

# The Impact of Environmental Recreational Opportunities on Obesity Rates in Washington Counties

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## Hypothesis:

**Increased environmental recreational opportunities in a state county could help lower its obesity rate.**

## Introduction:

This study analyzes the correlation between obesity rates across different counties and the amount of environmental recreational opportunities that exist within each county. For this study, environmental recreation will be defined as parks, forests, and trails maintained by state and national governments. Obesity is known as a condition defined by one's Body Mass Index (BMI), a measurement of one's weight (kg) divided by their squared height (m<sup>2</sup>). For this study, obesity will be defined as having a BMI greater than or equal to 30. [1] Obesity is a critical health issue for Americans as it can significantly increase the risks of mortality from illnesses like type II diabetes, coronary heart disease, cardiovascular death, types of cancer, mood, respiratory disease, and musculoskeletal disorders. [2] Obesity is a condition caused by a large variety of different factors. These can be both immutable factors like genetics and controllable factors such as sleep, diet, and physical activity. [3]. This study will focus on the factor of physical activity by analyzing the amount of recreational opportunities for inhabitants of each county. This data will determine how government-regulated outdoor recreation could prevent obesity, and how an expanded recreation infrastructure may prevent it.

Percent of adults who who have a Body Mass Index of 30 or greater

Geography: County, Time period: 2019-2021

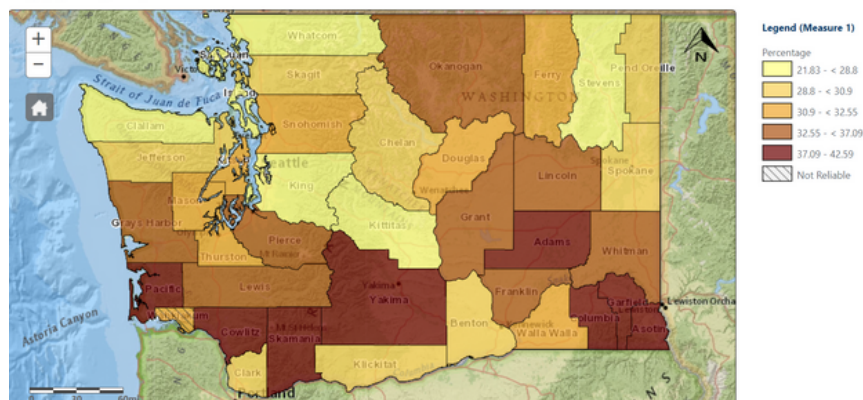


Fig 2: A choropleth map representing different percentages of obesity throughout Washington counties. The data for this projection was obtained through the Washington Tracking Network, and sourced from the Center of Disease Control's Behavioral Risk Surveillance System Survey.

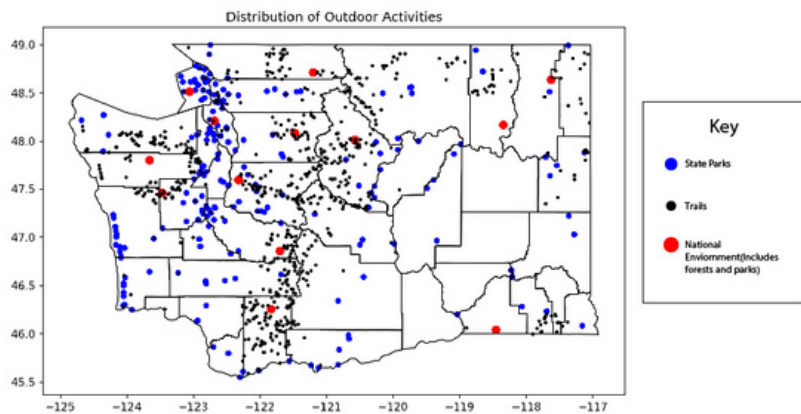


Fig 1: A graph representing the distribution of government-regulated recreational land across Washington Counties with longitude and latitude. This data was sourced from the National Park Service's Application Programming Interface, the Washington Geospatial Open Data Portal, the Washington Department of State Parks and Recreation, and the National Forest Service.

## Map Correlations:

The visual distribution of the points throughout Washington counties reveals that for the majority of the state, a greater number of government-regulated recreational opportunities will correspond with lower percentages of obesity for each county. Examples of this correlation include the comparison between the counties that provide many environmental opportunities like King, Kittitas, and Chelan with percentages in the 20-30% range versus the neighboring counties that possess much fewer environmental opportunities like Yakima, Grant, Adams, Lincoln, Franklin, and Whitman which possess percentages in the 30-40% range. The correlation is maintained in further middle eastern and northeastern counties such as Spokane, Pend Ornette, Stevens, and Ferry with a lower 20%-30% range as well as in the Northwest with counties like San Juan, Island, Whatcom, Skagit, and Clallam plus Jefferson in the Northern Olympic Peninsula. However, there are some discrepancies within this correlation most notably in counties like Gray's Harbor, Pacific, and Skamania which possess higher percentages of obesity despite their large numbers of outdoor recreation opportunities. A few Southeastern counties such as Columbia and Garfield do not correlate with the hypothesis also.

# Reasons for Discrepancies:

This study contributes three possible reasons for the discrepancies in counties like Gray's Harbor, Pacific, and Skamania. The first reason is the balance each of these counties maintains in providing access to both state parks and trailheads. State parks can often prioritize accessibility, but may be less focused on providing opportunities for physical activity such as hiking trails. This logic could explain the high obesity rates in counties like Gray's Harbor and Pacific. On the other hand, counties with many trails may provide many opportunities for physical activity, yet with the lack of a more organized state park, these trails may not be as accessible. This could explain the discrepancy in Skamania which has the most hiking trails, but also one of the highest obesity rates. The second reason for such discrepancies could be the smaller sample size in counties with smaller populations. For example, Garfield County with 2,286 people, Columbia County with 3,952 people, and Skamania County with 12,036 people, are all part of Washington's top six smallest populations by county. [5] Finally, discrepancies are expected because obesity has many different causes, and consequently, one possible factor for preventing obesity may not always directly correlate with lower obesity rates.

## Trendlines and Scatterplots:

### State Parks Number vs. Obesity Rate

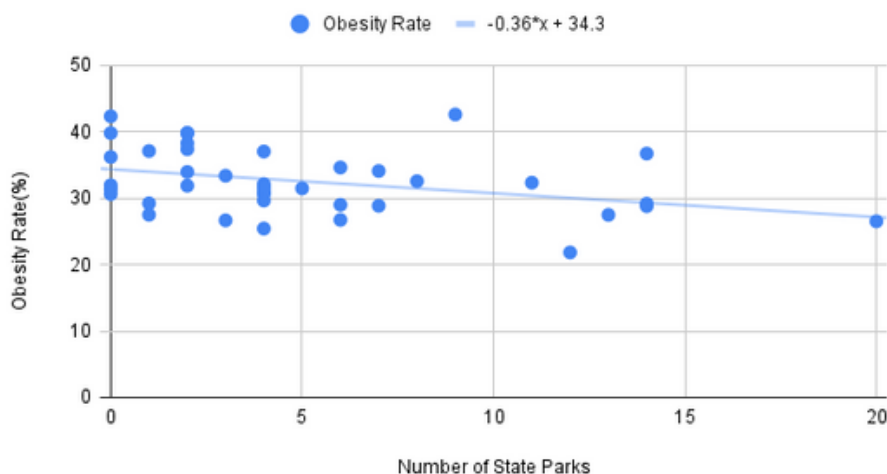


Fig 3: A scatter plot with a trendline that indicates the function between the obesity rate based on the number of state parks for each county. The data used for this visualization is an extension of the data from Fig 1.

## Trendline Analysis:

The visualization of each trend line in Fig 3. and Fig 4. indicates an obvious downward trend in obesity percentages as the number of state parks or trailheads increases. Such a claim is strengthened by the trendlines which both show a negative correlation between obesity percentages and the quantities of parks and trailheads. The absolute value of the slope of each trend is less than one for both the states comparison (0.36 parks/%) and trail comparison (0.0513 trails/%) predicting a percentage drop for around every 3 additional state parks or every 19 additional trails. Although the data does produce a downward trendline, the data points fluctuate greatly below or above the trendline. This variability could be attributed to obesity being a health issue with many different causes including, but not limited to physical activity. Creating more outdoor recreational opportunities for Washingtonians may incentivize physical activity, but it is not guaranteed to prevent obesity as many different factors cause it. Nevertheless, the negative correlation of Fig 3. and Fig 4. suggests that environmental recreational opportunities may slightly lower obesity rates; however, the high variability of the data suggests that other factors could also contribute to lower county-wide obesity percentages.

### Number of Trailheads vs. Obesity Rate

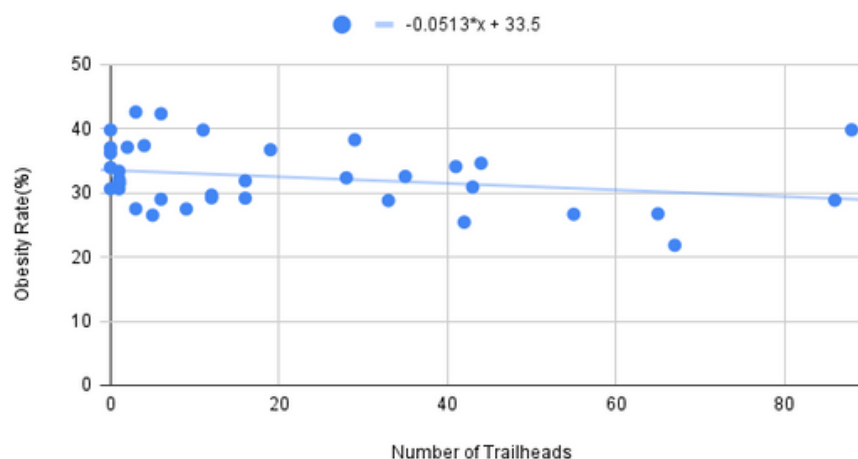


Fig 4: A scatter plot with a trendline that indicates the function between the obesity rate based on the number of trailheads for each county. The data used for this visualization is an extension of the data from Fig 1.

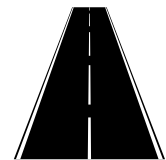
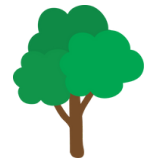
# Significance:

The obesity epidemic in America can make citizens across all Washington counties susceptible to health problems and consequently, shortened life spans. The Worldwide Organization of Health revealed that up to 5 million deaths worldwide could have been caused due to higher-than-optimal BMI levels. [1] As a threat to millions of lives each year, targeting controllable factors of obesity like physical activity can save future generations. Activity accessible on government recreational land like hiking could act as a preventive measure as it is low cost and more pleasurable to complete because it prioritizes a focus on nature rather than exercise itself. [4] The correlation between recreational opportunities and obesity percentages indicates that expanding these opportunities in counties with higher obesity percentages could lower the number of obesity-related deaths.

# Solutions:

Possible solutions that could help prevent obesity according to the previous data:

- The Washington Government can create and fund more parks and trails in counties with less accessibility to outdoor recreation.
- Cities can educate by creating physical and digital resources that notify citizens where all the trails and parks are located in their county.
- The government can issue low-cost transportation for inhabitants of counties with less accessibility to outdoor recreation so they can visit trails and parks in neighboring counties.



# Equity:

This project indicates that the distribution of outdoor recreational opportunities for Washingtonians is not equitable geographically. Depending on one's geographic location, it may require much more time, effort, and money to visit a local park or trail. The varying proximity for citizens between their home county and outdoor recreation means that there are different levels of accessibility based on geography. When citizens are deprived of their accessibility to outdoor recreation they are also deprived of the active lifestyle it promotes. Since physical activity is a factor of obesity, depriving populations of access to opportunities for outdoor activity through environmental recreation could help cause obesity because of one's geographic origin.

# References:

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