke symptom recognition in another person. Second portion of the research explored the shared beliefs, values, practices, language, norms, and rituals surrounding stroke in the Cambodian community with a small subset of participants (n=10). Seventy (70%) percent of the small subset of participants was able to articulate about stroke, however, another 30% viewed stroke and heart attack as the same condition similar finding as the survey.

CHAPTER V

DISCUSSION

The primary purpose of this study was to examine the relationship between stroke knowledge recognition and acculturation of Cambodian immigrants in southern California. It was hypothesized that stroke knowledge recognition is related to acculturation level and social economic status of Cambodian immigrants. This chapter will discuss the significance of the research findings as well as the study strengths, limitations, and implications that will guide future research.

Demographics

This study was conducted in a setting where participants were from varied socioeconomic statuses, from poor to more affluent regions. As expected, socioeconomic status had a mild to moderate impact on stroke knowledge and acculturation of Cambodian immigrants residing in southern California. From the result of the self-administered survey, the correlation tests consisted of Pearson correlation and Kendal Tau. Pearson correlation was used to perform statistical analysis for gender, age, friends and family with stroke, stroke symptoms, and stroke risk factors (SL-ASIA items 1-21).

There was a small but highly significant correlation between having family and friends with stroke and knowledge of stroke symptoms and risk factors recognition..

Having family or friends with stroke increased participants' knowledge of stroke and stroke risk factors through lived experience. Cambodian immigrants were more likely to recognize stroke symptoms and risk factors compared to those who had exposure to stroke.

Another expected finding was older Cambodian immigrants having a harder time adapting to new cultural ideas or traditions. In relation to age in Cambodian immigrants, there was a small but significant negative correlation between age and stroke risk factors knowledge. The older Cambodian immigrants were, the less likely they were to know about stroke risk factors. Because the mean education level of participants was eighth grade, stroke risk factors were less due to poor education and lack of opportunity or access to education in the participants' native country. There was also a large negative but highly significant relationship between age and acculturation. Older Cambodian immigrants were less likely to assimilate or acculturate to Westernized values, behaviors, or self-identity. From previous research studies, the more immigrants immigrate to host countries, the more they gravitate toward their native cultural practices and customs. Older participants were more likely to retain more Asian values and younger participants were more likely to be acculturated due to constant exposure to the host country.

Similar to previous studies on the general population, there was a medium but highly significant relationship between educational level and income. Cambodian immigrants with higher educational levels had higher household incomes. Educated Cambodian immigrants were more affluent than less educated. There was also a medium but highly significant correlation between income and acculturation (SL-ASIA); more acculturated Cambodian immigrants were wealthier than those who were non-

acculturated. Lastly, there was a medium but highly significant correlation between acculturation and education level, in that educated Cambodian immigrants were more acculturated than those who were not.

Overview

Every 3.3 minutes, someone in the United States dies from stroke. Stroke is a worldwide medical problem that affects people with increasing age. Every year, 15 million people worldwide experience a stroke (Wolfe & Rudd, 2007; WHO, 2013). Of these, 5 million die from stroke or stroke-related complications, and another 5 million are permanently disabled (WHO, 2013). The unfortunate part of this disease is the lack of knowledge of symptoms and risk factor recognition among general population as a whole. It is imperative that the general public knows the symptoms and risks to prevent the incidences of stroke, reduce complications, promote better outcomes, and decrease potential disabilities. On average, 60% to 78% of the surveyed participants of this study were able to recognize some major neuromuscular stroke symptoms such as paralysis or weakness to one side of the face, arm, or leg, and slurred speech. Fiftyeight percent (58%) did not recognize other symptoms such as headache, confusion, or dizziness as stroke symptoms. Approximately 60% to 80% of Cambodian immigrant participants recognized inactivity, overweight, high cholesterol, history of cardiac disease, and hypertension as stroke risk factors. Approximately 44% to 50% did not recognize other risk factors including smoking, cardiac arrhythmias such as atrial fibrillation, alcohol consumption, and carotid or neck vein disease.

Participant Sample

Cambodian immigrants ($n=200$) residing in southern California were surveyed for this study from January to February 2015. Since the mean average education of the participants was ninth grade, with more than 26% of participants having less than an elementary education, there were some concerns about the participants' ability to read or write, comprehend, and communicate consent to participate. The primary investigator or research assistant read questionnaires to those Cambodian immigrants who wished to participate in the research but did not read or write. This helped solve a dilemma that can arise when participants wish to be involved in the research but are unable due to illiteracy and lack of help from the primary investigator and research assistant. There were other concerns such as response burden, since there were a total of 84 questions from two tools. These participants encountered problems of limited time to answer a lengthy questionnaire, especially after long religious services or special gatherings.

Stroke Recognition Questionnaire (SRQ)

One survey with two different language versions was used to determine stroke knowledge and recognition. The SRQ has good reliability with Chronbach's Alpha coefficient of 0.865. The result was from the Cambodian and English versions as the survey was in both English and Khmer to meet participants' needs. These tools were translated and back translated by certified translators.

The SRQ tool contains questions regarding recognition of stroke symptoms and stroke risk factors. The correlation was obtained through Pearson correlation. Since this tool contains a subset, there was a correlation between stroke symptoms and the SRQ. There was also correlation between acculturation and stroke risk factors. The survey

results showed that the more acculturated or Westernized the participants were, the more likely they were able to recognize stroke risk factors.

Asian Acculturation (SL-ASIA)

One survey with two language versions was used to determine acculturation (SL-ASIA). SL-ASIA was translated and back translated. The survey has good reliability and validity with Chronbach's Alpha Coefficient of 0.906. This result was from both the Cambodian version and the English version.

It is important to note the results centered from second aim of this research study, indicating no significant relationships between the participants' demographics such as gender to stroke knowledge, stroke risk factor, or acculturation (SL-ASIA). However, examination of data trends reveals possible relationships between some of the variables or small significance. Hence, the larger sample size may have produced more relevant outcomes for the proposed study.

Research Strengths and Limitations

This descriptive study has multiple strengths. First, it constitutes an initial step in examining the relationship between stroke symptoms, stroke risk factor knowledge, and acculturation to demographic data in Cambodian immigrants residing in southern California with various socioeconomic backgrounds. Second, this research was conducted using self-administered surveys and for those who could not read or write in English, a Cambodian research assistant was able to help participants complete the survey. This produced better internal reliability due to having one person reading the survey. Third, the research methods were validated via SRQ and SL-ASIA questionnaires, in which the relationship between stroke knowledge and acculturation to

age, gender, income, and educational level was illuminated. Fourth, these two questionnaires (SRQ and SL-ASIA) have Chronbach Alphas of .86 and .91, respectively. These tools were appropriate for the research participants and helped to obtain more reliable data. Despite having one option being a part of the question, the SL-ASIA provides high Chronbach's Alpha of .91. Knowledge ranges from 6 from stroke symptoms and 6 from stroke risk factors out of ten actual stroke symptoms and ten actual risk factors. Fifth, a small narrative piece of this research explored the meaning of stroke and participants' actions when friends or family experience symptoms of stroke. These participants are certain to activate emergency medical technicians (EMT) upon experiencing neuromuscular deficit or paralysis. When it comes to less obvious symptoms, Cambodian immigrant participants will utilize eastern or traditional medicine. Lastly, the research explored the participants' lived experiences with healthcare access. Cambodian immigrants perceive themselves to have equal treatment from healthcare providers while seeking medical attention for themselves and/or family members. The research also identified a healthcare issue, in that 13.5% of participants had no healthcare insurance and 17.5% subscribed to alternative healthcare treatments for stroke. This research enabled the primary investigator to have a better understanding of cultural norms, cultural practices, level of acculturation, knowledge of cardiovascular diseases, traditional treatments, and access to healthcare for this population.

The limitations of this study included its small sample size, the SRQ and SL-ASIA tools, and participant samples. Despite having these tools translated and back translated with a high Chronbach Alpha Coefficients, accuracy of translation across culture for same meaning may be compromised and difficult to achieve. Despite having a

small subgroup to analyze tools for language congruency, consistency, and fluidity, there was still one error on the tool where option “A” became part of the question. Another issue was with the SRQ tool in which the medical terminology or disease were not accurately translated. The term *Lyme Disease* does not exist in the Cambodian vocabulary and is translated as “disease cause by tick bite.” There is also a Likert-style question about participants’ chance of getting stroke. The stroke recognition scale may not be appropriate for older Cambodian immigrants since this group of participants prefers to use percentages over a Likert-type scale. This tool’s response scale of 1 through 10 was complicated for the participants to grasp.

Lastly, this study was conducted in a setting consistent with a variation in socioeconomic community but it was conducted in a Buddhist Temples that have skewed the acculturation result. Because participants attended Buddhist gatherings, this may result in less acculturation because they socialized with people of the same culture and ethnicity. The average annual income ranged from less than \$14,000 to greater than \$60,000 per year. Nevertheless, the analysis from this study yields an interesting report of stroke symptoms, stroke risk factors recognition and level of acculturation with demographic data. This will provide foundation for further study to improve stroke knowledge.

Implications for Nursing Research and Practice

Cambodians are one of the fastest growing Southeast Asian populations in the United States (US Census Bureau, 2010). Due to chronic medical conditions, obesity, and a sedentary lifestyle, the Cambodian population is at risk for high stroke incidence, which will create a heavy strain on healthcare resources. Without early recognition of

symptoms, those affected may not seek medical attention and may experience more stroke-related disability, resulting in higher costs for care.

The CDC developed the *Healthy People 2010* initiatives to improve access to quality health services and eliminate health disparities. *Healthy People 2020* initiatives have the same goals. The core of these initiatives is to improve cardiovascular health and quality of life through prevention, detection, and treatment of risk factors for heart attack and stroke (Riegelman & Garr, 2011). To help meet these goals, more research and data dissemination are needed.

Crippling consequences of stroke will continue to be seen due to the ever-increasing level of obesity in the world (Ennen & Zerwic, 2010). There will also be an increasing toll of stroke-related deaths and disability with the aging of the baby boomer generation across all races and ethnicities. These two factors have brought new urgency to prevention, earlier recognition, and timely treatment of stroke. Because nurses are in a unique position to provide education for the public, nurse-led stroke awareness programs could make a difference in better stroke symptom recognition, faster stroke treatment, and ultimately, less residual effect or disability.

Future Research

Stroke prevalence continues to escalate despite better living conditions, improved socioeconomic status, better access to healthcare, and up-to-date treatments of chronic medical conditions. The Asian population in general has the highest numbers of deaths from stroke, where stroke is ranked second of six leading causes of death among other populations (Hoy et al., 2012). It is imperative that the incidence of stroke and stroke-related mortality be reduced in this population. This goal can be achieved through better

understanding of lifestyle and baseline knowledge of chronic illnesses, stroke, and cultural and medical practices. This study showed that Cambodian immigrants only recognized major stroke symptoms such as paralysis and some risk factors for stroke such as high cholesterol, obesity, and hypertension. Only a small percentage of Cambodian immigrants recognized that smoking or alcohol consumption can increase the risk of stroke. More research is needed to understand the participants' stroke knowledge and stroke interventions. This information is essential to to improve cardiovascular health. More interventional research is also needed to better understand and improve knowledge about this population, as many still use traditional medicine to treat non-life threatening symptoms such as numbness or dizziness.

Summary

The aims of this study were formulated to determine whether relationships existed between subscales and total score for both the Stroke Recognition Questionnaire (SRQ) and Suinn-Lew's Asian Self-Identification Acculturation Scale (SL-ASIA) in a group of Cambodian immigrants residing in southern California. The results confirmed some of the literature suggesting there are relationships between stroke knowledge, SES, and SL-ASIA. In a sample of 200 participants from the general Cambodian population attending religious gatherings in Los Angeles, Long Beach, Escondido, and east San Diego, results revealed that this population gravitates more toward Asian identity and are less Westernized. Almost 40% of the population has an education level of grade school or lower.

There was a small correlation between having family and friends with stroke and knowledge of stroke symptoms recognition; having family or friends with stroke

increased the participants' knowledge of stroke through experience. There was also a small correlation between having family and friends with stroke and knowledge of risk factors for stroke; Cambodian immigrants who were exposed to friends and family with stroke had more knowledge of stroke risk factors compared to those without exposure.

Advanced age makes it harder to change and adapt new cultural ideas or traditions. In relation to age in Cambodian immigrants, there was a small negative correlation: the older Cambodian immigrants were, the less likely they were to know about stroke risk factors. There was also a large negative correlation between age and acculturation; older Cambodian immigrants were less likely to assimilate or acculturate to Westernized values. From previous research studies, the more immigrants immigrate to host countries, the more they gravitate toward their native cultural practices and customs. For this study, there was a negative medium relationship between age and Asian values; older participants were more likely to retain more Asian values and younger participants were more likely to be acculturated. Furthermore, there was a correlation between age and how well participants fit with others of Asian ethnicity. The older the immigrants living in Southern California, the better fit they were with others of Asian ethnicity, thus being less acculturated. There was a correlation between age and how Cambodian immigrant participants viewed themselves; older participants viewed themselves as more Asian, while younger participants viewed themselves as more Asian American or acculturated. Therefore, older Cambodian immigrants are more likely to retain their native culture and remain marginalized to Westernized society.

It is important to note that the research results geared toward the second aim indicated no significant relationships between participants' demographics (gender,

educational level, and age) and stroke symptom knowledge recognition. However, examination of data trends reveals possible relationships between some of the variables. Hence, the small sample size may have hindered the relevancy outcome of the study.

Conclusion

Stroke is a worldwide medical problem that affects people with increasing age. This study was conducted to promote better understanding of stroke knowledge among Cambodian immigrants. The study attempts to reach more in-depth understanding of Cambodian immigrants' knowledge of the disease and level of acculturation, and the relationship between the SRQ and SL-ASIA tools and demographic data.

This investigator found that 70% to 80% of the population are aware of major stroke symptoms such paralysis and inability to talk or walk; however, only 60% of the population recognized stroke symptoms that are not neuromuscular. A disheartening finding from this research is that one-third of the population believes any symptom could be a stroke symptom and anything can cause stroke, such as staying in the sun or living near a power plant. This group also believes that severe illnesses are caused by karma. Another potentially problematic finding is that Cambodian immigrants rely on traditional medicine as a form of treatment for non-neuromuscular deficits. This can delay the treatment of stroke by eliminating patients' ability to receive tissue plasminogen activator (tPA) to prevent the severely debilitating effects of stroke.

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Appendix A

Below is a list of symptoms; some are symptoms of stroke and some are not. Please check the "Yes" box if you think it is a stroke symptom. Please check the "No" box if you think it is not a symptom of stroke.

PLEASE START HERE:

		Yes
1.	No
Diarrhea
☐	☐
2.	No
Difficulty breathing
☐	☐
3.	No
Confusion
☐	☐
4.	No
Chest pain
☐	☐
5.	No
Diplopia
☐	☐
6.	No
Weakness on one side of the body
☐	☐
7.	No
Swollen ankles
☐	☐

		Yes
8.	No
Numbness on one side of face
☐	☐
9.	No
Heartburn
☐	☐
10.	No
Dizziness and loss of balance
☐	☐
11.	No
Difficulty in walking
☐	☐
12.	No
Sudden severe headache
☐	☐
13.	No
Fever
☐	☐
14.	No
Slurred/garbled speech
☐	☐
15.	No
Cough
☐	☐
16.	No
Sudden pain in one arm
☐	☐

		Yes
	No	
17.	Leg cramps	☐
	☐	
		Yes
	No	
18.	Sudden unexplained dizziness	☐
	☐	
		Yes
	No	
19.	Chronic fatigue	☐
	☐	
		Yes
	No	
20.	Trouble with controlling body movements	☐
	☐	

Below is a list of risk factors; some are risk factors for stroke and some are not.

Please check the "Yes" box if you think it is a risk factor of stroke. Please check the "No" box if you think it is not a risk factor of stroke.

		Yes
	No	
21.	Blacklegged tick infected disease	☐
	☐	
		Yes
	No	
22.	Drinking alcohol more than 2 times per day	☐
	☐	
		Yes
	No	
23.	Abnormal heartbeat such as atrial fibrillation	☐
	☐	
		Yes
	No	
24.	High blood pressure	☐
	☐	

		Yes
25.	No
Diabetes
☐	☐
		Yes
26.	No
High blood cholesterol
☐	☐
		Yes
27.	No
Iron deficiency
☐	☐
		Yes
28.	No
Alzheimer disease
☐	☐
		Yes
29.	No
Traveling abroad
☐	☐
		Yes
30.	No
Physical inactivity
☐	☐
		Yes
31.	No
Trouble sleeping
☐	☐
		Yes
32.	No
More than 20 pounds overweight
☐	☐
		Yes
33.	No
Low levels of calcium in diet
☐	☐

		Yes
34.	No
History of having a heart attack
☐	☐
		Yes
35.	No
Smoking cigarettes
☐	☐
		Yes
36.	No
Varicose veins
☐	☐
		Yes
37.	No
Living close to a power plant
☐	☐
		Yes
38.	No
Too much sunlight exposure
☐	☐
		Yes
39.	No
History of having neck vein disease or carotid artery disease
☐	☐
		Yes
40.	No
Hypoglycemia (low blood sugar)
☐	☐

41. On a scale of 1 – 10, with 1 being “very low” and 10 being “very high”, how would you rate your risk of having a stroke? (Please mark an X on the line to

 rate your risk

 1 2 3 4 5 6 7 8 9 10

42. How sure are you that you would recognize the signs and symptoms of stroke in another person? (Please mark an X in the box close to the applicable response)

☐ Not at all sure ☐ Somewhat not sure

☐ Sure ☐ Somewhat sure

☐ Very sure

43. If you think someone is having a stroke what would you do? (Please mark an X in the box close to the applicable response)

☐ Do nothing ☐ Call a doctor

☐ Call 911

44. Does any member of your family or a close friend has a stroke? (Please mark an X in the box close to the applicable response)

☐ Yes ☐ No

INSTRUCTION: Each of the following questions asks for specific information about yourself.

(Please insert your answer on the line provided or mark the box next to correct answer.)

45. Were you born in the United States? ☐ Yes ☐ No

How old were you when you came to the United States? ____years old

How old are you now? _____years old

46. Are you ☐ Male ☐ Female

47. What is your origin?

☐ Cambodian	☐ Laotian
☐ Thai	☐ Other ____

48. What is your marital status?

☐ Married	☐ Separated
☐ Not married	☐ Widowed
☐ Divorced	

49. Number of years of formal education you have completed? _____

50. Number of persons living in household. _____

51. Are you currently

☐ Working	☐ Homemaker
☐ Retired	☐ Unemployed

52. What is your Zip Code? _____

53. What is the highest level of education you completed?

☐ Never attended school	☐ Community College
☐ General education elementary school	☐ Four-year College Graduate
☐ Junior high/secondary school	☐ Completed a Master's Degree
☐ High school graduate	☐ Completed a Doctoral Degree
☐ Technical school	

54. Where do you get most of your health information?

☐ Television	☐ Family Member
☐ Church	☐ Friend
☐ Doctor	☐ Internet
☐ Nurse	☐ Health/Fitness Center
☐ Newspaper/Magazine	☐ Alternative Practitioners

55. What type of health insurance do you currently have? (Check all boxes that apply.)

☐ Private or commercial (e.g. Blue Cross/Blue Shield)	☐ Medicare
☐ Health Maintenance Organization (HMO)	☐ Medicaid
☐ Preferred Provider Organization	☐ Have no health insurance
	☐ Other _____

56. Which of the following categories best describes your household income during the year 2012?

- ☐ Less than \$14,000
- ☐ From \$14,001 to \$22,200
- ☐ From \$22,201 to \$28,400
- ☐ From \$28,401 to \$35,600
- ☐ From \$35,601 to \$60,000
- ☐ More than \$60,000

END HERE.

Thank you for your participation in this important survey.

School of Nursing
University of North Carolina Wilmington
Wilmington, NC

Appendix B

Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA)

Instruction: The following questions are for the purpose of collecting information about your historical background as well as more recent behaviors that may be related to your cultural identity. Choose one answer which best describes you.

1. What languages can you speak?
 1. Only Asian language (for example: Khmer, Chinese, Laotian, Thai, Vietnamese, etc.)
 2. Mostly Asian language, some English
 3. Asian language and English equally well (bilingual)
 4. Mostly English, some Asian language
 5. Only English
2. What language do you prefer?
 1. Only Asian language (for example: Khmer, Chinese, Laotian, Thai, Vietnamese, etc.)
 2. Mostly Asian language, some English
 3. Asian language and English equally well (bilingual)
 4. Mostly English, some Asian language
 5. Only English
3. How do you identify yourself?
 1. Asian
 2. Asian-American
 3. Cambodian-American, Chinese-American, Laotian-American, Thai-American, etc.
 4. American

4. Which ethnic identification does (did) your mother use?

1. Oriental
2. Asian
3. Asian-American
4. Cambodian-American, Chinese-American, Laotian-American, Thai-American, etc.
5. American

5. Which ethnic identification does (did) your father use?

1. Oriental
2. Asian
3. Asian-American
4. Cambodian-American, Chinese-American, Laotian-American, Thai-American, etc.
5. American

6. From early childhood to 6 years of age, what was the ethnic origin of friends and peers you had?

1. Almost exclusively Asians, Asian-Americans, Orientals
2. Mostly Asians, Asian-Americans, Orientals
3. About equally Asian groups and Anglo groups
4. Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
5. Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

7. From 6-18 years of age, what was the ethnic origin of friends and peers you had?

1. Nearly all Asians, Asian-Americans, Orientals
2. Mostly Asians, Asian-Americans, Orientals
3. About equally Asian groups and Anglo groups
4. Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
5. Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

8. Whom do you associate with in the community?

1. Nearly all Asians, Asian-Americans, Orientals
2. Mostly Asians, Asian-Americans, Orientals
3. About equally Asian groups and Anglo groups
4. Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
5. Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

9. If you could choose, whom would you prefer to associate with in the community?

1. Nearly all Asians, Asian-Americans, Orientals
2. Mostly Asians, Asian-Americans, Orientals
3. About equally Asian groups and Anglo groups
4. Mostly Anglos, Blacks, Hispanics, or other non-Asian ethnic groups
5. Almost exclusively Anglos, Blacks, Hispanics, or other non-Asian ethnic groups

10. What is your music preference?

1. Only Asian music (for example: Cambodian, Laotian, Thai, etc.)
2. Mostly Asian
3. Equally Asian and English
4. Mostly English
5. Only English

11. What is your movie preference?

1. Only Asian-language movies
2. Mostly Asian-language movies
3. Equally Asian/English and English-language movies
4. Mostly English-language movies
5. Only English-language movies

12. What generation are you? (Circle the generation that best applies to you)

1. 1st Generation = I was born in Asia or country other than U.S.
2. 2nd Generation = I was born in U.S.; either parent was born in Asia or country other than U.S.
3. 3rd Generation = I was born in U.S.; both parents were born in U.S. and all grandparents born in Asia or country other than U.S.
4. 4th Generation = I was born in U.S.; both parents were born in U.S. and at least one grandparent born in Asia or country other than U.S. and one grandparent born in U.S.
5. 5th Generation = I was born in U.S.; both parents were born in U.S. and all grandparents also born in U.S.
6. Don't know what generation I am because I lack some information.

13. Where were you raised?

1. Only in Asia
2. Mostly in Asia, some period of time in U.S.
3. Equally in Asia and U.S.
4. Mostly in U.S., some period of time in Asia
5. In U.S. only

14. What connection have you had with Asia?

1. Raised one year or more in Asia
2. Lived for less than one year in Asia
3. Occasional visits to Asia
4. Occasional communications with people in Asia (via letters, phone calls, etc.)
5. No connection or communications with people in Asia

15. What is your food preference at home?

1. Only Asian food
2. Mostly Asian food, some American
3. About equally Asian and American
4. Mostly American food
5. Only American food

16. What is your food preference in restaurants?

1. Only Asian food
2. Mostly Asian food, some American
3. About equally Asian and American
4. Mostly American food
5. Only American food

17. Do you

1. Read only an Asian language?
2. Read an Asian language better than English?
3. Read both Asian and English equally well?
4. Read English better than an Asian language?
5. Read only English?

18. Do you

1. Write only an Asian language?
2. Write an Asian language better than English?
3. Write both Asian and English equally well?
4. Write English better than an Asian language?
5. Write only English?

19. If you consider yourself a member of an Asian group (Oriental, Asian, Asian-American, Cambodian-American, Chinese-American, Laotian-American, Thai-American, etc., whatever term you prefer), how much pride do you have in this group?

1. Extremely proud
2. Moderately proud
3. Little pride
4. No pride but do not feel negative toward the group
5. No pride but do feel negative toward the group

20. How would you rate yourself?

1. Very Asian
2. Mostly Asian
3. Bicultural
4. Mostly Westernized

5. Very Westernized

21. Do you participate in Asian occasions, holidays, traditions?

1. Nearly all
2. Most of them
3. Some of them
4. A few of them
5. None at all

22. Rate yourself on how much you believe in Asian values (e.g., about marriage, families, education, work):

1 2 3 4 5 (do not believe (strongly believe, believe) in Asian values)

23. Rate yourself on how much you believe in American (Western) values:

1 2 3 4 5 (do not believe (strongly believe, believe) in American values)

24. Rate yourself on how well you fit when with other Asians of the same ethnicity:

1 2 3 4 5 (do not (fit very well) fit)

25. Rate yourself on how well you fit when with other Americans who are non-Asian (Westerners):

1 2 3 4 5 (do not (fit very well) fit)

26. People think of themselves in many different ways. Which one of the following most closely describes how you view yourself?

1. Generally, I consider myself as an Asian person (e.g., Cambodian, Chinese, Laotian, Thai, Vietnamese, etc.). Even though I live and work in America, I still view myself as an Asian person.
2. Generally, I consider myself as an American. Even though I have an Asian background and characteristics, I still view myself as an American.
3. Generally, I consider myself as an Asian-American, although deep down I

always know I am an Asian.

4. Generally, I consider myself as an Asian-American, although deep down, I view myself as an American first.
5. Generally, I consider myself as an Asian-American. I have both Asian and American characteristics and I view myself as a blend of both.

Appendix C

IRB Approval

ENTRUSTED

Institutional Review Board Project Action Summary

Action Date: January 21, 2015

Note: Approval expires one year after this date.

Type: ☐ New Full Review ☒ New Expedited Review ☐ Continuation Review ☐ Exempt Review
☐ Modification

Action: ☒ Approved ☐ Approved Pending Modification ☐ Not Approved

Project Number: 2015-01-155

Researcher(s): Samantha N Sangsanoi-Terkchareon Doc SON

Jennifer B Chan-Eng RN

Dr. Jane Georges Fac SON

Project Title: Knowledge of Stroke Symptom and Risk Factors among Cambodian immigrants living in Southern California

Note: We send IRB correspondence regarding student research to the faculty advisor, who bears the ultimate responsibility for the conduct of the research. We request that the faculty advisor share this correspondence with the student researcher.

Modifications Required or Reasons for Non-Approval

None

The next deadline for submitting project proposals to the Provost's Office for full review is N/A. You may submit a project proposal for expedited review at any time.

Dr. Thomas R. Herrinton
Administrator, Institutional Review Board
University of San Diego
herrinton@san-diego.edu
5998 Alcalá Park
San Diego, California 92110-2492

Appendix D

Letter of Introduction

Samantha Sangsanoi
University of San Diego
Hahn Nursing and Human Services
5998 Alcala Park
San Diego, CA 92110

Date: March 01, 2014

To: Whom this may concern,

My name is Samantha Sangsanoi and I am a third year Doctor of Philosophy (PhD) student at University of San Diego. I am expected to graduate by May 2015. I am in the process of starting my dissertation. In order to meet requirements for my dissertation, I will be conducting a research project or survey on stroke symptoms and risk factors recognition among Cambodian population. I will be conducting surveys among Cambodian population residing in San Diego, Long Beach, and Los Angeles,. I am will collect a total of 200 surveys between the months of November 2014 to March 2015.

The research data will be collect through questionnaires from volunteered participants at different Buddhist temples. Informed consent will be obtained prior to data collection. All data collected will be locked up in a safe and Primary Investigator (Samantha Sangsanoi) will be the only person who will have access to the information to protect participants' identity and information. Research participants who participated in the filling out surveys will get ten (\$10) dollars compensation and appreciation.

Thank you for you time and support toward my education. If I may be of assistance, please call me at (619) 992-1268.

Sincerely,

Samantha Sangsanoi, MSN, RN, CCRN

Appendix E

Consent Form

**University of San Diego
Institutional Review Board****Research Participant Consent Form**

For the research study entitled:
Knowledge of Stroke Symptoms, risk factor recognition and acculturation among
Cambodian immigrants living in southern California

I. Purpose of the research study

Samantha N Sangsanon-Terkchareon is a PhD nursing student at the University of San Diego. You are invited to participate in a research study she is conducting. The purpose of this research study is to look at acculturation and stroke recognition of Cambodian Immigrants in California.

II. What you will be asked to do

If you decide to be in this study, you will be asked to complete three questionnaires. One of them asks you questions about yourself, such as what language do you speak, type of food you eat, types of movies you like, and how you see yourself as Asian or as an American. The second one asks about your knowledge of stroke, including things like symptoms and risk factors. The third questionnaire asks about causes of stroke, what to do if you know someone is having a stroke, your know on how to rate your risk of having a stroke, what your experience was like with health care in the past. Your participation in this study will take a total of 15-30 minutes.

III. Foreseeable risks or discomforts

Sometimes when people are asked to think about their feelings, they feel sad or anxious. If you would like to talk to someone about your feelings at any time, you can call toll-free, 24 hours a day:

San Diego Mental Health Hotline at 1-800-479-3339

IV. Benefits

While there may be no direct benefit to you from participating in this study, the indirect benefit of participating will be in knowing that you helped researchers better understand Cambodian Immigrant knowledge of stroke and treatments.

V. Confidentiality

Any information provided and/or identifying records will remain confidential and kept in a locked file and/or password-protected computer file in the researcher's office for a minimum of five years. All data collected from you will be coded with a number or pseudonym (fake name). Your real name will not be used. The results of this research project may be made public and information quoted in professional journals and meetings, but information from this study will only be reported as a group, and not individually.

VI. Compensation

If you participate in the study, Samantha will give you \$10 cash with the survey and you will also qualify to enroll in a raffle drawing for \$100. You will receive this compensation even if you decide not to complete the entire questionnaire.

VII. Voluntary Nature of this Research

Participation in this study is entirely voluntary. You do not have to do this, and you can refuse to answer any question or quit at any time. Deciding not to participate or not answering any of the questions will have no effect on any benefits you're entitled to, like your health care. **You can withdraw from this study at any time without penalty.**

VIII. Contact Information

If you have any questions about this research, you may contact either:

1) Samantha N Sangsanoi-Terkchareon

Email: Samanthas@sandiego.edu

Phone: (619) 992-1268

2) Dr. Jane Georges (Samantha's Dissertation Advisor)

Email: jgeorges@sandiego.edu

Phone: (619) 260-4566

I have read and understand this form, and consent to the research it describes to me. I have received a copy of this consent form for my records.

Signature of Participant

Date

Name of Participant (**Printed**)

Signature of Investigator

Date

Appendix F

Qualitative Questionnaire

1. Can you please tell me what “stroke” means to you?
2. Have you ever talked to a doctor about stroke? (If “yes”): What did he or she say about it?
3. Thinking about yourself, how likely are you to have a stroke?
4. So from what you’ve told me, on a scale from 1-10, what number describes how likely you are to get a stroke, with 1 being not very likely and 10 being extremely likely?
5. Can you tell me why you gave yourself that number?
6. Tell me about a time when you or a family member needed medical care. What was that like for you?
7. Thinking about that time you just talked about, how did the people at the facility treat you and your family?
8. Thinking about the times you or family needed medical care, how long was your usual waiting time?
9. What do you personally believe causes a person to have stroke?
10. Can you tell me about any other reasons that might cause people to get a bad health problem like a stroke?
11. If you notice that your family members or friends have severe weakness to half of the body, what would you do? If your family members or friends complain of unexplained dizziness or severe headache with nausea and vomiting, what would you do? If you family complained of some numbness to the arm or leg, what you would you do?