OLD DOMINION UNIVERSITY

Master of Public Health
Epidemiology- MPH746
Study Design Project

Mortality from Major Cardiovascular Diseases in Georgia based on Race: Cross-sectional study

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Part IV: Abstract (Max 250 words)

The aim of this study is to find the relationship between smoking and stroke to determine if populations are more/less likely to have a stroke due to smoking and then determine the best ways to aid each population. This will be done by finding the mortality of smokers in the U.S. and finding the relationship with smoking and stroke. A cohort study will be used to observe the causes of strokes and find the relationship between smoking and having a stroke. Previous medical history of subjects and two groups will be established to compare the data. Prevalence and relative risk will measure the burden of the disease and show the relationship between smoking and stroke to determine the strength of the relationship.

Part I: Background & Objectives

According to the World Health Organization (WHO), cardiovascular diseases are the leading cause of death globally (WHO, 2021). These diseases are disorders in the heart and blood vessels that often cause heart attacks and strokes. This can be caused by high blood pressure, physical inactivity, unhealthy diets, and being overweight and obese. Strokes usually occur when blood flow to the brain is cut off or reduced. This stops the brain from being able to get the necessary oxygen and nutrients it needs to function in order to function and it leads to almost instant death (MayoClinic, 2021). In 2018, 1 out of 6 cardiovascular disease deaths came from strokes. Stroke is a leading cause of long-term disability that reduces the ability to carry out daily living functions (CDC, 2021). Smoking is one of the leading causes of cardiovascular diseases and causes about 1 out of every 4 cardiovascular deaths: “Each year, secondhand smoke exposure causes more than 8,000 deaths from stroke” (CDC, 2021). Even secondhand smoke can affect the possibility of having a stroke as smoking can cause blood to clot and get sticky, make

blood fatty, and damage blood vessels. Almost 5,000 people in Georgia died in 2020 from strokes. With cardiovascular diseases being the leading cause of death in the world, being able to put emphasis on reducing its prevalence within each state could begin to turn the trend the other way.

Objectives:

This study aims to:

1. Find the mortality rate for stroke in the U.S.
2. Determine if those suffering/dying from strokes were smokers, secondhand smokers, or non-smokers.
3. Find ways to address the high mortality rates and prevent them.
4. Find the relationship between smoking and stroke in Georgia.

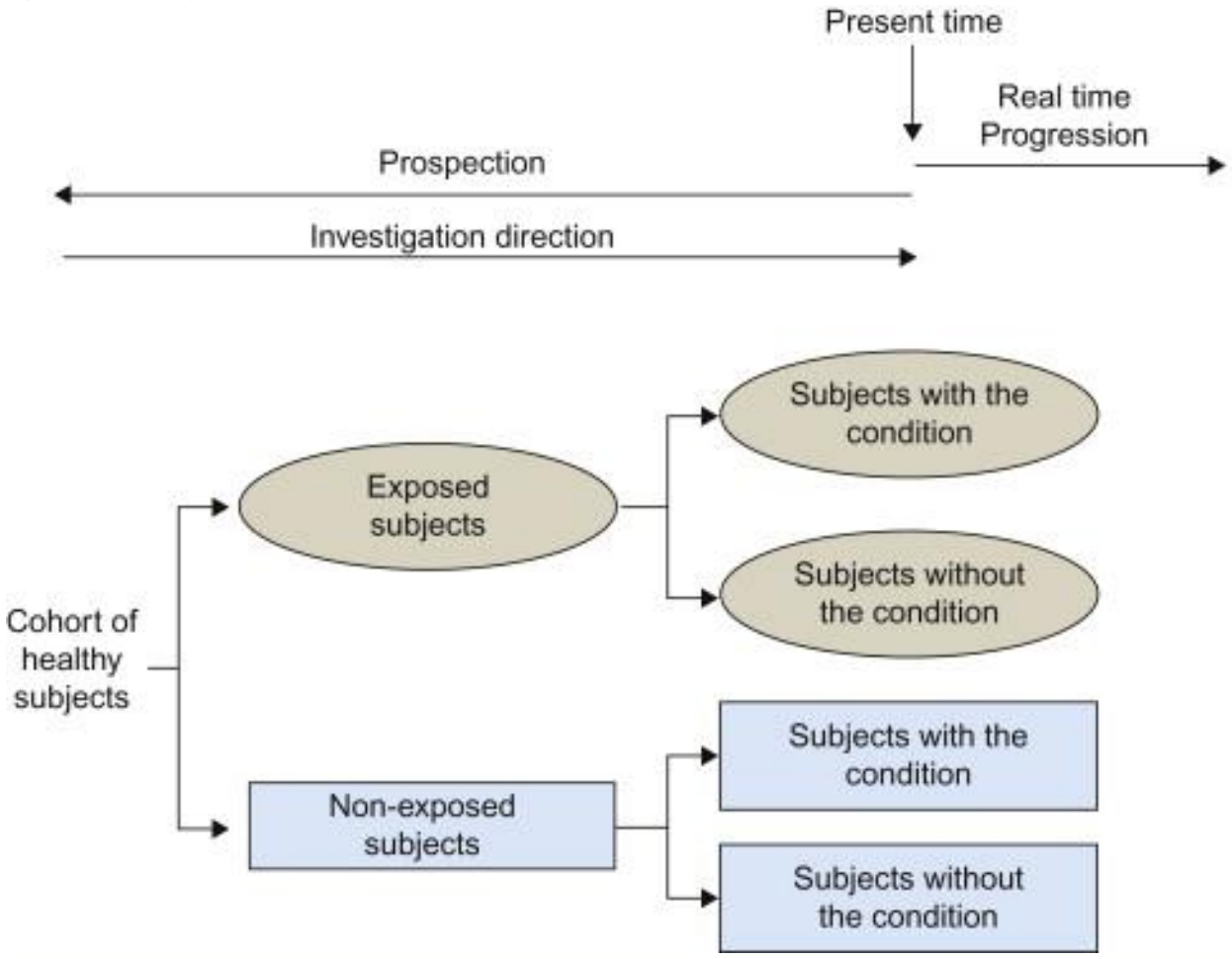
Part II: Methods

Study design:

For this study, an observational study is the best way to get the relationship between smoking and strokes. Cohort studies look at whether or not your exposure is present and follow it to see if the disease occurs or not. This study will use a retrospective cohort design to determine if smoking is a significant risk factor for strokes. The design uses past records to determine if your exposure is present and from the point the study is started, the study is followed to determine if the outcome happens. Those who have died from stroke, will have their medical records examined as well so that their exposures are not excluded. Although this is longer compared to a case-control study, it is better for large sample sizes. Case-control studies were not selected because they are more prone to bias and can not calculate incidence. All experimental studies (randomized-control trials) were thrown out because we did not have to test

any subjects. Ecological models are also observational studies that would work well in this study because they use prevalence and incidence to determine relationships of exposures and diseases, but they are used more for rare diseases.

Figure1. Cohort Study Layout



In the exposed subjects there would be the word smoker, there would be another one with secondhand smoke and in non-exposed, it would be non-smokers.

Study participants:

For this study, we will randomly select 3000 adults >50 years in the state of Georgia. These participants would be split into two groups of 1500 differentiated by the exposure of smoking. The exposed are the smokers and non-exposed are the non-smokers.

Data collection

Smoking is the exposure being measured for the outcome (stroke). For measuring the population's smoking, we will use previous doctor visit notes/medical history and ask the patients themselves to clarify. Smokers will be labeled by the number 1 and non-smokers will be labeled by 0.

The outcome in this study is stroke and it will be measured per individual. We will measure strokes by medical history and death certificate notes if the patient dies. If a stroke occurs it will be marked with a 1 and if it does not, it will be marked by a 0.

One confounding factor for this study will be race. In Georgia, whites make up for the larger percentage of death, but in America, African Americans have almost twice the risk of having a stroke than any other race (CDC, 2021). There are also other exposures such as high blood pressure, high cholesterol, obesity, and diabetes. The best way to account for these factors is randomization because restriction would limit the sample size and statistical control only goes by the variables observed. Randomization will allow us to account for all possible variables and minimize their impact.

Possible sources of errors

Selection bias is when an error is made with which people were chosen to be in the study. In cohort studies, the issue typically is with follow ups. People fail to respond or be found to follow throughout the duration of the study. With this study, we could lose touch with the subject, but that's why it is important to have a larger sample size. We could also have recall bias when discussing the subjects' smoking history, but that's where the medical records come in.

Time frame

This study will be followed for 5 years to see if a stroke occurs in the population.

Ethical consideration

This study will not be conducted until an Institutional Review Board gives ethical approval. To take care of the study participants and their identities and confidentiality we would randomly assign each individual a number as we selected them from the study going from 0001 to 3000.

Part III: Proposed findings and their possible impact

Prevalence is a measure of disease frequency and in measuring prevalence, we need to know the total number of people in each comparison group and the number of people that had a stroke. Then the two prevalence rates will be compared to see which group is more affected.

Prevalence per 1, 000

$$\frac{\text{No. of cases of a disease present In the population at a specified time}}{\text{No. of persons in the population at that specified time}} \times 1.000$$

Relative risk (risk ratio) measures the association of exposures and disease. In this study the relative risk will examine the probability of a person having a stroke as a smoker divided by the probability of a person having a stroke as a nonsmoker.

Relative Risk

$$\frac{\textit{Risk of disease (incidence proportion, attack rate) in group of primary interest}}{\textit{Risk of disease (incidence proportion, attack rate) in comparison group}}$$

Finding the prevalence of smokers having a stroke and the risk of disease will help policy makers see the reasons for stricter laws on selling and purchasing tobacco products, give health educators more information to provide to children and communities, and help inform the public of healthier living behaviors.

Confounders for this study include race, high blood pressure, high cholesterol, obesity, and diabetes. These will be adjusted for during analysis by randomizing our samples after we determine whether they are smokers or not. This randomization will eliminate bias, and investigators will give an honest look at the data.

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Reference:

Centers for Disease Control and Prevention. (2021, February 5). *Stats of the states - heart disease mortality*. Centers for Disease Control and Prevention. Retrieved October 4, 2021, from https://www.cdc.gov/nchs/pressroom/sosmap/heart_disease_mortality/heart_disease.htm.

Centers for Disease Control and Prevention. (2021, May 25). *Stroke facts*. Centers for Disease Control and Prevention. Retrieved October 24, 2021, from https://www.cdc.gov/stroke/facts.htm.

Mayo Foundation for Medical Education and Research. (2021, February 9). *Stroke*. Mayo Clinic. Retrieved October 24, 2021, from https://www.mayoclinic.org/diseases-conditions/stroke/symptoms-causes/syc-20350113.

NCI Dictionary of Cancer terms. National Cancer Institute. (n.d.). Retrieved October 31, 2021, from https://www.cancer.gov/publications/dictionaries/cancer-terms/def/case-control-study.

Oasis web query - mortality statistics. Georgia Department of Public Health, Office of Health Indicators for Planning OASIS. (n.d.). Retrieved October 4, 2021, from https://oasis.state.ga.us/oasis/webquery/qryMortality.aspx.

Risks of living in the stroke belt. Heart Attack & Stroke Prevention Center (The Prevention Center). (n.d.). Retrieved October 25, 2021, from http://www.thepreventioncenter.com/cardiovascular-disease/stroke-belt/.

World Health Organization. (n.d.). *Cardiovascular diseases (cvds)*. World Health Organization. Retrieved October 4, 2021, from https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds).