CHRONIC DISEASE DIAGNOSIS AND USUAL SOURCE OF CARE AMONG OLDER AMERICAN INDIANS AND ALASKA NATIVES

by

LATISHA LOVE MARSHALL

(Under the Direction of Joel Lee)

ABSTRACT

Despite the United States having a unique responsibility to provide healthcare for American Indians and Alaska Natives (AI/AN), they continue to face disparities in healthcare access and poor health outcomes, such as heart disease and diabetes. Older populations are particularly vulnerable to these diseases, their associated comorbidities and functional limitations. As the population continues to age, there is a need to focus and target the health of older AI/AN.

This dissertation has two purposes that are addressed by two manuscripts. The first study seeks to assess the factors related to chronic disease diagnosis among older AI/AN age 45 years and older. The second study seeks to assess the predictors of having a usual source of care among older AI/AN to better understand where they are going for care and how best to reach them in order to prevent and manage chronic diseases, such as heart disease and diabetes.
Both studies used secondary data from the California Health Interview Survey (CHIS), a multistage and population-based Random Digit Dial (RDD) telephone (landline and cell phone) survey.

The first study found that 74.4% had neither been diagnosed with heart disease nor diabetes, 10.5% were diagnosed with heart disease and 15.1% were diagnosed with diabetes. In addition, age and self-rated health were the primary factors related to these diagnoses. The second study found that 91% of AI/AN had a usual source of care and utilized a doctor’s office/Kaiser/HMO (65%), followed by a clinic/health center/hospital clinic (26%). The remaining 9% did not have a usual source of care. In addition, predisposing (i.e. age, marital status and education) and enabling (i.e. being an enrolled member of a state or federally recognized tribe, having insurance, and poverty level) factors were the most significant determinants of having a usual source of care.

Multilevel interventions and policies are needed to address the social determinants of health that heavily impact the health status and healthcare access of older AI/AN. This study discusses possible opportunities and strategies to intervene on improving diabetes, heart disease and usual source of care among older AI/AN and underscores the need for action.

INDEX WORDS: Chronic disease diagnosis; Usual source of care; Healthcare Access; Heart Disease; Diabetes; American Indian; Alaska Native

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DEDICATION

This dissertation is dedicated to my God, my personal Lord and Savior. His grace, mercy, favor and love have covered me throughout this journey. I am truly grateful and thankful and give God all of the Glory! My prayer is that I represent you well in all that I do.

To my husband, Rasheed and children, Bryson and Brandon, this work is dedicated to you for your love, support and patience.

To my mother, Myra Lewis. Thanks for your tireless support, unselfishness and sacrifice in raising me and my siblings. It's because of you that I learned the importance of education. I am forever grateful to you.

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CHAPTER 1

INTRODUCTION

Background

The American Indian or Alaska Native (AI/AN) populations are descendants of any of the original peoples of North, South, and Central America. According to the 2010 Census, over 5.2 million people in the United States self-identified as AI/AN (Norris, 2012). Of these individuals, 2.9 million self-identified as AI/AN only, with the remainder being in combination with at least one additional race. Overall, AI/ANs make up 1.7% of the U.S. population (Norris, 2012) and represent 566 federally-recognized tribes (Bureau of Indian Affairs, 2015b), 64 state-recognized tribes (National Conference of State Legislators, 2015) and hundreds of non-recognized tribes (United States Government Accountability Office, 2012). Geographically, the majority of the AI/AN population live in California, Oklahoma, Arizona, Texas, New York, New Mexico, Washington, North Carolina, Florida, and Michigan (Norris, 2012), and nearly half of all recognized tribes are located in Alaska (Bureau of Indian Affairs, 2015b).

Each AI/AN tribe is different and maintains its own culture, history, demography and traditions (Kagawa-Singer, 1996). In addition, there are more than 270 languages spoken among the various tribes (Ogunwale, 2006). There are also distinct differences between American Indians and Alaska Natives. Most Alaskan tribes are relatively small compared to those located within the “lower 48” states and are in remote rural areas that are only accessible by boat or plane (University of Alaska Fairbanks Interior Aleutians Campus, 2004)

While there are cultural differences among AI/AN tribes, collectively, they endure a disproportionate burden of illness and poor health outcomes compared to the general U.S. population (Barnes, Adams, & Powell-Griner, 2010; Census, 2012). Largely impacted by disparities that have existed for centuries, AI/AN communities have historically been plagued by poverty, poor health conditions, and a host of infectious diseases (e.g., smallpox, measles, diphtheria, and malaria) that can be traced back to their first encounters with European colonists (Jones, 2006; Shelton, 2001).

This contact also set the course for numerous treaties that were used by European colonists and later the U.S. government to formalize and facilitate the process of simultaneously seizing tribal lands and subjugating tribal members (Shelton, 2001). A major law enacted was the American Indian Removal Act of 1830, which granted the government power to remove members of five major tribes in the southeast (i.e., Cherokee, Choctaw Chickasaw, Creek and Seminole Indians) to western territories that are now known as Oklahoma and Kansas (Purvis, 1997). Due to poor administration, inadequate rations, and lack of proper winter quarters this removal resulted in nearly 3,000 Indian deaths. Other treaties and laws formed during this time guaranteed housing, education, and health care to AI/AN in exchange for their land. However, this "guarantee" has never been truly realized, especially regarding healthcare.

While federal healthcare for AI/AN has evolved through the 19th and first half of the 20th centuries, the earliest record of federal healthcare to tribes was the purchase and administration of the small pox vaccine by the U.S. Army (Indian Health Service, 2005). Since that time, the responsibility of Indian Health programs through the Bureau of Indian Affairs has transferred from the U.S. Department of War to the Department of the Interior and lastly, to the present day serving organization, the Indian Health Service under the U.S. Department of Health and Human

Services (E. R. Rhoades & Rhoades, 2014). Since then, there have been several laws that have had an impact on the way that health services are organized, managed, and provided. Table 1.1 highlights the progression of healthcare laws involving AI/AN.

Table 1.1 Progression of laws/policies related to Health Care of AI/AN

Law or Organization	Purpose/Outcome
Bureau of Indian Affairs	Oversees the Indian Health Program
Snyder Act of 1921	Allowed Congress to appropriate funds to address AI/AN health on a recurring basis
Transfer Act of 1954	Indian health program became the responsibility of the Public Health Service
Indian Health Service (1955)	Responsible for providing federal health services to American Indians and Alaska Natives. Mission: to raise the physical, mental, social, and spiritual health of American Indians and Alaska Natives to the highest level.
Indian Self Determination and Education Assistant Act (1975)	Authorizes tribes to assume management of BIA and IHS program and ability to enter into self-determination contracts at the request of any tribe.
Indian Health Care Improvement Act (1976)	The cornerstone legal authority for the provision of healthcare to American Indians and Alaska Natives.
Permanent reauthorization of the Indian Health Care Improvement Act (2010)	Through ACA, Act made permanent. Major changes and improvements to original Act to facilitate the delivery of healthcare services.

This “exchange” established the “trust responsibility” of the U.S. government to tribes and was written into many laws confirming this relationship, particularly for health care. For example, Congress states in the findings of the Indian Health Care Improvement Act (IHCIA):

> “Federal health services to maintain and improve the health of the Indians are consonant with and required by the Federal government’s historical and unique legal relationship with, and resulting responsibility to, the American Indian people. It is the policy of this Nation, in fulfillment of its special responsibilities and legal obligation to the American Indian people, to assure the highest possible health status for Indians and urban Indians and to provide all the resources necessary to effect that policy” (IHCIA, 1976).

However, the intent of these laws (Table 1.1) is inconsistent with the reality of the poor health outcomes observed among AI/AN today. AI/AN have the poorest health status among all Americans. AI/AN have a higher prevalence of chronic disease and associated risk factors, including cigarette smoking, obesity, and excessive alcohol use compared to the rest of the U.S. population (Denny, Holtzman, & Cobb, 2003; Doshi & Jiles, 2006; Holm, Vogeltanz-Holm, Poltavski, & McDonald, 2010). Moreover, AI/AN experience excess mortality due to tuberculosis, chronic liver disease, unintentional accidents, pneumonia, homicide, and suicide (Doshi & Jiles, 2006). There has been an epidemiological transition from AI/AN populations being afflicted by infectious diseases to chronic diseases such as heart disease and diabetes (Kunitz, 2008b).

Public Health Significance

Older populations are particularly vulnerable to these diseases and their associated comorbidities (Chapleski, Lichtenberg, Dwyer, Youngblade, & Tsai, 1997; Goins & Pilkerton, 2010; John, Kerby, & Hennessy, 2003) and functional limitations (Fuller-Thomson & Minkler, 2005). Moreover, the aging population is growing with projections of AI/AN age 65 and older expecting to almost quadruple between 2012 and 2050 from 266,000 to 996,000 (Ortman, 2014).

Further, most studies have categorized “older” as beginning at 55 (Denny, Holtzman, Goins, & Croft, 2005; Schure, Conte, & Goins, 2014), 60(Kim, Bryant, Goins, Worley, & Chiriboga, 2012; Kim, Ford, Chiriboga, & Sorkin, 2012) or 65 (Rosenblatt et al., 2001) years; however, it is well documented that AI/AN experience aging, morbidity and mortality due to chronic disease at younger ages compared to other racial groups (Centers for Disease Control and Prevention, 1998; Goins & Pilkerton, 2010). In addition, morbidities tend to occur 15 to 20 years earlier than the general population (National Indian Council on Aging, 1981), and life expectancy is 73.7 years or over 4 years lower than the general U.S. population (Indian Health Service, 2014a).

Diabetes

Diabetes is the fourth leading cause of death among the AI/AN population (Centers for Disease Control and Prevention, 2015b). AI/AN are twice as likely to have diabetes compared to the general U.S. population and are more than four times as likely to die from the disease (Gittelsohn & Rowan, 2011) (J. O'Connell, Yi, Wilson, Manson, & Acton, 2010). In some communities, 40-50% of adults are diabetic (Roubideaux, 2002), such as the Pima Indians of Arizona (traditional mane is Tohono O’odham) (Knowler, Pettitt, Saad, & Bennett, 1990). The prevalence of diabetes among AI/AN adults 50 years and over is 22.9% compared to 12% among non-Hispanic whites (Balluz, Okoro, & Mokdad, 2008).

There are also disparities related to morbidities associated with diabetes. Compared to U.S. adults with diabetes, AI/AN diabetic adults are significantly more likely to have end stage renal disease (ESRD), neuropathy, possible blindness, mental health disorders, as well as 10 times more likely to have lower-extremity amputations (J. O'Connell et al., 2010). Having these additional comorbidities complicates the diabetes treatment; decreases overall quality of life; and increases the chance of death (J. O'Connell et al., 2010). Unfortunately, coping with these disabilities are made more complicated with lack of access to transportation, which is a major issue among those living in rural areas (Roubideaux & Acton, 2001).

Heart disease

While 16% of cardiovascular disease (CVD/heart disease) deaths can be attributed to diabetes (American Diabetes Association, 2008, 2013), alone it accounts for 33.6% of all U.S. deaths and is responsible for more deaths among AIAN than any other cause (Roubideaux, 2001). A report from the CDC has shown that the prevalence of CVD among AI/AN is much higher than non-Hispanic whites (14.7% vs. 12.2%) (Barnes, Adams, & Powell-Griner, 2010b) and the percentage of premature deaths is higher among the AI/AN population than among any other racial or ethnic group in the United States (Centers for Disease Control and Prevention, 2004). Further, 36% of those who die of heart disease, die before the age of 65 (Centers for Disease Control and Prevention, 2004).

The economic impact of both diabetes and CVD on our healthcare system is excessive. According to the CDC, the total costs of CVD in the U.S. were estimated to be $444 billion (Centers for Disease Control and Prevention, 2011) and the treatment associated with this disease accounts for approximately $1 of every $6 spent on health care (Centers for Disease Control and Prevention, 2011). Total direct medical costs of CVD are projected to triple, (from $273 billion in 2010 to $818 billion in 2030) and the indirect costs due to lost productivity for CVD are estimated to increase by 61% ($172 billion in 2010 to $276 billion in 2030) (Heidenreich et al., 2011). The total estimated costs of diagnosed diabetes in 2012 was $245 billion, which includes $176 billion in direct medical costs and $69 billion in lost productivity (American Diabetes Association, 2013). As the U.S. population ages, the economic impact of these diseases on our nation’s health care system will become even greater.

Health Access

While the Indian Health Service (IHS) was formed to provide direct health care for AI/AN, it only serves individuals who are enrolled in federally recognized tribes and has limitations related to where a person resides within the state of their respective tribe. Despite the United States having a unique responsibility to provide health care for American Indians and Alaska Natives (AI/AN), they continue to face disparities in high uninsured rates (Artiga S., 2013) and significant barriers to obtaining needed care (Call et al., 2006; Goins, Bogart, & Roubideaux, 2010; Shah et al., 2014). In each consecutive year between 2000 and 2012, AI/AN under age 65 were less likely than whites to have health insurance (in 2012, 73.0% compared with 83.3%) (U.S. Department of Health and Human Services, 2014). According to the National Healthcare Disparities Report (NHDR), measures of health care quality and access were tracked and found that AI/AN had worse care than whites for 40 measures. In addition, AI/ANs received worse care than whites for 33% of the quality measures (U.S. Department of Health and Human Services, 2014). These quality measures included receipt of specific services needed to treat or prevent a medical condition and outcomes of treatment, such as functional limitation and death (U.S. Department of Health and Human Services, 2014). These access issues serve as a barrier to obtaining much needed care. Further, it is widely known that people with a usual source of care (a provider or facility where one regularly receives care) experience improved health outcomes (Starfield & Shi, 2004) and are more likely to receive preventive health services (Ettner, 1996).

Many of the public health concerns related to AI/AN population is a result of historical factors, education, poverty, unemployment, housing (among other social determinants of health). The AI/AN older population is especially vulnerable to these factors and subsequent poor health outcomes contributed by barriers such as lack of transportation, low levels of education and lack of resources. As the population continues to age, there is a need to focus and target the health of the older AI/AN population.

However, very little research has focused on the effect and association of factors related to multiple disease categories in the same study, specifically “Heart Disease (HD) only” and “Diabetes (D) only,” among older AI/AN. Rather, studies have discussed their comorbidities related to chronic diseases to include conditions such as arthritis, lung disease, pain, and allergies (Chapleski et al., 1997; Goins & Pilkerton, 2010). Being able to identify the factors related to these disease categories would facilitate or enhance appropriate interventions for older AI/AN.

Purpose

To help address these research needs and provide appropriate policy recommendations, this dissertation has two purposes that are addressed by two manuscripts. The first manuscript seeks to identify the factors related to chronic disease diagnosis among older American Indians and Alaska Natives age 45 years and older. There are three categories that will be explored: “Heart Disease (HD) only,” “Diabetes (D) only,” and “neither HD nor D”. .

Since both diabetes and heart disease are chronic diseases which require management and care from a healthcare provider, it is important to have a better understanding of healthcare access, particularly having a usual source of care among older AI/AN. Having an understanding of where this population presents for care may provide an opportunity to know how best to reach them in order to prevent and manage heart disease and diabetes. The second manuscript seeks to explore the type of usual source of care that is used among older AI/AN. More specifically, this manuscript will assess the predictors of having a usual source of care among this population.

Further, a primary variable of interest in this study is the participants' disease diagnosis of heart disease or diabetes.

Andersen/Aday Vulnerability Model

The Andersen/Aday Vulnerability Model will be the conceptual framework used to understand the factors that influence health care access and utilization (Aday & Andersen, 1981) (Andersen, Rice, & Kominski, 2011), These factors are categorized into three components: predisposing, enabling, and need –all which work together to affect an individual's access to care. Predisposing characteristics are existing conditions that describes an individual's propensity to use or not use services, such as age, sex, social structure, race/ethnicity, health beliefs and culture. Enabling characteristics are factors that facilitate or impede use of services, such as income, insurance coverage and the availability of heath care services. Need is characterized by specific illnesses/disease and health needs that would encourage an individual to seek care. These three characteristics converge and interact and subsequently work together to influence health care access, health quality and health status (Andersen et al., 2011; Shi, 2010). (Shi, 2010) discusses this model from a vulnerability perspective in that the convergence of these factors creates a vulnerable population.

California Health Interview Survey

Both manuscripts will use secondary data from the 2005, 2009, and 2011-2012 California Health Interview Survey (CHIS). The CHIS survey provides generalizable data for California's ethnically diverse population. CHIS uses a multisampling design and is a population-based Random Digit Dial (RDD) telephone (landline and cell phone) survey of California's population. This survey is conducted by the Center for Health Policy Research, University of California at Los Angeles and other partners. It is the largest state health survey in the country and is conducted every two years among non-institutionalized adults in California. This survey includes information on health status and conditions, diet, physical activity, health related behaviors, health insurance coverage, access and utilization of health care, and mental health.

The state of California is chosen for this analysis for two reasons. First, California has the largest number of AI/AN compared to any other state, with 109 federally recognized Indian tribes (Bureau of Indian Affairs, 2015b) and total population of 362,801 (Norris, 2012). Second, the California Health Interview Survey (CHIS) is a public use data set that is readily accessible, includes the variables of interest and oversamples for the AI/AN population in California.

CHAPTER 2

LITERATURE REVIEW

This chapter will define social determinants of health and its significance and parallel to the Aday/Andersen Framework. This chapter is organized by the framework to provide the context of how each of the factors (predisposing, enabling, need) contribute to the vulnerability of AI/AN in having poor health outcomes, such as diabetes and heart disease and accessing and utilizing health care services. These factors are further explored within the context of older AI/AN.

Social Determinants of Health

Traditionally, research has emphasized a connection between chronic diseases and the *individual* characteristics of the patients diagnosed, such as their genetics, health behaviors, and culture (Dinca-Panaitescu et al., 2011 Daiski, Pilkington, & Raphael, 2011). Those prescribing to this path of causation have contributed to a conventional wisdom that chronic disease onset was exclusively the fault of the individual; he or she was presumably genetically predisposed to the disease (and hence unable to prevent the onset of the disease) or the individual did not properly change his or her health behaviors, and hence “deserved” to be diagnosed with the disease (Shi, 2010). However, the flaw of both of these constructs is that they blame the victim (Shi, 2010) and fails to address what we now understand to be associated with social determinants of health.

Social determinants of health (SDH) are the “complex, integrated, and overlapping social structures and economic systems that include the social environment, physical environment, and health services; structural and societal factors that are responsible for most health inequities. SDH are shaped by the distribution of money, power and resources at global, national, and local levels, which are themselves influenced by policy choices”(Centers for Disease Control and Prevention, 2010). In short, SDH are the causes behind the causes. Examples of SDH include education, poverty, access to health care services and healthy food, social norms, etc.

There have been considerable efforts put forth in public health towards understanding and applying SDH to address disparities in health outcomes observed among segments of the population (Frieden, 2011). For example, Healthy People 2020’s overarching goal is to “create social and physical environments that promote good health for all” through achieving health equity, elimination of health disparities and improved health of all age groups (U.S. Department of Health and Human Services, 2010). This underscores the importance of understanding the link between social factors and health and intervening within these factors to move towards improved health equity among and between segments of the population. Further, this suggests that improvements in health could be achieved if policy makers, program developers, and implementers address these broader influences on health outcomes while maintaining evidence-based approaches to disease prevention and control (Dean, Williams, & Fenton, 2013).

The vulnerability or likelihood of experiencing disparate health outcomes among populations, such as in the case of AI/AN, is determined by the merging of characteristics at both the individual and ecological levels (Shi, 2010) (Figure 2.1). While individual characteristics are important in contributing to health behaviors and subsequent health outcomes, the ecological (or contextual) perspective, as considered in SDH, is particularly important to consider among

AI/AN communities. The Andersen/Aday Vulnerability Model encompasses both of these models and offers a way to analyze these factors within the context beyond individual influences.

The Andersen/Aday Vulnerability Model

The Andersen/Aday Vulnerability Model will be the conceptual framework used in this dissertation to understand the factors that influence health care behaviors, access, utilization and health outcomes (Shi, 2010). These factors are categorized into three components: predisposing, enabling, and need – all which work together to affect an individual's access to care, health care quality and health status. Predisposing characteristics are existing conditions that describe an individual's propensity to use or not use services, such as age, sex, social structure, race/ethnicity, health beliefs and culture (Shi, 2010). Enabling characteristics are factors that facilitate or impede use of services, such as income, insurance coverage and the availability of heath care services. Need is characterized by specific illnesses/disease and health needs that would encourage an individual to seek care. These three characteristics converge, interact and subsequently work together to influence health care access, health quality and health status.

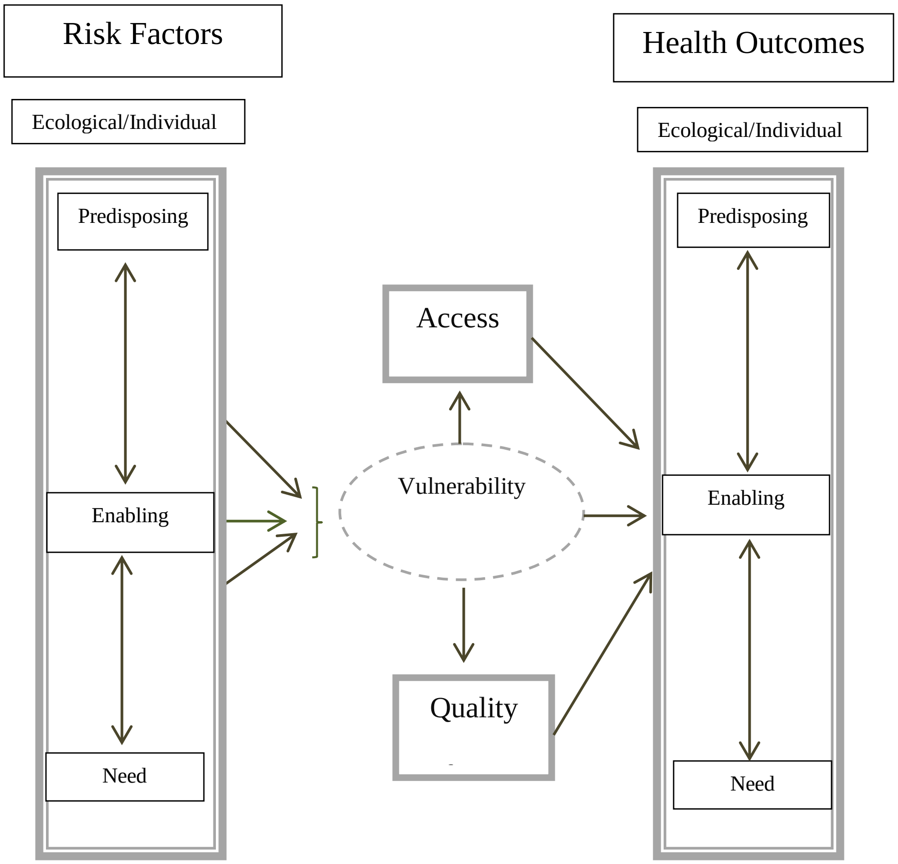

Figure 2.1 The Andersen/Aday Vulnerability Model (Aday & Andersen, 1974)

This framework was adapted from the well-known Andersen's Behavioral Model of Health Services Use (RM Andersen, 1995). The Andersen model was first created in the 1960s as a way to understand the reasons families use health care and provides a way to define and measure equitable access. It was borne out of national surveys focused on health services research (R. M. Andersen, 2008). This model has continued to be adapted and modified to understand the health and health seeking behavior among specific vulnerable populations, such as the homeless (Gelberg, Andersen, & Leake, 2000; Stein, Andersen, & Gelberg, 2007). While this model has been widely used, not much of the literature has been found regarding its application to older AI/AN with the exception of two that focused on the use of mental health services (Barney, 1994; Roh et al., 2014). Even though these studies directly addressed the use of Andersen's model, many studies discussed several different components of the model (i.e., predisposing, enabling, and/or need) as independent variables (Kim, Bryant, et al., 2012; Kim, Ford, et al., 2012) in their studies related to health outcomes and/or health care use. Other studies have used this framework in studies to address individuals with serious psychological distress (Wilkinson et al., 2012), homeless populations (Gelberg et al., 2000) (Stein et al., 2007), complementary and alternative medicine use (Brown, Barner, Bohman, & Richards, 2009); oral health (RM. Andersen & Davidson, 1997); psychiatric treatment (Dhingra, Zack, Strine, Pearson, & Balluz, 2010) among others.

Predisposing Factors

Age

The median age of AI/AN in the U.S. is 31.4 years with 32.5% of the population 45 years and older (U.S. Census Bureau, 2014) and approximately 9.5% are 65 years and older (Barnes, Adams, & Powell-Griner, 2010a). The aging population is growing with projections of AI/AN age 65 and older expecting to almost quadruple between 2012 and 2050 (from 266, 000 to 996, 000) (Ortman, 2014). Older AI/AN are the most rural of all ethnic older Americans, predominantly living in three states: Oklahoma, California, and Arizona (Norris, 2012; U.S. Census Bureau News, 2012).

The chronological pace of aging among AI/AN substantially exceeds that of other racial groups (Hayward & Heron, 1999). However, it is well documented that AI/AN experience aging, morbidity and mortality due to chronic disease at younger ages compared to other racial groups (Centers for Disease Control and Prevention, 1998; Goins & Pilkerton, 2010). The morbidity observed among AI/AN tend to occur 15 to 20 years earlier than the general population (National Indian Council on Aging, 1981), resulting in a lower life expectancy of 73.7 years or over 4 years lower when compared to the US population (Indian Health Service, 2014a). In the Northwest U.S. region, differences in life expectancy were also similar at 72.8 years, about seven years fewer than their white counterparts (Dankovchik, Hoopes, Warren-Mears, & Knaster, 2015). However, Arias, Xu, and Jim (2014) analyzed the 637 Contract Health Service Delivery Area (CHSDA) counties, which generally either contain federally recognized tribal land or are adjacent to tribal lands, and found that the life expectancy of AI/AN at birth was lower by close to a decade compared to other racial groups.

While disparities in all-cause mortality were evident in younger age groups, particularly ages 25 to 44 years, in total, they were three times higher than for whites (Espey et al., 2014). This is important to note, due to the negative health impact that this may have on older populations. It is suggested that the reversal of age trends among AI/AN is a result of the increasing burden of disease such as diabetes as well as inadequate funding for IHS and tribal health programs (Kunitz, 2008a).

Defining "older" age among AI/AN

While most studies have categorized "older" as beginning at 55 (Denny et al., 2005; Schure et al., 2014), 60 (Kim, Bryant, et al., 2012; Kim, Ford, et al., 2012) or 65 (Rosenblatt et al., 2001) years for AI/AN, the National Indian Council on Aging found that AI/AN aged 45 years and older experienced similar functional limitations as non-AI/AN at the age of 65 (National Indian Council on Aging 1981). As a result of early aging, the United States Congress amended the Older Americans Act in 1981 to allow tribes the ability to define elderly for their respective tribes (Gelfand, 1987).

Significance of Older population within Tribal communities

Older AI/AN hold a significant role among and within tribal communities and are considered a special part of AI/AN heritage. For many, they have been given the title as “Elder.” Traditionally, Elders are highly respected and honored due to their embodiment of knowledge, history and spirituality (Baldridge, 2001) and are given this title much earlier than in Western societies. The title of Elder is not just a function of chronological age, but rather their role in their respective communities (Baldridge, 2001). Historically, Elders serve as mentors, counselors and keepers of customs and values of their respective tribes. Their role is especially important when considering the historical trauma, laws and policies forced upon AI/AN to adopt to Anglo-American traditions (Purvis, 1997) and disrupt social and group structure of tribes through forced boarding schools (Shelton, 2001), forced surgical sterilization of women and the illegality to speak traditional languages or practice tribal customs (Roubideaux, 2002). Today, the role of Elders in the urban community, where most reside, is less known because many AI/AN have adapted to contemporary urban life (Forquera, 2001). As a result, some cultural practices and traditions have been lost, especially among youth (Forquera, 2001; Wexler, 2011). However, Wexler (2011) discusses the use of an intergenerational dialogue, between Elder and youth to contribute to larger cultural revitalization efforts in the community and beyond. These conversations are instrumental in passing on traditional knowledge from the older to younger generation The journey and adversity endured by AI/AN to the present time represents the resilience of the older population. The health and well-being of older AI/AN is important, as they represent great significance within Indian life, for if absent, there would be a loss of wisdom and traditional practices. Being that they serve as integral part of tribal communities, the disparate health experienced among this segment of the AIAN population is one that cannot be ignored.

Sex

Among all AI/AN, approximately 49.3% are male and 50.7% female (Indian Health Service, 2014b). Among those 45 years and older, 20.8% are male and 23.4% are female, which is lower than all races in the U.S. with 31.5% male and 36.6% female (Indian Health Service, 2014b).

Marital Status

There has been much research concerning the positive health effects of marriage, particularly healthy marriages. The positive influences and outcomes of marriage can be summarized through its economic effect, protection effect of social support and intimacy effect (Staton & Ooms, 2011). Married people are more likely to have access to increased economic resources and therefore have the means to purchase health insurance or other sources of social and economic support (Wood, Goesling, & Avellar, 2007). In addition, there is greater social support and encouragement to be healthier and increased monitoring of health behaviors through marriage (Staton & Ooms, 2011; Wood et al., 2007)

As people age, social support found through marriage or having close supportive relationships are linked to better health and longevity (Carr & Springer, 2010; Staton & Ooms, 2011). One study found that older AI/AN who were married/partnered were associated with having high levels of social support (Conte, Schure, & Goins, 2014).

Education

According to the National Center for Education Statistics, 20% of AI/AN 25 years and older have less than a high school education compared to 9% of whites (Table 2.1) (National

Center for Education Statistics, 2008). While 36% of AI/AN completed high school, 9% earned a bachelor's degree compared to 21% of whites. Not only is education associated with better health (Cutler & Lleras-Muney, 2012), but also an improved likelihood of financial stability through employment. Further, having AI/AN health practitioners is a need among many tribal communities. However, AI/AN account for only 0.4% of nurses (U.S. Department of Health Human Services, 2013) and less than 0.4% of physicians (Association of American Medical Colleges, 2015) in the U.S.

Table 2.1 Percentage of adults age 25 and over by highest level of educational attainment of AI/AN compared to whites in the U.S., 2007

	AI/AN	Whites
Less than high school diploma	20%	9%
High School graduate (including GED)	36%	32%
Bachelor's degree	9%	21%
Graduate or professional degree	5%	11%

Source: National Center for Education Statistics, 2008

Urban/Rural

While many AI/AN live in rural areas approximately 60% live in urban areas (Castor et al., 2006). Individuals residing in rural areas often face more severe barriers to accessing health care, higher rates of poverty, greater distance to travel for health care and other services, and lower levels of education. Reservations are located in rural areas and AI/AN living on these reservations are among the poorest segments of the U.S. population (Szasz, 1992) and disproportionately affected by issues such as food insecurity (Bauer et al., 2012). In addition, overall death rates were found to increase as the level of rurality increased (Kunitz, Veazie, & Henderson, 2014). Further, throughout the U.S., areas containing AI tribal lands are mired in persistent rural poverty and maintain incomes consistently below the U.S. average (Leichenko, 2003). In rural and reservation communities, housing is often substandard or overcrowded and lacking indoor plumbing, electricity, and cooking facilities (Szasz, 1992).

Many AI/AN have lived in urban areas for generations, moving on their own in search for better opportunities related to education and/or employment or as a result of federal government relocation policies (Venables, 2004). Federal relocation programs encouraged AI families living on impoverished reservations to "relocate" to various cities across the country (e.g., San Francisco, Los Angeles, Chicago, Salt Lake, Phoenix) as a way to escape poverty on the reservation (Indian Health Service, n.d.). As a result, the federal government relocated over 160,000 AI/AN to select urban centers across the country (Indian Health Service, n.d.).

Even though the majority of AI/AN live in urban areas, they are often described as an invisible minority (Ledesma, 2007; D. A. Rhoades, Manson, Noonan, & Buchwald, 2005), because less information (Evans-Campbell, 2008) and resources (Ledesma, 2007) are available about and for them compared to those that live on reservations (Evans-Campbell, 2008). Further, lack of transportation, geographic dispersion and residential patterns across communities creates social and cultural isolation (Evans-Campbell, 2008; Ledesma, 2007; Weaver, 2012) and contribute to barriers to accessing their respective tribal land (Hartmann & Gone, 2012). While urban AI/AN are within a large multicultural community and recognized by fellow members of the community, they are not a constituency (Ledesma, 2007) and subsequently impacts their level of power within their urban communities.

Geographical studies have shown that the place one lives influences health care access and subsequent health disparities (Diggs, 2012; Gone, 2008; Lardinois, 1987; Probst, Moore, Glover, & Samuels, 2004; M. Smith et al., 2013; Towne, Smith, & Ory, 2014; Wilson, Rosenberg, & Abonyi, 2011). Towne et al. (2014) found that there were great disparities in the availability, utilization and distance to providers in areas with higher concentrations of AI/AN aged 65 and older compared to other areas; and the average distance to providers was at least twice that of the areas with lower presence of AI/AN individuals.

Enabling Factors

Poverty

According to U.S. Census data, 27% of AI/AN lived below the poverty level, and had the highest poverty rate for all races and ethnicities (Macartney S., 2013). Older AI/AN adults tend to live in poverty more than other racial groups. High levels of poverty are associated with increased mortality (Kunitz et al., 2014).

In 1990, per capita income levels for American Indians were $8,284 – less than 60 percent of the U.S. average of $14,420 (Leichenko, 2003). In 1999, the per capita income of tribal counties with an AI population of at least five percent was 16 percent less than the per capita income of non-tribal counties (Leichenko, 2003). These conditions of poverty are compounded by several factors: AI communities endure some of the highest rates of unemployment (60-80%) and lowest rates of educational attainment (Leichenko, 2003; Szasz, 1992). Compared to the general population, AI/AN are almost twice as likely to be poor, unemployed, and to lack a college degree (Castor et al., 2006 Park, Lawson, & Forquera, 2006).

Research addresses the immense impact that poverty can have on the eventual onset of chronic diseases such as diabetes due to the level of stress of having a low income. The stressors related to living in poverty can impact one's health by the release of a hormone called cortisol that is typically released when under stress. While cortisol can be protective in stressful situations, elevated levels can cause negative effects such as high blood sugar levels and high blood pressure (Diabetes in Control, 2011). In one study that followed participants for 12 years, participants who lived more often in poverty had a 41% greater chance of developing diabetes. Even when controlling for education, body mass index (BMI) and physical activity levels, living in poverty made the risk of developing diabetes substantially high at 36% (Dinca-Panaitescu et al., 2011).

Residents of lower-income neighborhoods find it difficult, if not impossible, to access fresh, healthy foods or programs that promote physical activity – both of which are key to managing stress, controlling weight and, ultimately, preventing diabetes (Diabetes in Control, 2011). Interviews with diabetes patients living in low-income neighborhoods have further revealed that the very conditions that contribute to diabetes (e.g. a lack of nutritious foods and poor environments that discourage physical activity) make it particularly difficult to not only prevent diabetes, but also make it difficult to manage the disease effectively, once diagnosed. These findings suggest that physicians and other health care providers should pay more attention to the socioeconomic conditions that can lead to diabetes, rather than simply addressing individual risk factors (Diabetes in Control, 2011).

Indian Health Service

The IHS was established in 1955 in order to uphold the federal "trust responsibility" to provide health care to federally recognized AI/AN tribes. The IHS consists of a three-part system (also known as I/T/U), in which "I" denotes IHS, the federally operated direct care system; "T" denotes independent tribally operated health care services, and "U" denotes the urban Indian health care services. Each component of the IHS System has separate funding streams and their own structure of governance. Further, IHS is comprised of twelve area offices or regional administrative units, which are further divided into service units (Indian Health Service, 2014b). Generally, each service unit provides services to one large tribe (with the exception of Navajo Nation which has eight service units) or several small tribes (Dixon, 2001).

The term “IHS system” will be used hereafter when describing all three parts together. Otherwise, the single parts (I/T/U) will be specifically named when appropriate. While there are 5.2 million AI/AN in U.S., approximately 2 million tribal members obtain care through the IHS System, particularly those residing on or near reservations (Figure 2.4). The majority of this care is provided by tribal (1.1 million) and federal facilities (0.9 million). Even though 1.2 million AI/AN live in Urban Indian Health Service areas across twenty states, only 149, 000 are served by the IHS System. The remaining AI/AN population (3.2 million) receive care through other public systems (i.e. Department of Veteran Affairs (VA), Medicaid, and Medicare), private sector (Sequist, Cullen, & Acton, 2011) or through emergency room or other safety net providers. In addition, 25% of IHS enrolled veterans use the VHA for healthcare (B. Kramer et al., 2009). This dual coverage results in IHS system, being used for primary care and VHA being used for specialty care that cannot be obtained from the IHS system (B. Kramer et al., 2009).

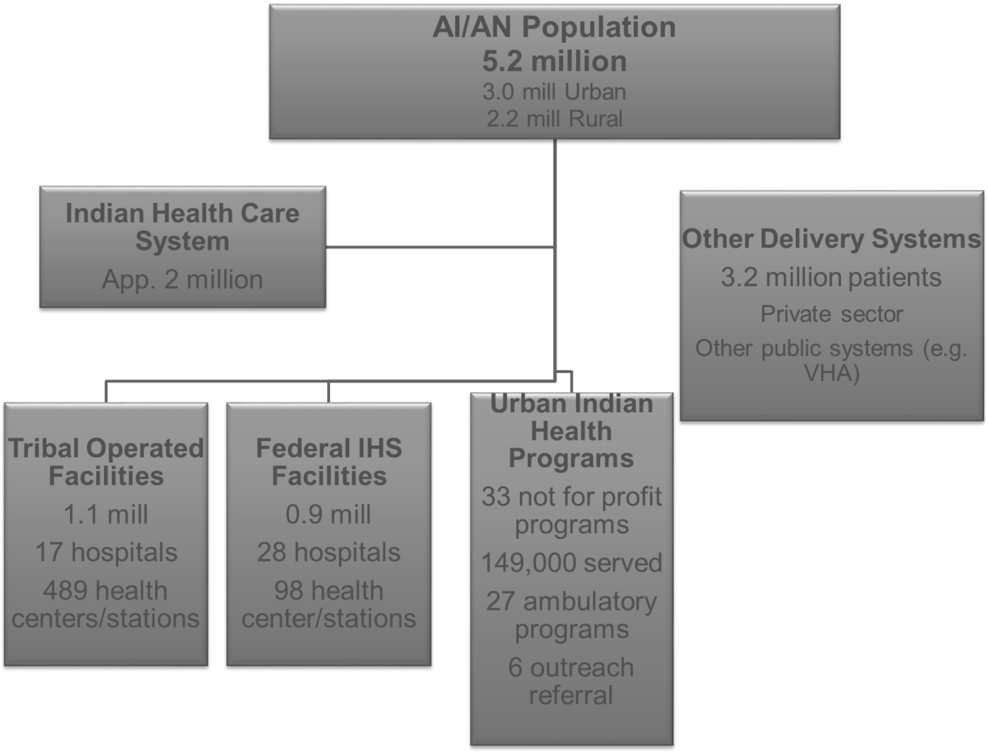

Figure 2.2 Structure of Healthcare Delivery for AI/AN in the U.S. (adapted from (Sequist, Cullen, & Acton, 2011)

The self-determination Act of 1975 is a policy to end Federal Government domination of AI/AN programs and services and shift control to AI/AN tribes on the premise that tribal participation in the design of federal programs and services will make those programs and services more responsive to the wants, needs, and desires of AI/AN communities (Bureau of Indian Affairs, 2006). Over the past forty years, this shift of management of Indian health programs from IHS to tribes is apparent. Today, 17 out of 45 hospitals and 489 out of 587 ambulatory facilities are directly managed by tribes (Indian Health Service, 2014b).

While IHS system reports that its service population is approximately 2.1 million, this is considerably less than the total AI/AN population reported by the U.S. Census (5.2 million) and more than those who actually uses the IHS system for service (1.6 million) (Figure 2.2)(Department of Health and Human Services, 2013; Norris, 2012). This is partly due to the majority of IHS and tribal facilities being located in rural areas and not being accessible to 60% of the AI/AN population that reside in urban communities (Castor et al., 2006).

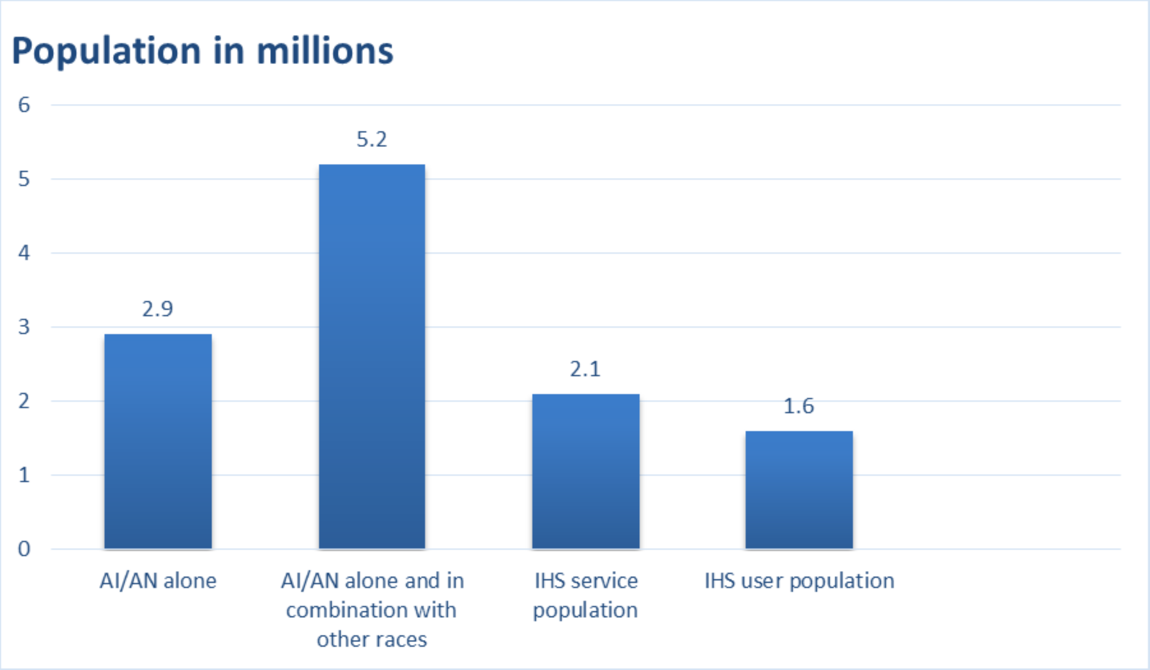

Figure 2.3 AI/AN Population and IHS Service and Use

Sources: U.S. Census, 2010; IHS FY FY2012 and 2014
IHS Service Population: AI/AN people identified to be eligible for IHS services.
IHS user population: AI/AN people who have used IHS services at least once during the last three year period according to their community of residence.

Similar to the gaps in the federal healthcare noticed among AI/AN across the U.S., California has similar disparities among their AI/AN population (Figure 2.5). While there are 627,562 AI/AN in California, most seek care outside of the IHS System.

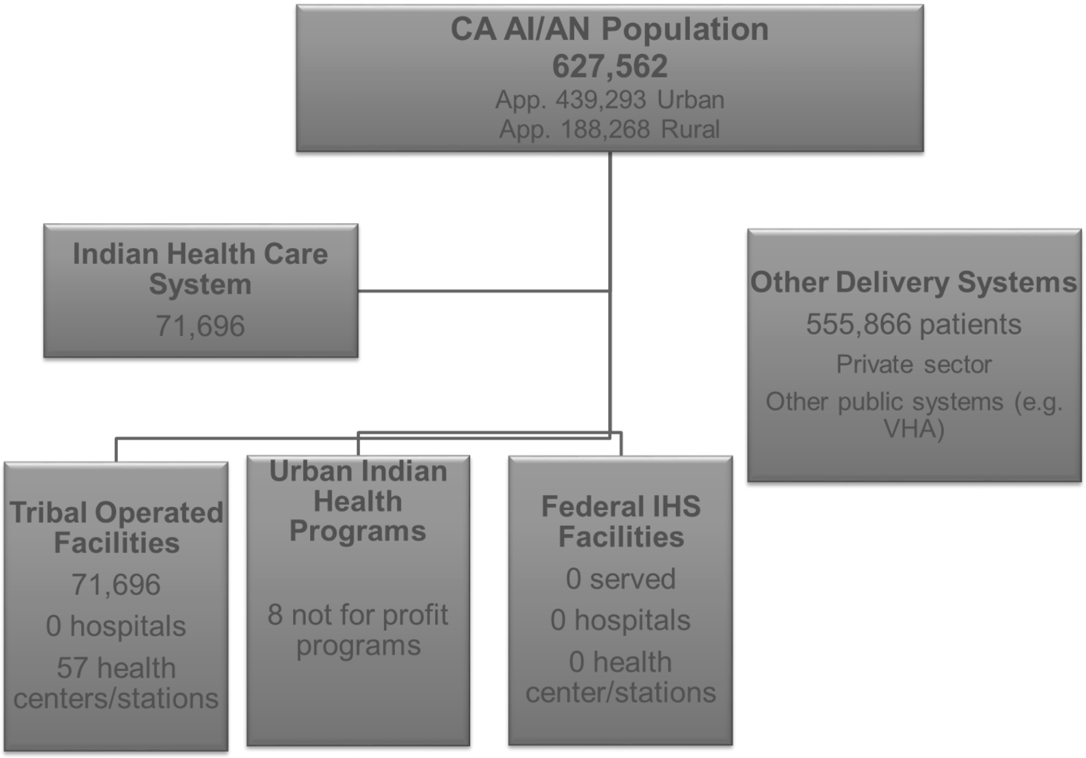

Figure 2.4 Structure of Healthcare Delivery for AI/AN in California

While the Patient Protection and Affordable Care Act (ACA)("Patient Protection and Affordable Care Act," 2010) permanently reauthorized the Indian Health Care Improvement Act, the main law which facilitates health coverage for AI/AN, the IHS system still remains a discretionary budget item which is subject to change based on congressional priorities (Table 2.2). The reliance on discretionary spending for AIAN healthcare has resulted in a system that is insufficient, unreliable and subsequently associated with ongoing health disparities (Westmoreland & Watson, 2006). The IHS system has a long history of being chronically underfunded (Dixon, 2001; Sequist, Cullen, Bernard, et al., 2011). It only receives half of the Congress-appropriated funds needed to adequately serve their patients (Westmoreland & Watson, 2006), which clearly is not sufficient to serve their current population, let alone the entire AI/AN population. For example, only 1% of the federal Indian Health Service budget is earmarked for urban health care (Castor et al., 2006; Duran et al., 2005), even though 60% of the AI/AN population lives in urban communities (Castor et al., 2006). In general, this lack of funding negatively impacts the sub-specialty care services that are routinely available at IHS facilities, making prioritization based on clinical urgency (Sequist, Cullen, Bernard, et al., 2011). In a study conducted among IHS physicians, it was found that IHS did not have adequate access to high-quality specialists and reported a lack of high-quality diagnostic imaging and mental health services due to the scarcity of equipment and resources to perform screenings, such as mammography and diabetic eye exams (Sequist, Cullen, Bernard, et al., 2011). Further, having limited resources and a weakened infrastructure makes IHS ineffective at minimizing the incidence and associated health complications of diseases such as diabetes (Acton et al., 2001).

Table 2.2 Indian Health Service Budget

Category	**FY 2006**	**FY 2011**	**FY 2015**
Clinical Services	2,176,220	2,962,621	3,243,045
Preventive Health Services	117,110	144,027	155,857
Other Services			
Urban Health	32,744	43,053	41,375
Indian Health Professions	31,039	40,661	38,466
Tribal Management	2,394	2,581	2,442
Direct Operations/Agency Management	62,194	68,583	68,065
Self-Governance	5,668	6,054	5,727

Contract Support Cost	264,730	397,693	617,205
Sub-Total Other	398,769	558,625	773,280
Total Services	2,692,099	3,665,273	4,172,182
Facilities	353,211	403,947	461,995
TOTAL SERVICES AND FACILITIES[1]	3,045,310	4,069,220	4,634,177
Medicare/Medical Collections	606,324	823,688	1,067,658[2]
Private Insurance Collections	75,101	80,467	90,303[2]
VA Reimbursement[3]	0	0	39,000
Quarters Collections	6,288	6,288	8,000
Advance Transfer Appropriation: Diabetes	150,000	150,000	150,000
TOTAL IHS[4] – CURRENT $s	3,726,735	4,973,375	5,831,138
TOTAL IHS[4]- CONSTANT $s[5]	3,273,833	3,915,660	4,340,877

In addition, federal and tribal operated services sites are situated in remote locations (Roubideaux, 2002), posing a time and travel challenge for many tribal members. There are also shortages of physicians at IHS facilities (Sequist, Cullen, & Acton, 2011), with a physician vacancy rate of 20% for health professionals (Sequist, Cullen, Bernard, et al., 2011) and nearly 30% for dentistry (Warne, 2007). Additionally, health care professionals at IHS tend to not be AI/AN, which may affect the receipt of receiving culturally appropriate care.

IHS has contributed to better health outcomes from 1955 to present through the control of infectious diseases, the reduction of gastroenteritis deaths among children, and safe water projects (E. R. Rhoades & Rhoades, 2014). However, the epidemiological transition from AI/AN populations being afflicted by infectious disease, such as smallpox, has now shifted to chronic diseases such as cardiovascular diseases and diabetes observed today (Kunitz, 2008a). This has posed a huge dilemma because IHS was initially structured to provide acute care (Roubideaux, 2002), which is not sufficient to provide for those suffering from chronic diseases.

In addition, IHS System does not have a component related to public health, preventative care nor long term care, all being a necessity for older AI/AN.

Insurance Status and Usual Source of Care

While ‘access’ to health care is a multifaceted concept that can be assessed on several dimensions (Gulliford et al., 2002), it can be defined as “the timely use of personal health services to achieve the best health outcomes” (Institute of Medicine, 1993). There are three specific steps for acquiring good access to care: gaining entry into the health care system; getting access to sites of care where patients can receive needed services; and finding providers who meet the needs of individual patients and with whom patients can develop a relationship based on mutual communication and trust (DHHS, 2010). In addition, measures for health care access includes having health insurance or usual source of care, patients’ assessment of ease of access to health care, and the successful receipt of needed services. It is widely known that people with a usual source of care (a provider or facility where one regularly receives care) experience improved health outcomes, reduced disparities among different groups (Starfield & Shi, 2004) and are more likely to receive preventive health services (Ettner, 1996).

In each consecutive year between 2000 and 2012, AI/AN under age 65 were less likely than whites to have health insurance (in 2012, 73.0% compared with 83.3%) (U.S. Department of Health and Human Services, 2014). Approximately 24% of AI/AN compared to 18% of whites in the state of California reported having no health insurance for all or part of the past year (UCLA, 2012). AI/AN over the age of 65 may utilize Medicare exclusively or in part with private or public insurance.

Similar to other Americans with employment, AI/AN may access insurance through their employer or through state programs, such as Medicaid. Medicaid is an important source of health insurance coverage for approximately 700,000 AI/AN, which helps fill the gaps in private coverage. It also serves as a source of funding for IHS. While many AI/AN are eligible for insurance, 30% remain uninsured due to many barriers (Kaiser, 2011). These barriers include mistrust of federal and state government due to historical experiences or preference for IHS and the belief that the federal government has a trust responsibility to provide all needed care through the IHS (Langwell, Laschober, Cox, & Schur, 2003).

Enrolled member of a tribe

Being an enrolled member of a specific tribe helps to preserve the culture and tradition of customs, history, language, religious beliefs and practices and is set apart from the traditions of other tribal communities (Bureau of Indian Affairs). Enrollment gives a tribal member the right to be a part of the political landscape through voting in tribal elections, serving in tribal leadership, and the ability to exercise the use of tribal treaty rights (such as hunting, fishing, and gathering) within the tribe's jurisdiction. Further, an enrolled member has the right to participate in the sharing of tribal assets, and to receive tribal services and benefits such as healthcare (Bureau of Indian Affairs). In addition, an enrolled member may have access to tribal lands outside of their own for use of traditional purposes such as plant gathering (Satter, 2015).

Criteria for tribal enrollment is established by tribes and may in many cases may be determined by "blood quantum." Blood quantum, usually characterized as full-blood, half-blood, quarter-blood, etc., is a simile for ancestry, with the more traceable blood that an individual may have, the stronger their ancestral and ties to a particular tribal community. The U.S. government originally introduced blood quantum laws as a way to maintain power and determine eligibility of certain benefits (Garroutte, 2001; Miller, 2014). However, this criterion was later adopted by many tribes and is still used by many today. While the Bureau of Indian

Affairs issues a “Certificate of Degree of Indian or Alaska Native Blood (CDIB)” to assist individuals in establishing their eligibility for programs and services based upon their status as AI/AN (Federal Register, 2000), each tribe has their own requirement and may not necessarily require a CDIB. For example, some require blood quantum to match the specific tribe (Hoopa Valley Tribe, 2003); or blood quantum of any Indian descent (Colorado River Indian Tribes, 1975); or lineal descent (Choctaw Nation of Oklahoma, 1983) through matrilineal or patrilineal descent (Pueblo of Santa Clara, 1935), or some combination of these criteria.

Need Factors

Self-rated Health

Self-rated health (SRH) is a valid and reliable measure of well-being and a powerful predictor of future health and use of health services (Shields & Shooshtari, 2001). While there are variations of the question that is asked to capture SRH, the most widely used question is asked in the following way: “In general, would you say your health is excellent, very good, good, fair or poor?” SRH is an indicator of one’s valuation of the importance of their health problems (Andersen et al., 2011). Jylha (2009) states that

> “self –rated health is a statistical (rather than a causative) predictor of mortality because of its ability to reflect the state of the human organism; the accuracy with which it can reflect this state depends on the comprehensiveness and accuracy of the information that the individual incorporates into the self-rating.”

It is an encompassing measure and is predictive of mortality, chronic disease incidence, recovery from illness, functional decline and the use of medical services (Jylha, 2009; Shields & Shooshtari, 2001), even when more objective health measures are taken into account (Shields & Shooshtari, 2001).

Overall, predisposing and enabling variables such as age, gender, race/ethnicity, education and income have all been significantly associated with SRH (Benjamins, Hummer, Eberstein, & Nam, 2004). For example, women tend to have poorer SRH than men (Zack, Moriarty, Stroup, Ford, & Mokdad, 2004). This is likely due to women considering more factors in their evaluation such as psychological influences and the presence of non-life threatening illnesses (Shields & Shooshtari, 2001). Also, self-ratings of health tend to be poor if an individual is older, non- white, have low-income and is less educated (Badland, Turrell, & Giles-Corti, 2013; Benjamins et al., 2004; Min, Rhee, Lee, Rhee, & Tran, 2014; Shields & Shooshtari, 2001; Zack et al., 2004).

The use of a single item measure of self-rated health to measure health status in different ethnic groups, is valid (Chandola & Jenkinson, 2000). Therefore, it is plausible to state that this measure is also valid among AI/AN. While minorities usually perceive their health to be poor when compared to whites, understanding the differences observed among different nationalities may provide a better lens to understand health disparities and possible courses of action to mitigate these disparities.

Sociodemographic status is a significant predictor of self-rated health. In general, as age increases worse self-rated health is likely observed. Older AI/AN were significantly more likely to report poorer overall health (Poltavski, Holm, Vogeltanz-Holm, & McDonald, 2010). In one study, they looked at different categories of “old” age groups to assess this relationship and found that AI/AN 55-64 years tend to have a fair/poorer self-rated health when compared to 18-54 year olds; while 65 and older AI/AN were less likely to have a poorer self-rating when compared to 18-54 year olds (Wilson et al., 2011).

In an Aboriginal study, males tend to have fair/poorer self-rated health status than females (Wilson et al., 2011); which contradicts what is observed among the general population and in other studies of AI/AN when stratified by sex. Other studies have shown that AI/AN females tend to have fair/poor health status when compared to AI (Poltavski et al., 2010) men or other populations (Denny et al., 2005). Other trends include individuals with less education (Ruthig, Hanson, Ludtke, & McDonald, 2009; Wilson et al., 2011) and lower income having a higher likelihood of having fair/poor health (Wilson et al., 2011) (Goins, John, Hennessy, Denny, & Buchwald, 2006; Poltavski et al., 2010; Ruthig et al., 2009). On the other hand, one study found that there was no association between education/employment and better health status among AI on reservations (Cheadle et al., 1994). However, this may be due to a narrower range of education and income level on the reservations; therefore, making it inadequate to truly test if health improved as a result of affluence (Cheadle et al., 1994).

Among AI/AN Elders, health behaviors such as exercise and less nutritional risk predicted better self-rated health (Ruthig et al., 2009). However, Elders not having the ability to access needed medical care predicted poor self-rated health (Ruthig et al., 2009). Other factors affecting SRH includes having disabilities. According to CDC, the prevalence of disability was highest among AI/AN (29.9%) compared to the total U.S. population (19.9%) and other racial groups (Centers for Disease Control and Prevention, 2008). As expected, AI/AN with disabilities rated their health as fair or poor compared to persons without disabilities (Centers for Disease Control and Prevention, 2008).

One study encapsulated self-rated health status within a measure called wellness (Hodge & Nandy, 2011). This is an interesting perspective and differs from other studies focused on SRH among AI, as it is inclusive of AI cultural outlook of the interconnectivity of life. This concept of wellness not only includes the absence of disease, but the balance of environmental traits to include physical, mental, emotional, and spiritual well-being, which together, maintains good health status (Hodge & Nandy, 2011). This wellness measure was dichotomized into poor wellness, which was considered fair/poor and good wellness considered as excellent/very good. It is likely that this wellness measure is closely related and similar to the self-rated health measure, because a significantly higher proportion of participants reporting fair/poor wellness also reported having a poor SRH.

Similar to poor SRH, individuals in the poor wellness group were most likely obese (Hodge & Nandy, 2011; Poltavski et al., 2010); suffered from diabetes; and reported having activity limitations when compared to the good wellness group (Hodge & Nandy, 2011). Interestingly, both the poor and good wellness groups were similar with respect to smoking status (i.e., current, former, never). There were different measures of cultural connectivity, such as the ability to speak their tribal language, participation in AI practices and feeling connected to community—all associated with the good wellness group.

Heath care barriers are also associated with self-rated health. Interestingly, as age increases the likelihood of contacting a traditional healer decreased (Wilson et al., 2011) among Aboriginals. However, this may likely be due to underreporting because of the historical trauma associated with being shipped to boarding schools and the subsequent prohibition of engaging in traditional practices (Dixon, 2001; Wilson et al., 2011) , such as a traditional healer. AI living in a rural area are more likely to report fair/poor health than AI in urban settings (Wilson et al., 2011). Understandably, it’s been observed that AI living on reservations, compared to the rest of the population have poor self-rated health (Cheadle et al., 1994).

Across various health outcomes self-report diagnosis has good reliability, sensitivity and validity when compared to physician self-report (McAdams et al., 2011; Rispens et al., 2015; Schneider, Pankow, Heiss, & Selvin, 2012). The SRH rating has also been extended to include other measures. CDC's health-related quality of life measures consists of four questions from the Behavior Risk Surveillance System (BRFSS) and National Health and Nutrition Examination Survey (NHANES) that assesses self-rated health, physically unhealthy days, mentally unhealthy days, and days with activity limitation (Zahran, Kobau, Moriarty, Zack, Holt, Donehoo, et al., 2005). According to a surveillance report that highlighted health-related quality of life surveillance, the percentage of AI/AN with fair/poor health was higher compared to other racial groups; reported mean number of unhealthy days was higher; and mean number of mentally unhealthy days were higher (Zahran, Kobau, Moriarty, Zack, Holt, Donehoo, et al., 2005).

Diabetes

Diabetes is the fourth leading cause of death among AI/AN (Centers for Disease Control and Prevention, 2015b). AI/AN are twice as likely to have diabetes compared to the general U.S. population and are more than four times as likely to die from the disease (Gittelsohn & Rowan, 2011) (J. O'Connell et al., 2010). Nationally, more than one in five AI Elders have diabetes (Denny et al., 2005), which is usually associated with an increase in other chronic health conditions. One study conducted in Montana found that AI/AN persons over 45 years of age were 3.36 times more likely to have diabetes compared to non AI/AN persons (Harwell et al., 2001). In some communities, 40-50% of adults are diabetic (Roubideaux, 2002), such as the Pima Indians of Arizona (Knowler et al., 1990). Similarly, results from the Native Elder Care Study, a community sample, showed that the prevalence of AI/AN ≥ 55 years old was 42%

(Goins & Pilkerton, 2010). The prevalence of diabetes among AI/AN adults 50 years and over was 22.9% compared to 12% for non-Hispanic whites (Balluz et al., 2008).

There are a myriad of complications related to having diabetes. Compared to U.S. adults with diabetes, AI/AN diabetic adults are significantly more likely to have end stage renal disease (ESRD), neuropathy, possible blindness, mental health disorders, and are 10 times more likely to have lower-extremity amputations (J. O'Connell et al., 2010). Having these additional comorbidities complicates diabetes treatment; decreases overall quality of life; and increases the chance of death (J. O'Connell et al., 2010). Unfortunately, coping with these disabilities are made more complicated with access to transportation issues, a concern for many older adults (Roubideaux & Acton, 2001).

In addition to the health consequences of diabetes, the financial burden is exorbitantly high. The total estimated costs of diagnosed diabetes in 2012 was $245 billion, which includes $176 billion in direct medical costs and $69 billion in lost productivity (American Diabetes Association, 2013). Among states, California has the largest population with diabetes and thus the highest costs, at $27.6 billion (American Diabetes Association, 2013). The largest portion of medical expenditures are inpatient hospital care and medications to treat complications such as damage to the eyes, heart, blood vessels, nervous system, teeth and gums, feet and skin, or kidneys (American Diabetes Association, 2013). Older adults, especially 65 years and older, contribute to a significant amount of costs, as they use a substantially larger portion of services, specifically hospital inpatient days, nursing/residential facility days, and prescription medications (American Diabetes Association, 2013).

People diagnosed with diabetes have medical expenditures approximately 2 times higher than what expenditures would be in the absence of diabetes (American Diabetes Association, 2013; Fu, Qiu, Radican, & Wells, 2009). The government covers the majority of the cost (62.4%) through insurance such as Medicare and Medicaid; the remaining cost is paid for by private insurance (34.4%) or by the uninsured (3.2%) (American Diabetes Association, 2013). Similarly to the high burden of costs due to diabetes among the U.S. population, approximately 1 of every 3 IHS dollars were spent on service utilization and treatment costs (JM. O'Connell, Wilson, Manson, & Acton, 2012). In addition, IHS treatment costs for AI/AN with diabetes were 3.6 times those without diabetes (JM. O'Connell et al., 2012). IHS noted that in 2009, Medicare costs per year for one patient on hemodialysis (a common treatment for kidney failure) were $82,285.

Insurance status impacts the utilization of needed services and how these services are delivered. According to the American Diabetes Association, persons with diabetes who do not have health insurance have 79% fewer physician office visits and are prescribed 68% fewer medications than people with insurance coverage (American Diabetes Association, 2013). However, individuals without insurance have 55% more emergency department visits than people who have insurance (American Diabetes Association, 2013). The complications and costs due to diabetes underscore the need for prevention and targeted efforts at the risk factors associated with this disease.

Initiatives related to Diabetes

In response to the disproportionate rate of diabetes among the AI/AN population, Congress established the Special Diabetes Program for Indians (SDPI) within IHS in 1997 (IHS, 2012). The goal of this program is to promote evidence-based interventions in AI/AN communities across the nation. This program provides funds to 404 IHS, tribal and urban Indian health programs (IHS, 2012). In addition, SDPI has resulted in demonstration projects and specific initiatives which have facilitated the documentation of outcomes and dissemination of best practices throughout the Indian health system. In an evaluation of SDPI's Community-Directed Diabetes Programs there has been a noteworthy increase in access to diabetes treatment and prevention services between the time before SDPI funding was available in 1997 and 2010 (Table 2.3) (IHS, 2012b). Also, there have been improvements in outcomes related to mean blood sugar and LDL cholesterol (IHS, 2012b). Further, between 1995 and 2006, the incident rate of ESRD in AI/AN persons with diabetes fell by 27.7%, which was a greater decline than for any other racial or ethnic group (Figure 2.3) (IHS, 2012b).

Table 2.3. Pre (1997) and Post (2010) Special Diabetes Program for Indians

	1997*	2010
Diabetes clinics	31%	71%
Diabetes clinical teams	30%	94%
Diabetes patient registries	34%	94%
Nutrition services for adults	39%	89%
Access to registered dietitians	37%	77%
Culturally tailored diabetes education	36%	99%
Access to physical activity specialists	8%	74%
Adult weight management programs	19%	76%

*Before SDPI funding was available

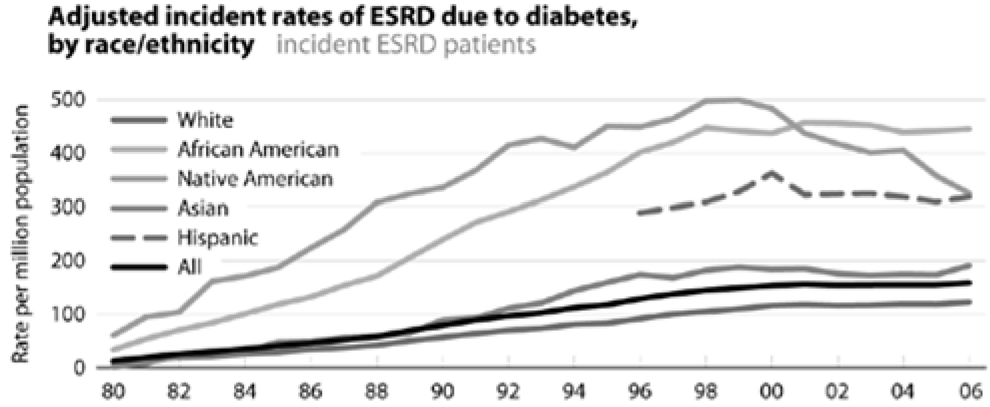

Figure 2.5 Incident Rate of ESRD due to Diabetes 1980-2006

Other diabetes initiatives include the Native Diabetes Wellness Program (CDC, 2013) established by the Centers for Disease Control and Prevention; National Diabetes Education Program (Centers for Disease Control and Prevention, 2015b) supported by national, public and private partners; and the “Awakening the Spirit” Campaign (American Diabetes Association, 2014) supported by the American Diabetes Association. Together, these initiatives and programs support approaches to promote the use of traditional foods, physical activity, social support, and health policy change in communities. In addition, they work with partners to reduce the burden of diabetes and pre-diabetes by facilitating the adoption of evidence-based approaches to prevent or delay the onset of Type 2 diabetes and its complications (American Diabetes Association, 2014; CDC, 2013; Centers for Disease Control and Prevention, 2015b).

In recent years, there has been a decrease in diabetes related deaths. A new study that looked at twenty year trends for diabetes as a cause of death showed an increase from 1990-1997 and then decline among AI/AN population overall from 1997-2009 (Cho et al., 2014). The overall decline observed from 1997-2009 suggests that the SDPI, which was established during 2007, may have contributed to these results. However, this decline was not observed across all segments of the AI/AN population. The 2009 rates of diabetes as a cause of death among young adults (20-44 years), older adults ($\geq$ 75 years) and men were greater than 20 years prior (Cho et al., 2014). These findings may suggest that AI/AN are possibly living longer due to increased access to treatment and prevention services or possibly dying from diabetes at older ages (Cho et al., 2014). Further, the overall decline in mortality has not translated to a decrease in the number of adults with diabetes.

Heart Disease

While 16% of cardiovascular disease (heart disease) deaths can be attributed to diabetes (American Diabetes Association, 2008, 2013), alone it accounts for 25% of U.S. deaths each year (Centers for Disease Control and Prevention, 2015c) and is responsible for more deaths among AIAN than any other cause(Centers for Disease Control and Prevention, 2015a) . Overall, studies among AI/AN overall, as well as specific tribal communities, have highlighted the heavy burden of heart disease among Native people (Barnes et al., 2010b; Casper ML, 2005). A report from the CDC has shown that the prevalence of CVD among AI/AN is much higher than non-Hispanic whites (14.7% vs. 12.2%) (Barnes et al., 2010b) and the percentage of premature deaths is higher among the AI/AN population than among any other racial or ethnic group in the United States (Centers for Disease Control and Prevention, 2004). Further, 36% of those who die of heart disease die before the age of 65 (Centers for Disease Control and Prevention, 2004).

Disparities are also observed on the state and community level. In Minnesota, AI ≥ 45 years old reported a significantly higher prevalence of CVD compared to non-AI and reported higher rates of diabetes (BRFSS) (Harwell et al., 2001). In the latest Racial and Ethnic Approaches to Community Health (REACH) report on health status in minority communities, it was found that the median prevalence of cardiovascular disease and diabetes among AI men (13.4%, 18.0%) and AI women (12.3%, 18.4%) were higher than other minority communities as well as the national median for both men (8.8%, 8.8%) and women (6.3%, 8.2%), respectively (Liao et al., 2011). In one study of AI/AN women, those who self-reported being diagnosed with cardiovascular disease were older, less educated, employed less, reported more AI ancestry (higher blood quantum), had higher prevalence rates of diabetes, higher systolic blood pressure, and higher body mass index in comparison to women who self-reported an absence of cardiovascular disease (Struthers, Baker, & Savik, 2006).

Initiative related to Heart Disease

A new initiative through the CDC called, A *Comprehensive Approach to Good Health and Wellness in Indian Country*, began in 2014 aimed at preventing heart disease, diabetes, stroke, and associated risk factors in American Indian tribes and Alaska Native villages. This program supports tribes and tribal organizations in using community chosen and culturally adapted public health interventions to reduce commercial tobacco use and exposure; improve nutrition and physical activity; increase support for breastfeeding; increase health literacy; and strengthen team-based care and links between community resources and clinical services (Centers for Disease Control and Prevention, 2014).

Risk Factors

Cardiovascular disease (CVD), cigarette smoking and obesity all serve as risk factors for diabetes. In fact, obesity alone serves as a strong risk factor for diabetes (Gittelsohn & Rowan, 2011) and AI/AN rates of obesity exceed that of the general population (Hodge, Cantrell, & Kim, 2011). Other risk factors related to diabetes include parental diabetes, degree of Indian heritage, and high fat diets (Knowler, Saad, Pettitt, Nelson, & Bennett, 1993; E. T. Lee et al., 1995). More than 80% of AI/AN adults are either overweight or obese (IHS, 2011), which places this population at an increased risk for cardiovascular disease. The past several decades have shown increases in the prevalence of many risk factors of CVD (Galloway, 2002), which are also shared with diabetes, including obesity (Amparo, Farr, & Dietz, 2011; Hassin, Joe, & Young, 2010; Hodge et al., 2011; Slattery et al., 2010), diabetes, high blood pressure (Amparo et al., 2011;

Struthers et al., 2006), smoking (Struthers et al., 2006), high cholesterol (Harjo, Perez, Lopez, & Wong, 2011; Struthers et al.), and a sedentary lifestyle (Struthers et al., 2006).

Food and Environment

The food and activity environment of communities is also a particularly significant contributor to health. The increases in risk factors noted among AI/ANs appear in part related to changes in lifestyle and a more westernized diet, with an overall increase in food availability and consumption (Edwards & Patchell, 2009). Prior to colonization, diabetes and CVD, along with their risk factors did not exist. AI/AN tribes have a history of a healthy food system, including the cultivation of agricultural crops (Edwards & Patchell, 2009). Once American Indians had been forced to relinquish their land to live on government-sponsored reservations, traditional, fresh tribal foods were replaced with processed foods that were rationed by U.S. federal government officials – in particular lard, flour, and salt (Weber, 2011). As a result, fried and heavily processed foods became embedded in American Indian culture. Furthermore, stores managed by the Bureau of Indian Affairs (BIA) are often the only stores available to tribal members living on reservations and often sell largely processed foods (Weber, 2011).

Summary

The federal government has not lived up to the trust responsibility entered when land was taken or traded in exchange for healthcare and as a result AI/AN continue to suffer disproportionately from poor health outcomes. It is clear through review of the literature that the prevalence of health outcomes, specifically diabetes and heart disease and their associated risk factors are much higher among AI/AN compared to other racial groups. Further, increasing age compounds these risk factors, resulting in older AI/AN being more vulnerable to having these poor health outcomes. However, simply considering the health outcomes is not enough. It is necessary to consider other factors (predisposing, enabling and need) in order to have a more robust understanding of the issue with the goal of creating and/or improving interventions targeted at older AI/AN.

Overall, the literature is sparse as it relates to older AI/AN. First, the age of older AI/AN varies, with the majority of studies defining age at 55, 60 or 65 years old. Further, previous studies have investigated diabetes care and management (Kim, Ford, et al., 2012; Kirk et al., 2015; Roubideaux et al., 2004), functional limitations (Fuller-Thomson & Minkler, 2005) and patterns of comorbidities (Chapleski et al., 1997; Goins & Pilkerton, 2010; John et al., 2003) among older AI/AN population. However, very little research has focused on the effect and association of factors related to multiple disease categories, specifically “Heart Disease only,” and “Diabetes only”. While unrelated to the AI/AN population, one study utilized similar “CVD and diabetes” categories and found that participants diagnosed with “CVD only” were age 75 years and older and participants in this age group were significantly more likely to be diagnosed with “CVD and diabetes” compared to younger participants (Smith, Honore Goltz, Ahn, Dickerson, & Ory, 2012).

Further, it is well known that having a usual source of care improves an individual’s chances of having improved health outcomes. However, the literature is sparse on where older AI/AN are going for their usual source of care. While the IHS exists and was created to uphold the federal government’s responsibility of having the best healthcare possible; it is clear that this is not happening. Considering the complexities around health care access among AI/AN, further exploration is warranted on where older AI/AN are going for care and how best to reach them in order to prevent and manage health outcomes, such as heart disease and diabetes. The Andersen and Aday Vulnerability framework provides an opportunity to identify the factors related to having a usual source of care among older AI/AN in order to facilitate or enhance appropriate interventions.

To help address these research needs and provide appropriate policy recommendations, this dissertation has two purposes that are addressed by two manuscripts. In Chapter 3, the first manuscript seeks to identify the factors related to chronic disease diagnosis among older AI/AN age 45 years and older. There are three diagnosis categories that will be explored: “Heart Disease (HD) only,” “Diabetes (D) only,” and “neither HD nor D.”

In Chapter 4, the second manuscript seeks to identify the predictors of having a usual source of care among older American Indians and Alaska Natives in order to understand where older AI/AN are going for their care. Both manuscripts will use secondary data from the 2005, 2009, and 2011-2012 California Health Interview Survey (CHIS). This survey includes information on health status and conditions, diet, physical activity, health related behaviors, health insurance coverage, access and utilization of health care, and mental health. The state of California is chosen for this analysis for two reasons. First, California has the largest number of AI/AN compared to any other state, with 109 federally recognized Indian tribes (Bureau of Indian Affairs, 2015b) and total population of 362,801 (Norris, 2012). Second, the California Health Interview Survey (CHIS) is a public use data set that is readily accessible, includes the variables of interest and oversamples for the AI/AN population in California.

CHAPTER 3

CHRONIC DISEASE DIAGNOSIS AMONG OLDER AMERICAN INDIANS AND ALASKA NATIVES IN CALIFORNIA[1]

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[1] LaTisha L. Marshall, Matthew Smith, Joel Lee, Delight Satter, Marsha Davis. To be submitted to *Preventing Chronic Disease*.

Abstract

Introduction: Chronic diseases such as heart disease and diabetes are major public health problems among American Indians/Alaska Natives (AI/AN) and contributes to an excess in morbidity and mortality, as well as an exorbitant amount of healthcare costs. The aging population is growing; making older AI/AN particularly vulnerable to these diseases and their associated comorbidities. This study aims to assess the factors related to chronic disease diagnosis among older AI/AN in California.

Methods: Using a cross-sectional analysis of data from AI/AN adults 45 years and older who participated in the 2005, 2009 and 2011-2012 California Health Interview Survey, we assess the factors related to chronic disease diagnosis. There are three disease diagnosis categories explored: "Heart Disease (HD) only," "Diabetes (D) only," and neither HD nor D".

Results: Age and self-rated heath were the two factors significantly associated with having a diagnosis of both heart disease and diabetes. In particular, women in the age group of 55-64 were found to be significantly associated with a diabetes diagnosis.

Conclusions: This study underscores the importance of culturally appropriate interventions geared towards education and inclusive of healthcare providers in the prevention and management of heart disease and diabetes.

Keywords: Chronic disease, diabetes, heart disease, Older American Indian/Alaska Native

Introduction

Heart disease and diabetes are major public health problems among American Indians/Alaska Natives (AI/AN). Heart disease is the second leading cause of death among AI/AN and diabetes, a known risk factor, is the fourth leading cause of death among this population. Many studies have reported the disproportionate prevalence of diabetes and heart disease and their known risk factors (Balluz et al., 2008; Centers for Disease Control and Prevention, 2013a; Denny et al., 2005; Finkelstein, Khavjou, Mobley, Haney, & Will, 2004; Harjo et al., 2011; Shaw, Brown, Khan, Mau, & Dillard, 2013).

Older populations are particularly vulnerable to these diseases, their associated comorbidities (Chapleski et al., 1997; Goins & Pilkerton, 2010; John et al., 2003) and functional limitations (Fuller-Thomson & Minkler, 2005). Moreover, the aging population is growing rapidly with projections of AI/AN age 65 and older expecting to almost quadruple between 2012 and 2050 from 266,000 to 996,000 (Ortman, 2014). This fact alone has several implications on the current and future burden of morbidity, mortality and health care costs.

This study aims to expand the current literature through using a state-based survey to assess the factors related to chronic disease diagnosis of heart disease and diabetes among AI/AN 45 years and older in California. There are three categories that will be explored: “Heart Disease (HD) only,”, “Diabetes (D) only” and “neither HD nor D”.

Methods

Sample

We used data from the California Health Interview Survey (CHIS), which is a population-based random digit-dial telephone survey of the state’s non-institutionalized population. The CHIS is conducted every other year and is the largest state health survey in the U.S. The survey is a collaborative study between the University of California, Los Angeles (UCLA) Center for Health Policy Research, the California Department of Health Services, and the Public Health Institute. CHIS collects information for all age groups on health status, health conditions, health-related behaviors, health insurance coverage, access to health care services, and other health related issues. The CHIS sample is representative of California's population living in households. The present study used adult data from 3 cycles: 2005 (N=43,020), 2009 (*N* = 47,614) and 2011-2012 (N=42,935). The 2005 CHIS data were collected between July 2005 and April 2006; 2009 data collected between September 2009 and April 2010; and 2011-2012 collected between June 2011 and January 2012. Data from 2007 were excluded due to a difference in the collection of a variable of interest (Harlin, 2015) compared to the other years. Detailed information regarding sampling methods for respective years is available via the CHIS webpage (http://healthpolicy.ucla.edu/chis/design/Pages/sample.aspx).

We pooled public use CHIS data from the 2005, 2009, and 2011-2012 to increase the stability of estimates for AI/AN. Data were merged with a survey cycle indicator and yielded a total of 133,569 completed interviews for adults 18 years and older. We only kept records for self-reported AI/AN adults aged 45 years and older who had no missing information on all dependent and independent variables that were included in the analysis. As a result, the overall analysis dataset used had a sample of 2,654 AI/AN. The age group of 45 years and older was chosen based on the recognition that chronic diseases occur earlier among American Indian and Alaska Natives relative to the U.S. population (BJ Kramer, 1997; National Indian Council on Aging 1981). The use of publicly available CHIS data, which is non-identifiable and is inclusive of the current study, does not fulfill the criteria for Human Subject Research by the University of Georgia, and is exempt from review by the Institutional Review Board.

Measures

An individual was defined as AI/AN if the respondent self-described themselves as "American Indian or Alaska Native." Respondents were also questioned about whether they were enrolled in a federal or state recognized tribe and they were questioned about their tribal heritage. Based on the responses related to tribal heritage they were grouped accordingly and placed in the category "California tribe" where appropriate.

Dependent variable

The dependent variable was the respondent's self-reported disease diagnoses. Self-reported disease diagnosis categories included having neither heart disease nor diabetes (neither HD nor D); heart disease only (HD only); or diabetes only (D only). The presence of diabetes was first assessed by asking respondents, "Has a doctor ever told you that you have diabetes or sugar diabetes (other than during pregnancy)?" Response options were "yes", "no", or "borderline or prediabetes.". Respondents who answered affirmatively were then asked, "Were you told that you had Type 1 or Type 2 diabetes?" Response options were "Type 1" "Type 2" or "another Type." Self- reported heart disease was assessed by the question, "Has a doctor ever told you that you have any kind of heart disease?" Respondents were considered having "heart disease only" if they responded "yes to ever being told they had heart disease and if they never been told that they had diabetes. Respondents were categorized as having "diabetes only" if they answered "yes" to ever being told they had diabetes, stated they had "Type 2" diabetes and if they had never been told that they had heart disease. Respondents were considered having “neither heart disease nor diabetes” if respondents considered not having diabetes if they answered, “no” or “borderline or prediabetes” to the first diabetes question or if they answered “type 1” or “another type” to the second diabetes question and answered “no” to ever being told that they had heart disease. These variables were combined to create a single 4-category variable based on participants’ disease diagnoses. Response choices for this variable included “neither HD nor D,” “HD only,” “D only,” and “HD and D.” However, because of the small number of cases for participants diagnosed with both HD and D, this category was dropped from analyses.

Independent variables

The independent variables were selected based on different components of the Andersen /Aday Vulnerability Model. This model posits that ecological and individual factors converge and interact subsequently influencing ones vulnerability to poor health or illness (Shi, 2010). Predisposing factors are demographic characteristics, enabling factors are resources that may facilitate obtaining and using health services, and need factors are health needs of the individual (Shi, 2010).

Predisposing variables

Personal characteristics of the participants included age groups (i.e. 45 to 54 years, 55 to 64 years, 65 to 74 years, 75+ years), sex (male or female), marital status (married or not married), highest educational level attained (less than high school, high school graduate, some college, and more than a bachelor’s degree), and rural or urban residence per Indian Health Service definition.

Enabling variables

Federal Poverty level (<100%, 100-199%, 200-299% or 300 %+) indicates the total annual income of the household as a percent of the Federal Poverty Level. Insurance vs. no insurance was created based on respondent's type of insurance coverage (public, private or uninsured). Other variables include coverage by the Indian Health Service (IHS) and if enrolled in a state or federally recognized tribe.

Need

Self-rated health is a valid measure and predictor of future health (Shields & Shooshtari, 2001). Self-rated health was measured with a single item question, "Would you say that in general your health is excellent, very good, good, fair, or poor?" (Zahran, Kobau, Moriarty, Zack, Holt, & Donehoo, 2005). These five categories were collapsed into three: 1) excellent/very good, 2) good, 3) fair/poor.

Statistical Analysis

We performed all analyses using SAS version 9.3 (SAS Institute, Inc., Cary, NC) and SUDAAN version 11.0 (RTI International, Research Triangle Park, NC) softwares to account for the complex survey design of CHIS and to yield state estimates by using survey weights (final sampling weight and replicate weights). We merged the 2005 data and weights provided by CHIS with the data and weights from 2009 and 2011-2012. We then divided the total weights by three to obtain weights for a single year. These data were weighted to compensate for unequal probabilities of selection, to adjust for nonresponse to ensure that results were consistent with

California population. These pooled data (2005, 2009, 2011-2012) were used for all of the analyses.

First, frequencies were calculated for all variables in relationship to respondent's chronic disease diagnosis (i.e. neither HD nor D, HD only, and D only). Chi-square tests were performed to evaluate independence between the dependent variable and categorized independent variables. All independent variables with a $p < 0.05$ level were considered significant and subsequently included in all regression analyses unless the coefficient of variation (CV) (the ratio of the standard error of the estimate divided by the estimate and multiplied by 100) was greater than 30% for a particular variable or a variable was assessed as part of an interaction. In this study, having such a large CV (> 30%) is associated with a small sample size which consequently results in greater variability, and less stability and reliability in the estimate. CV is a useful tool for determining the stability of estimates, and in order to avoid biases and assumptions, these values were suppressed and not included in subsequent analyses (Lee et al., 2007). Second, multinomial logistic regression was used to identify factors associated with participants' chronic disease diagnosis category (i.e. participants diagnosed with neither HD nor diabetes served as the referent group). Odds ratios (ORs) and corresponding 95% confidence intervals (CI's) were reported. Third, binary logistic regression was performed to identify factors associated with being diagnosed with diabetes only (i.e. being diagnosed with HD only served as the referent group). Again, odds ratios (ORs) and corresponding 95% confidence intervals (CI's) were reported. Since there is an association between age and diabetes/heart disease as well as between gender and diabetes/heart disease, we also tested the interaction of age and gender with diabetes/heart disease.

Results

Table 3.1 presents the weighted characteristics for AI/AN 45 years and older in the pooled CHIS sample. Of the 2,654 study participants, 42.3% were 45-54 years, 29.0% were 55-64 years, 16.8% were 65-74 years and 11.9% were 75 years and older. The greatest proportion of individuals were female (52.7%), married (54.5%), had some level of college education (30.4%), lived in urban areas (61.9%), not an enrolled member in a state or federally recognized tribe (82.9%), had income above the 300% federal poverty level (46.7%), did not have IHS coverage (90.8%), were insured (86.5%), had a usual source of care other than the emergency room (91.0%) and considered themselves in excellent/very good health (42.0%). Approximately 74% of participants had neither been diagnosed with HD or diabetes, while 10.5% were diagnosed with HD only and 15.1% were diagnosed with diabetes only.

In general, the percentage of those diagnosed with HD only increased as age increased. In contrast, the percentage of those diagnosed with diabetes only decreased incrementally as age increased. The proportion of participants age 75 years and older was highest among those with HD only (39.2%) and lowest among those with D only (16.9%) and neither HD nor D (7.1%) (χ^2 =26.27, p<0.001).The proportion of participants with less than a high school education was largest among those diagnosed with HD only (26.6%) and diabetes only (32.4%) compared to participants without HD or diabetes diagnoses (20.8%) (χ^2 =3.62, p=0.0021). A significantly larger proportion of participants who rated their health as fair/poor were diagnosed with HD only (49.5%) and diabetes only (46.02%) (χ^2 =23.06, p<0.001).

Factors associated with chronic disease diagnosis

Table 3.2 presents predisposing, enabling and need factors associated with participants' disease diagnosis. The first model compared participants who were diagnosed with diabetes only to those without HD or diabetes (i.e. the referent group). Participants who were age 65-74 years [OR=4.14 CI (1.70, 10.10), p=0.0020], 75 years and older [OR=2.97, CI (1.10, 7.98), p=0.0312], rated their health as good [OR=5.46, CI (3.17, 9.41), p<0.0001] and fair/poor [OR=8.55, CI (5.47, 13.38), p<0.0001], and women within the age group of 55-64 [OR=6.42 CI (2.87, 14.40), p<0.0001 were significantly more likely to be diagnosed with diabetes only compared to younger participants, those rating their health as excellent, and younger men, respectively. Women [OR=0.38 (0.19, 1.74) p=0.0046] and high school graduates [OR=0.45, CI (0.25, 0.83), p=0.0107] were significantly less likely to be diagnosed with diabetes only compared to men and those with less than a high school education.

The second model compared participants who were diagnosed with heart disease only to those without HD or diabetes (i.e. the referent group). Participants who were age 75 years and older [OR=22.81 CI (9.87, 52.71), p<0.0001], 65-74 years [OR=10.52, CI (4.57, 24.23), p<0.0001], 55-64 years [OR=2.84, CI (1.30, 6.22), p=0.0094] and rated their health as good [OR=1.76, CI (1.14, 2.72), p=0.0118] and fair/poor [OR=5.41, CI (3.60, 8.15), p<0.0001] were significantly more likely to be diagnosed with heart disease only compared to younger participants and those rating their health as excellent/very good, respectively.

Comparisons between being diagnosed with diabetes only and heart disease only

Table 3.3 presents the factors associated with being diagnosed with diabetes only with participants diagnosed with heart disease only (i.e. the referent group). Participants who were age 75 years and older [OR=0.16, CI (0.06, 0.48), p=0.0011], 55-64 years [OR=0.23, CI (0.10, 0.57), p=0.0015], and females [OR=0.37, CI (0.14, 0.97), p=0.0430] were significantly less likely to be diagnosed with diabetes only compared to younger participants and males, respectively. Participants who rated their health as good [OR=2.96, CI (1.39, 6.26), p=0.0050] and were women in the age group of 55-64 [OR=8.60, CI (2.46, 30.05), p=0.0009] significantly more likely to be diagnosed with diabetes only compared to those rating their health as excellent/very good and younger women, respectively.

Discussion

Diabetes and heart disease are major public health problems contributing to an excess in morbidity and mortality among the U.S. population, particularly among AI/AN. This excess burden of heart disease and diabetes is especially of concern due to the impact of an aging population. Using a California sample of AI/AN adults aged 45 years and older, we describe three chronic disease diagnosis (heart disease only, diabetes only and neither heart disease nor diabetes) and assessed factors that predict these diagnoses. Our findings indicate that the factors (i.e. age and self-rated health) related to the diagnosis of heart disease and diabetes among older American Indians mirrors other studies (Berkowitz, Meigs, & Wexler, 2013; Creatore et al., 2010; Harwell et al., 2001; Struthers et al., 2006). The literature is established regarding the greater likelihood of developing heart disease as one’s age increases. This relationship was shown in our study; individuals 75 years and older were nearly 23 times more likely to be diagnosed with heart disease compared to those who were younger and without heart disease. We also observed that the prevalence of being diagnosed with diabetes decreased as age increased. This is supported by the increased risk of being diagnosed with diabetes at an early age (Creatore et al., 2010). Nonetheless, these data serve as the most recent state based data among the largest older population of AI/AN in the U.S.

While gender was not significant in our initial analysis, we were interested in assessing if a relationship existed when paired with age, a significant variable. Therefore we conducted an interaction between these two variables (age and gender) and found that women within the age group of 55-64 are particularly vulnerable to being diagnosed with diabetes, and consequently this may double the likelihood of developing heart disease (Struthers et al., 2006). In general, this disparity is also observed between AI/AN women and non- AI/AN women. AI/AN women have a prevalence that is three and half times higher(Harwell et al., 2001) than non AI/AN women. This suggests that interventions should be targeted towards women, particularly those in the younger age group, as three out of five women between the ages of 18 and 44 were found to have at least three chronic conditions or risk factors related to heart disease and diabetes (Amparo et al., 2011).

Self-rated health was also a significant factor in our study. We found that the odds of being diagnosed with heart disease only and diabetes only increased as the participant's SRH worsened, which is consistent with previous studies; those rating their health poorer were significantly more likely to be diagnosed with a poor health outcome, such as chronic disease (Jonnalagadda & Diwan, 2005). Self-rated health is a well-established measure (Idler & Benyamini, 1997; Strawbridge & Wallhagen, 1999) and found to be predictive of future health, mortality (Bopp, Braun, Gutzwiller, & Faeh, 2012), chronic disease incidence, health behaviors (Hodge & Kotkin-Jaszi, 2009; Hodge & Nandy, 2011; Ruthig et al., 2009), recovery from illness, functional decline and the use of health care services (Ruthig et al., 2009), even when more objective health measures are taken into account (Shields & Shooshtari, 2001).

While this study predominantly assesses the association of self-rated health with chronic disease, research has shown that minority and indigenous populations are more likely to rate their health far worse than majority populations(Badland et al., 2013; Shields & Shooshtari, 2001) and having this perception of health may likely be contributed and /or worsened by other factors, such as stress, discrimination, exclusion, socioeconomic disparities and poor health (Bombak & Bruce, 2012). Further, an individual's attitudes and beliefs about their health are strongly influenced by personal experiences, cultural norms, and societal values (Hodge & Nandy, 2011; Quandt et al., 2013; Ruthig et al., 2009).

This study is subject to a few limitations. First, CHIS is a single state survey and therefore cannot be generalizable to older AI/AN residing in other states. Second, our dependent variables were based on the mutually exclusive diagnosis of diabetes and heart disease, so we cannot make direct comparisons of prevalence with other studies assessing the diagnosis of these diseases. Further, due to small sample sizes, we were unable to assess factors related to being diagnosed with both diabetes and heart disease, as well as other variables of interest. Third, self-reported diagnosis is subject to recall bias; however self-report data is known to be an accurate representation of evaluated diagnosis (McAdams et al., 2011; Rispens et al., 2015; Schneider et al., 2012).

As the population continues to age, the burden of morbidity, mortality and health care costs associated with chronic diseases will continue to rise. This study underscores the importance of interventions geared towards educating tribal communities regarding the prevention and management of heart disease and diabetes in a culturally relevant way. The influence of family and social gatherings are heavily valued among many tribal communities and can affect a person's belief system regarding the prevention and management of diabetes (Quandt et al., 2013). Incorporating the family within interventions may facilitate them serving as a change agent in discussing the ways to prevent, and manage these diseases. In addition, having the positive reinforcement and involvement of family and friends may alleviate the pressure that is found regarding adhering to dietary needs around social gatherings (Jones et al., 2012; Shaw et al., 2013), which is considered a valued time among many AI/AN. Further, promoting cultural activities that are relevant to specific tribes (such as fishing and gathering roots and berries) may promote physical activity and community unity (Mendez-Luck, Bethel, Goins, Schure, & McDermott, 2015).

Other culturally appropriate interventions related to health care providers are necessary as well. Healthcare providers responsible for the care of AI/AN should be culturally sensitive and appropriate when administering care. While the majority of participants in this study have a usual source of care, further exploration is warranted on where older AI/AN are going for care and how best to reach this population in order to prevent and manage heart disease and diabetes.

Table 3.1 Sample Characteristics of American Indians/Alaska Natives by Disease Diagnosis

Characteristic	**Total** (n=2654)	**Neither HD nor Diabetes** (n=1949)	**HD only** (n=339)	**Diabetes Only** (n=366)	**X^2**	**P value**
Predisposing						
Age					26.27	< **0.001**
45-54	42.29% (39.80, 44.82)	48.43% (45.62, 51.25)	14.52% (10.51, 19.71)	31.39% (22.05, 42.53)		
55-64	29.01% (27.00, 31.11)	29.86% (27.59, 32.24)	19.88% (15.26, 25.47)	31.19% (23.82, 39.64)		
65-74	16.79% (14.99, 18.77)	14.67% (12.81, 16.74)	26.44% (21.65, 31.85)	20.56% (13.55, 29.95)		
75+	11.90% (10.24, 13.80)	7.05% (5.81, 8.51)	39.17% (32.05, 46.78)	16.86% (10.47, 26.01)		
Sex					1.29	0.278
Male	47.30% (44.45, 50.17)	46.92% (43.66, 50.21)	42.71% (36.54, 49.11)	52.36% (42.86, 61.70)		
Female	52.70% (49.83, 55.55)	53.08% (49.79, 56.34)	57.29% (50.89, 63.46)	47.64% (38.30, 57.14)		
Marital Status					1.3	0.269
Married	54.51% (51.78, 57.22)	54.06% (50.85, 57.23)	50.20% (43.34, 57.04)	59.77% (50.61, 68.30)		
Not Married	45.49% (42.78, 48.22)	45.94% (42.77, 49.15)	49.80% (42.96, 56.66)	40.23% (31.70, 49.39)		
Education					3.62	**0.002**
<HS	20.57% (18.04, 23.36)	17.33% (14.65, 20.38)	26.56% (19.96, 34.41)	32.42% (23.00, 43.52)		
HS	28.53% (25.89, 31.33)	29.52% (26.56, 32.67)	33.25% (27.20, 39.91)	20.36% (13.69, 29.18)		
Some college	30.38% (27.81, 33.09)	30.73% (28.12, 33.48)	23.72% (18.36, 30.08)	33.31% (23.63, 44.64)		
Bachelors+	20.51% (18.32, 22.88)	22.42% (19.85, 25.22)	16.47% (12.91, 20.76)	13.91% (8.56, 21.80)		
Living area					2.58	0.078
Urban	61.86% (59.33, 64.32)	62.85% (59.99, 65.62)	55.15% (48.90, 61.24)	61.66% (52.52, 70.04)		
Rural	38.14% (35.68, 40.67)	37.15% (34.38, 40.01)	44.85% (38.76, 51.10)	38.34% (29.96, 47.48)		
Enabling						
Enrolled member in recognized tribe					0.6058	0.547
Yes	17.08% (14.81, 19.62)	16.73% (14.31, 19.47)	14.98% (10.73, 20.53)	20.28% (12.91, 30.38)		
No	82.92% (80.38, 85.19)	83.27% (80.53, 85.69)	85.02% (79.47, 89.27)	79.72% (69.62, 87.09)		
Poverty Level					0.8398	0.541
0-99%	16.62%	15.85%	17.41%	19.86%		

	(14.07, 19.53)	(13.09, 19.07)	(12.64, 23.50)	(12.46, 30.15)		
100-199%	20.15% (17.93, 22.56)	19.59% (17.03, 22.43)	22.36% (17.44, 28.19)	21.36% (15.77, 28.26)		
200-299%	16.49% (14.58, 18.61)	15.59% (13.67, 17.72)	17.62% (1367, 22.41)	20.19% (13.40, 29.25)		
300%+	46.74% (43.98, 49.51)	48.97% (45.80, 52.15)	42.61% (36.08, 49.41)	38.59% (28.77, 49.43)		
IHS Coverage					2.59	0.078
Yes	9.22% (7.45, 11.35)	9.43% (7.38, 11.98)	6.35% (4.04, 9.86)	*		
No	90.78% (88.65, 92.55)	90.57% (88.02, 92.62)	93.65% (90.14, 95.96)	88.45% (79.28, 93.88)		
Insurance					38.66	**<0.001**
Uninsured	13.52% (11.50, 15.83)	16.82% (14.33, 19.65)	*	4.91% (3.11, 7.67)		
Insured	86.48% (84.17, 88.50)	83.18% (80.35, 85.67%)	97.47% (95.38, 98.63)	95.09% (92.33, 96.89)		
Usual Source of Care					3.38	0.036
Yes	90.99% (88.43, 91.95)	89.09% (86.80, 91.02)	93.29% (88.54, 96.16)	94.41% (88.25, 97.44)		
No	9.67% (8.05, 11.57)	10.91% (8.98, 13.20)	6.71% (3.84, 11.46)	*		
Need						
Self-rated health					23.06	**<0.001**
Excellent/Very Good	42.02% (38.98, 45.12)	50.19% (46.74, 56.63)	25.56% (19.92, 32.17)	13.21% (9.25, 18.53)		
Good	29.26% (26.38, 32.31)	27.53% (24.60, 30.67)	24.99% (19.36, 31.61)	40.77% (30.10, 52.38)		
Fair/Poor	28.72% (26.03, 31.57)	22.29% (19.56, 25.27)	49.45% (42.50, 56.42)	46.02% (35.92, 56.45)		
Main dependent variables						
Neither HD nor diabetes diagnosis	74.40% (71.49, 77.11)					
Diagnosed with diabetes only	15.08% (12.34, 18.31)					
Diagnosed with HD only	10.52% (9.23, 11.96)					

*Coefficient of Variation (CV) >30%

Table 3.2 Correlates of Disease Diagnosis (n= 2654)

Diagnosed with Diabetes only (2 vs. 3)					Diagnosed with Heart Disease Only (1 vs 3)			
	B	SE	P^a	OR (95% CI)	B	SE	*P*	OR (95% CI)
Age								
45-54	0.00	---	---	1.00	0.00	---	---	1.00
55-64	-0.52	0.34	0.1233	0.59 (0.30, 1.15)	1.04	0.40	**0.0094**	2.84 (1.30, 6.22)
65-74	1.42	0.45	**0.0020**	4.14 (1.70, 10.10)	2.35	0.42	**<0.0001**	10.52 (4.57, 24.23)
75+	1.09	0.50	**0.0312**	2.97 (1.10, 7.98)	3.13	0.42	**<0.0001**	22.81 (9.87, 52.71)
Sex								
Male	0.00	---	---	1.00	0.0	--	---	1.00
Female	-0.97	0.34	**0.0046**	0.38 (0.19, 0.74)	0.12	0.40	0.7685	1.13 (0.51, 2.49)
Education								
<HS	0.0			1.00				1.00
HS	-0.79	0.31	**0.0107**	0.45 (0.25, 0.83)	-0.00	0.25	0.9844	1.00 (0.61, 1.62)
Some college	-0.14	0.29	0.6261	0.87 (0.49, 1.54)	0.00	0.27	0.9894	1.00 (0.59, 1.71)
Bachelors+	-0.66	0.34	0.0537	0.51 (0.26, 1.01)	0.17	0.25	0.4883	1.19 (0.72, 1.96)
Self-rated health								
Excellent/Very Good	0.0	---	---	1.00	0.0	---	---	1.0
Good	1.70	0.28	**<0.0001**	5.46 (3.17, 9.41)	0.56	0.22	**0.0118**	1.76 (1.14, 2.72)
Fair/Poor	2.15	0.23	**<0.0001**	8.55 (5.47, 13.38)	1.69	0.21	**<0.0001**	5.41 (3.60, 8.15)
Year								
2005								
2009	0.26	0.31	0.4124	1.30 (0.70, 2.41)	-0.16	0.24	0.5101	0.86 (0.54, 1.36)
2011-2012	0.06	0.21	0.7624	1.06 (0.71, 1.60)	0.18	0.17	0.2984	1.20 (0.85, 1.69)
55-64*Female	1.86	0.41	**<0.0001**	6.42 (2.87, 14.40)	-0.54	0.50	0.2780	0.58 (0.22, 1.56)
65-74* Female	-0.78	0.50	0.1189	0.46 (0.17, 1.23)	-0.49	0.50	0.3305	0.61 (0.23, 1.65)
75+* Female	0.61	0.64	0.3422	1.84 (0.52, 6.46)	-0.20	0.53	0.6989	0.82 (0.29, 2.31)

Referent group: neither HD nor diabetes diagnoses

[a]P values determined using multinomial logistic regression.

Table 3.3 Correlates of Diabetes Only (n=705)

	B	SE	P[a]	OR
Age				
45-54	---			1.00
55-64	-1.46	0.45	**0.0015**	0.23 (0.10, 0.57)
65-74	-0.99	0.52	0.0570	0.37 (0.13, 1.03)
75+	-1.81	0.54	**0.0011**	0.16 (0.06, 0.48)
Sex				
Male	---			1.00
Female	-1.00	0.49	**0.0430**	0.37 (0.14, 0.97)
Education				
<HS	0.00			1.00
HS	-0.66	0.40	0.0955	0.52 (0.24, 1.13)
Some college	-0.20	0.36	0.5687	0.82 (0.40, 1.65)
Bachelors+	-0.58	0.37	0.1211	0.56 (0.27, 1.17)
Self-rated health				
Excellent/Very Good	----			1.00
Good	1.08	0.38	**0.0050**	2.96 (1.39, 6.26)
Fair/Poor	0.31	0.30	0.3068	1.36 (0.75, 2.47)
Year				
2005	---			1.00
2009	0.26	0.41	0.5153	1.30 (0.58, 2.91)
2011-2012	0.05	0.28	0.8634	1.05 (0.60, 1.84)
55-64*Female	2.15	0.63	**0.0009**	8.60 (2.46, 30.05)
65-74* Female	-0.36	0.66	0.5818	0.70 (0.19, 2.55)
75+* Female	0.56	0.80	0.4228	1.74 (0.45, 6.82)

Referent group: diagnosed HD only

[a] P values determined using logistic regression

CHAPTER 4

USUAL SOURCE OF CARE AMONG OLDER AMERICAN INDIANS AND ALASKA NATIVES[2]

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Abstract

Keywords: Usual source of Care; American Indian/Alaska Native; California

Objective: To assess the factors that influence usual source of care among older American Indian/Alaska Native in California.

Data sources/Study Setting: The 2005, 2009 and 2011-2012 California Health Interview Survey data were used. The sample included 2,760 AI/AN adults 45 years and older. The main dependent variable was usual source of care.

Study design: Multivariable analysis were conducted to identify predisposing, enabling and need factors associated with participants usual source of care and the kind of usual source of care received.

Principal Findings: We found that predisposing (i.e. age, marital status and education) and enabling (i.e. being an enrolled member of a state or federally recognized tribe, having insurance, and poverty level) factors were the most significant determinants of having a usual source of care. Being an enrolled member of a state or federally recognized tribe was the strongest and most consistent predictor for having a usual source of care.

Conclusions: These findings suggest the need to implement culturally appropriate interventions towards the facilitation having a usual source of care.

Introduction

Despite the United States having a unique responsibility to provide health care for American Indians and Alaska Natives (AI/AN), they continue to face disparities in health, healthcare, high uninsured rates (Artiga S., 2013), significant barriers to obtaining needed care (Call et al., 2006; Goins et al., 2010; Shah et al., 2014) and poor health outcomes, such as high rates of chronic disease. In each consecutive year between 2000 and 2012, AI/AN under age 65 were less likely than whites to have health insurance (in 2012, 73.0% compared with 83.3%) (U.S. Department of Health and Human Services, 2014). According to the National Healthcare Disparities Report (NHDR), measures of health care quality and access were tracked and found that AI/AN had worse care than whites for 40 measures. For example, there were great disparities for AI/AN age 50 and over who ever received a colonoscopy, sigmoidoscopy, or proctoscopy; and difficulty contacting their usual source of care over the telephone when compared to whites (U.S. Department of Health and Human Services, 2014). In addition, AI/AN received worse care than whites for 33% of quality measures (U.S. Department of Health and Human Services, 2014). These quality measures included receipt of specific services needed to treat or prevent a medical condition and outcomes of treatment, such as functional limitation and death (U.S. Department of Health and Human Services, 2014).

While ‘access’ to health care is a multifaceted concept that can be assessed on several dimensions (Gulliford et al., 2002), it can be defined as “the timely use of personal health services to achieve the best health outcomes” (Institute of Medicine, 1993). There are three specific steps for acquiring good access to care--gaining entry into the health care system; getting access to sites of care where patients can receive needed services; and finding providers who meet the needs of individual patients and with whom patients can develop a relationship based on mutual communication and trust (DHHS, 2010). In addition, measures for healthcare access include having health insurance; patients' assessment of ease of access to healthcare; the successful receipt of needed services; and having a usual source of care. However, social determinant of health also contribute to having a usual source of care. There have been considerable efforts put forth in public health towards applying social determinants of health to address differences in health outcomes observed among segments of the population (Frieden, 2011), such as within the AI/AN population.

Social determinants of health (SDH) are the "complex, integrated, and overlapping social structures and economic systems that include the social environment, physical environment, and health services; structural and societal factors that are responsible for most health inequities. SDH are shaped by the distribution of money, power and resources at global, national, and local levels, which are themselves influenced by policy choices" (Centers for Disease Control and Prevention, 2010; Commission on Social Determinants of Health, 2008). SDH, such as poverty, lack of education, and unequal access to health care, contribute to poor health outcomes as well as health inequities. As such, reductions in health and health care disparities can be obtained through policy interventions, community- based interventions, health care interventions and individual interventions (Shi, 2010).

Older AI/AN are particularly vulnerable to these factors, making them susceptible to poor health outcomes. The vulnerability or likelihood of experiencing poor health outcomes among populations such as in the case of AI/AN, is determined by the merging of characteristics at both the individual and ecological levels (Shi, 2010). Further, it is widely known that individuals with a usual source of care experience improved health outcomes, reduced health disparities (Starfield & Shi, 2004) and are more likely to receive preventive health services (Ettner, 1996). The purpose of this study is to explore the type of usual source of care that is used among older AI/AN. More specifically, we seek to assess the predictors of having a usual source of care among this population.

We used the Andersen /Aday Vulnerability Model as the framework to understand the factors that influence an individual's usual source of care.(Aday & Andersen, 1974) These factors are categorized into three components: predisposing, enabling, and need. Predisposing factors are demographic characteristics that describe an individual's propensity to use or not use services, such as age and sex. Enabling factors are resources that may facilitate or impede use of obtaining and using health services, such as income and insurance coverage. Need factors are characterized by specific illnesses/disease and health needs that would encourage an individual to seek care (Shi, 2010). This model posits that these three factors converge and interact subsequently influencing one's health care access, health quality and vulnerability to poor health or illness (Shi, 2010).

Methods

Weighted Sample

We used data from the California Health Interview Survey (CHIS), which is a population-based random digit-dial telephone survey of the state's non-institutionalized population. The CHIS is conducted every other year and is the largest state health survey in the U.S. CHIS collects information for all age groups on health status, health conditions, health-related behaviors, health insurance coverage, access to health care services, and other health related issues. The present study used adult data from 3 cycles: 2005 (N=43,020), 2009 (N = 47,614) and 2011-2012 (N=42,935). The 2005 CHIS data were collected between July 2005 and

April 2006; 2009 data collected between September 2009 and April 2010; and 2011-2012 collected between June 2011 and January 2012. Data from 2007 were excluded due to a difference in the collection of our main variable of interest, *usual source of care* (Harlin, 2015) compared to the other years. Detailed information regarding sampling methods for respective years is available via the CHIS webpage (http://healthpolicy.ucla.edu/chis/design/Pages/sample.aspx).

We pooled public use CHIS data from the 2005, 2009, and 2011 to increase the stability of estimates for AI/AN. Data were merged with a survey cycle indicator and yielded a total of 133,569 completed interviews for adults. The analysis dataset includes adults aged 45 years and older (92,578). For this study, the population of interests were self-reported AIANs (*n* = 2760) aged 45 years and older who had no missing information on all dependent and independent variables. The use of publicly available CHIS data, which is non-identifiable, does not fulfill the criteria for Human Subject Research by the University of Georgia and is exempt from review by the Institutional Review Board.

Measures

An individual was defined as American Indian or Alaska Native if the respondent self-described themselves as “American Indian or Alaska Native.” Respondents were also questioned about whether they were enrolled in a federal or state recognized tribe and they were questioned about their tribal heritage. Based on the responses related to tribal heritage they were grouped accordingly and placed in the category “California tribe” where appropriate.

Dependent variable

Usual source of care (USOC) was measured by responses to the following two questions, “Is there a place that you usually go to when you are sick or need advice about your health?”

Response options were “yes,” “no,” “doctor/my doctor,” “Kaiser,” or “more than one place.” Respondents who answered affirmatively as “yes” or “more than one place” were then asked, “What kind of place do you go to most often?” or “Is your doctor in a private..?” Response options were “doctor’s office/Kaiser/other HMO,” “clinic/health center/hospital clinic,” “emergency room,” “some other place,” or “no one place.” A dichotomous variable for usual source of care (yes/no) was created from the two questions noted above. Respondents were considered to have a usual source of care (yes) if they answered “yes,” “doctor/my doctor,” or “Kaiser” from the first question and “doctor’s office/Kaiser/other HMO,” “clinic/health center/hospital clinic” from the second question. Respondents were considered not having a usual source of care (no) if they answered “no” from question one and “emergency room” from question two. Respondents who answered “more than one place,” “some other place (specify)” or “no one place” were excluded from the analysis, as the combined sample sizes were small (n=20) and the subsequent meanings of these options would be difficult to measure and interpret.

We also created a categorical variable (usualplace) as an extension of our usual source of care variable in order to determine the kind of place that participants visited for their usual source of care. Categories were the following: (a) doctor’s office/Kaiser/HMO; (b) clinic/health center/hospital clinic; and (c) no usual source of care.

Independent variables

Predisposing variables

Personal characteristics of the participants included age groups (i.e. 45 to 54 years, 55 to 64 years, 65 to 74 years, 75+ years), sex (male or female), marital status (married or not married), highest educational level attained (less than high school, high school graduate, some college, and more than a bachelor's degree), and rural or urban residence per Indian Health Service definition.

Enabling variables

Federal Poverty level (<100%, 100-199%, 200-299% or 300 %+) indicates the total annual income of the household as a percent of the Federal Poverty Level. Other variables were dichotomous (yes/ no), insurance status, Indian Health Service (IHS) coverage and enrollment in a state or federally recognized tribe.

Need

Self-rated health was measured with a single item question, "Would you say that in general your health is excellent, very good, good, fair, or poor?" (Zahran, Kobau, Moriarty, Zack, Holt, & Donehoo, 2005). These five categories were collapsed into three: 1) excellent/very good, 2) good, 3) fair/poor. The presence of diabetes was first assessed by asking respondents, "Has a doctor ever told you that you have diabetes or sugar diabetes (other than during pregnancy)?" Response options were "yes," "no," or "borderline or prediabetes." Respondents who answered affirmatively were then asked, "Were you told that you had Type 1 or Type 2 diabetes?" Response options were "Type 1" "Type 2" or "another Type". Respondents were considered having diabetes if they responded "yes" to ever being told they had diabetes and reporting that they had 'Type 2' diabetes. Respondents were considered not having diabetes if they answered, "no" or "borderline or prediabetes" to the first question or if they answered "Type 1" or "another type" to the second question. Self- reported heart disease was assessed by the question, "Has a doctor ever told you that you have any kind of heart disease?" Respondents were considered having heart disease if they responded "yes."

Statistical Analysis

We performed all analyses using SAS version 9.3 (SAS Institute, Inc., Cary, NC) and SUDAAN version 11.0 (RTI International, Research Triangle Park, NC) softwares to account for the complex survey design of CHIS and to yield state estimates by using survey weights (final sampling weight and replicate weights).We merged the 2005 data and weights provided by CHIS with the data and weights from 2009 and 2011-2012. We then divided the total weights by three to obtain weights for a single year. These data were weighted to compensate for unequal probabilities of selection, to adjust for nonresponse to ensure that results were consistent with California population. These pooled data (2005, 2009, 2011-2012) were used for all of the analyses.

First, simple unadjusted models testing the univariate associations between each of the study characteristics (independent variables) and USOC were conducted (Table 4.1). Second, binary logistic regression was performed by the grouping of factors (predisposing, enabling and need) to predict the odds of having a usual source of care (Table 4.2). Third, we conducted sequential multinomial logistic regression as a “step by step” approach in order to determine which factors were significant in comparison to others when grouped by predisposing (model 1), enabling (model 2), need (model 3) and finally a fourth model that included all factors. These four models were tested to assess if there was an associated with participants using a doctor’s office/Kaiser/HMO and clinic/health center/hospital clinic as their USOC (i.e. participants with no USOC served as the referent group) with odds ratios (ORs) and corresponding 95% confidence intervals (CI’s) reported (Table 4.3). Fourth, logistic regression was performed to identify factors associated with participant’s USOC being a clinic/health center/hospital clinic (i.e. doctor’s office/Kaiser/HMO served as the referent group) with odds ratios (ORs) and corresponding 95% confidence intervals (CI's) reported (Table 4.4). All independent variables with a p <0.05 level were considered significant.

Results

Weighted Sample

Table 4.1 presents the characteristics of the weighted sample and their association with a reported USOC. Most participants were female (52%), within the age group of 45-54 (42%), married (54%), had some level of college education (50%), resided in an urban community (61%) and were not enrolled in a federal or state recognized tribe (82%). Most participants were at least 300% above the poverty level (46%), did not have IHS coverage (88%), had health insurance (86%), rated their health as excellent or very good (40%) and did not have a diabetes (81%) nor heart disease (85%) diagnosis.

Determinant of Usual Source of Care

Out of 2,760 respondents, 91% of AI/AN had a usual source of care and utilized a doctor's office/Kaiser/HMO (65%), followed by a clinic/health center/hospital clinic (26%). The remaining 9% did not have a usual source of care (including an emergency room) (Table 4.1). Overall, participants who are in the older age groups, 65-74 (93%) or 75 years and older (97%) (p<0.0001), married (92%) (p=0.04), and those with higher levels of education some college (93%) or Bachelor's (94%) (p=0.02) had a higher proportion of reporting a USOC. A higher proportion of participants who were enrolled in a state or federally recognized tribe (96%) (p <0.0001), were at least above the poverty level of300% (94%) (p=0.0008), were covered by IHS (96%) (p=0.0016), and had health insurance (94%) (p<0.0001) reported having a usual source of care. In addition, a higher proportion of participants with diabetes (95%) (p=0.106) and heart disease (95%) (0.0127) reported having a usual source of care.

Binary Logistic Regression

Table 4.2 presents USOC determinants. Participants 75 years and older [OR=3.82 CI (1.89, 7.71), those with high school [OR=1.81 CI (1.00, 3.28)] some college [OR=3.37 CI (1.97, 5.76)] and bachelor's degree or higher [OR=3.10 CI (1.82, 5.29)], enrolled in a state or federally recognized tribe [OR=2.75 CI (1.31, 5.78)], and having health insurance [OR=6.63 CI (4.07, 9.99)] were more likely to be associated with having a usual source of care compared to those who were 45-54 years old, had less than a high school education, not enrolled in a state or federally recognized tribe, and not having health insurance, respectively. Participants who were not married [OR=0.61 CI (0.41, 0.93)] and were within the 100-199% poverty level [OR=0.42 CI (0.22, 0.83)] were less likely to have a usual source of care than those married and within the 0-99% poverty level, respectively.

Sequential Multinomial Logistic Regression (Doctor's Office/Kaiser/HMO)

Table 4.3 presents predisposing, enabling and need factors associated with the kinds of places where participants go to obtain their usual source of care. The first regression model in this multinomial logistic regression compared participants who reported going to a doctor's office/Kaiser/HMO to those without a usual source of care (i.e. the referent group). In Model 1, which assessed predisposing factors only, participants who were age 65-74 years [OR=2.32 CI (1.11, 4.84)], 75 years and older [OR=7.89 CI(4.30, 14.47)], female [OR=1.71 CI (1.09, 2.70)], and those with a high school degree [OR=1.91 CI(1.01, 3.61)], some college education [OR=3.29 CI(1.90, 5.70)] and a bachelor's degree and higher [OR=3.83 CI (2.12, 6.92)] were more likely to visit a doctor's office/Kaiser/HMO as their usual source of care compared to 45-

54 year olds, males and those with less than a high school education, respectively. Participants who were not married [OR=0.44 CI (0.28, 0.68)] were less likely to visit a doctor's office/Kaiser/HMO as their usual source of care compared to those who were married.

In Model 2, which assessed enabling factors, participants enrolled in a state or federally recognized tribe [OR=2.37 CI (1,23, 4.57)] and those having insurance [OR=14.06 CI(8.77, 22.52) were more likely to visit a doctor's office/Kaiser/HMO as their usual source of care than those not enrolled and without insurance, respectively.

In Model 3, which assessed need factors only, neither self-rated health categories (i.e. excellent, good, fair/poor) nor chronic disease status (i.e. diabetes or heart disease) were associated with visiting a doctor's office/Kaiser/HMO as their usual source of care.

In Model 4, all independent variables were assessed simultaneously, participants who were age 75 years and older [OR=5.23 CI (2.53, 10.80)], had some college education [OR=2.24 CI (1.11, 4.510], bachelor's degree or higher [OR=3.32 CI (1.92, 5.76)], enrolled in a state or federally recognized tribe [OR=2.22 CI (1.10, 4.48)], within 200-299% poverty level [OR=2.23 CI (1.11, 4.49)], have health insurance [OR=11.39 CI (6.94, 18.70)] and rated their health as fair/poor [OR=2.03 CI (1.08, 3.81)] were more likely to visit a doctor's office/Kaiser/HMO as their usual source of care compared to 45-54 year olds, those with less than a high school education, not enrolled in a state or federally recognized tribe respectively, within 0-99% poverty level without health insurance, and rating their health as excellent/very good, respectively. Participants who were not married [OR=0.55 (0.36, 0.84)] and within the 100-199% poverty level [OR=0.49 CI (0.25, 0.95)] were less likely to visit a doctor's office/Kaiser/HMO as their usual source of care than those who were married and within the 0-99% poverty level, respectively.

Sequential Multinomial Logistic Regression (Clinic/Health Center/Hospital Clinic)

Also presented in Table 4.3, the second multinomial logistic regression model compared participants who reported going to a clinic/health center/hospital clinic to those without a usual source of care (i.e. the referent group). In Model 1, which assessed predisposing factors only, participants who had some level of college education [OR=2.24 CI (1.11, 4.51)] and a bachelor's degree or higher [OR=2.30 CI (1.08, 4.89)] were more likely to visit a clinic/health center/hospital clinic as their usual source of care than those with less than a high school education.

In Model 2, which assessed enabling factors only, participants enrolled in a state or federally recognized tribe [OR=3.79 CI (1.97, 7.31)], covered by the IHS [OR=3.00 CI (1.06, 8.42)] and those having health insurance [OR=2.86 CI (1.18, 4.52)] were more likely to visit a clinic/health center/hospital clinic as their usual source of care than those not enrolled in a state or federally recognized tribe, not covered by IHS and without health insurance, respectively. Participants within the 100-199% poverty level [OR=0.38 CI (0.18, 0.80)] were less likely to visit to a clinic/health center/hospital clinic as their usual source of care than those within the 0-99% poverty level.

In Model 3, which assessed need factors only, neither self-rated health nor chronic disease status (i.e. diabetes or heart disease) were associated with having a clinic/health center/hospital clinic as their usual source of care.

In Model 4, all independent variables were assessed simultaneously, participants with some level of college education [OR=3.22 CI (1.65, 6.31)], bachelor's degree or higher [OR=2.55 CI (1.28, 5.07)], enrolled in a state or federally recognized tribe [OR=3.60 CI (1.77, 7.33)], covered by IHS [OR=3.01 CI (1.11, 8.16)] and having health insurance [OR=3.16

CI(1.97, 5.09)] were more likely to have a clinic/health center/hospital clinic as their usual source of care than those with less than a high school education, not enrolled in a state or federally recognized tribe, not covered by IHS and without health insurance. Participants within the 100-199% poverty level [OR=0.38 CI (0.19, 0.76) were less likely to visit to a clinic/health center/hospital clinic as their usual source of care than those within the 0-99% poverty level.

Logistic Regression

In Table 4.4, we present a logistic regression assessing participants reporting having a clinic/health center/hospital clinic as their usual source of care compared to those visiting a doctor's office, Kaiser or HMO.). In model 1, which assessed predisposing factors only, participants who were not married [OR=1.93 CI (1.39, 2.67)] were more likely to report having a clinic/health center/hospital clinic as their usual source of care than those married. Participants age 65-74 years [OR=0.38 CI (0.27, 0.56)], 75 years and older [OR=0.25 CI(0.12, 0.51], female [OR=0.62 CI (0.44, 0.87)], and those living in rural areas [OR=0.61 CI (0.43, 0.86) were less likely to report going to the clinic/health center/hospital clinic as their usual source of care than 45-54 year olds, males, and those living in urban areas, respectively. In model 2, which assessed enabling factors only, participants enrolled in a state or federally recognized tribe [OR=1.61 CI (1.04, 2.51)] and those covered by IHS [OR=3.71 CI (2.24, 6.14) were more likely to report going to the clinic/health center/hospital clinic as their usual source of care than those not enrolled and not covered by IHS, respectively. Participants within the 200-299% [OR=0.44 CI (0.26, 0.74)] and 300% and above poverty levels [OR=0.38 CI (0.24, 0.59)] and those with health insurance [OR=0.21 CI (0.14, 0.31)] were less likely to visit to a clinic/health center/hospital clinic as their usual source of care than those within the 0-99% poverty level and without health insurance, respectively. In model 3, where need factors were assessed, neither self-rated health nor chronic disease status (i.e. diabetes or heart disease) were associated with having a clinic/health center/hospital clinic as their usual source of care. In model 4, all independent variables were assessed simultaneously, participants who were not married [OR=1.41 CI (1.09, 1.82)] and enrolled in a state or federally recognized tribe [OR=1.65 CI (1.07, 2.57)] were more likely to report having a clinic/health center/hospital clinic as their usual source of care than those married and not enrolled. Participants 65-74 years [OR=0.53 CI (0.36, 0.79)], 75 years and older [OR=0.34 CI(0.15, 0.75], female [OR=0.71 CI (0.51, 0.98)], within the 200-299% [OR=0.43 CI (0.24, 0.74)] and 300% and over poverty levels [OR=0.36 CI (0.23, 0.58)], and with health insurance [OR=0.28 CI (0.19, 0.41)] were less likely to report going to the clinic/health center/hospital clinic as their usual source of care than 45-54 year old, males, those with 0-99% poverty level and without health insurance respectively.

Discussion

In this study, we set out to explore the determinants of usual source among older AI/AN in California. The majority of our sample indicated having a usual source of care which is comparable to what other studies have found (Kim, Bryant, et al., 2012; Kim, Ford, et al., 2012). Moreover, respondent's either utilized a doctor's office/Kaiser/HMO or clinic/health center/hospital clinic for this kind of care. Generally, we found that predisposing (i.e. age, marital status and education) and enabling (i.e. being an enrolled member of a state or federally recognized tribe, having insurance, and poverty level) factors were the most significant determinants of having a usual source of care.

Predisposing determinants

In our study, we found that respondents in the older age groups, specifically 75 years and older, were more likely to have a usual source of care and have a private doctor/Kaiser or HMO compared to younger counterparts without a usual source of care. Other studies have reported similar relationships with age and utilization (Jahangir, Irazola, & Rubinstein, 2012) as well as having a usual source of care (Hammond et al., 2011). This finding likely reflects that these individuals are more likely to have insurance through Medicare and tend to seek care more frequently due to aging and/or onset of chronic diseases. On the other hand, because of these reasons, it was surprising that individuals in the 65-74 year age group were not found to be significant. In model 1 of our sequential multinomial logistic regression that assesses the doctor's office/Kaiser/HMO as a USOC, we found that 65-74 were significant as well as females. However, in the presence of all the variables (model 4) these variables were not significant which means that there were stronger factors that were associated with this variable. While the younger age groups tend to report having USOC less, this could possibly mean delays in detection of diseases that may have an early onset within this population (Hammond et al., 2011), such as diabetes. Therefore, consistent and clear interventions should be geared towards younger adults that are focused on the benefit of having a usual source of care.

Individuals who were not married consistently showed an association with being less likely to have a usual source of care. This may likely be due to the increased material resources available to purchase insurance when married and/or the social support, monitoring and encouragement of healthy behaviors received through a healthy marriage (Wood et al., 2007). This data suggest the benefit of leveraging marriage partnerships and other social support in an effort to facilitate having a USOC.

We expected to see rurality remain significant in the full logic model that assessed having a clinic/health center/hospital clinic as a usual source of care as it was in model 1; however in the presence of all the factors, it was no longer a significant variable.

Enabling determinants

We found that being enrolled in a state or federally recognized tribe was the strongest and most consistent predictor for each model. Not only was enrollment associated with having a usual source of care, but it was also associated with both visiting the doctor's office/Kaiser/HMO and clinic/health center/hospital clinic compared to those without a usual source of care. There are varying complexities to understanding what this may mean, as AI/AN have similar and different rights to health care as compared to other Americans. If an individual is enrolled, they have broader access to federal benefits, such as access to IHS services if they live on or near reservations. Therefore, it is not surprising that AI/AN enrolled are significantly likely to report a clinic/health center/hospital clinic, as IHS could be considered a part of this category, especially if an individual is enrolled in a California tribe. Both kinds of locations are important and needed in providing access to care to older American Indians. However, there are fundamental differences between health centers/clinics and traditional private practices, in that the former serves as a "safety net", providing comprehensive primary and preventive care to low-income, uninsured, Medicaid enrolled, and other underserved individuals through coordination and case management and culturally appropriate care (National Association of Community Health Centers, 2013). While costs are reduced within health centers, by decreasing the use of emergency rooms and hospitals, there are barriers related to the uninsured seeking specialty care and being referred to overcrowded hospital specialty clinics or to providers that are not familiar with their culture. Surprisingly, the quality of care within many health centers meet or even exceeds that of private practices and other primary care providers (Bryant et al., 2004; Goldman, Chu, Tran, Romano, & Stafford, 2012; U.S. Department of Health and Human Services, 2015).

These findings suggest the need to facilitate enrollment among tribal members where possible and feasible, even if they belong to a tribe outside of California. For example, case mangers working as part of the I/T/U could help with enrollment, especially among urban communities. Being an enrolled member of a specific tribe helps to preserve the culture and tradition of customs, history, language, religious beliefs and practices and is set apart from the traditions of other tribal communities (Bureau of Indian Affairs). In addition, an enrolled member is able to receive tribal services and benefits such as health care via the Indian Health Service. It is likely that being enrolled may serve as mediator, through providing sense of belonging, community and stronger social support and social capital which may partly explain the increased likelihood of having a usual source of care (Fujiwara & Kawachi, 2008; King, Smith, & Gracey, 2009; Ponce N., 2014).

Poverty level was also a significant factor. While each poverty level was not significant in model 2 of our sequential multinomial logistic regression that assesses the doctor's office/Kaiser/HMO as a USOC, we found that in the presence of all the variables (model 4) these poverty level was significant. Our data also showed that individuals within the 100-199% poverty level, are least likely to have a usual care, which is likely due to the inability to qualify for public programs, such as Medicaid to cover nonelderly individuals with incomes at or below 138% FPL (a threshold for expanded eligibility under the Affordable Act (ACA)). This threshold still leaves many individuals between the 183-199% poverty level without access, as well as the likelihood to be able to afford private insurance. In 2011, a program called Low-

Income Health Program (LIHP) was expanded to provide coverage for hundreds of thousands uninsured, specifically those who are legal residents with at least five years of residency and with incomes less than 200% of the Federal Poverty Level. This would likely benefit individuals within the 100-199% poverty level.

Need determinants

We found that having a diagnosis of diabetes, heart disease or any of the self-rated health measures were not associated with having a usual source of care. This may be due to individuals obtaining a USOC before getting these diseases and/or particular social determinants of health that may play a more significant role. Therefore, focusing on these factors through policy initiatives may indirectly have an effect on the need variables.

This study has implications on various levels, including policy, community, heath care and individual. For example, there is a need to increase federal funding to IHS and directly to tribes themselves in order to enhance access and resources to enrolled members. Also, we need to encourage training of health care providers and health care professionals on culturally appropriate care for all AI/AN and the adherence to evidence-based guidelines for preventive health and better provider-patient communication, regardless of enrollment status. In addition, require accountability on the part of providers to reporting and monitoring of health gaps among this population by both types of health care providers. On an individual level, enhance training and incentives for AI/AN to enter health care professionals in order to provide a more diverse health care providers and the ability to assist in serving their community.

This study is subject to a few limitations. First, CHIS is a state survey and therefore cannot be generalizable to older AI/AN residing in other states. Second, since this is a cross-sectional survey, we were unable to assess causality between any of our independent variables and having a usual source of care.

With the expansion of the ACA, many older AI/AN residing in California, particularly those within the age group of 45-65, who were previously uninsured, may have increase access to health coverage. Time will tell if full implementation of this law may have an effect on access, specifically having a usual source of care and ultimately, improved health outcomes.

Table 4.1 Characteristics of Older American Indians and Alaska Natives

Characteristic	N(proportion)[1]	N(proportion)[1] responding "Yes" to having a Usual Source of Care	p-value
Total	2760 (1.00)	2547 (0.91)	
Doctor's office/Kaiser/HMO	1783 (0.65)		
Community/gov't clinic	764 (0.26)		
No USOC (including emergency room)	213(0.09)		
Sex			
Male	1086 (0.48)	984 (0.89)	0.0923
Female	1674 (0.52)	1563 (0.92)	
Age(years)			
45-54	847 (0.42)	759 (0.89)	**<0.0001**
55-64	954 (0.29)	871 (0.89)	
65-74	587 (0.17)	561 (0.93)	
75+	372 (0.12)	356 (0.97)	
Marital Status			
Married	1251 (0.54)	1185 (0.92)	**0.0408**
Not Married	1509 (0.46)	1362 (0.89)	
Education			
<HS	407 (0.21)	367 (0.85)	**0.0243**
HS	734 (0.29)	670 (0.90)	
Some college	992 (0.30)	919 (0.93)	
Bachelors+	627 (0.20)	591 (0.94)	
Area			
Urban	1247 (0.61)	1154 (0.90)	0.7436
Rural	1513 (0.39)	1393 (0.91)	
Enrolled in state/federal recognized tribe	2780 (1.0)	2567 (0.91)	
Enrolled	601 (0.18)	575 (0.96)	**<0.0001**
Not enrolled	2159 (0.82)	1972 (0.89)	
Poverty Level			
0-99%	458 (0.18)	410 (0.90)	**0.0008**
100-199%	613 (0.20)	548 (0.82)	
200-299%	440 (0.16)	413 (0.93)	
300%+	1249 (0.46)	1176 (0.94)	
IHS Coverage			
Yes	392 (0.12)	377 (0.96)	**0.0016**
No	2368 (0.88)	2170 (0.90)	
Health Insurance			
No insurance	307 (0.15)	227 (0.72)	**<0.0001**
Has insurance	2453 (0.86)	2320 (0.94)	
Self-rated health			
Excellent/Very good	1082(0.40)	975 (0.89)	0.4728
Good	786 (0.29)	735 (0.92)	
Fair/Poor	892 (0.31)	837 (0.91)	
Chronic Disease status			
Diabetes	491 (0.19)	469 (0.95)	**0.0106**
No Diabetes	2269 (0.81)	2078(0.90)	

Heart Disease	463 (0.15)	442 (0.95)	**0.0127**
No Heart Disease	2297 (0.85)	2105 (0.90)	

[1] Sample sizes are unweighted. Proportions are weighted.

Table 4.2 Usual Source of Care Determinants among Older American Indians and Alaska Natives

Variable	OR (95%CI)
Predisposing Factors	
Age (years)	
55-64	1.10 (0.66, 1.84)
65-74	1.29 (0.57, 2.95)
75+	3.82 (1.89, 7.71)*
Sex	
Female	1.29 (0.80, 2.08)
Marital Status	
Not Married	0.61 (0.41, 0.93)*
Education	
HS	1.81 (1.00, 3.28)*
Some college	3.37 (1.97, 5.76)*
Bachelors+	3.10 (1.82, 5.29)*
Area	
Rural	0.81 (0.51, 1.28)
Enabling Factors	
Enrolled	2.75 (1.31, 5.78)*
Poverty Level	
100-199%	0.42 (0.22, 0.83)*
200-299%	1.49 (0.75, 2.94)
300%+	0.97 (0.50, 1.90)
IHS Coverage	
Yes	2.13 (0.65, 6.93)
Health Insurance	
Has insurance	6.63 (4.07, 9.99)*
Need Factors	
Self-rated health	
Good	1.45 (0.87, 2.40)
Fair/Poor	1.77 (0.97, 3.24)
Chronic Disease status	
Diabetes	1.66 (0.71, 3.87)
Heart Disease	0.94 (0.43, 2.08)

*significant at the $p < 0.5$ level

Table 4.3 Predisposing, Enabling and Need Factors Related to the Places Visited For Usual Source of Care

Variable	Doctor’s Office/Kaiser/HMO				Clinic/health center/hospital clinic			
	Model 1: OR (CI)	Model 2: OR (CI)	Model 3: OR (CI)	Model 4: OR (CI)	Model 1: OR (CI)	Model 2 OR (CI)	Model 3 OR (CI)	Model 4 OR (CI)
Predisposing Factors								
Age (years)								
55-64	1.03 (0.62, 1.71)			1.13 (0.66, 1.94)	0.79 (0.46, 1.37)			1.06 (0.61, 1.82)
65-74	2.32 (1.11, 4.84)*			1.59 (0.70, 3.60)	0.89 (0.40, 1.95)			0.83 (0.33, 2.04)
75+	7.89 (4.30, 14.47)*			5.23 (2.53, 10.80)*	1.99 (0.83, 4.77)			1.76 (0.68, 4.52)
Sex								
Female	1.71 (1.09, 2.70)*			1.46 (0.89, 2.41)	1.07 (0.65, 1.75)			1.03 (0.63, 1.70)
Marital Status								
Not Married	0.44 (0.28, 0.68)*			0.55 (0.36, 0.84)*	0.85 (0.50, 1.46)			0.76 (0.49, 1.17)
Education								
HS	1.91 (1.01, 3.61)*			1.73 (0.94, 3.19)	1.61 (0.77, 3.37)			1.73 (0.89, 3.37)
Some college	3.29 (1.90, 5.70)*			3.36 (1.96, 5.77)*	2.24 (1.11, 4.51)*			3.22 (1.65, 6.31)*
Bachelors+	3.83 (2.12, 6.92)*			3.32 (1.92, 5.76)*	2.30 (1.08, 4.89)*			2.55 (1.28, 5.07)*
Area								
Rural	1.09 (0.70, 1.71)			0.87 (0.55, 1.39)	0.67 (0.93, 1.15)			0.73 (0.45, 1.20)
Enabling Factors								
Enrolled		2.37 (1.23, 4.57)*		2.22 (1.10, 4.48)*		3.79 (1.97, 7.31)*		3.60 (1.77, 7.33)*
Poverty Level								
100-199%		0.48 (0.23, 1.01)		0.49 (0.25, 0.95)*		0.38 (0.18, 0.80)*		0.38 (0.19, 0.76)*
200-299%		2.08 (0.99, 4.35)		2.23 (1.11, 4.49)*		0.87 (0.39, 1.93)		0.91 (0.43, 1.91)
300%+		1.60 (0.78, 3.30)		1.45 (0.74, 2.85)		0.60 (0.29, 1.25)		0.51 (0.26, 1.03)
IHS Coverage								
Yes		0.79 (0.28, 2.26)		0.88 (0.31, 2.48)		3.00 (1.06, 8.42)*		3.01 (1.11,

								8.16)*
Health Insurance								
Has insurance		14.06 (8.77, 22.52)*		11.39 (6.94, 18.70)*		2.86 (1.81, 4.52)*		3.16 (1.97, 5.09)*
Need Factors								
Self-rated health								
Good			1.11 (0.65, 1.89)	1.42 (0.83, 2.45)			1.31 (0.72, 2.40)	1.53 (0.90, 2.60)
Fair/Poor			0.91(0.55, 1.51)	2.03 (1.08, 3.81)*			1.09 (0.62, 1.91)	1.47 (0.77, 2.81)
Chronic Disease status								
Diabetes			1.98 (0.89, 4.39)	1.48 (0.64, 3.44)			2.47 (0.93, 6.54)	1.85 (0.76, 4.45)
Heart Disease			1.74 (0.95, 3.18)	0.79 (0.37, 1.69)			1.94 (0.86, 4.34)	1.12 (0.50, 2.51)

*Significant at $p<0.05$

Referent group: No Usual Source of Care

Table 4.4 Factors Associated With Having a Clinic/Health Center/Hospital Clinic as Usual Source Of Care

Variable	Clinic/Health Center/Hospital Clinic			
	Model 1: OR (CI)	Model 2: OR (CI)	Model 3: OR (CI)	Model 4: OR (CI)
Predisposing Factors				
Age (years)				
55-64	0.76 (0.54, 1.08)			0.97 (0.67, 1.41)
65-74	0.38 (0.27, 0.56)*			0.53 (0.36, 0.79)*
75+	0.25 (0.12, 0.51)*			0.34 (0.15, 0.75)*
Sex				
Female	0.62 (0.44, 0.87)*			0.71 (0.51, 0.98)*
Marital Status				
Not Married	1.93 (1.39, 2.67)*			1.41 (1.09, 1.82)*
Education				
HS	0.83 (0.48, 1.42)			0.95 (0.57, 1.57)
Some college	0.68 (0.40, 1.16)			0.92 (0.55, 1.54)
Bachelors+	0.59 (0.33, 1.04)			0.70 (0.40, 1.23)
Area				
Rural	0.61 (0.43, 0.86)*			0.85 (0.62, 1.16)
Enabling Factors				
Enrolled		1.61 (1.04, 2.51)*		1.65 (1.07, 2.57)*
Poverty Level				
100-199%		0.77 (0.51, 1.15)		0.75 (0.50, 1.14)
200-299%		0.44(0.26, 0.74)*		0.43 (0.24, 0.74)*
300%+		0.38 (0.24, 0.59)*		0.36 (0.23, 0.58)*
IHS Coverage				
Yes		3.71 (2.24, 6.14)*		3.38 (2.06, 5.53)
Health Insurance		0.21 (0.14, 0.31)*		0.28 (0.19, 0.41)*
Need Factors				
Self-rated health				
Good			1.19 (0.83, 1.69)	1.03 (0.71, 1.51)
Fair/Poor			1.20 (0.87, 1.63)	0.71 (0.50, 1.01)
Chronic Disease status				
Diabetes			1.25 (0.68, 2.28)	1.23 (0.65, 2.32)
Heart Disease			1.11 (0.57, 2.17)	1.36 0.93, 2.00)

*Significant at $p<0.05$

Referent: Doctor’s Office/Kaiser/HMO

CHAPTER 5

DISCUSSION

In this dissertation, we set out to accomplish two tasks. First, to assess the factors related to chronic disease diagnosis among AI/AN age 45 years and older; and second, to assess the predictors of having a usual source of care among this segment of the population. We utilized the Andersen/Aday Vulnerability Model as the framework to understand the factors that influence a diagnosis of "Heart Disease only (HD)," "Diabetes only (D)," and "Neither Heart Disease nor Diabetes (neither HD nor D)" and the factors related to having a usual source of care. The Andersen/Aday framework posits that there are three overarching factors that affect one's health behavior, use, and access to care: predisposing, enabling, and need. Predisposing factors are existing conditions that describe an individual's propensity to use or not use services and are generally the factors that we cannot change, such as race and sex. Enabling factors facilitate or impede the use, such as income and insurance. Need factors are specific illnesses/disease or health needs that would encourage an individual to seek care.

We found that most AI/AN had neither heart disease nor diabetes (74.4%), followed by a diabetes only diagnosis (15.1%), and lastly a heart disease only diagnosis (10.5%). The prevalence of having diabetes from our study was slightly lower than the national estimate of 21.9% among AI/AN 55 years and older, but was still higher among whites (13%) (Denny et al., 2005). Similarly, when comparing the prevalence of heart disease among the sample in this study, it was slightly lower among AI/AN age-adjusted rates nationally (11.6%), but again, higher than whites (5.8%). Our study further substantiates the current literature related to the chronic disease disparities that exist between AI/AN and other racial groups.

In our study, the primary factors that were significant were age (predisposing factor) and self-rated health (need factor). Our results showed that as age increased, an individual's self-rated health worsened and their likelihood to have heart disease increased. In addition, we found that AI/AN with a diabetes diagnosis decreased as age increased. This is logical, as diabetes is a disease that is usually diagnosed at a younger age. While older AI/AN are more likely to report poorer overall health (Poltavski et al., 2010), their negative perception may be due to having more frequent doctor visits due to ailments and/or the expectation that their health will be poor because of the poor health of others around them (Jones et al., 2012). These results were also supported in the literature by other studies (Berkowitz et al., 2013; Creatore et al., 2010; Harwell et al., 2001; Struthers et al., 2006) such as individuals rating their health poorer were significantly more likely to be diagnosed with a poor health outcome, such as chronic disease (Jonnalagadda & Diwan, 2005).

Self- rated health is a well-established measure (Idler & Benyamini, 1997; Strawbridge & Wallhagen, 1999) and found to be predictive of future health, mortality (Bopp et al., 2012), chronic disease incidence, health behaviors (Hodge & Kotkin-Jaszi, 2009; Hodge & Nandy, 2011; Ruthig et al., 2009), recovery from illness, functional decline and the use of health care services (Ruthig et al., 2009), even when more objective health measures are taken into account (Shields & Shooshtari, 2001). While self-rated health is a valid measure among different ethnic groups (Chandola & Jenkinson, 2000), AI/AN are likely considering other factors such as wellness (Hodge & Nandy, 2011). Wellness not only includes the absence of disease, but is inclusive of physical, mental, emotional and spiritual wellness (Hodge & Nandy, 2011). It is important to understand the interconnected view that is likely being measured when interpreting the meaning of as self-rated health among AI/AN.

An interesting finding not found in the current literature was related to women within the age group of 55-64 more likely being diagnosed with diabetes. While Harwell et al. (2001) observed a prevalence of diabetes among AI/AN women that was three and half times higher than non- AI/AN women, our findings suggest that women in the 55-64 year old are particularly vulnerable. It is unclear why this was the case, as it would be expected that the younger age group would be more vulnerable, since diabetes is usually diagnosed at younger ages. Nonetheless, these finding support the need for evidence-based interventions that are culturally appropriate and geared towards women in general. For example, incorporating traditional foods into one's diet is an intervention that may be a viable option. AI/AN tribes have a history of a healthy food system, including the cultivation of agricultural crops (Edwards & Patchell, 2009). This strategy could engage individuals in the inclusion of this activity as part of their culture that may have been loss, while being able to make healthy meal decisions for themselves and their family.

Since both diabetes and heart disease are chronic diseases which requires management and care from a provider, it is important to have a better understanding of health care access, particularly having a usual source of care among older AI/AN. It is widely known that individuals with a usual source of care experience improved health outcomes and reduced health disparities (Starfield & Shi, 2004). The majority of our sample indicated having a usual source of care which is comparable to what other studies have found (Kim, Bryant, et al., 2012; Kim, Ford, et al., 2012). Moreover, respondent's either utilized a doctor's office/Kaiser/HMO or clinic/health center/hospital clinic for this kind of care. Generally, we found that predisposing (i.e. age, marital status and education) and enabling (i.e. being an enrolled member of a state or federally recognized tribe, having insurance, and poverty level) factors were the most significant determinant of having a usual source of care.

In our study, we found that respondents in the older age groups, specifically 75 years and older, were more likely to have a usual source of care and have a private doctor/Kaiser or HMO compared to younger counterparts without a usual source of care. Other studies have reported similar relationships with age and utilization (Jahangir et al., 2012) as well as having a usual source of care (Hammond et al., 2011). This finding likely reflects that these individuals are more likely to have insurance through Medicare and tend to seek care more frequently due to aging and/or onset of chronic diseases, such as heart disease. On the other hand, because of these reasons, it was surprising that individuals in the 65-74 year age group were not found to be significant as well. Since individuals in this age group are more likely to have insurance through Medicare and tend to seek care more frequently due to aging and/or onset of chronic diseases, I would expect this group to significantly associated with having a usual source of care. While the younger age groups tend to report having USOC less this could possibly mean delays in detection of diseases that may have an early onset within this population (Hammond et al., 2011), such as diabetes. Therefore, consistent and clear interventions should be geared younger adults that are focused on the benefit of having a usual source of care are warranted.

Individuals who were not married consistently showed an association with being less likely to have a usual source of care. This may likely be due to the increased material resources available to purchase insurance when married and/or the social support, monitoring and encouragement of healthy behaviors received through a healthy marriage (Wood et al., 2007).

As people age, social support found through marriage or having close supportive relationships are linked to better health and longevity (Carr & Springer, 2010; Staton & Ooms, 2011). One study found that among older AI/AN, being married/partnered was associated with high levels of social support (Conte et al., 2014). Our findings suggest the benefit of leveraging marriage partnerships and other social support in an effort to facilitate having a USOC and preventing and/or managing chronic diseases such as diabetes and heart disease.

The most interesting finding was being an enrolled member of a federally or state recognized tribe was the most consistent predictor of having a usual source of care for both visiting the doctor's office/Kaiser/HMO and clinic/health center/hospital clinic compared to those without a usual source of care. There are varying complexities to understanding what this may mean, as AI/AN have similar and different rights to health care compared to other Americans. If an individual is enrolled, they have broader access to federal benefits, such as access to IHS services if they live on or near reservations. Therefore, it is not surprising that AI/AN enrolled are significantly likely to report a clinic/health center/hospital clinic, as IHS could be considered a part of this category, especially if an individual is enrolled in a California tribe. In California, there are over 129 federally funded health center with over 1,225 sites serving 3,412,961 patients (National Association of Community Health Centers, 2015) . These centers are consider the "core safety net" providers because access is provided to all, regardless of ability to pay and their patients are considered a vulnerable population whose primary form of payment is Medicaid.

Both kinds of locations are important and needed in providing access to care to older American Indians. However, there are fundamental differences between health centers/clinics and traditional private practices, in that the former serve as a "safety net" providing comprehensive primary and preventive care to low-income, uninsured, Medicaid enrolled, and other underserved individuals through coordination and case management and culturally appropriate care (National Association of Community Health Centers, 2013).

While rurality was not significant in our final model that assessed factors associated with usual source of care, it is an important variable to consider. There are gaps in access between AI/AN living rural areas versus urban AI/AN. While IHS system reports that its service population is approximately 2.1 million, this is considerably less than the total AI/AN population reported by the U.S. Census (5.2 million) and more than those who actually uses the an IHS system for service (1.6 million) (Figure 2.2)(Department of Health and Human Services, 2013; Norris, 2012). This is partly due to the majority of IHS and tribal facilities being located in rural areas and not being accessible to 60% of the AI/AN population that reside in urban communities. Urban Indian Health programs also fall short with providing access, as only 149,000 are served even though there are 1.2 million AI/AN living in urban areas. This disparity is also seen with California, a state with the largest number of AI/AN. In CA, there are 627, 562 AI/AN; however, 89% receive care outside of the I/T/U. These other delivery systems include the private sector, Federally Qualified Health Centers, or the VHA, etc.

These findings suggest the need to facilitate enrollment among tribal enrollment where possible and feasible, even if they belong to a tribe outside of California. For example, case mangers working as part of the I/T/U could help with enrollment, especially among urban communities. It is likely that being enrolled may serve as a mediator, through providing sense of belonging, community, and stronger social support and social capital which may partly explain the increased likelihood of having a usual source of care (Fujiwara & Kawachi, 2008; King et al., 2009; Ponce N., 2014). On the other hand, facilitating enrollment involves a complex process that has implications for the level resources that would need to be provided by federal government and tribe.

According to U.S. Census data, 27% of American Indians lived below the poverty level, the highest poverty rate for all races and ethnicities (Macartney S., 2013). Moreover, research have addressed the immense impact that poverty can have on the eventual onset of chronic diseases, including CVD and diabetes (Diabetes in Control, 2011). As such, it was not surprising that poverty level was found to be a significant factor in our study. Our data showed that individuals within the 100-199% poverty level, are least likely to have a usual care, which is likely due to the inability to qualify for public programs, such as Medicaid to cover nonelderly individuals with incomes at or below 138% FPL (a threshold for expanded eligibility under the Affordable Act (ACA)). This threshold still leaves many individuals between the 183-199% poverty level without access as well as the likelihood not to be able to afford private insurance. In 2011, a program called Low-Income Health Program (LIHP) was expanded to provide coverage for hundreds of thousands uninsured, specifically those who are legal residents with at least five years of residency and with incomes less than 200% of the Federal Poverty Level. This would likely benefit individuals within the 100-199% poverty level.

We found that having a diagnosis of diabetes, heart disease or any of the self-rated health measures were not associated with having a usual source of care. This may due to individuals obtaining a USOC before getting these diseases and/or other determinants, such as social determinants of health that play a more significant role. Therefore, focusing on these factors through policy initiatives may indirectly have an effect on the need variables.

Collectively, our research, through the use of the Aday and Andersen Framework, shows how selected social determinant of health may contribute to health outcomes and access to care. Traditionally, research has emphasized a connection between chronic diseases and the *individual* characteristics of the patients diagnosed, such as their genetics, health behaviors, and culture (Dinca-Panaitescu et al., 2011 Daiski, Pilkington, & Raphael, 2011). Those prescribing to this path of causation have contributed to a conventional wisdom that chronic disease onset was exclusively the fault of the individual: he or she was presumably genetically predisposed to the disease (and hence unable to prevent the onset of the disease) or the individual did not properly change his or her health behaviors, and hence "deserved" to be diagnosed with the disease (Shi, 2010). However, the flaw of both of these paradigms is that they use a "blame the victim" approach.

Limitations

There are limitations that should be noted. First, CHIS is a state survey and therefore cannot be generalizable to older AI/AN residing in other states. Second, since this is a cross-sectional survey we were unable to assess causality between any of our independent variables and dependent variables (disease diagnosis and usual source of care). Third, in our first study, our dependent variables were based on the mutually exclusive diagnosis of diabetes and heart disease, so we cannot make direct comparisons of prevalence with other studies assessing the diagnosis of these diseases. If we did not analyze these chronic disease categories mutually exclusive from each other, it is likely that the prevalence would be much higher. However, our analysis provides valuable information on the associations related to heart disease and diabetes that are independent and exclusively from each other. Fourth, due to small sample sizes, we were unable to assess factors related to being diagnosed with both diabetes and heart disease, as well as other variables of interest. Fifth, self-reported diagnosis is subject to recall bias; however self-report data is known to be an accurate representation of evaluated diagnosis. Sixth, the CHIS data (as does most national surveillance systems) merges both American Indian and Alaska Natives together. However, American Indians and Alaska Native are distinctly different, especially geographically. While risk factors are well known among AI, very little is known about AN. The difference among and within groups, such as lifestyle and food sources are important in creating meaningful interventions across these communities. For example, one tribe's subsistence is dependent on whale meat and fat; and the other does not have access to the same food (Ebbesson et al., 2005). Nevertheless, this is an issue of national surveillance, which is beyond the scope of this dissertation.

Recommendations

Federal Policy within cooperative agreements

As the population continues to age, the burden of morbidity, mortality and health care costs will continue to rise. This study has implications on various levels, including the policy, community, health care, and individual levels. First, federal agencies at the highest level should recognize, acknowledge and act on their legal obligation to significantly improve the health of all AI/AN, particularly the older population. There is a need to increase federal funding to IHS and directly to tribes themselves in order to enhance access and resources to tribal members. While a few cooperative agreements (such as *Native Diabetes Wellness Program, A Comprehensive Approach to Good Health and Wellness in Indian Country, and Tribal Capacity Building and Quality Improvement*) exist specific to AI/AN through HHS federal agencies, such as the CDC, there is a need to improve upon these programs and others specific to states. As such, I would propose a state and tribal partnership approach that is facilitated by the federal government as a strategy to address diabetes and heart disease among AI/AN. For example, it would be reasonable for state health departments that receive federal funds to serve the public health needs of their state to also serve the public health needs of tribal communities within their respective tribes.

The social determinants of health is multicomplex and any strategies to address them would require multilevel partnerships (Dean et al., 2013). Since AI/AN are sovereign nations, efforts must be at the tribal level with consultation directly with the U.S. federal government level. Many tribal communities are without public health resources and access to infrastructure. The partnerships between states and tribes are essential in enhancing the capacity of many tribes and states in meeting the health needs of tribal communities. An overall logic model (Figure 5.1) for this policy was developed to visually show the link between activities and intended outcomes. This logic model can also be used within each state's diabetes or heart disease programs as an overarching "road map" to reducing the prevalence of diabetes and heart disease among AI/AN.

Inputs	**Activities**	**Outputs**	**Short-Term**	**Intermediate**	**Long-term**
• Funding • Training • FOA • Tribal Leaders • Federal Leaders • State Leaders • Tribal Liaison • State DOH • Tribal	• Tribal Consultation • Create a tribal/state workgroup • Develop a state/tribal plan • Training of states	• Formal agreement in place (includes data sharing agreement) • State and tribal strategic plan and evaluation plan • Tribal liaison	• Increased reach • Increased surveillance efforts • Increased leverage and resources • Increased state/tribal activities in various programs • Increased	• Policy and System Level Change • Reduced risk factors related to heart disease and diabetes • Improvements in health behaviors	• Decrease in prevalence of diabetes and heart disease among AI/AN • Reduced health disparity among AI population

Program		placed • Culturally appropriate interventions in place	infrastructure and capacity		

Figure 5.1 State/Tribal Partnership Logic Model to Reduce Diabetes and Heart Disease among Tribes

Adapted from Centers for Disease Control and Prevention. Evaluation Guide: Fundamentals of Evaluating Partnerships. Atlanta: U.S. Department of Health and Human Services; 2008.

There are various resources that will be necessary for this policy to be implemented. The funding of the programs would be provided by the CDC and distributed to the states/tribes that successfully responded to a CDC Funding Opportunity Announcement (FOA). Leadership at all levels would be required for this policy/program to be successful and would include tribal leaders, state leadership and federal leaders (i.e. Secretary of Health and Human Services). Other important individuals would be the CDC Project Officer, tribal liaisons, the tribal program, and the state departments of health.

This policy would allow the Federal government to expand their reach in improving the health of tribes far beyond what the Indian Health Service (IHS) could accomplish alone. In being respectful in acknowledging the sovereignty of the tribes, the first activity would be for states to have consultation with the tribal leaders of each tribe within each respective state. Overall, many tribal nations have not always worked closely with states (Droste, 2005) and so it would be imperative that a relationship is built through transparency and collaboration. This consultation would include discussions about what is needed in tribal communities and strategies to move forward. Further, each state would be required to purposively have a plan (within one year of funding) to partner with Tribal Nations to address the diabetes and heart disease disparities of tribal communities located within their respective state.

A formal agreement would be put in place regarding the collection and dissemination of tribal data. The collection of this data should be inclusive of a community-based participatory research (CBPR) where tribal communities are part of the design, collection and all other parts of the research. CBPR is a promising approach used with underserviced Indigenous communities, especially those in rural and remote locations (Ritchie et al., 2013). CBPR principles enhances partnerships (Ritchie et al., 2013) and would likely aid in building partnerships between tribal communities and the states. Tribal specific data are lacking among many tribes. However, states have experience in the collection of many surveillance efforts such as the Behavioral Risk Factor Surveillance System (BRFSS), Youth Risk Behavior Survey (YRBS), and others and can assist in building the capacity of tribes in the development of designing and selecting appropriate samples. Again, this activity would be a collaborative process between states and tribes. The inclusion of indigenous methodologies which are a mix of existing methodological approaches and indigenous practices (L. Smith, 2012) are important. “Indigenous methodologies tend to approach cultural protocols, values, and behaviors as an integral part of methodology” (L. Smith, 2012).

There would be at least 1 tribal liaison (who is an AI/AN) per 12 IHS area region and would serve as a resource to enhance relationships between the states and tribes and help to design and facilitate the delivery of culturally appropriate interventions in the state. Cultural appropriateness is important, as there is evidence that shows that culturally tailored interventions could have a positive impact on health outcomes (Goode, Dunne, Bronheim, & Fund, 2006). An example of a culturally appropriate intervention is the implementation of traditional foods as a way of integrating and embracing cultural identity, history and traditional methods to address health (Centers for Disease Control and Prevention, 2013b). There have been many success stories of tribes incorporating this form of intervention (Centers for Disease Control and Prevention, 2013b). In addition, this tribal liaison will assist in the training of states on the tribal history and culture of the tribes within their state.

Further, this relationship would help both entities in leveraging resources such as funds and surveillance efforts, as well as increase the reach of the states to tribes that were previously hard to reach. Overall, there would be an increase in state/ tribal activities designed to address health disparities due to diabetes and heart disease among tribal communities. All of the listed short-term outcomes would help build the tribes capacity in serving their communities. Policy and system level change may vary by state/tribal program. The main purpose of this intermediate outcome would be to provide motivation to assist in a change of behavior.

Historically, some states have ignored the sovereignty of tribes, which have left many of these relationships in need of repair. As a result, many tribal nations have not always worked closely with states (Droste, 2005). The federal government’s role is to uphold the “trust responsibility” of improving the health of AI/AN. The tribes are concerned with protecting their sovereignty and improving the health of their tribal members. There are several strategies that may facilitate this partnership. It is important to obtain buy-in from stakeholders such as Tribal Leaders in order to be a part of any effort within the tribe; the provision of additional CDC funds for tribes are needed; CDC should formulate guidance through consultation with tribal entities on ways that states may effectively work with tribes in a culturally appropriate and respectful way including the use of community based participatory based approaches to research; CDC should look for ways to make states accountable for distributing funds to tribes within their state to address tribal health outcomes; CDC should provide more resources, guidance and support towards the development of promising practices among tribal communities.

On a local programmatic level, it is imperative to include tribal members in the design of the Diabetes and/or Heart Disease program. They know their communities best. In addition, it would be important that interventions geared towards educating tribal communities regarding the prevention and management of heart disease and diabetes in a culturally relevant way. For example, family is valued among AI/AN. The influence of family and social gatherings are heavily valued among many tribal communities and can affect a person's belief system regarding the prevention and management of diabetes (Quandt et al., 2013). Incorporating the family within interventions may facilitate them serving as a change agent in discussing the ways to prevent, and manage these diseases. In addition, having the positive reinforcement and involvement of family and friends may alleviate the pressure that is found regarding adhering to dietary needs around social gatherings (Jones et al., 2012; Shaw et al., 2013). Further, promoting cultural activities that are relevant to specific tribes (such as fishing and gathering roots and berries) may promote physical activity and community unity (Mendez-Luck et al., 2015).

Training of Health Care providers

There is a need for health care providers and health care professionals to provide culturally appropriate care for all AI/AN while adhering to evidence-based guidelines for preventive health and better provider-patient communication, regardless of enrollment status. The kind of care that AI/AN receive in healthcare settings has an impact on their health. For example, evidence suggest that discrimination and possibly microaggressions enacted by healthcare providers, may contribute to worse health, decreased service utilization, and reduced treatment compliance (Gonzales, Harding, Lambert, Fu, & Henderson, 2013; Gonzales, Lambert, Fu, Jacob, & Harding, 2014; Gonzales et al., 2015; Walls, Gonzalez, Gladney, & Onello, 2015). Walls et al. (2015) found that over 1 in 3 patients reported a healthcare encounter in which a provider’s words or behaviors delivered a microaggressive message. Other behaviors reported by patients included stereotypes about their cultural group, even if the provider did not express them directly; and sometimes the minimization of the importance of cultural issues (Walls et al., 2015). It would be important to require accountability on the part of providers to report and monitor health gaps among this population by health care providers.

On an individual level, educating tribal communities regarding the prevention and management of heart disease and diabetes in a culturally relevant way is important. Incorporating the family within interventions may facilitate them serving as a change agent in discussing the ways to prevent, and manage these diseases. In addition, having the positive reinforcement and involvement of family and friends may alleviate the pressure that is found regarding adhering to dietary needs around social gatherings (Jones et al., 2012; Shaw et al., 2013), which is considered a valued time among many AI/AN. Further, promoting cultural activities that are relevant to specific tribes (such as fishing and gathering roots and berries) may promote physical activity and community unity (Mendez-Luck, Bethel, Goins, Schure, & McDermott, 2015). It is clear that SDH, such as education, is a major contributor of health outcomes. As such, there is a need to facilitate educational opportunities among AI/AN and enhance training and incentives to enter health care professions. Currently, AI/AN account for only 0.4% of nurses (U.S. Department of Health Human Services, 2013) and less than 0.4% of physicians (Association of American Medical Colleges, 2015) in the U.S. Having more AI/AN health practitioners would provide more diverse providers and enhance the ability assist in serving and making health decisions affecting their own community.

Conclusions

Despite the U.S. government not fulfilling their promise to uphold their responsibility to ensure that AI/AN have the highest possible health status, they are resilient. The paradox between the provision of healthcare agreed through treaties and laws versus the reality of the current health status of AI/AN observed today, is beyond appalling. While the aging population has major implications on organization and delivery of health care, along with the need for long term care, interventions aimed at significantly decreasing the prevalence of diabetes and heart disease among older AI/AN are needed.

While the Affordable Care Act was recently implemented to increase health insurance among all U.S. citizens, we will have to wait to see if it has an effect on poor health outcomes observed among AI/AN, particularly older adults. Multilevel interventions and policies are needed to address the social determinants of health that heavily impact the health status and healthcare access of older AI/AN. Our study discusses possible opportunities and strategies to intervene on improving diabetes, heart disease and usual source of care among older AI/AN and underscores the need for action. These primary recommendations are the following:

1. The federal government should uphold their legal responsibility to improve the health of AI/AN.
2. Increased funding for all arms of the Indian Health Care System (IHS, tribal programs and urban programs) that is commensurate with the population served.
3. Federal policy placed within all cooperative agreements to facilitate partnerships between state and tribes.
4. Increase tribal involvement and responsibility in the creation of culturally appropriate interventions.

5. Increase AI/AN health care providers and implement training of all health care providers on culturally appropriate care.
6. Provision of resources to enhance educational opportunities among AI/AN.

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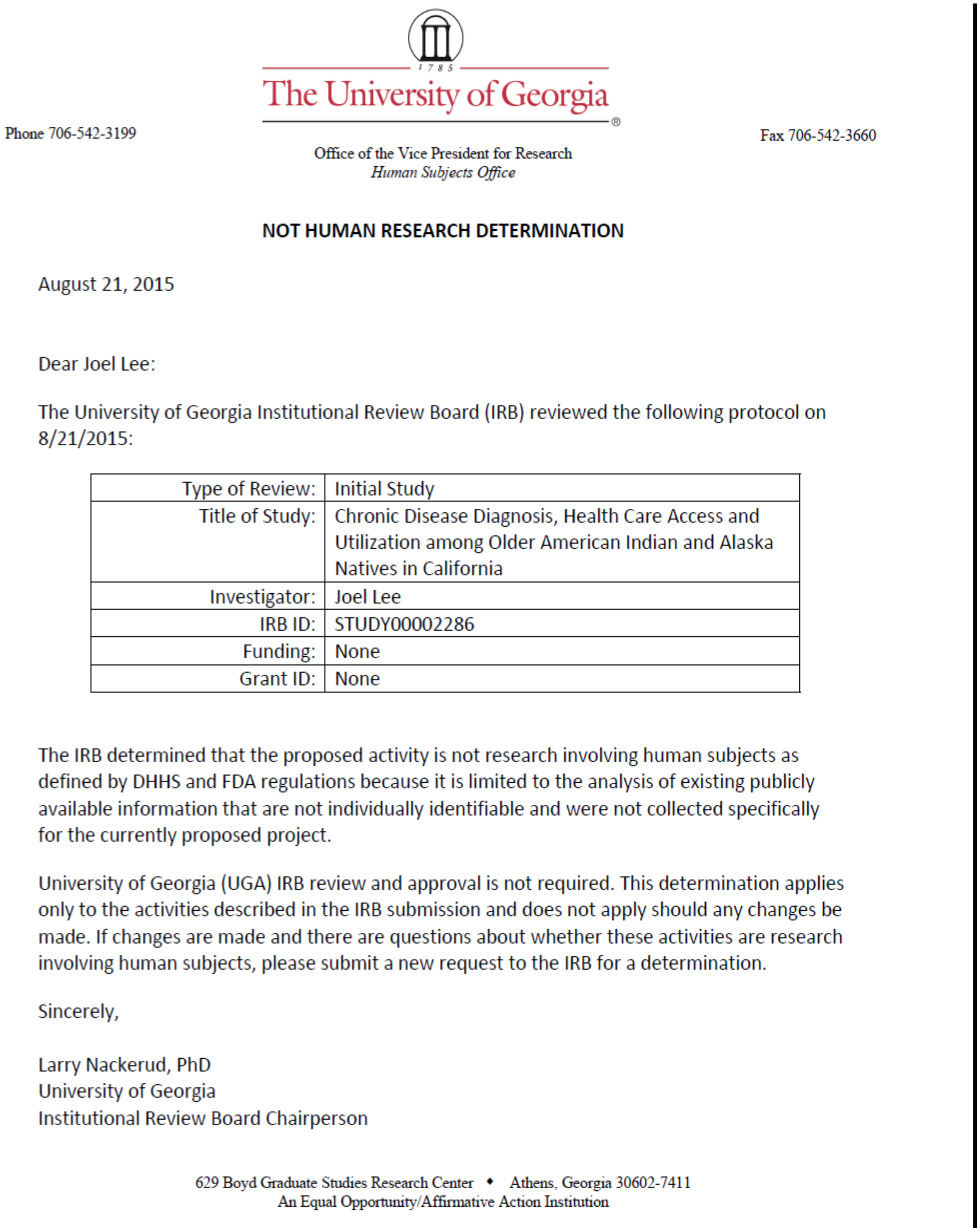
APPENDIX

A EXEMPT FROM HUMAN RESEARCH



The University of Georgia

Phone 706-542-3199

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Office of the Vice President for Research
Human Subjects Office

NOT HUMAN RESEARCH DETERMINATION

August 21, 2015

Dear Joel Lee:

The University of Georgia Institutional Review Board (IRB) reviewed the following protocol on 8/21/2015:

Type of Review:	Initial Study
Title of Study:	Chronic Disease Diagnosis, Health Care Access and Utilization among Older American Indian and Alaska Natives in California
Investigator:	Joel Lee
IRB ID:	STUDY00002286
Funding:	None
Grant ID:	None

The IRB determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations because it is limited to the analysis of existing publicly available information that are not individually identifiable and were not collected specifically for the currently proposed project.

University of Georgia (UGA) IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human subjects, please submit a new request to the IRB for a determination.

Sincerely,

Larry Nackerud, PhD
University of Georgia
Institutional Review Board Chairperson

629 Boyd Graduate Studies Research Center ◆ Athens, Georgia 30602-7411
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