



**Master of Public Health
Epidemiology- MPH746
Study Design Project**

Prevalence of obesity in adults in Hampton Roads: Cross-sectional study

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Part IV: Abstract (Max 250 words)

Obesity is a growing problem in the United States, and more specifically in the Hampton Roads area of Virginia. The objectives of this study are to estimate the prevalence of obesity in the population of Hampton Roads adults while investigating the association between obesity and social characteristics, such as socioeconomic status, race/ethnicity, and educational level. Additionally, we will investigate the association between obesity and behavioral health habits in the Hampton Roads area, such as alcohol use, weekly exercise, and food habits. We will be using an analytical cross-sectional study design. Participants will be randomly selected from the United States 2020 Census data based on residence in the pre-selected areas within Hampton Roads, and then a random sample will be selected from that group. Participants will self-report exposures through an electronic survey that will be monitored. We will be using the responses to calculate the prevalence of obesity amongst adults in the Hampton Roads area and to determine if there is a link between obesity and various exposures. The findings will be used in future decision-making processes on where to allocate resources and funding for nutritional education programs within the Hampton Roads community.

Part I: Background & Objectives

Obesity is a growing problem in the United States, and is considered a critical public health issue. The Center for Disease Control, CDC, defines obesity as having a body mass index (BMI) of 30 or above (Defining Adult Overweight and Obesity, 2020). Links have been made between obesity and various chronic diseases, such as coronary heart disease, diabetes, and various cancers. With links between obesity and chronic diseases, there is reason to connect obesity to reduced life expectancy (van den Broek-Altenburg et al., 2020, p. 2). According to the CDC the prevalence of obesity in the United States was 42.2% from 2017 through 2018 (Adult Obesity Facts, 2020). Taking it a step further, the age-adjusted prevalence in adults was 9.2%, and was higher in women versus men (Hales et al., 2020). Along with prevalence rates, obesity-related mortality rates increased by 142% from 1999 to 2016 (D'Souza et al., 2018, p. 65). In 2015 alone, excess weight contributed to 4.0 million deaths and 120 million disease-specific mortalities (DALYs) among adults globally (GBD 2015 Obesity Collaborators, 2017, p. 22). In the United States, the years of life lost (YLL) associate with obesity-related diseases for non-smoking adults between the ages of 40 and 49 was 914,573 for white males, 1,324,105 for white females, 189,847 for black males, and 501,745 for black females (Chang et al., 2013, p. 6).

Along with alarming prevalence rates and years of life lost, growing obesity rates have affected medical spending. The proportion of spending attributed to obesity increased by 29% from 2001 to 2015 (van den Broek-Altenburg et al., 2020, p. 2). While this data is for the United States as a whole, Virginia is no exception to the burden of obesity. According to CDC's 2019 prevalence report on obesity, 31.9% of adults are classified as obese in the state of Virginia (Adult Obesity Prevalence Maps, 2020). Obesity rates must seriously be studied and analyzed in Virginia, specifically the Hampton Roads area, where 1,676,822 Virginian citizens reside. When looking at the nine health districts within the Hampton Roads area, the percentages of over-weight and obese adults range from 65.1% to 74.9%, with half of the values laying between 66 and 70.2% (Greater Hampton Roads, 2017). While there are various causes for obesity, most have been looked at for the nation level or state level, not locally. Understanding what factors are linked to obesity in the Hampton Roads area is necessary to help reach the goal of lower obesity rates.



Objectives:

The objective of this study is to estimate the prevalence of obesity in the Hampton Roads area of Virginia, and to investigate local social and behavioral health factors associated with obesity.

This study aims to:

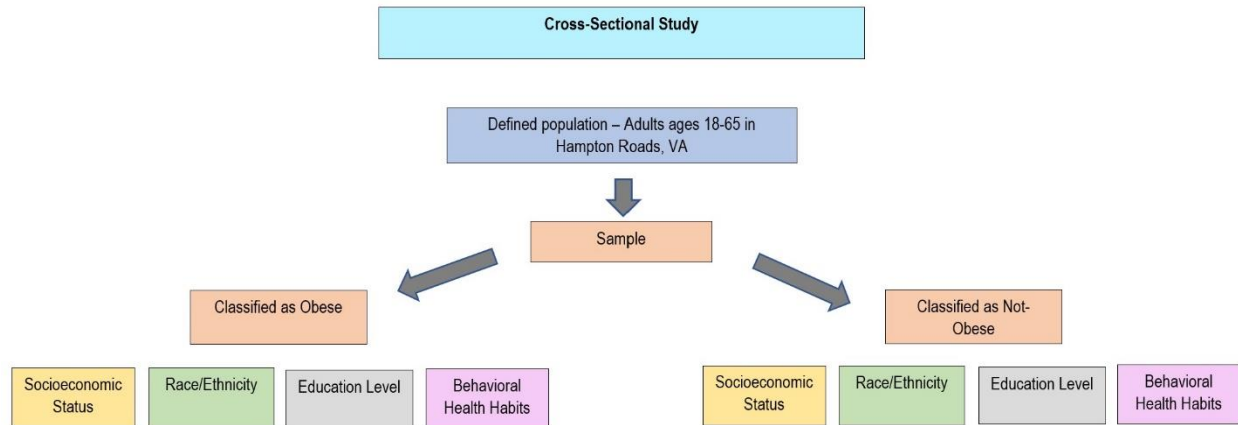
- 1) Estimate the prevalence of obesity in the population of Hampton Roads, Virginia.
- 2) Investigate the association between obesity and social characteristics in the Hampton Roads area, such as socioeconomic status, race/ethnicity, and educational level.
- 3) Investigate the association between obesity and behavioral health habits in the Hampton Roads area, such as alcohol use, weekly exercise, and food habits.

Part II: Methods

Study design:

For this study, I have selected a cross-sectional study design, more specifically an analytical cross-sectional design. The cross-sectional design was selected due to being advantageous for frequent diseases with long duration. Obesity is present in the Hampton Roads area, and it is not a disease that can appear or disappear overnight. Additionally, cross-sectional studies allow for the study of multiple outcomes and exposures. While the outcome of focus is obesity, there will be multiple exposures studied. And, in pairing with the first objective listed, cross-sectional was selected due to its ability to estimate prevalence of the disease. Analytical cross-sectional design was selected over descriptive cross-sectional due to analytical cross-sectional design's ability to collect data on risk factors and outcomes simultaneously.

Case-control was not selected for this study, because while it is able to investigate multiple exposures, it is best for rare diseases, and obesity is not rare within the Hampton Roads area. Additionally, one major disadvantage of case-control studies is that they are not very efficient with rare exposures, and while unsure if any of the exposures being studied are rare, selecting cross-sectional prevents a rare exposure from being mis-calculated. Cohort study design was also not selected due to the time, money, and effort necessary to complete the design. Additionally, it is difficult to study multiple exposures with cohort studies, since the groups will become too small to accurately represent the data.



Study participants:

The study population will consist of adults ages 18 through 65 who currently reside in the Hampton Roads area of Virginia. For this particular study, the Hampton Roads area includes the following cities and counties: Chesapeake, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Williamsburg, Virginia Beach, York County. Participants must have lived in one or multiple of the included cities/counties for at least five years to be eligible to participate. Participants will be randomly selected from Hampton Roads by pooling a population group from the United States 2020 census data. From that pooled population, 400 individuals will be randomly selected and asked to participate in the study. To adjust for the possibility of a high unresponsive count, participants will keep being randomly selected from the pooled population until a study sample of 400 individuals is met.

Data collection:

This study is looking for an association between obesity and multiple exposures, with those exposures being socioeconomic status, education level, race/ethnicity, and behavioral health habits. All exposures will be self-reported by participants. For socioeconomic status, the focus will be on household income level, and participants will write-in their income levels. The write-in responses will then be grouped into three categories, yearly income less than \$20,000, yearly income level \$20,001 through \$50,000, and yearly income level above \$50,000. Education level will have options for participants to select: some high school, high school degree, some undergraduate, undergraduate degree, some graduate, graduate degree. Similar to education level, race/ethnicity will have option provided to the participants: American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander, White, and Other. The final exposure category is behavioral health habits. For this section, participants will be asked four main questions that will be answered numerically. The questions are as follows: number of times the participant exercised for at least 30 minutes a week, the number of meals the participant eats out per week, the number of alcoholic beverages consumed by the participant each week, and the number of cigarettes or vape pods the participant smokes per day (the participant will specify cigarettes or vape pods in their response).

The outcome will be the measurement of obesity. While participants will have the option to select if they are obese or not, their height and weight will be measured and recorded by a survey monitor so BMI can be calculated. BMI will be calculated for a participant regardless if they self-report obesity or not. Obesity will be defined as a participant having



a BMI of 30 or higher, which is in align with the CDC's definition of obesity. Confounding variables are possible with this study, as with any study design. The most common confounding variable for obesity would be a participant on a medication that has weight-gain as a side effect. To control this variable, participants will self-report in the survey if they are on any prescription medications, and researchers will investigate those medications to access weight-gain side effects. Participants who are on a medication where weight-gain is a common side effect, which will be classified as between 1 in 10 and 1 in 100 people experiencing weight gain, will not be counted in the data analysis. Another confounding variable would be participant age and gender. These variables will be controlled via the statistical analysis of the results.

Possible sources of errors:

Selection bias could occur if the random selection of the study participants is not representative of the whole Hampton Roads area. To combat this potential issue, participants will be randomly selected from the pooled population from the 2020 census data as previously stated, but there must be an even distribution amongst the cities/counties being included. Therefore, each city/county must have 40 randomly selected participants. This ensures that the sample group is not over-representing one of the areas over the rest. Measurement bias could occur in the data collection process. If a participant is not truthful on their survey, it could alter the data analysis. Additionally, if a participant does not understand the question, their answer could be inaccurate. To help with this, there will be a second survey monitor in the room with the participant. This will not be the same monitor who recorded height and weight. The monitor will be behind a screen, so the monitor will not see the participant. This is to prevent the monitor from seeing the size of the participant, which could alter how the monitor answers the participant's questions. Finally, to combat measurement bias, if a participant does not answer all questions, their survey will not be counted in the final data analysis.

Time frame:

The study will be conducted over a 6-month period. Participant selection will take 1-2 months, participant survey completion will take 1-2 months, and data analysis and study completion will take 1-2 months.

Ethical consideration:

Participants will be contacted to take part in the study, but participation is completely voluntary. Study participation will be kept confidential by not including names on surveys. The surveys will be conducted electronically and stored in an electronic data base, with no name or time stamp on the surveys, so neither the researchers or survey monitors can associate responses with participants. The study will not be conducted until ethical approval is obtained from an Institutional Review Board.

Part III: Proposed findings and their possible impact

The measure of disease frequency for this study is prevalence, and the measure of association is odds ratio. Prevalence will be calculated by dividing the number of cases present in the population at a specific time by the numbers of persons in the population at that specific time. Prevalence will then be compared amongst the groups



which will be divided based on socioeconomic status, race/ethnicity, education level, and behavioral health habits. The odds ratio is calculated by dividing the odds of the event in the exposed group by the odds of the event in the non-exposed group. Confounders in this study, including medication, age, and gender, will be adjusted for during statistical analysis.

Finding the prevalence of obesity amongst certain groups of adults can aid decision makers in allocating resources and funding for nutritional education towards these groups of people in the Hampton Roads area. By putting resources and funding to groups that will benefit from the educate, Hampton Roads can see an improvement in its obesity rates, and even an increase in life expectancy amongst its residence.

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