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Tracking a Silent Killer: High Blood Pressure/Hypertension Among American Indians/Alaska
Natives in Los Angeles and Orange Counties, California.

A thesis submitted in partial satisfaction of the requirements for the degree

Master of Arts

in American Indian Studies.

by

Christopher Thomas Roldan

2016

ABSTRACT OF THE THESIS

Tracking a Silent Killer: High Blood Pressure/Hypertension Among
American Indians/Alaska Natives in Los Angeles and Orange Counties, California.

By

Christopher Thomas Roldan

Master of Arts in American Indian Studies

University of California, Los Angeles

Professor Felicia S. Hodge, Chair

High blood pressure, otherwise known as hypertension, is a major health issue for the American Indian population in the United States. Blood pressure can be described as the force of person's blood pushing on the walls of their veins. Hypertension is a sustained high blood pressure over a long period of time, which can lead to many negative health outcomes. Hypertension is also strongly associated with other cardiovascular conditions, and may exacerbate those conditions further in an individual. The purpose of this research is to identify the prevalence of high blood pressure among American Indians/Alaska Natives (AI/ANs) in two counties in Southern California (Los Angeles and Orange), and to compare those numbers with the overall state.

The thesis of Christopher Thomas Roldan is approved.

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2016

TABLE OF CONTENTS

High Blood Pressure(Hypertension)	1
Background	3
Previous Studies	6
Methods	9
Regional Population	12
Results	14
Discussion	15
Implications	16
Conclusion	19
Tables	21
Bibliography	23

High Blood Pressure (Hypertension)

High blood pressure, also known as hypertension, has two different measurements to determine an individual's blood pressure status. These numbers are written as a ratio and express both systolic, and diastolic pressure in the arteries. The top number (systolic), which is also the higher of the two numbers, measures the pressure in the arteries when the heart beats (when the heart muscle contracts). The bottom number (diastolic), which is also the lower of the two numbers, measures the pressure in the arteries between heartbeats (when the heart muscle is resting between beats and refilling with blood).¹ Together, these numbers give a picture of how the vessel responds to pressure generated by the heart pumping blood.

The American Heart Association (AHA) recommendation for health blood pressure is a systolic reading less than 120, and a diastolic pressure less than 80.² A systolic pressure over 120 mm Hg is considered prehypertensive. Systolic readings over 140 mm Hg is considered high blood pressure. Blood pressure approaching 180 mm Hg is considered a hypertensive crisis. The following chart reflects the categories as defined by the AHA:

¹ American Heart Association, "Understanding Blood Pressure Readings," *heart.org*, last modified August 4, 2014, http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/AboutHighBloodPressure/Understanding-Blood-Pressure-Readings_UCM_301764_Article.jsp#.V0Xsm5ErLDc

² American Heart Association, "Understanding Blood Pressure Readings," *heart.org*, last modified August 4, 2014, http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/AboutHighBloodPressure/Understanding-Blood-Pressure-Readings_UCM_301764_Article.jsp#.V0Xsm5ErLDc

Blood Pressure Category	Systolic mm Hg (upper number)		Diastolic mm Hg (lower number)
Normal	Less than 120	and	Less than 80
Prehypertension	120-139	or	80-89
High Blood Pressure (Hypertension) Stage 1	140-159	or	90-99
High Blood Pressure (hypertension) Stage 2	160 or higher	or	100 or higher
Hypertensive Crisis (Emergency care needed)	Higher than 180	or	Higher than 110

Since every individual is different, these readings may be seen as a guideline for measuring one's blood pressure. The other important thing to remember is that one high reading does not necessarily mean an individual has hypertension. High blood pressure can become problematic when it persists over time.

At times, an individual's blood pressure can be affected by obstructions, or other physical degradations of the blood vessels themselves. These obstructions would make it more difficult for the heart to pump blood through a person's body. Examples of physical characteristics that

may impede blood flow include: flexibility of blood vessels themselves, plaque buildup in the vessels, and even the strength of the heart.³ All these factors add to the complications which high blood pressure already brings.

Background

The Center for Disease Control and Prevention (CDC) has labeled heart disease as the leading cause of death for AI/ANs. The Office for Minority Health further states that AI/ANs are more likely to be diagnosed with heart disease than their White counterparts. Overall, AI/AN adults are 30 percent more likely than white adults to have high blood pressure.⁴ High blood pressure is often a precursor to heart disease, and can be attributed to a variety of maladies.⁵ The long-term effects of hypertension can lead to heart attacks, strokes, aneurysms, heart disease, and even metabolic syndrome, along with other complications.

³ American Heart Association, "Heart and Artery Damage and High Blood Pressure," *heart.org*, last modified August 4, 2014, http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/WhyBloodPressureMatters/Heart-and-Artery-Damage-and-High-Blood-Pressure_UCM_301823_Article.jsp#.V0fO-5ErLDc

⁴ "Heart Disease and American Indians," *minorityhealth.hhs.gov*, last modified January 28, 2016, <http://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=34>

⁵ World Health Organization (WHO). *A Global Brief on Hypertension: Silent Killer, Global Public Health Crisis*. Available from: <http://www.thehealthwell.info/node/466541> [Accessed: 31st May 2016]. http://chronicconditions.thehealthwell.info/search-results/global-brief-hypertension-silent-killer-global-public-health-crisis?&content=resource&member=572160&catalogue=none&collection=Prevention,Management,Hypertension,Conditions,Chronic%20Conditions,Causes,Burden&tokens_complete=true

The CDC estimates that about 70 million (29%) of American adults have high blood pressure.⁶ Often cited as a “silent killer,” it can progress without noticeable symptoms. High blood pressure and hypertension greatly increases the risk of major health problems such as heart disease and stroke, the first and fifth leading causes of death overall in the United States.⁷ According to one study, the total cost associated with high blood pressure in 2011 in the US was about \$46.4 billion. This figure includes health care services, medications, and missed days of work (Table 1).⁸

There can be many reason a person may develop hypertension in adulthood. These reasons can be attributed to genetics, they may be related to the environment a person is living in, or as a result of a combination of both genetics and the environment. The National Institutes of Health (NIH) has identified several factors that can lead to high blood pressure/hypertension: kidney fluid and salt imbalances, sympathetic nervous system activity, the renin-angiotensin-aldosterone system, and blood vessel structure and function.⁹

⁶Nwankwo T, Yoon SS, Burt V, Gu Q. “Hypertension among adults in the US: National Health and Nutrition Examination Survey, 2011-2012. NCHS Data Brief, No. 133.” National Center for Health Statistics, Centers for Disease Control and Prevention, US Dept of Health and Human Services, 2013.

⁷Dariush Mozaffarian, Emelia J. Benjamin, Alan S. Go, Donna K. Arnett, Michael J. Blaha, Mary Cushman, Sarah de Ferranti, Jean-Pierre Després, Heather J. Fullerton, Virginia J. Howard, Mark D. Huffman, Suzanne E. Judd, Brett M. Kissela, Daniel T. Lackland, Judith H. Lichtman, Lynda D. Lisabeth, Simin Liu, Rachel H. Mackey, David B. Matchar, Darren K. McGuire, Emile R. Mohler III, Claudia S. Moy, Paul Muntner, Michael E. Mussolino, Khurram Nasir, Robert W. Neumar, Graham Nichol, Latha Palaniappan, Dilip K. Pandey, Mathew J. Reeves, Carlos J. Rodriguez, Paul D. Sorlie, Joel Stein, Amytis Towfighi, Tanya N. Turan, Salim S. Virani, Melanie B. Turner, “Heart Disease and Stroke Statistics-2015 Update: A Report from the American Heart Association,” *Circulation* 131(2015): 434-441 doi: 10.1161/CIR.000000000000157

⁸Mozzafarian D, Benjamin EJ, Go AS, et al. Heart Disease and Stroke Statistics-2015 Update: a report from the American Heart Association. *Circulation*. 2015;e29-322.

⁹“Causes of High Blood Pressure,” *nhlbi.nih.gov*, last modified September 10, 2015, <http://www.nhlbi.nih.gov/health/health-topics/topics/hbp/causes>

Environmental, and behavioral, factors can also contribute to high blood pressure. Behaviors such as alcohol consumption, and low levels of activity, are contributing factors to high blood pressure.¹⁰ Some of these factors can be controlled, while others are more difficult to manage. Other studies have suggested environmental stresses such as work stress, and “chronic social conflict” are also potential contributors to high blood pressure.¹¹ Though these are but a few examples of factors that contribute to high blood pressure, the reality of it is far more complex. When describing the causes of high blood pressure, it seems that it is a combination of factors. Behaviors such as smoking, bad diet, and alcohol consumption may also contribute to the deterioration of blood vessel walls¹². All of these factors may independently, but often in combination, may play a role in increasing an individual’s risk of hypertension.

AI/AN have long held traditional beliefs on illness, and health. These beliefs are just some of the unique factors to consider when working with AI/ANs. In many ways AI/ANs have unique experiences as a population in the United States. The history of the peoples, and their relationship with the US government has shaped many individuals’ attitudes towards contemporary health services.

¹⁰ Barbara V. Howard, Elisa T. Lee, Jeunliang L. Yeh, Oscar Go, Richard R. Fabsitz, Richard B. Devereux, Thomas R. Welty, “Hypertension in Adult American Indians: The Strong Heart Study.” *Hypertension* 28(1996): 256-264 doi: 10.1161/01.HYP.28.2.256

¹¹ T.G. Pickering, “The effects of environmental and lifestyle factors on blood pressure and the intermediary role of the sympathetic nervous system.” *Journal of Human Hypertension* (1997) Aug;11 Suppl 1:S9-18. <http://www.ncbi.nlm.nih.gov/pubmed/9321735>

¹² Mozaffarian D, Benjamin EJ, Go AS, et al. Heart Disease and Stroke Statistics-2015 Update: a report from the American Heart Association. *Circulation*. 2015;e29-322.

Previous Studies

Relatively few studies have focused on hypertension in AI/ANs. One that focused on hypertension in AI/AN was the 1988 Strong Heart Study, an NIH-supported study of AIs residing in several mid-western states, whose findings were published in 1996 by the American Heart Association¹³. That population included adult AI/ANs from the states of Arizona, Oklahoma, North Dakota, and South Dakota. The age range consisted of individuals between the ages of 45 and 74 years. Research findings concluded that hypertension rates among AI/ANs in Oklahoma, and Arizona, were similar to the overall US population rate, though still slightly higher. While AI/AN hypertension rates range between 42-47% for AI/ANs, the US population as a whole had hypertension rates between 26-38%, with prevalence increasing with age. The states of North Dakota and South Dakota, however, reported lower rates of hypertension (27%) among American Indians than the general US population. Further, blood pressure was higher in individuals with diabetes ($P<.0001$) and was significantly correlated with age ($P<.0001$) and albuminuria (kidney disease) ($P<.0001$), but only weakly related to obesity.¹⁴ Nonetheless, the Strong Heart Study had strongly advised that “hypertension should be aggressively treated and controlled in American Indians because it is a known precursor to morbidity and mortality associated with diabetes and cardiovascular disease.”¹⁵

¹³ Barbara V. Howard, Elisa T. Lee, Jeunliang L. Yeh, Oscar Go, Richard R. Fabsitz, Richard B. Devereux, Thomas R. Welty, “Hypertension in Adult American Indians: The Strong Heart Study.” *Hypertension* 28(1996): 256-264 doi: 10.1161/01.HYP.28.2.256

¹⁴ Mozaffarian et al. “Heart Disease and Stroke Statistics-2015 Update: A Report from the American Heart Association.”

¹⁵ Howard et al. “Hypertension in Adult American Indians: The Strong Heart Study.”

The treatment of high blood pressure/hypertension is essential in order to reduce the risk of further health problems in any individuals. A 2014 study published in the American Journal of Cardiology outlines a general approach to managing hypertension which focuses on improvements at the system-level.¹⁶ A system-level approach, inclusion of all areas and systems associated with an individual, has been successful in other areas of the medical field, such as reducing medical errors, improving the inpatient treatment and outcomes of acute myocardial infarction, heart failure, stroke, and cardiopulmonary resuscitation.¹⁷ In the case of hypertension, system-level methods can address multiple factors in a coordinated manner while treating hypertension:

1. Identifying all patients eligible for management
2. Monitoring at the practice/population level
3. Increasing patient and provider awareness
4. Providing an effective diagnosis and treatment guideline
5. Systematic follow-up of patients for the initiation and intensification of therapy
6. Clarifying roles of healthcare providers to implement a team approach
7. Reducing barriers for patients to receive and adhere to medications and to implement lifestyle modifications

¹⁶ Alan S. Go, Mary Ann Bauman, Sallyann M. Coleman King, Gregg C. Fonarow, Willie Lawrence, Kim A. Williams, Eduardo Sanchez, "An Effective Approach to High Blood Pressure Control" A Science Advisory From the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention." *Journal of American Cardiology*, 2014, 63(12):1230-1238. doi:10.1016/j.jacc.2013.11.007

¹⁷ *Ibid.*

8. Leveraging the electronic medical record systems being established throughout the United States to support each of these steps¹⁸

This approach may help to improve systemic issues that are preventing AI/AN from receiving the most effective healthcare for hypertension. The other side that needs to be addressed is the individual's ability to make lifestyle choices that will contribute to improved blood pressure management. An issue like quitting smoking will certainly take a degree of personal responsibility to succeed. The same can be said, to a degree, for a person's diet choices and other factors. Of course, some individuals may have more options when it comes to food choices. The point being that the most effective way to manage hypertension is a combination of systemic improvements, and individual commitment/responsibility to blood pressure management.

Hypertension control is important to the health and wellbeing of American Indian people. Little is known about the prevalence of hypertension among AI/ANs living in Southern California. The purpose of the this study is to shed some light on an at risk population in the region. As more research is done in this field, the hope is that hypertension can be better managed, and even prevented in some cases. With hypertension often being a symptom and precursor to other severe maladies, this study also highlights the importance of awareness of hypertension, and management strategies.

¹⁸ Alan S. Go, Mary Ann Bauman, Sallyann M. Coleman King, Gregg C. Fonarow, Willie Lawrence, Kim A. Williams, Eduardo Sanchez, "An Effective Approach to High Blood Pressure Control: A Science Advisory From the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention." *Journal of American Cardiology*, 2014, 63(12):1230-1238. doi:10.1016/j.jacc.2013.11.007

Methods

The data source for this research is derived from the California Health Interview Survey (CHIS), a publicly available source for health statistics for the state of California. CHIS is the nation's largest state health survey. CHIS is a random-dial telephone survey conducted on a continuous bi-annual basis and covers a wide range of health topics. CHIS gives a detailed picture of the health and health care needs of California's large and diverse population. The survey is conducted by the UCLA Center for Health Policy Research in collaboration with the California Department of Public Health, and the Department of Health Care Services. For the purposes of this research, no personal identifying information was used, or required.

The study selected the CHIS dataset from the 2011-2012 surveys. Variables of interest included data on the rates of hypertension among AI/ANs residing in California in the two counties of Los Angeles and Orange. This study will target the population within the two counties who self reported as, in the 2011-2012 CHIS, as AI/AN. The survey question used to determine AI/AN status was, "Has a doctor ever told you that you have high blood pressure?"

For this research, data from the 2011-2012 California Health Interview survey were used. The CHIS data comes from surveys administered to California residents selected from a computer generated random list of telephone numbers. CHIS methodology includes using a sample of a household to make population estimates. Computers randomly draw a sample of telephone numbers in each of 44 geographic areas (sampling strata) that represent 41 individual counties and 3 groupings of counties with smaller populations together. These areas represent the entire state. In the case of CHIS, one adult per household is selected to participate, and their

information is used to get an idea of the overall population. Depending on the composition of the household, adolescents and children may be included in the CHIS.

The 2011-2012 CHIS included an oversample of the AI/AN population. This oversample was sponsored by Urban American Indian Involvement, Inc., and California Indian Health Services. The purpose of this oversample was to increase the number of AI/AN participants and improve the statistical stability and precision of estimates for this group. The oversample was conducted using a list provided by Indian Health Services.¹⁹

The data for this research was accessed via the CHIS website, and filtered through AskCHIS. The AI/AN population was identified through self-reported answers to the survey regarding any mention of AI/AN. After isolating the self-reported AI/AN population, those who had ever been diagnosed with high blood pressure were identified. AskCHIS then gave the sample estimates for those AI/AN in a specific region who have ever been diagnosed with high blood pressure. This estimate is a reflection of the AI/AN population based on individual respondent. This data may then reflect the larger, overall AI/AN population in a particular region.

The CHIS data utilized in this research is available to the general public through the UCLA Center for Health Policy Research website.²⁰ The AskCHIS feature can then be selected from the UCLA CHPR homepage menu bar, and population data can then be searched. The search can be tailored to include certain counties, health topics, gender, and race. The following steps describe the search procedure for obtaining the AI/AN hypertension rates for Los Angeles and Orange counties:

¹⁹ California Health Interview Survey. CHIS 2011-2012 Methodology Series: Report 1 - Sample Design. Los Angeles, CA: UCLA Center for Health Policy Research, 2014.

²⁰ <http://healthpolicy.ucla.edu/Pages/home.aspx>

1. Go to the UCLA CHPR website, then select the askCHIS feature from the menu bar.
2. The askCHIS search feature will offer a selection of search criteria in five categories.
(geographic area, topic, compare topic, limit population, and years)
3. Los Angeles and Orange counties were selected as the target regions. Other counties may also be selected for this category, or the state as a whole.
4. The first topic selected to search is “health condition (not cancer).” From there, the survey topic used to get the hypertension rates is, “ever been diagnosed with high blood pressure.”
5. The limit population filter selected was, “Any mention of American Indian/Alaska Native (self reported).” For this study, the population age range was narrowed to adults over the age of 45.
6. Finally, the year selected was the 2011-2012 survey data.

The previously described steps were repeated with modifications to generate estimates for comparison groups: Los Angeles/Orange county non-AI/AN, statewide AI/AN, statewide AI/AN urban/rural.

Though the CHIS provides valuable information about the population in California, there are some limitations when using CHIS. First, CHIS only provides an estimate of the population, and is therefore not one hundred percent accurate. In particular, the 2011-2012 CHIS survey used an oversampling of AI/ANs to compensate for the lower interview rates. The oversampling was accomplished by using Indian Health Services lists to attain a greater number of survey households for AI/ANs. The survey uses a technique where only a portion of the selected

households to gets interviewed to get an estimate (one adult, one adolescent, and one child).

Another limitation is that, to participate in the survey, the household must have a phone number (cell or house). This may also exclude a significant amount of the population.

To produce population estimates from CHIS data, weights are applied to the sample data to compensate for the probability of selection and a variety of other factors, some directly resulting from the design and administration of the survey. Missing values in the CHIS data files were replaced through imputation for nearly every variable.²¹

Regional Population

According to the U.S. Census Bureau, the 2010 AI/AN population in California was 723,225.²² While the total AI/AN population in the US numbers 5,220,579, the state of California reports approximately 13.85% of AI/ANs residing in the state.²³ The city of Los Angeles alone holds the second highest concentration of AI/ANs in the US numbering 54,236 individuals.²⁴ Only New York City has more AI/AN residents (111,749).²⁵

²¹ California Health Interview Survey. CHIS 2011-2012 Methodology Series: Report 1 - Sample Design. Los Angeles, CA: UCLA Center for Health Policy Research, 2014.

²²Tina Norris, Paula L. Vines, and Elizabeth M. Hoeffel. "The American Indian and Alaska Native Population: 2010." *2010 Census Briefs*, US Census Bureau, Issued January 2012. <http://www.census.gov/prod/cen2010/briefs/c2010br-10.pdf>

²³ *Ibid*

²⁴ Tina Norris, Paula L. Vines, and Elizabeth M. Hoeffel. "The American Indian and Alaska Native Population: 2010." *2010 Census Briefs*, US Census Bureau, Issued January 2012. <http://www.census.gov/prod/cen2010/briefs/c2010br-10.pdf>

²⁵ *Ibid*

Both Los Angeles and Orange Counties are primarily urban and suburban areas. Much of the population is in close proximity to major urban centers, with relatively few rural/isolated communities. The US Census Bureau places the total population for both counties combined at over 13 million people, and that number seems to be going up.²⁶ Los Angeles and Orange are major commercial, industrial, and government centers for the for the region. The area is also a major center of US culture, known for Hollywood and other “West Coast” ideals. The area is also a major hub for travel, both in the country and internationally, with multiple airports serving the populations of the two counties.

In the region now defined as Los Angeles and Orange counties, and how that relates to American Indians, it is important to acknowledge the indigenous roots of the area. Los Angeles County and Orange County, both lie in a region that was once populated by an Indigenous People now called the Tongva, or Gabrielino Indians. More recently, members of tribes across the nation immigrated to the region for work and education, the Indian relocation Act of 1956 being one reason for the move. Even as early as 1892, the Sherman Indian School was established in Southern California to house, and teach Native children off the reservation.²⁷ Descendants of the Tongva, along with a great many other AI/AN peoples still live in the area today.

At this point it would be worth mentioning that many AI/AN living in Los Angeles and Orange counties maintain some kind of connection to traditional beliefs, including those concerning health. The idea of what is traditional is subjective for different people. “Because

²⁶US Census Bureau, “Quick Facts” Accessed May 15, 2016
<http://www.census.gov/quickfacts/table/SEX255214/06059,06037>

²⁷ Carol Ray, *The History of Sherman Indian High School*.
http://www.nativevillage.org/Messages%20from%20the%20People/history_of_sherman_indian_high_s.htm

cultures, languages, technologies, and values shift faster than most people realize, it is hard to define what is truly traditional.”²⁸ This is not to say all AI/AN practice “traditional” healing. Even among American Indian people, ideas of what is traditional can differ between communities and individuals. Though it would be impossible to account for the variety of different beliefs and practices relating to health for AI/AN, those things are part of what is unique about the population. For thousands of years AI/ ANs have used traditional healing methods to treat physical, mental, and spiritual maladies. These often holistic approaches sought to address not only personal health, but the health of the community as well. Practices such as sweats, drum circles, smudging, medicinal plants, curandismo, and syncretic healing techniques have found their way into urban settings far away from reservations. Today nearly 71 percent of the AI/AN population in the US lives in urban environments, away from tribal lands (2010 U.S. Census).

Results

The 2012 CHIS estimated the percentage of AI/AN adults over the age of 45 (as self-reported) in the two counties who have ever been diagnosed with high blood pressure is 43.6% percent overall (C.I. 29.5%-57.6%).²⁹ When compared to the non-AI/AN population in the same region, the difference is small 42.8% (C.I. 40.3%-45.3%), and not statistically significant. As a comparison, high blood pressure for American Indian/Alaska Natives in other

²⁸ Anton Treuer. *Everything You Wanted to Know About Indians But Were Afraid to Ask*. St. Paul: Minnesota Historical Society Press, 2012. Print. P43

²⁹ UCLA Center for Health Policy Research, “ASKCHIS,” *2012 California Health Interview Survey*, Accessed April 14, 2016.
http://ask.chis.ucla.edu/AskCHIS/tools/_layouts/AskChisTool/home.aspx#/geography

regions of the state overall stands at a rate of about 49.0% percent (C.I. 37.%-60.9%).³⁰ By this measure, the rates of hypertension in the two Southern California counties are about the same as the state-wide average for AI/ANs (Table 2) (Table 3).

When men and women are compared, the adult male AI/AN population in Los Angeles and Orange County have similar rates of high blood pressure.

Discussion

Hypertension rates for AI/AN who live in Los Angeles and Orange counties are estimated to be lower than those reported for the AI/AN state-wide population, but this difference is not statistically significant. This is a very interesting outcome, and raises many questions. Future studies with larger sample sizes may want to take a closer look at AI/AN hypertension rates in Los Angeles and Orange County compared to the rest of the state, and see if similar rates are recorded. This may potentially point to various reasons that account for possibly better health outcomes in Los Angeles and Orange Counties.

One reasons may be related to place of residence in the Los Angeles/Orange County metropolitan area. AI/AN who live in the two county region (LA and Orange) generally reside in urban and suburban areas. This may mean that that AI/AN in those areas have access to a great many more resources than their counterparts in other parts of the state. Urban resources can take many forms, and are not uniformly distributed/utilized among the urban AI/AN population, but may play a role in relatively lower rates of hypertension. Some factors to consider include media

³⁰ UCLA Center for Health Policy Research, "ASKCHIS," *2012 California Health Interview Survey*, Accessed April 14, 2016.
http://ask.chis.ucla.edu/AskCHIS/tools/_layouts/AskChisTool/home.aspx#/geography

exposure, availability of health services, and physical activity may account for some part of the two county AI/AN population's lower hypertension rates.

What does "access" have to do with lower rates of hypertension? This is a tough question to answer without more in-depth investigation. In some cases it may be awareness of, and/or access to, resources and services. The urban setting of LA and Orange may provide a greater variety of ways for AI/ANs to manage their high blood pressure than the rural counties. Maybe there are more opportunities for AI/ANs to become aware of the threat of hypertension in urban spaces. Of course these are somewhat broad suggestions, but they set the stage for future research into why the urban AI/AN populations of this region seem to differ so greatly in terms of hypertension rates than AI/ANs statewide.

Implications

Few studies have investigated hypertension among AI/ANs. The studies available offer scant suggestions for preventing, and managing high blood pressure. Understanding the best approach for preventing and controlling hypertension among AI/ANs may be complex, however, examining the problem via a systems approach would address many of areas that would likely lead to improved outcomes.

Major elements that affects high blood pressure rests with individual's personal choices. Choices with regard to lifestyle, dietary habits, sedentary lifestyles and stress need to be recognized and controlled on an individual level. Hypertension prevention and management relies on an individual making good and appropriate decisions regarding their health. This may be better

realized by improved management of a person's diet and exercise, along with beneficial lifestyle choices with regards to controlling hypertension.

Future studies will be needed to identify the factors that play a role in the relatively lower rates of high blood pressure in the urban population. Unfortunately, there are also many factors that may contribute to high blood pressure and are not in a person's immediate control. Many of these factors are similar across most races, but there also seem to be other factors which are unique to AI/AN populations. Aside from biological features, AI/AN have their own unique cultures and histories. Other studies have pointed to historical trauma as an issue which AI/AN face in the US. According to Dr. Kathleen Rice, "This theory purports that some Native Americans are experiencing historical loss symptoms (e.g., depression, substance dependence, diabetes, dysfunctional parenting, unemployment) as a result of the cross-generational transmission of trauma from historical losses (e.g., loss of population, land, and culture)."³¹

As far as managing hypertension, the urban population may have better resources, therefore may have the potential to more effectively manage their blood pressure. The system level approach mentioned previously would likely be more effective in the urban area of LA and Orange counties. Specifically in the areas of awareness, and follow up care, the urban populations may have a leg up on the rural populations. With complex infrastructure, roads, and public transportation frequently available, the urban AI/ANs may have an easier time accessing medical services and information. Though not a definitive reason, the access to these resources may allow AI/ANs in the urban area to make healthier lifestyle choices. Of course, an alternative theory would be that many urban AI/ANs are susceptible to negative health outcomes by living in urban

³¹ Kathleen Brown-Rice, "Examining the Theory of Historical Trauma Among Native Americans" *The Professional Counselor*, 3(3) 2013: 117-130.

environments. Issues such as pollution, overcrowding/traffic, and other stresses can contribute to negative health outcomes as well.

Roads and other amenities may not be fully developed in rural areas, specifically on some reservations. This is not to say the AI/ANs on reservations are isolated, or are uneducated folks who cannot manage their health issues. Certainly many living in isolated areas still have phone service, internet access, and even satellite TV. The point here is that rural areas may not have as much access to services and information as those in Los Angeles and Orange counties. Perhaps it is just a little more difficult to access these things living in a rural area, and that may make all the difference in the world with regard to health outcomes. This research is not an assertion that urban AI/AN populations may be healthier, they just may have more access to services that help to better manage their hypertension.

Briefly I will also mention the historical relationship between AI/ANs and Indian Health Service (IHS), and how it may have negatively affected contemporary AI/AN perceptions of government health services. Though that relationship has had a long and detailed history, it has mostly been deficient when compared to services geared towards the general white population. Historic mistrust of the government has also played a role in preventing effective healthcare. Though the "Transfer Act" of 1955 proposed to work with, and respect the desires of the tribes, the IHS has at times not lived up to their promises.³² David H. DeJong notes that, "Since the allegations of forced sterilizations in the 1970s, the Indian Health Service and tribal communities have grappled over the role of research and patient/tribal privacy rights."³³ Along with mistrust, a

³² DeJong, David H. *Plagues, Politics, and Policy: A Chronicle of the Indian Health Service, 1955-2008*. (Lanham: Lexington Books, 2011), 190.

³³*Ibid.*, 186-187.

lack of qualified health professionals have also had a negative impact. Language barriers are still seen as an impediment to American Indian healthcare.³⁴ A lack of understanding of American Indian cultural beliefs and values also still seem to negatively impact American Indians seeking healthcare. Though this mistrust of government services is not an issue for all AI/ANs, it is something that health service providers, and professionals, should keep in mind when interacting with AI/AN individuals.

Conclusions

This research has assessed prevalence of high blood pressure in Los Angeles and Orange counties. In the process of this study, hypertension rates for Los Angeles and Orange counties were compared to the state rates for AI/ANs. As a comparison, the hypertension rates for the White population were also included at both the county, and state level.

The ultimate goal of this research is to help improve hypertension rates of hypertension among AI/AN in the area. Currently, some suggestions include continued system level improvements, but with consideration for the AI/AN experience. This may include further technical improvements, or more training for healthcare professionals on AI/AN cultural aspects of health. Language barriers need to be addressed as well to better communicate health management plans to non-English speaking patients. Though most of these suggestions may be more effectively implemented in urban areas, improvements can still be made in rural areas as well. With much infrastructure already in place in urban areas, the urban improvements may be easier to manage. Rural sites may need many different infrastructure projects completed before

³⁴DeJong, David H. *Plagues, Politics, and Policy: A Chronicle of the Indian Health Service, 1955-2008*. (Lanham: Lexington Books, 2011), 191.

their healthcare network is as effective as those at urban sites. Since California is such a large state, and geographically diverse, those factors must also be considered when addressing the statewide population.

Regardless of place of residence, hypertension is still an issue that many people are not well educated on. Being a “silent killer,” most people do not realize the negative consequences of hypertension until it is too late. Luckily, hypertension is a problem that can be managed, and can improve over time. Hopefully this research has shed a little light on the prevalence of high blood pressure among AI/ANs living in urban LA and Orange county, and the state as a whole. The hope being that at-risk communities may be more readily identified, and that effective preventative measures may be employed.

Table 1. Estimated Direct and Indirect Costs (in Billions of Dollars) of hypertensive disease: United States, 2011

Hospital Inpatient Stays	4.9
Hospital emergency department visits	1.5
Hospital outpatient or office based provider visits	13.5
Home health care	3.9
Prescribed medicines	19.0
Indirect costs (lost productivity/mortality)	3.6
Grand totals	46.4

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Table 2. Prevalence of hypertension among AI/AN in Los Angeles and Orange Counties, California. 2011-2012 CHIS data (AI/AN vs non AI/AN over age 45)

	AI/AN	vs.	Non-AI/AN
Has/Had high blood pressure	43.6% (C.I. 29.5-57.6)		42.8% (C.I. 40.3-45.3)
Doesn't have/Never had high BP	56.4% (42.4-70.5)		57.2% (C.I. 54.7-59.7)

2012 CHIS data

Table 3. Prevalence of hypertension among AI/AN in California over age 45 (not including LA and Orange Counties). 2012 CHIS

Has/Had high blood pressure	49.0% (C.I. 37.1-60.9)
Doesn't have/Never had high BP	51.0% (C.I. 39.1-62.9)

2012 CHIS data

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