Exploring the Prevalence of Obesity in America and the Potential Effect on Theme Parks

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Background

The theme parks are meant to be an escape from the "real world". They allow their guests to travel to distant worlds and get away from the troubles of everyday life. However, what happens when the troubles of everyday life creep their way into the theme parks? For some this is a reality check that they were not prepared for. In this instance, the guests I am talking about are the guests that are told due to their size they will not be able to be accommodated on an attraction. For the safety of all guests there are restrictions on theme park attractions. Many people, especially those with children, think of the height restrictions for some of the rollercoaster type attractions. However, based on the website for Cedar Point an amusement park in Sandusky, OH that is not the only thing that could keep a guest from safely riding an attraction. Cedar Point's ride policy and procedures states, "All passenger restraint systems, including lap bars, shoulder harnesses, and seatbelts must be positioned and fastened properly to allow guests to ride. Due to rider restraint system requirements, guests of larger size (in terms of height, weight, and/or proportions) may not be accommodated on some of our rides.". Cedar Point's policies are a little vaguer on what a guest with larger size means, however, Universal Studios Orlando has been more specific with their newest attraction the Velocicoaster in saying that guests with a 40-inch waist may not be able to be accommodated. These restrictions can cause a guest's experience to go from good to bad very quickly. A study published in the European Journal of Tourism Research titled "*The joy of riding or walk of shame? The theme park experience of obese people",* summarizes the shift in experience by saying, "The findings indicate the theme park experience is highly affected by the obese peoples' look and body size. Their body determines their interaction with the physical and human environments, creating a physically challenging and mentally humiliating visitor experience…At the core of the

experience is participants' perception that the bystanders who watched and stared at them when asked to leave, considered the request to be a mark justice made. The ensuing sense of humiliation was highly devastating." (Poria et al., 2019). This study is not the only place that I have found mention of larger gusts struggling with finding an enjoyable experience at the theme parks. There are blogs, vlogs and articles written about the experience of the larger guest. So, if this is a problem for some, is it prevalent enough that the theme parks should address it? In this project I will explore the prevalence of obesity in the United States and the trends over time to see what the impact could be for theme parks.

Problem Statement

What is the trend of the prevalence of obesity in the United States?

Is there a relationship between obesity and other health related categories such as life expectancy, physical activity?

How could the trends of the prevalence of obesity impact theme parks?

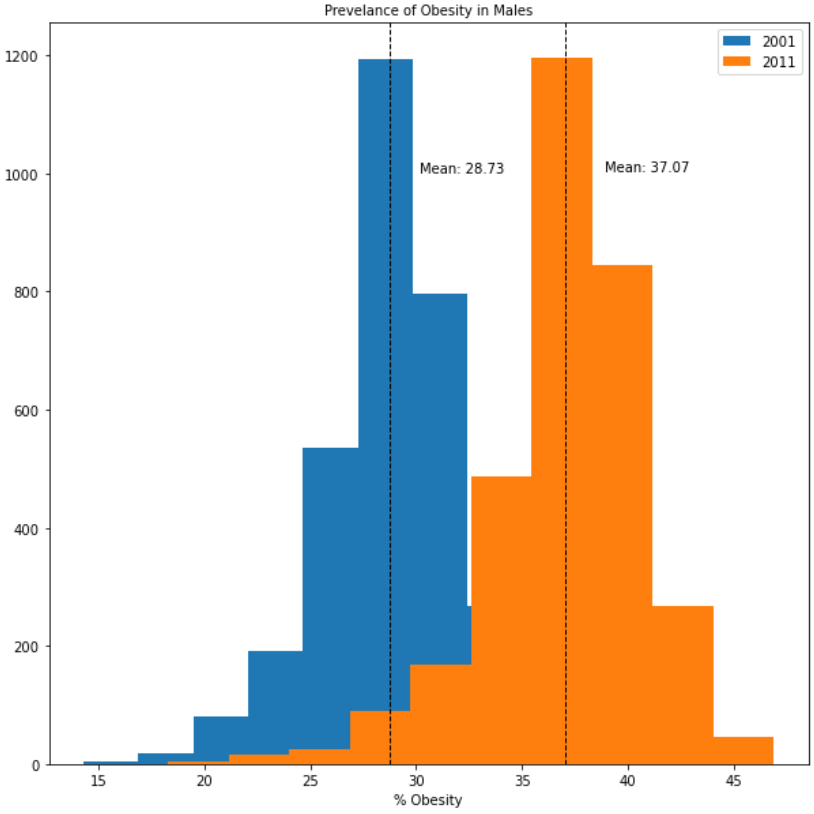
Methods

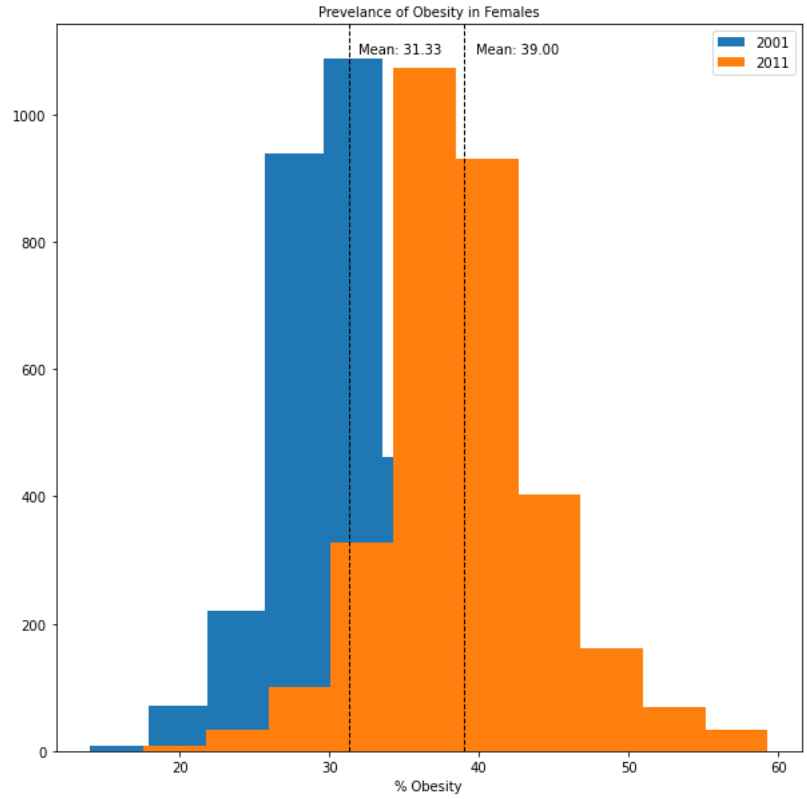
Obesity, according to the Center for Disease Control and Prevention (CDC), "Weight that is higher than what is considered healthy for a given height is described as overweight or obesity. Body Mass Index (BMI) is a screening tool for overweight and obesity.". According to the CDC, if a person's BMI is 30 or higher, that person would be considered obese. The waist circumference on average of an obese male is more than 40 inches and a non-pregnant female is more 35 inches. With the ride restrictions mentioned above, therefore the prevalence of obesity can be a good indicator of problems in accommodating guests on attractions.

The data being used for this project comes from the Institute for Health Metrics and Evaluation. The data is composed of statistics for each county in the United States of America on the prevalence of obesity for the years 2001,2009, and 2011. The data also has the prevalence for sufficient physical activity for the years 2001, 2009, 2011 and has the life expectancy for 1985-2010. This data set will be used to explore the trend in obesity from 2001-2011 and explore the relationship between obesity, physical activity, and life expectancy. The data is also broken up by gender for each feature as well. Here is a glimpse of the data for the overall United States.

Gender	Obesity 2001	Obesity 2009	Obesity 2011	Physical Activity 2011	Life Expectancy 2010
Male	26.1%	32.8%	33.8%	56.3%	76.1 years
Female	28.7%	35.1%	36.1%	52.6%	80.8 years

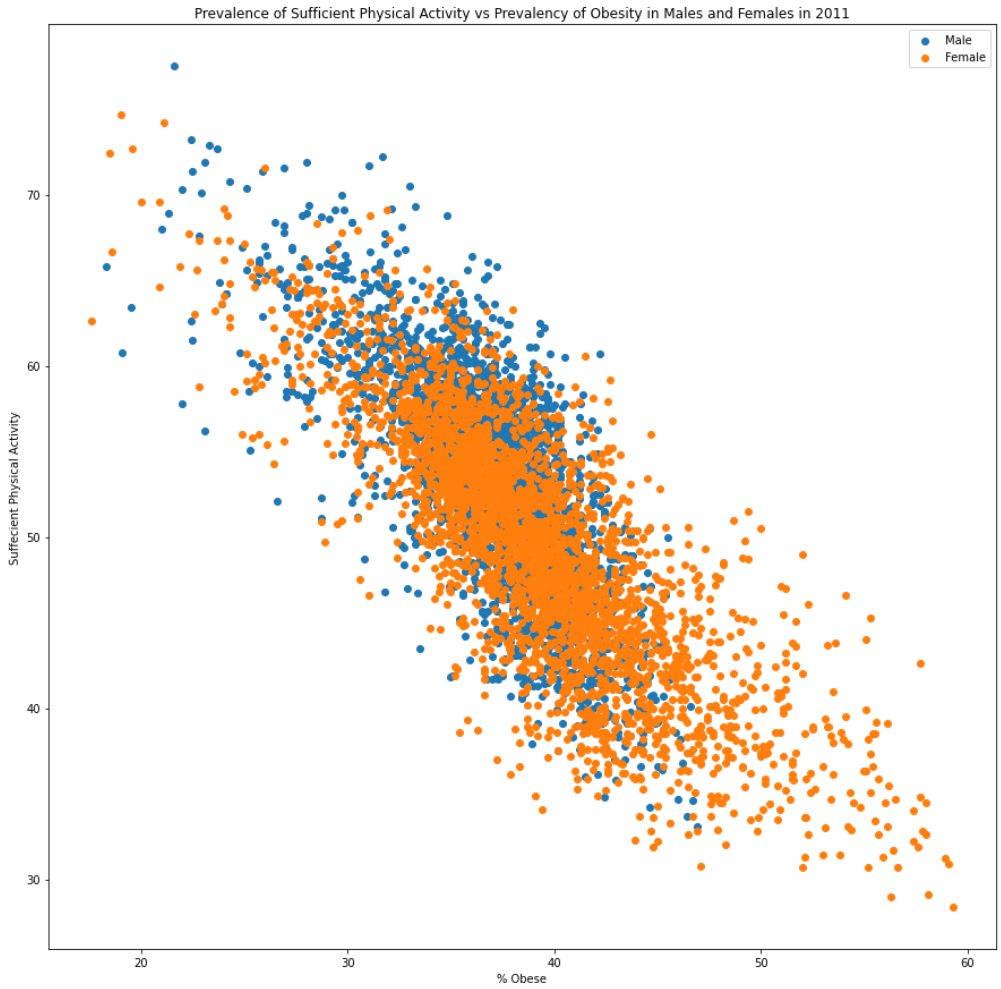
There was minimal cleaning needed for this data set. There were some null values that were needed to be cleaned out in the county column since the overall state's numbers and overall US number's rows were included. To remedy this a new dataframe was created with just the state's values and then those values were dropped from the county dataframe. The state's data could then be explored, and the maps of that data can be found in the appendix. For the rest of the project the dataframe with just the county numbers will be used. Looking at the histogram of the county data can help see where the data has changed over time. Here is a look at the data for all the counties in the USA in 2001 compared to 2011 for both males and females.


Prevelance of Obesity in Males
2001
2011
Mean: 28.73
Mean: 37.07
1200
1000
800
600
400
200
0
15
20
25
30
35
40
45
% Obesity


Prevelance of Obesity in Females
2001
2011
Mean: 31.33
Mean: 39.00
1000
800
600
400
200
0
20
30
40
50
60
% Obesity

These histograms show an increase of not only the spread of the data for both males and females but also a significant rise in the mean of the prevalence for obesity. After exploring the data on obesity, an exploration in the relationship between obesity, physical activity and life expectancy was done. The specific relationships that will be looked at are the prevalence of obesity for both males and females in 2009 and the life expectancy in 2010. This will be the best way to look at this relationship because it will show how the prevalence of obesity may or may not have affected the life expectancy in 2010. The other relationship that will be focused on will be the relationship between the prevalence for physical activity in 2011 and the prevalence for obesity in 2011. To begin modeling these relationships we will look at the scatterplot for Life Expectancy 2010 Vs Obesity 2009.

Looking at this scatterplot it implies that there may be a relationship between these two features. It looks like as the prevalence for obesity increases the life expectancy decreases for both males and females. In fact, the correlation coefficient for males is -0.62 and the correlation coefficient for females is -0.70. For the correlation, you are looking at the relationship between the two features. When the correlation is negative it is saying that as one goes up the other goes down or vice versa. The closer the value is to 1, for positive correlation, and -1, for negative correlation the stronger the relationship is. So, in this case we would say that there is a significant correlation between these two features. Now let's look at the relationship between the prevalence of obesity and sufficient physical activity.



The relationship between these two variables looks like the other relationship. As the prevalence for obesity goes up, the prevalence for sufficient physical activity goes down. The correlations for these relationships are more significant than the other relationships. The correlation for the males is -0.74 and the correlation for females is -0.81.

With correlations like this we can look at a linear regression to explore the predictive abilities of the relationships between the features. To do this we set up a linear regression of the life expectancy of 2010 as the target features and the obesity prevalence of 2009 as the predictor variable. We can do the same for the prevalence of obesity in 2011 as the target variable and the prevalence for sufficient physical activity as the predictor variable. For the regression analysis we look at the R-squared value to see to what extent one variable influences the other. In the first case we want to see how much the obesity influences the life expectancy. For the males the R-squared value is 0.39 and for the females it was 0.5. The value for the females shows a more significant influence but neither value would be considered a strong influence. The R-squared values for the prevalence for obesity and the prevalence for physical activity are 0.54 for the males and 0.65 for the females. These values would be considered a more significant and the argument can be made that the prevalence for physical activity has a slightly significant influence on the prevalence for obesity in both males and females.

Discussion/Recommendations

After exploring the prevalence of obesity and the relationship it has with sufficient physical activity and the relationship it has with the life expectancy, what implications does this have for theme parks? As mentioned before, according to the CDC a BMI over 30 is considered obese and males that are considered obese are more likely to have a waist size of over 40 inches. Cedar Point mentions that larger guests may not be accommodated on some attractions and

Universal Studios Orlando goes so far as saying anyone over a 40-inch waist may not be accommodated on its newest attraction. These restrictions could pose a problem for according to the data explored before, as of 2011, about 34% of American males and 36% of American females. In fact, the CDC is reporting that the obesity prevalence for Americans in 2017-2018 was 42.4%. It did not specify male or female, but that does show another increase from 2011 to 2018. Also, according to the CDC the prevalence for physical activity has gone down to 53.6% which based on the regression analysis above indicates that the prevalence for obesity will mostly rise.

The results of this study's exploration of the prevalence of obesity in the United States would indicate that there could be more guests that are coming to theme parks that will be obese than in the past. Therefore, what impact would this have on the theme parks and what recommendations can be made to limit this impact. For starters, with the currently predicted rise in the obesity level the theme parks should expect more guests to have trouble being accommodated on attractions which can lead to more guests that are dealing with the ramifications of that including but not limited to embarrassment and a ruined experience. The data on the economic impact of this would be something that should be explored for the theme parks. When the guests have a ruined experience, they would possibly be less likely to spend money other places in the park. That exploration can be compared to the economic impact of adjusting already built rides to accommodate more obese guests and the cost of adjusting future rides.

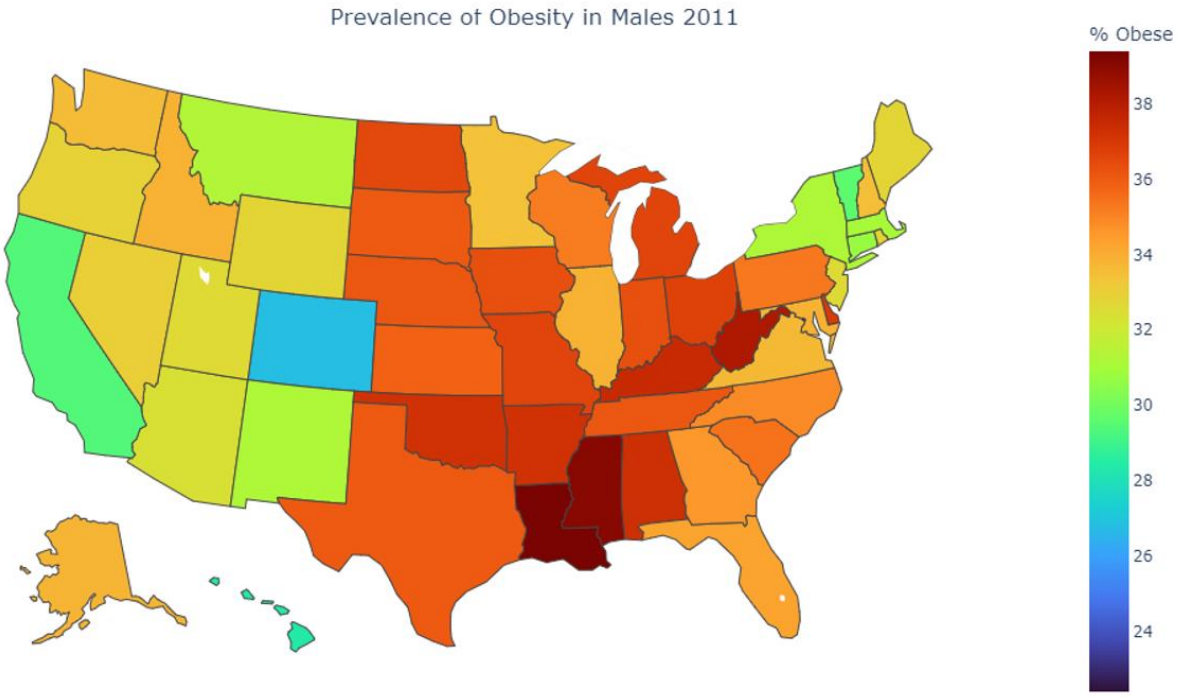
There are adjustments that theme parks can make now to recover the experience for the guest or prevent the bad experience to begin with. Since this is a known problem, making sure that it is well documented and well communicated to the guests would be a high priority. Making

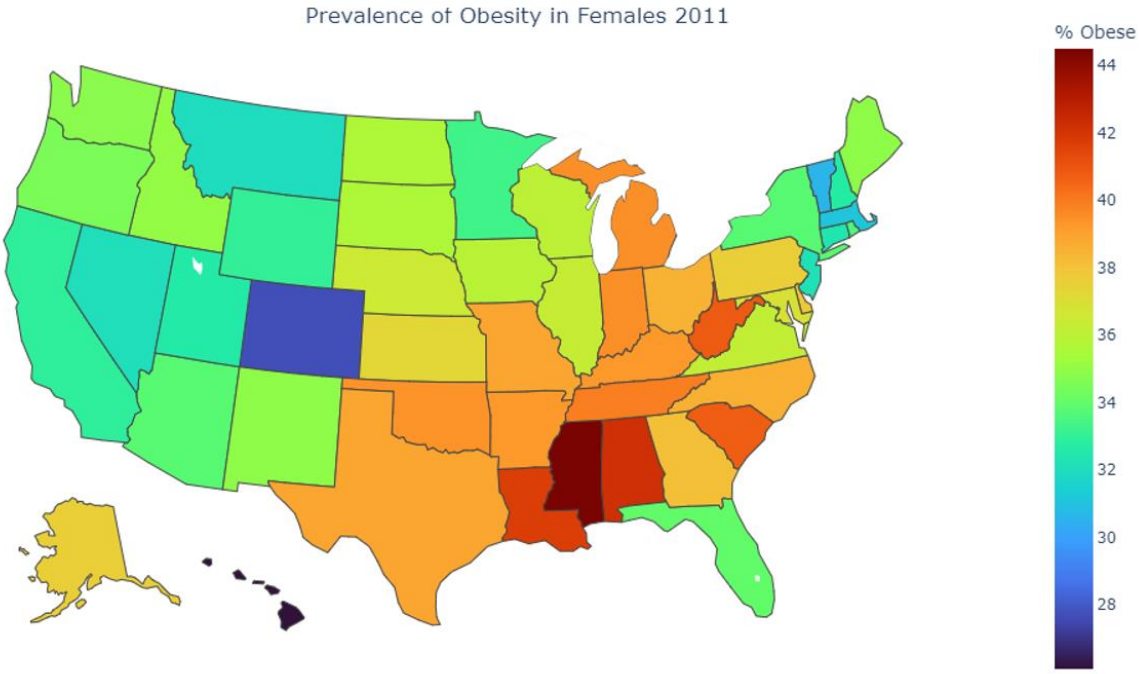
sure the guests understand the size recommendations in a very clear manner should help avoid the embarrassment of the “walk of shame”. Also, educating employees of how to handle the situation to limit the negative impact and recover some of the joy would be a good way to lower the impact on the guests and the theme parks. There are many rides that have test vehicles to show whether a guest can be accommodated. However, are these well communicated to guests and in a visible place for the guest to see and use? Making sure that there is a testing seat available and well maintained can be another way to avoid the impact. One of the other ways that theme parks can assist is through programs and partnerships to increase the prevalence for sufficient physical activity. Based on the results of the exploration, the higher the prevalence for physical activity the lower the prevalence for obesity. Theme parks can team with programs that promote and provide methods for physical activity. Many theme parks are already doing this with things like 5K races and even marathons.

Conclusion

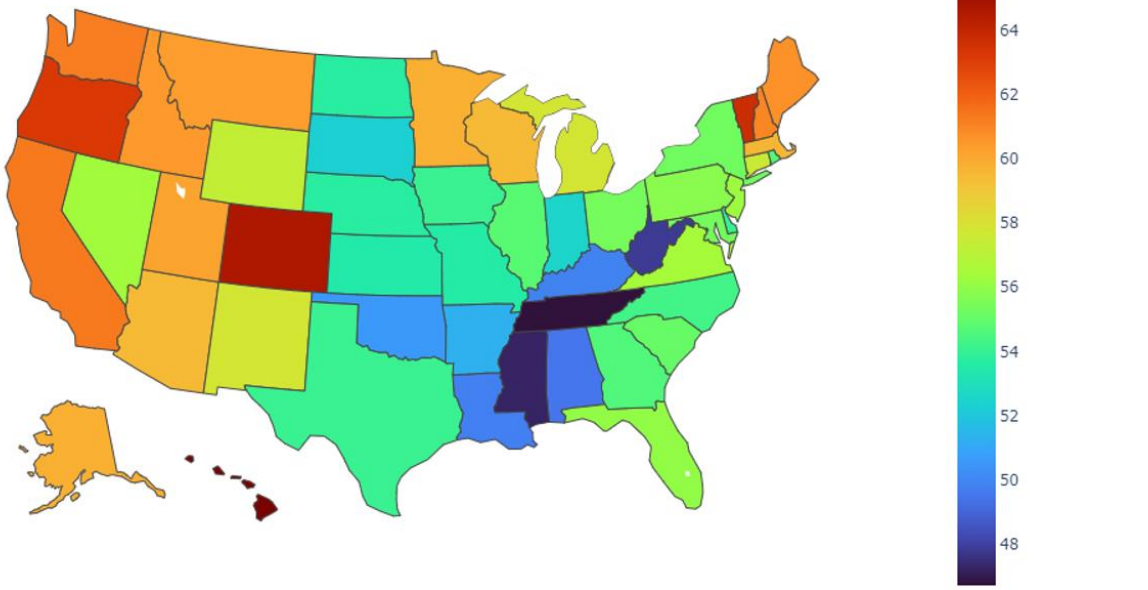
The prevalence for obesity in the United States is increasing. This means that there are more people in this country alone that are going to have trouble being accommodated on theme park attractions. Theme parks need to recognize this and make sure they are doing things to lower the impact this may have on their parks. There are more areas that can be explored to see where the largest impact would be whether this would just impact a guests experience or if it would have economic impacts as well for the theme parks.

Appendix

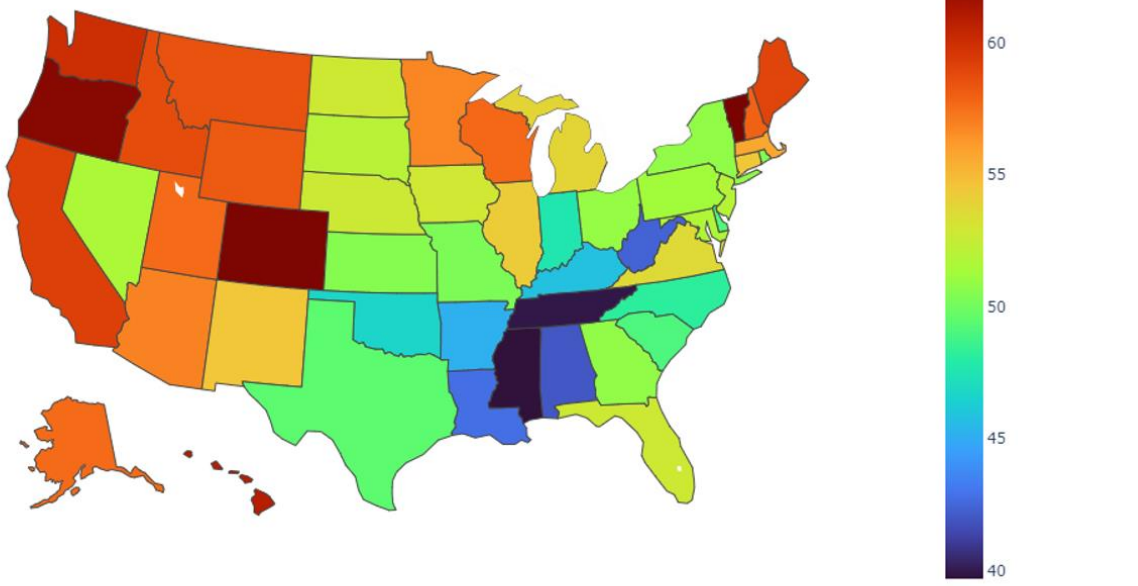

Prevalence of Obesity in Males 2011
% Obese
38
36
34
32
30
28
26
24


Prevalence of Obesity in Females 2011
% Obese
44
42
40
38
36
34
32
30
28

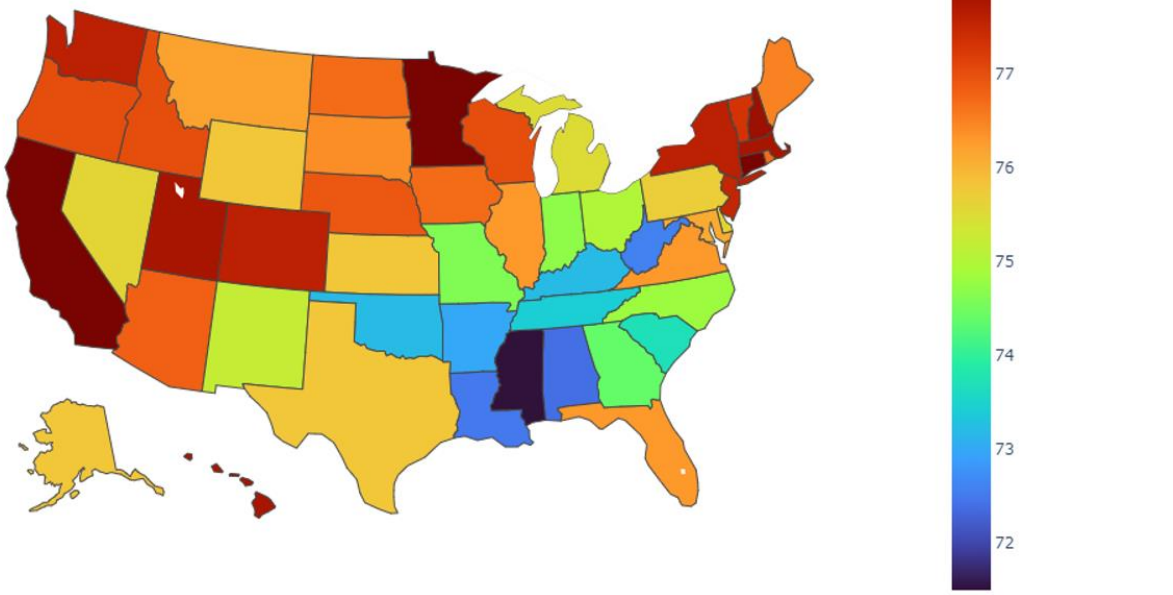
Male sufficient physical activity prevalence, 2011* (%)



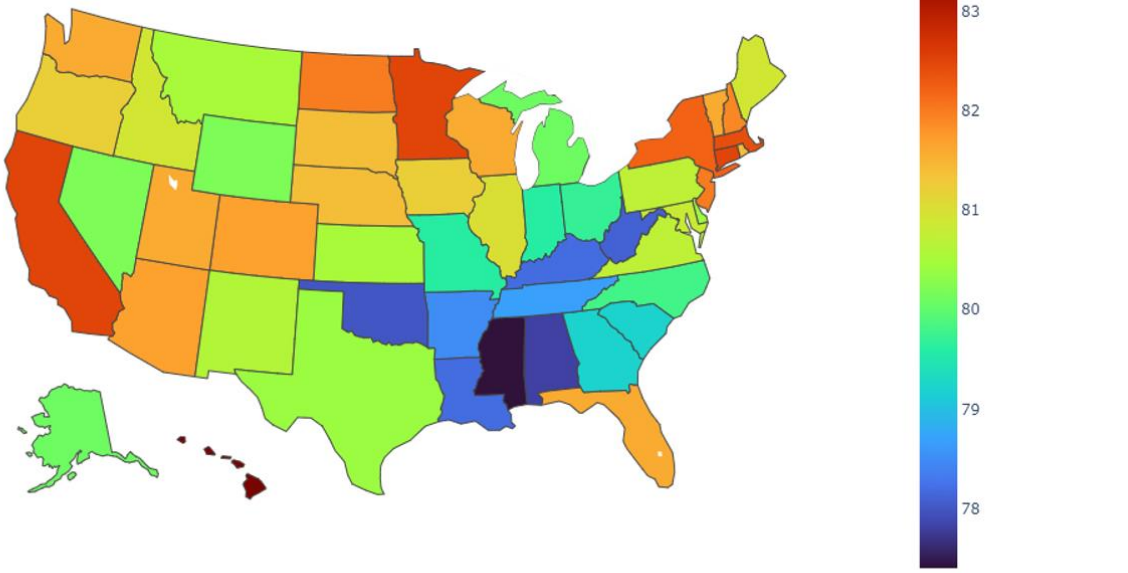
Female sufficient physical activity prevalence, 2011 (%)



Life Expectancy of Males 2010



Life Expectancy of Females 2010



Resources

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