EXPLORING THE OBESITY-DIABETES RELATIONSHIP IN BLACK AND LATIN COMMUNITIES

Manuela Deigh
Data science for the Public Good (DSPG)
August 3, 2023

Introduction

BACKGROUND

Obesity and diabetes are two major public health issues that significantly impact both individual well-being and healthcare systems.

Diabetes is a chronic medical condition that occurs when the body is unable to properly regulate blood glucose level. There are two type of diabetes:

In this research I will be focusing on type 2 diabetes and how obesity is a risk factor for developing type 2 diabetes

Type 1 diabetes is when the immune system mistakenly attacks and destroys the insulin-producing beta cells in the pancreas. As a result, the body produces little to no insulin. People with type 1 diabetes need to take insulin injections or use an insulin pump to manage their blood sugar levels.

Type 2 diabetes is a more common form of diabetes. the body doesn't use insulin properly and over time, the pancreas may not produce enough insulin to meet the body's needs. This type is often associated with lifestyle factors such as poor diet, lack of physical activity, and obesity.

Research Question

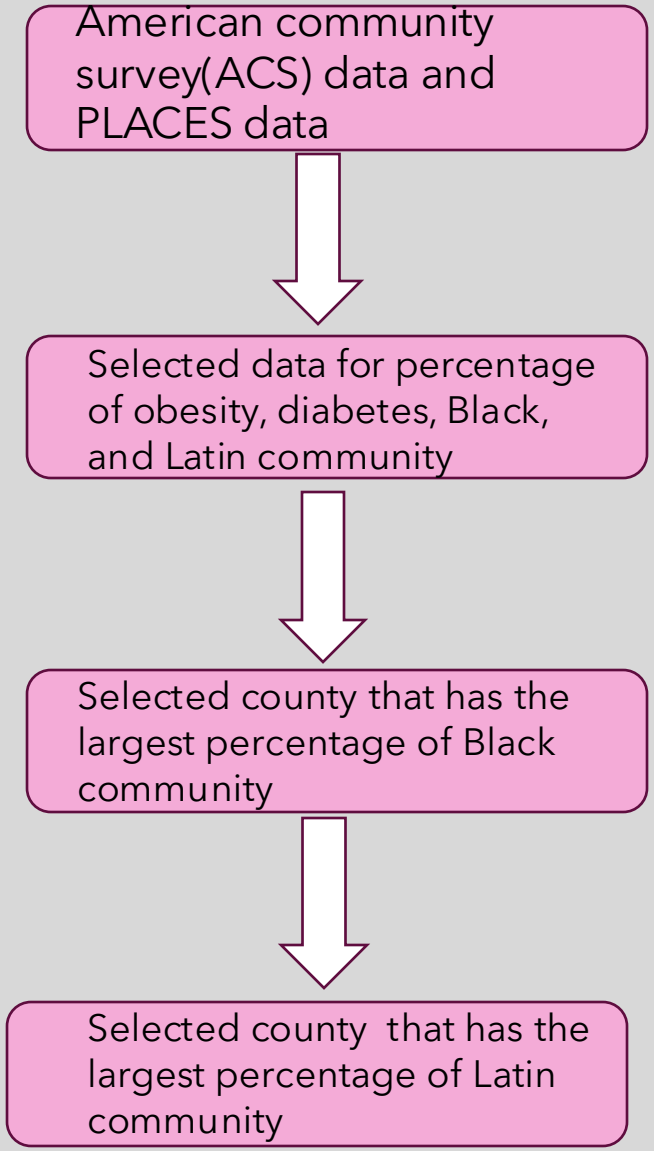
Problem statement	Question	Hypothesis
• Obesity tends to have an association with developing diabetes. I will investigate the relation and whether there exists a disparity in this risk factor between the black and Latin communities. I hope to find out if there are statistically significant differences in the prevalence of diabetes and obesity among these racial groups by analyzing relevant data.	• What is the relationship between obesity and diabetes in the black community compared to the Latin community?	• My hypothesis for this research is that obesity is positively associated with the development of diabetes. Furthermore, I anticipate that there will be a slight difference in this risk factor between the black community and the Latin community.

Literature Review

- **Paper:** "Longitudinal Associations between Obesity, Inflammation, and the Incidence of Type 2 Diabetes Mellitus among US Black and White Adults in the CARDIA (A cohort of nondiabetic respondents from the Coronary Artery Risk Development in Young Adults) Study
- **Study:** This study was aim to assess prospective relationship between obesity and inflammatory biomarkers (e.g. C-reactive protein) and the risk of developing type II diabetes. The paper also wanted to determine if this observed association between inflammatory biomarkers and type II diabetes varied by race.
- **Key points:**
  - Obesity is a risk factor for developing type II diabetes for both black and white
  - Additional studies are needed to further investigate differences in the relationship between inflammatory biomarkers and diabetes by race

Methods

1. I used the American Community Survey (ACS) data for my research, encompassing various crucial indicators such as county, state, minority population, obesity rates, diabetes prevalence, blood pressure levels, and more.



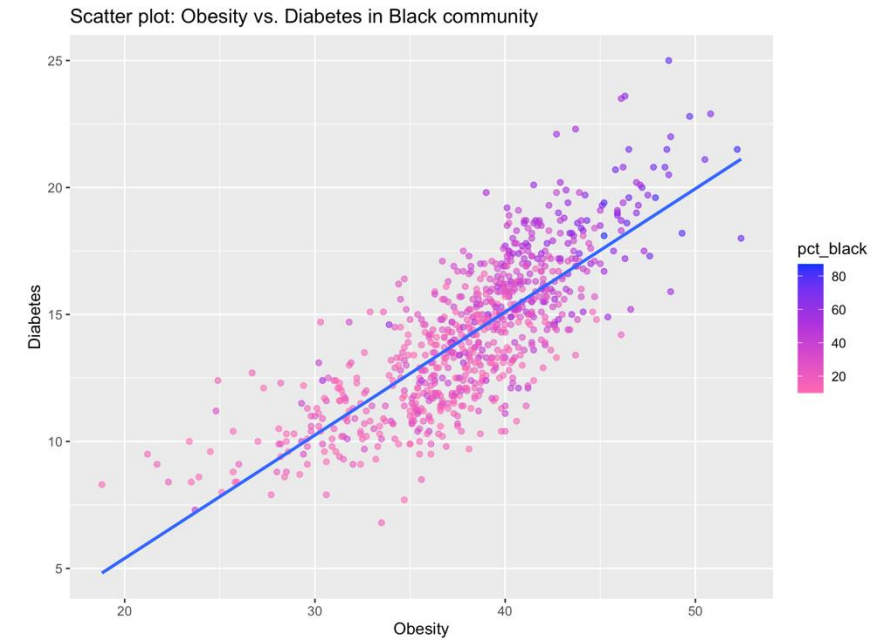
2. Subsequently, I filtered the dataset to focus specifically on diabetes and obesity, narrowing it down to the Black and Latin communities.

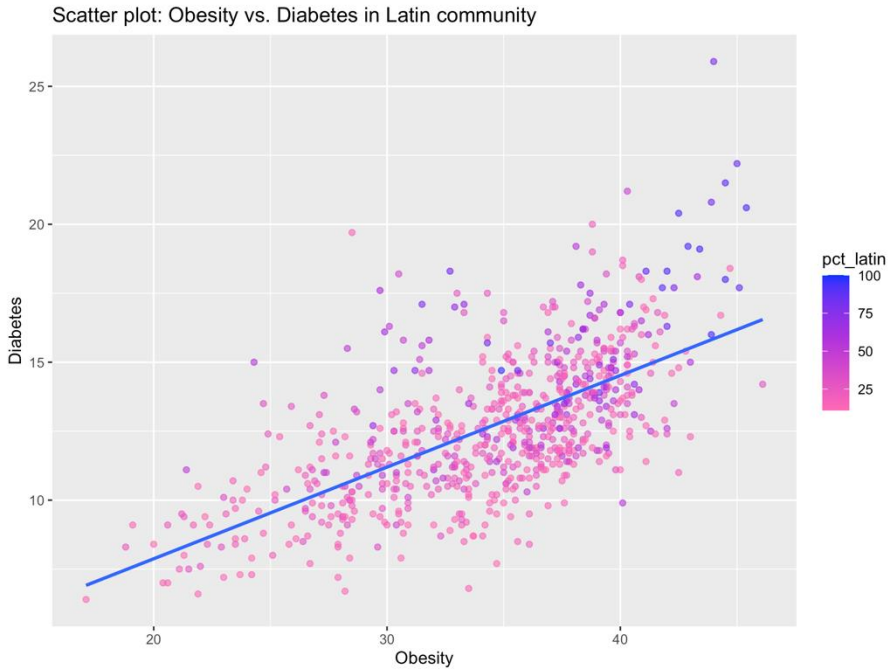
3. Following this initial filtering, I further segmented the data into subsets, distinguishing between areas with a high percentage of the Black population and those with a low percentage.

4. Similarly, I applied the same approach to the Latin community, creating distinct datasets for regions with varying Latin population percentages.

5. The entire analytical process was conducted using the **R programming language**, ensuring an organized and precise exploration of the specified variables and demographic groups.

Results





- In the **top graph** it illustrates the compelling correlation between obesity and diabetes within a predominantly Black community as the x-axis represents obesity and the y-axis represents diabetes. On the right side of the graph, it shows a bar that represents the percentage of black in that community, 20 being the lowest percentage in that community which shows as a pink color on the graph, and 80 being the highest percentage of black population which is represented by blue.

- Similarly, the **graph on the bottom** displays another diagram depicting the relationship between obesity and diabetes in a society primarily composed of Latin individuals; pink, which is 25 percent represent, the low Latin community, and blue which is 100 percent, and it represents the highest Latino population in the community. Both graphs display a noticeable pattern: as obesity rates increase, the likelihood of developing diabetes also rises significantly. Interestingly, upon examining the second part of my question, it becomes apparent that race may not be a determining factor influencing the increased risk of diabetes.

Black population R^2 = 0.6225

Latin population R^2 = 0.418

Next, I have the R^2 for top 25 black community which is 0.6225, and The R^2 for the top 25 Latin community is 0.418. When comparing the R^2 from the graph previous shown the relationship between obesity and diabetes is stronger in community that have high black population verses then the one that have high Latin population.

Discussion

Conclusion

- The data have supported my hypothesis that obesity is a significant risk factor for developing diabetes. Both graphs demonstrate a clear association between obesity and an increased likelihood of diabetes. There was a slight difference in this risk factor between the black and the Latin communities.
- Upon closer analysis, I observe a slight distinction in the impact of obesity on diabetes risk between the Black and Latin communities. While both groups show a heightened exposure, the extent of this risk appears to vary slightly.
- Recognizing the unique health dynamics within different racial or ethnic communities, we can develop targeted strategies to prevent and manage diabetes effectively.

Acknowledgements

- NIH Grant Number P20CA264068 – VSU-MCC Partnership for Cancer Disparities Research and Training Program (SUCCEED)
- USDA Award Number 2023-38821-39588-CBG: Development of a Center for Social Data Analytics at Virginia State University
- Datacamp
- Dr. Milton O Faison- Associate Vice Provost, Research & Economic Development

Reference

- Jackson, Sharon H, et al. "Longitudinal Associations between Obesity, Inflammation, and the Incidence of Type 2 Diabetes Mellitus among Us Black and White Adults in the Cardia Study." *Journal of Diabetes Research*, 15 Aug. 2020, www.ncbi.nlm.nih.gov/pmc/articles/PMC7448246/
- Golden, Sherita H, et al. "Racial/Ethnic Differences in the Burden of Type 2 Diabetes over the Life Course: A Focus on the USA and India." *Diabetologia*, Oct. 2019, www.ncbi.nlm.nih.gov/pmc/articles/PMC7181870/
- Hardy, Dale S, et al. "Anthropometric Discriminators of Type 2 Diabetes among White and Black American Adults." *Journal of Diabetes*, Mar. 2017, www.ncbi.nlm.nih.gov/pmc/articles/PMC5079832/

Question?