

The correlation of diabetes and obesity with physical inactivity in the US in 2017

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Introduction

In this project, I would like to see the correlation of diabetes and obesity with physical inactivity in the US in 2017. Thus, I download two datasets which are talking about “diagnosed diabetes among adults aged ≥ 18 years” and “Obesity among adults aged ≥ 18 years” in the US in 2017 from the CDC. They include estimates for the 500 largest US cities and approximately 28,000 census tracts within these cities. I also download one dataset which is the “Prevalence of Self-Reported Physical Inactivity Among US Adults by State and Territory, 2017–2020”.

Methods

Read in the data by API

I used API method to obtain my datasets from CDC. First, you have to create an account with password. Then, you have to apply for a free app token. Last, copy your API Endpoint. Both datasets contain 27 columns and 29,006 rows.

Here are my datasets links:

<https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Obesity-among-adults-aged-18-years/bjvu-3y7d>

<https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Diagnosed-diabetes-among-adults-aged-18/cn78-b>

The Physical Inactivity dataset contains 3 columns and 53 rows.

This is the URL to download it:

<https://www.cdc.gov/physicalactivity/data/inactivity-prevalence-maps/tables/2020/1-self-reported.csv>

Select columns

From CDC datasets, I select **data_value(%)**, **populationCount**, **stateabbr**, **statedesc(state name)**, **city_name**, **geolocation.latitude**, and **geolocation.longitude** total 7 columns. From the Physical Inactivity dataset, I select **state** and **prevalence** 2 columns.

Change column names

I change my column names in order to easily understand. In diabetes and obesity datasets, I have **diabetes_percentage**/**obesity_percentage**, **populationCount**, **state_abbr**, **state_name**, **city_name**, **lat**, and **lon**. In the physical inactivity dataset, I have **state_name** and **physical_inactivity_prevalence**.

Remove non-numeric value

This step, I remove the physical inactivity prevalence non-numeric value in the Physical Inactivity dataset.

Merge two datasets

Merge CDC two datasets by **state_abbr**, **populationCount**, **state_name**, **city_name**, **lat**, and **lon**. Then I merge the Physical Inactivity dataset with them.

Remove duplicates

```
## [1] 30008      9
```

My row number increased to 30,008 so I have to remove duplicates.

```
## [1] 28505      9
```

After removing duplicates, my rows shrink from 30,008 to 28,505.

Convert chr into num

In this step, I just convert character variables into numeric variables.

Check NAs

In my merged dataset, there are only 2.7% NAs values in columns of **diabetes_percentage** and **obesity_percentage**. Therefore, I'm going to remove them.

```
## [1] 0.02785476
```

```
## [1] 0.02785476
```

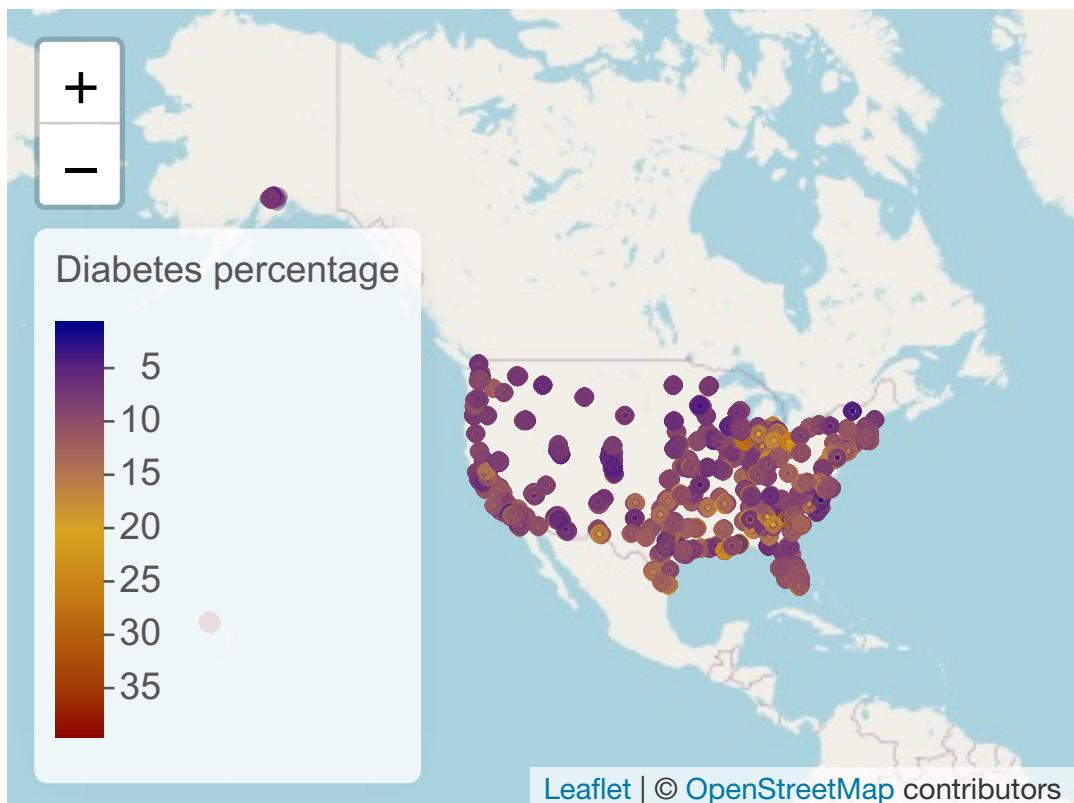
Add regions

Last, I create a new column contain Northeast, Northwest, Southwest, and Southeast four different regions.

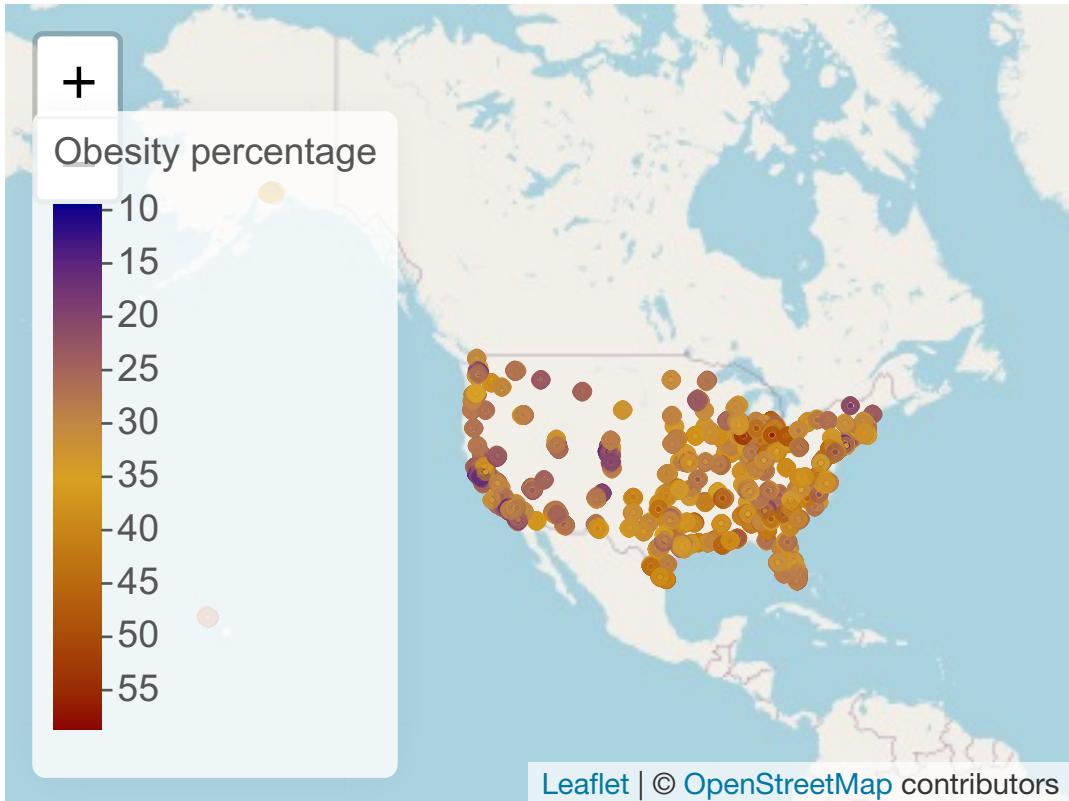
Results

Leaflet

Diabetes percentage in the US



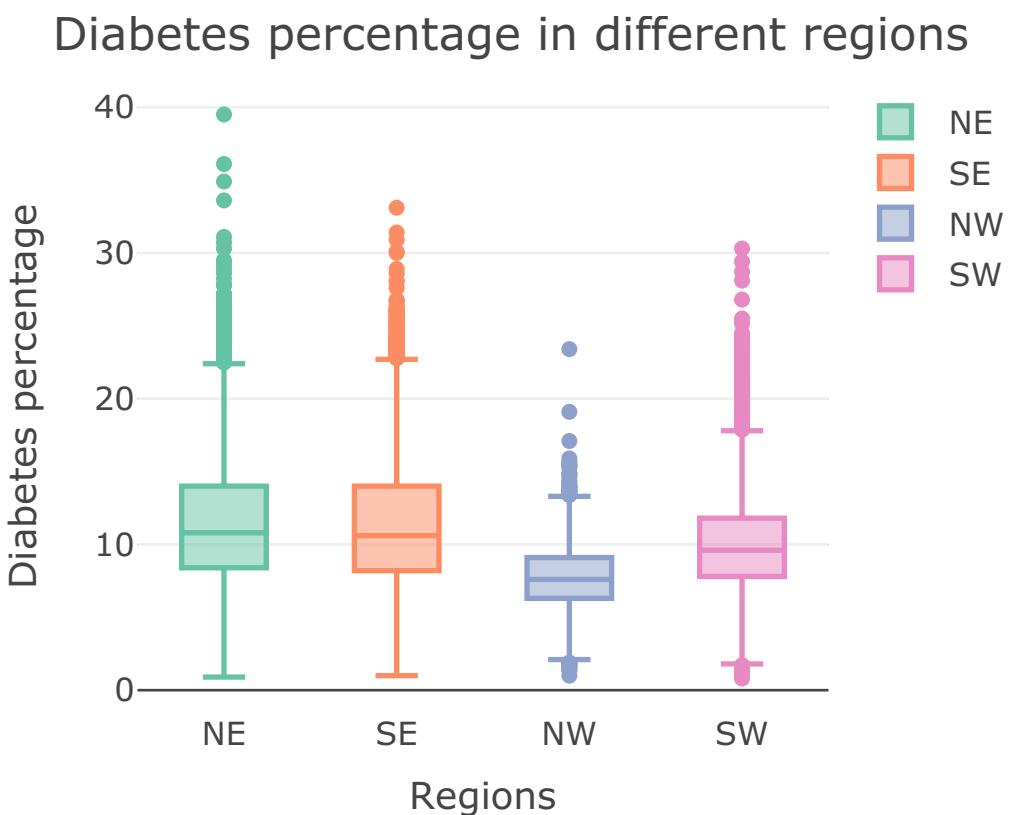
Obesity percentage in the US



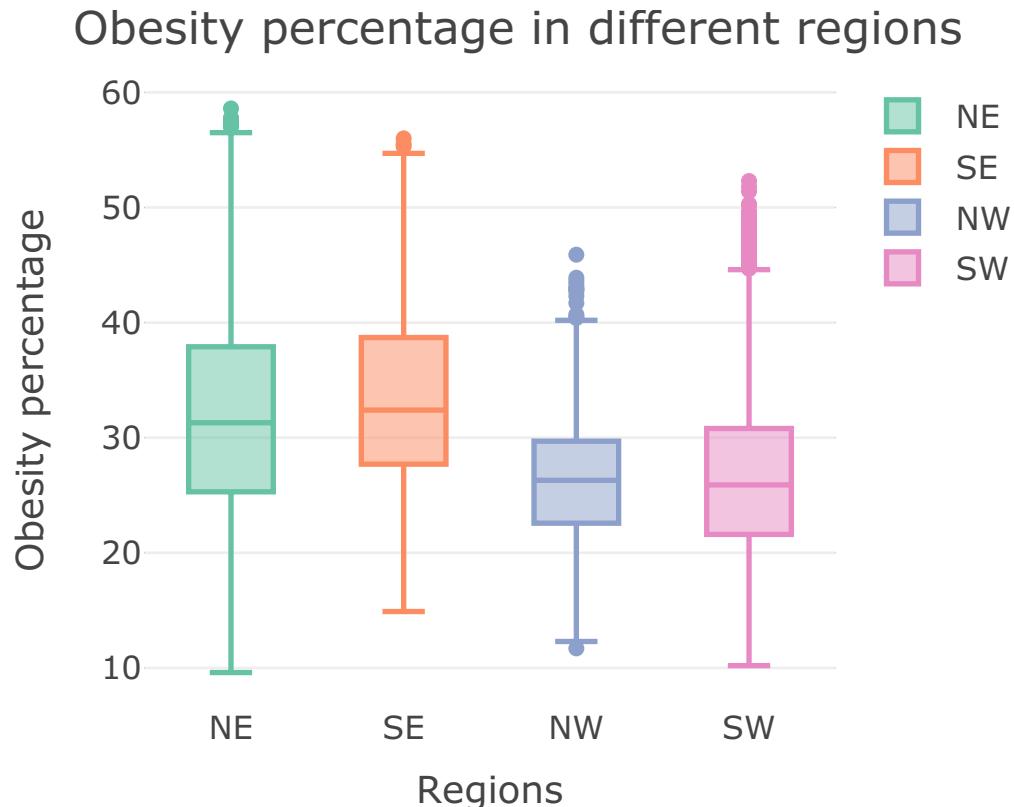
From the Leaflet, the legend shows the degree of the diabetes percentage. The red color means higher percentage of diabetes. I see there are more orange dots in the NE region and SE region from the plot of diabetes percentage. From the second plot of obesity percentage, we can see that there are more orange dots on the east-side than on the west-side.

Boxplots

Diabetes percentage



Obesity percentage



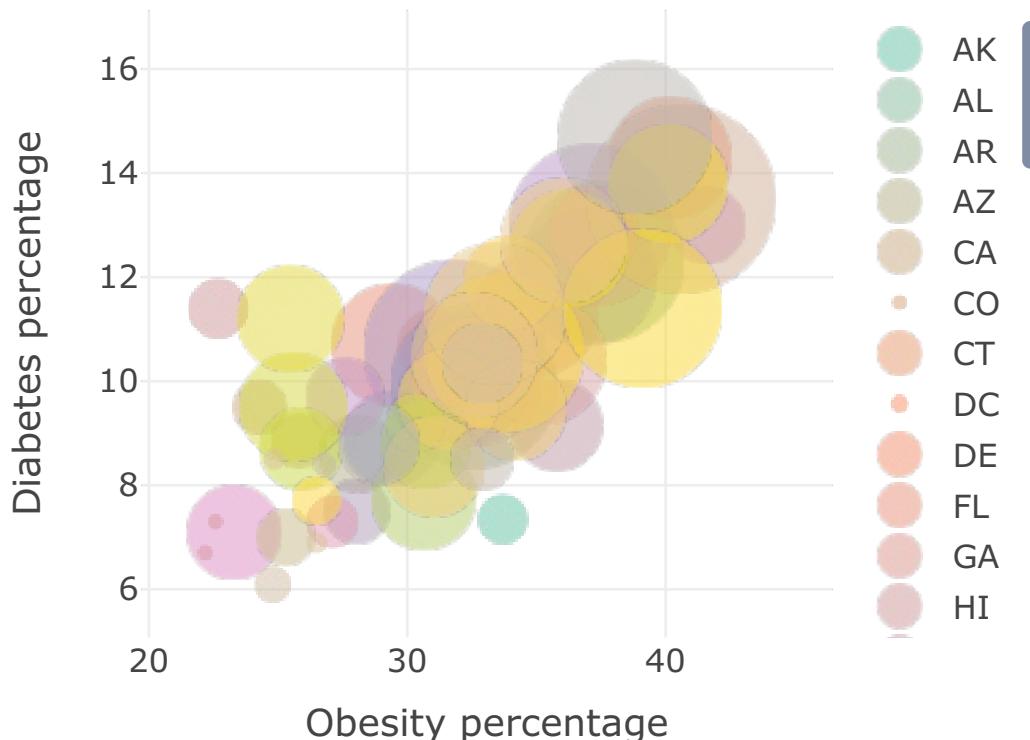
Now, let see the boxplot, the x-axis shows 4 regions: Northeast, Southeast, Northwest, and Southwest. On the y-axis shows the percentage of diabetes or obesity.

From the boxplot of diabetes percentage, there is a max diabetes percentage in the NE region, and the NE region and the SE region have a similar median diabetes percentage. The NW region has the lowest median diabetes percentage. In this plot, the east-side regions' median diabetes percentage is higher than the west-side regions'.

From the boxplot of obesity percentage, the east-side regions' median obesity percentage is also higher than the west-side regions'. Among all regions, the SE region has the highest median obesity percentage and the SW region has the lowest median obesity percentage.

Scatter plots

Age vs. Diabetes percentage with Physical Inactivity



In this scatter plot, I select each state's median of obesity percentage and diabetes percentage with their physical inactivity prevalence. We can see that there is a positive correlation between obesity and diabetes rates. We can also see the physical inactivity prevalence by the size of dots. I cannot tell the direct correlation with the obesity or diabetes rates. However, it looks like there are bigger dots on the top right corner and smaller dots on the bottom left corner.

Conclusion

Question 1: How are the distribution of diabetes and obesity percentages in the US?

From the leaflet, first we can see there are more orange dots on the NE and SE regions. From the box plot, the median of diabetes percentage looks equally high in the NE and SE regions. The median of obesity percentage looks higher in the SE region than in the NE region. Besides, we can also see there are higher diabetes and obesity percentages on the east-side than on the west-side.

Question 2: Is there any correlation between diabetes and obesity? If so, is there any correlation with physical inactivity prevalence?

From the scatter plot, we can see that there is a positive correlation between obesity and diabetes rates by states. As for the correlation with physical inactivity prevalence, I don't see a strong correlation with physical inactivity prevalence. However, I can tell that smaller dots are on the bottom left corner and bigger dots are on the top right corner.

Discussion

I would like to add more variables to my dataset in order to make more interesting plots. For example, I want to add different years and time to check if there are any changes of diabetes and obesity percentages in each state. Adding each state's median income level , average education level, and so on, to see whether diabetes and obesity percentages would be affected by them.