Prevalence of Cardiovascular Risks Among 13 American Indian Tribes within 9 Different Geographic Regions of the United States

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American Indians/Alaskan Natives

Study Population Description:

5.2 million people (~2% population)

560 recognized tribes from 9 broad geographical regions

Under-served group: this population has 20% greater chance of death than the rest of USA.

The Problem

- Heart disease is the leading cause of death amongst AI/AN
- This population has 20% greater chance of death than the rest of USA.
- Despite higher incidence/prevalence very little research has been done and few interventions target this group.
- Often treated as a homogenous group with most studies looking into a small proportion of the total tribes and regions.

Aims

- Increase knowledge about the prevalence of cardiovascular disease (CVD) and its major risk factors amongst American Indians and Alaskan Natives.
- Assess the heterogeneity of CVD risk factors between the different tribal regions.
- Through this study, we hope to better guide interventions and policies to address this issue.
- We hope to promote thorough research into indigenous populations, not only in the USA, but also globally.

Hypothesis

H_0: There is no difference in CVD risk factors between the 9 different tribal regions, within the United States.

H_a: There are differences in CVD risk factors between the 9 different tribal regions, within the United States.

Methods: Study Design

Study Advantages:

1. Provide data on CVD risk factors of an underserved ethnic group, with documented reports of higher CVD risk and mortality
2. Data from this study will be the first study to date that will contribute to gaps in literature, by assessing American Indians as a heterogenous, rather than homogenous group

Details:

Retrospective cohort study

- Data collected from Indian Health Service's (IHS) National Data Warehouse (NDW)
- National enterprise-level database
- Patient-level data available on the following: demographics, address, state of residence, tribal membership, various lab tests, clinical measures, and health factors [9].
  - Can evaluate various CVD risk factors

Methods: Region

Study aim: assess risk factors of CVD in American Indians living in 9 distinct geographic regions in the U.S.:

1. Northwest coast
2. California
3. Plateau
4. Great Basin
5. Great Plains
6. Southwest
7. East (a.k.a Northeast)
8. Southeast
9. Alaska.

Regions defined by both geographical and cultural areas

- Each of these 9 regions will provide a homogenous population → total of 9 unique American Indian populations
- Data collected from IHS NDW
  - State of residence (geocode of zip) and tribal membership

Methods

Risk Factor Assessment:

- Age measured as a continuous variable
- Gender dichotomized as male or female
- Family history of early heart disease - having father or brother before age 55 and/or a mother or sister before age 65 develop heart disease
- Cholesterol
  - Low level of HDL cholesterol: < 40 mg/dL
  - Total cholesterol: "low" is < 200 mg/dL, "borderline-high" is 200 - 239 mg/dL, and "high" is ≥ 240 mg/dL
- Blood pressure: hypertension = bp of 140/90 mmHg or above
- Overweight = BMI 25 - 29.9 and obesity = BMI ≥ 30

Methods Continued…

Risk Factor Assessment (continued):

- Physical inactivity: participating < 5 times of 30 minutes of moderate exercise per week or < 3 times of 20 minutes of vigorous exercise per week
- Diabetes mellitus - having fasting plasma glucose level of ≥ 7.0 mmol/L (126 mg/dL)
- Smoking status - never smoker, current smoker, or former smoker
- Alcohol use (CAGE questionnaire)
  - Categorized as 3-levels: never drinkers, former drinkers, and current drinkers
  - Of current drinkers, drinking frequency categorized as once a month or less, 2-4 times per month, 2-3 times per week, 4-7 times per week, more than 7 times per week
- Diet (FFQ): categorized as low or high fruit and vegetable intake

Potential Difficulties

1. Retrospective study itself
   - Temporal relationship is relatively hard to determine.
   - We should rely on existing medical records for accurate recordkeeping.
   - Selection bias, Information bias and Misclassification may be present in the study.

2. The data collected may not be a complete representation of the American Indian/Alaska Native (lack of access to health care/not identifying at AI/AN)

3. The statistical analysis will be conducted only for the identified variables.

To deal with: Although using Indian Health Service National Data Warehouse data, which is relative complete. A prospective study is preferred if time and funding available.

Sequence for this Project

1 month: Initial coordination with IHS database researchers and data collection from the IHS database.

2 months: Data cleaning and initial statistical analyses is expected to take 2 months.

1 month: Interpretation of the results with collaboration from other experts in the field.

3 months: Write up of the analysis and publication of the results.

Information dissemination, including talks given to the American Indian population, will occur after acceptance for publication.

Precautions to be Exercised

- Data of this retrospective cohort study will be obtained from Indian Health Service's (IHS) National Data Warehouse (NDW), so there is no direct investigations of participants in this study. All the requirement of conducting a study, including informed consent, professional investigation, and quality control of the data, have been completed by IHS.

Statistical Analysis

- Examining population from the IHS medical surveys adults 45-74 years of age
- Exclusion
  - Individuals lacking risk factor data excluded in calculation for that particular risk factor

Pooled Prevalence of Risk Factors

Calculation of the pooled prevalence for each CVD risk factor for each tribal center
SAS 9.4

- Family history of heart disease (yes/no)
- Cholesterol (low/high)
- Blood pressure (low/high)
- Overweight or obese (yes/no)
- Physical activity (yes/no)
- Diabetes mellitus (yes/no)
- Smoking status (ever/never smoker)
- Alcohol intake (ever/never drinker)
- Fruit and vegetable intake (high/low)

Calculation of the Pooled Prevalence for each Geographic Region

- 9 different geographic regions
- Use MetaXL
- Test for statistical heterogeneity using the I^2 statistic

Exploration of Statistical Heterogeneity

- Meta-regression in STATA
  - GDP
- Bureau of Economic Analysis
  - % people in urban areas
- 2010 United Census Data

Clustering of Risk Factors

- 9 different geographic regions
- 0, 1, 2, 3, 4, 5, 6 or more risk factors considered high
- Use MetaXL to calculate pooled cluster prevalence

Power Calculation

- Assumptions
  - n=4549
  - 22% loss to follow-up
  - CI 95%
  - 0.05% Type I Error
  - 9 different geographic regions
- 432 individuals to achieve 0.80 power
- Relevance

Questions ?