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Report on the diabetes status in the Rio Grande Valley

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REPORT ON THE DIABETES STATUS IN THE RIO GRANDE VALLEY

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Abstract:

The Rio Grande Valley (RGV) is located in the Southwest of Texas and is considered to have a high prevalence of diabetes and obesity. There are some empirical studies conducted in this region that report on the impact this disease has had on the population. However, most of these studies were conducted years ago and no longer reflect the current trend of diabetes in this region.

This study utilizes the most recent data, from reputable sources, to create an updated report on the prevalence of diabetes and obesity within the Rio Grande Valley. This study utilizes datasets from the Center of Disease Control (CDC) to chart the progress of diabetes and obesity. This data was captured within the time period between 2004-2017 and provides an analysis for comparison of the prevalence of diabetes and obesity between the Rio Grande Valley and the United States.

The results show that the Rio Grande Valley and each of its counties have surpassed the United States in growth percentage for diabetes and obesity. In addition, the national prevalence for diabetes among the Hispanic race-ethnic group has also increased over the measured period.

These findings indicate that there is a great need for enhanced healthcare intervention in this region as the prevalence of these co-morbidity conditions such as diabetes and obesity steadily increase with each passing year, especially in the Hispanic/Latino population. The goal of this study is to raise awareness of these conditions which constitute an important public health issue which needs to be resolved.

Keywords: diabetes, obesity, Rio Grande Valley, Hispanic

Introduction:

Historically, the Rio Grande Valley is a region with a high prevalence of diabetes across all ages, genders and ethnicities, this has been indicated by empirical studies conducted over time. Such findings are important because diabetes is associated with increased morbidity and mortality with the development of related health complications such as cardiovascular diseases, hypertension, renal insufficiency, diabetic foot etc. Previous research also demonstrated that there is a great need for healthcare intervention. Since most of these studies were conducted in the past, we like to review for the most recent data as an update follow up. Consequently, it would be beneficial to track the progression and status of diabetes and obesity prevalence within the Rio Grande Valley.

Methods:

The aim of this research is to use quantitative data to chart the progress of diabetes and obesity within the Rio Grande Valley. Quantitative data at the national and state county levels were used.

The data were collected from the American Diabetes Association (ADA) and the Latino Diabetes Association (LDA). The ADA and LDA are nonprofit organizations that aim to educate the general public about diabetes and to assist those who suffer from the disease. The ADA continuously conducts research and provides publications on their findings. Data provided from the ADA included the overall prevalence of diabetes within the United States, the incidence of diabetes in youths, the rates of diagnosed diabetes by race/ethnic background, and the cost of diabetes in the United States. Most of the quantitative data that was supplied by the ADA was sourced from the U.S Center of Disease Control (CDC).

The CDC is the national public health agency of the United States. Each year, the CDC publishes a National Diabetes Statistics Report. This report provides information on the prevalence and incidence of diabetes within the United States. The CDC collects these estimates from various data systems. Most of the estimates of diabetes in these reports do not differentiate between type 1 and type 2 diabetes. However, type 2 diabetes accounts for 90-95% of all diabetic cases. Therefore, it is assumed that most of this data provided by the CDC is characteristic of type 2 diabetes. Since this is an annual report, this study utilizes data from the most recent issue, the 2020 report.

In addition to the National Diabetes Statistics Report, the data obtained for county-level prevalence and incidence estimates was collected from the CDC's Behavioral Risk Factor Surveillance System (BRFSS), and from the US Census Bureau's Population Estimates Program. The BRFSS is a monthly state survey of the adult population aged 18 years and older. The survey provides state-specific information on behavioral risk factors and preventative health practices. Using the provided data sets, this study was able to identify trends in county-level data beginning in 2004 and ending in 2017. The estimates were restricted to adults aged 20 years or older to be consistent with population estimates from the US Census Bureau. Data sets were provided for the Rio Grande Valley's four counties: Hidalgo, Cameron, Starr, and Willacy.

Before analysis, the gathered data was prepared. The data was sorted into the following categories: the overall prevalence of diabetes, the race-ethnic differences in the prevalence of diabetes, the incidence of newly diagnosed diabetes, and the overall prevalence of obesity.

The data used for the prevalence of diagnosed diabetes, incidence of newly diagnosed diabetes, and prevalence of obesity used a time period between the years 2004-2017. Data points were collected from each county during the specific time period and then compared to those of the national data set. Each county data set consisted of adults ages 20+. The national data set consisted of adults ages 18+. The prevalence was reported as a percentage and the incidence were reported as a rate per 1,000 individuals. The data used for the national prevalence of diagnosed diabetes by race-ethnicity are between the years of 2004-2017. Each data set consisted of adults ages 18+. The prevalence was reported as a percentage.

The data set for the Rio Grande Valley was constructed using the previous data sets from the four counties: Hidalgo, Starr, Willacy, and Cameron. The study used the averages of the counties' data points for each year within the time period to construct a new data set that could be representative of the entire Rio Grande Valley.

The study used the age-adjusted filter to account for different age structures within the data sets. Once sorted, the data was plotted using graphs to display the points across the time period.

Results:

Figure 1 compares the prevalence of diagnosed diabetes in the United States to the prevalence of diagnosed diabetes in the Rio Grande Valley and each of its four counties: Hidalgo, Starr, Willacy, and Cameron.

Between the years of 2004-2017, the prevalence of diabetes within the United States had increased by 1.5% whereas the prevalence of diabetes within the Rio Grande Valley has increased by 6.33%. The prevalence of diabetes within Hidalgo County had increased by 4.6%, Starr County by 5.3%, Willacy County by 11.6%, and Cameron County by 4.3%.

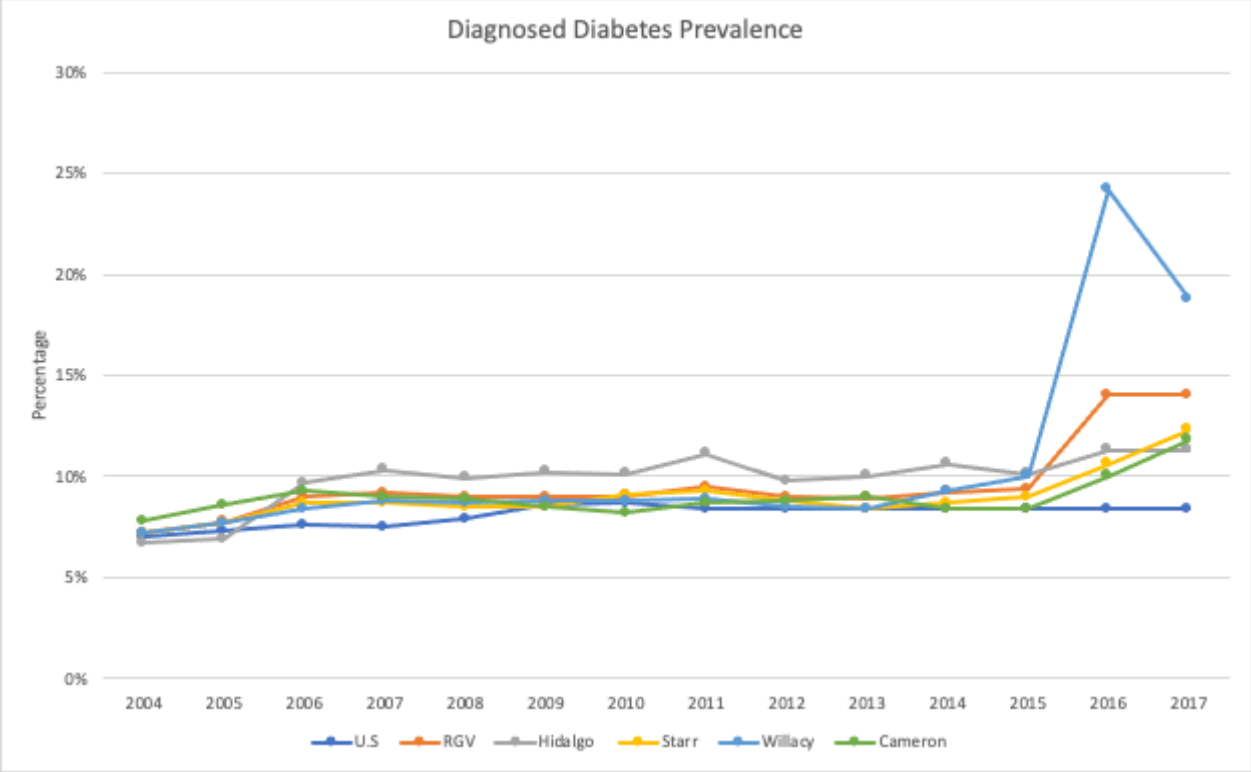

Figure 1. Prevalence of diagnosed diabetes between the United States, Rio Grande Valley, Hidalgo County, Starr County, Willacy County, and Cameron County.

Figure 2 compares the incidence of newly diagnosed diabetes in the United States to the incidence of newly diagnosed diabetes in the Rio Grande Valley and each of its four counties: Hidalgo, Starr, Willacy, and Cameron.

Between the years of 2004-2017, the incidence of newly diagnosed diabetes in the United States had decreased by 0.07% compared to the incidence of newly diagnosed diabetes in the Rio Grande Valley which had increased by 0.56%. The incidence of newly diagnosed diabetes in Hidalgo County had increased by 0.28%, Starr County by 0.51%, Willacy County by 1.35%, and Cameron County by 0.21%.

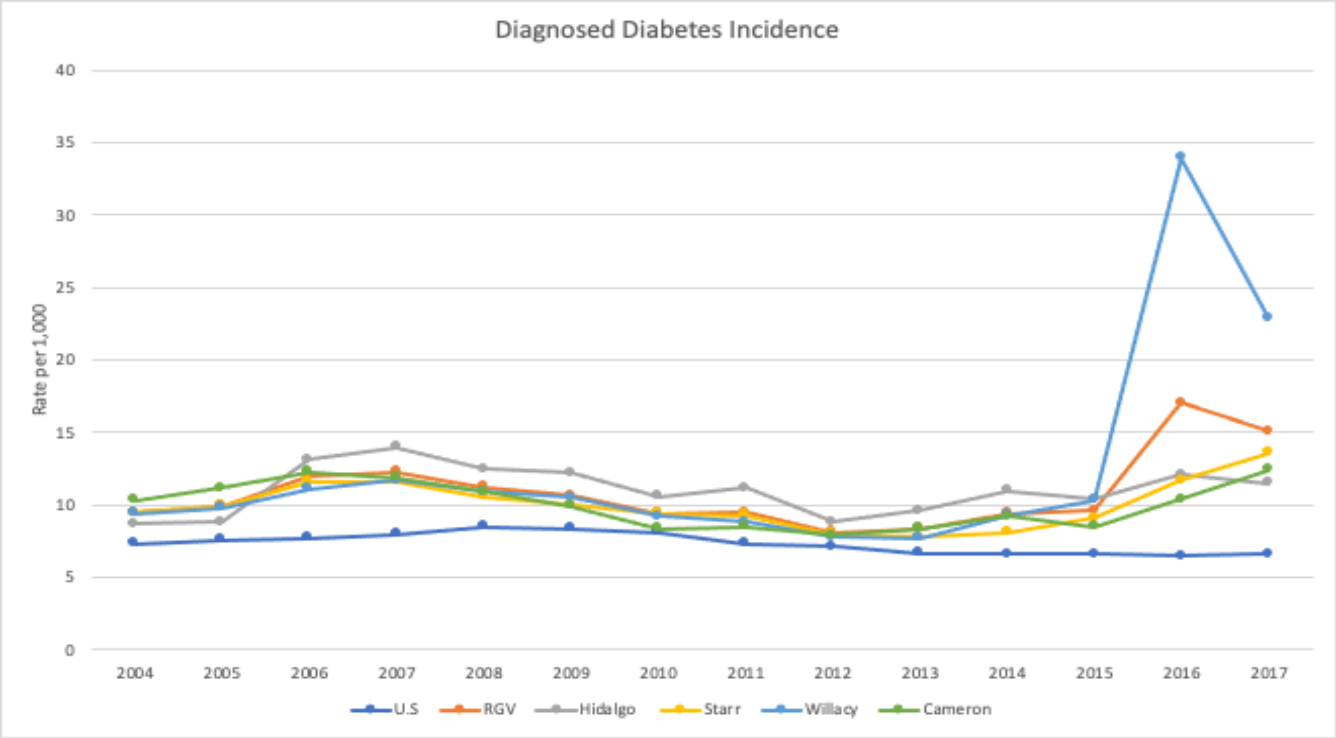

Figure 2. Incidence of diagnosed diabetes between the United States, Rio Grande Valley, Hidalgo County, Starr County, Willacy County, and Cameron County.

Figure 3 compares the prevalence of diagnosed diabetes in the United States between the Hispanic, Non-Hispanic White, Non-Hispanic Black, and Non-Hispanic Asian race-ethnic groups. Between the years of 2004-2017, the prevalence of diagnosed diabetes in Hispanics had increased by 2.4%. The prevalence of diagnosed diabetes in Non-Hispanic Whites had increased by 1.3%. The prevalence of diagnosed diabetes in Non-Hispanic Blacks had decreased by 0.1%. The prevalence of diagnosed diabetes in Non-Hispanic Asians had increased by 1.1%.

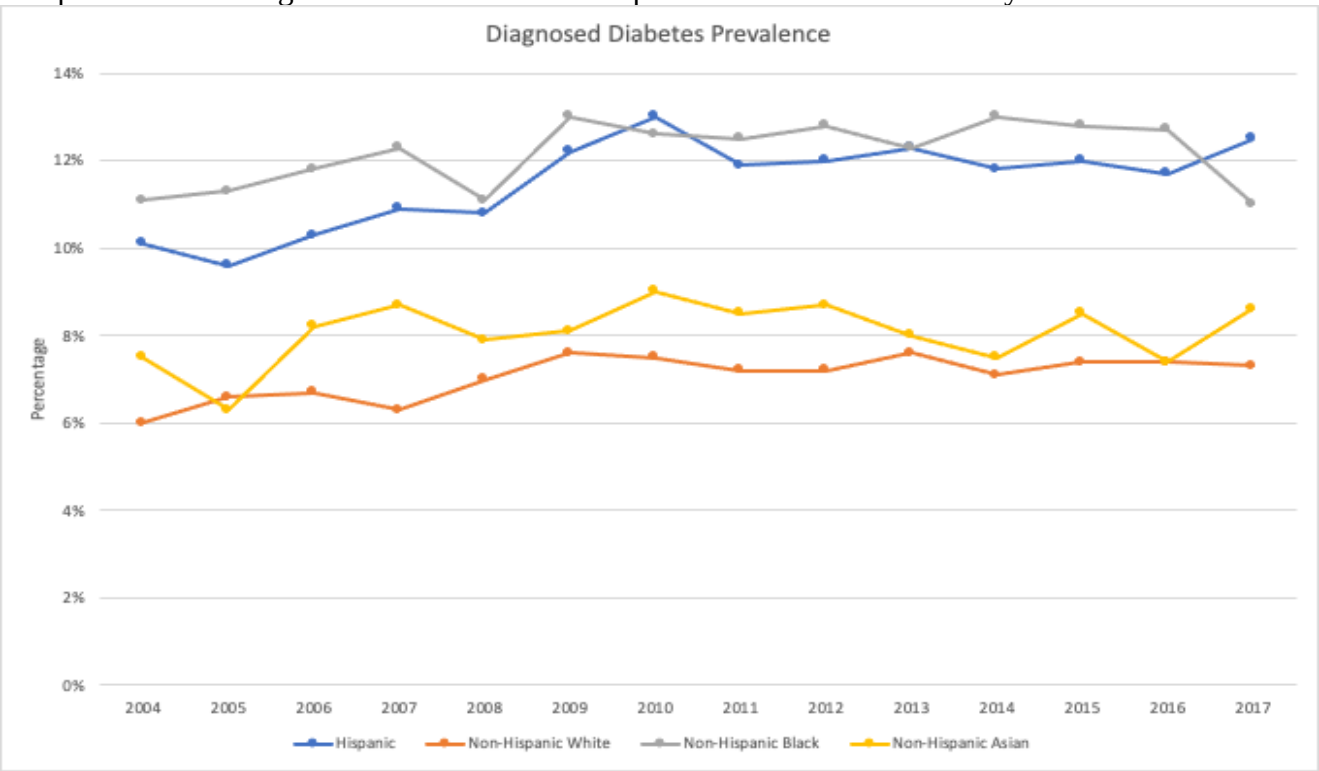

Figure 3. Prevalence of diagnosed diabetes in the United States by race-ethnicity.

Figure 4 compares the prevalence of obesity within the United States to the prevalence of obesity within the Rio Grande Valley and each of its four counties: Hidalgo, Starr, Willacy, and Cameron.

Between the years 2004-2017, the prevalence of obesity within the United States had increased by 6% whereas the prevalence of obesity within the Rio Grande Valley had increased by 9.15%. The prevalence of obesity within Hidalgo County had increased by 10.5%, Starr County by 6.6%, Willacy County by 12.9%, Cameron County by 6.6%.

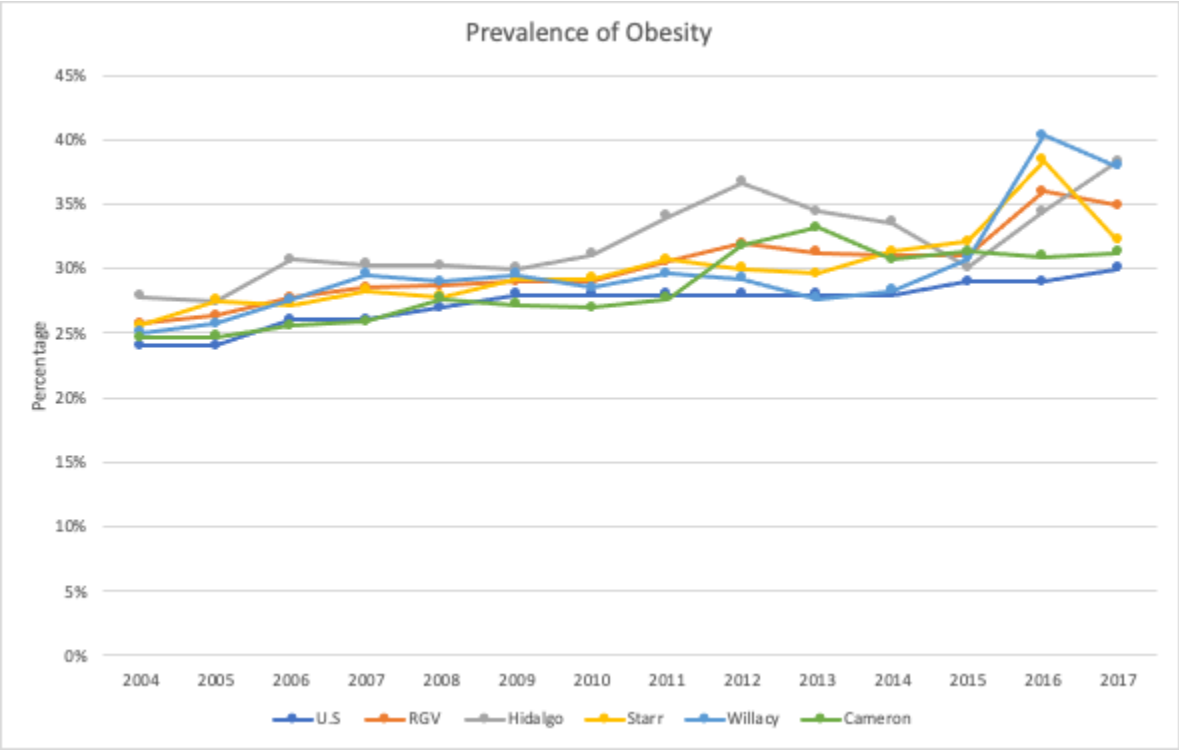

Figure 4. Prevalence of obesity between the United States, Rio Grande Valley, Hidalgo County, Starr County, Willacy County, and Cameron County.

Summary Graphs:

Figure 5 shows the diabetes and obesity prevalence between the United States and the Rio Grande Valley.

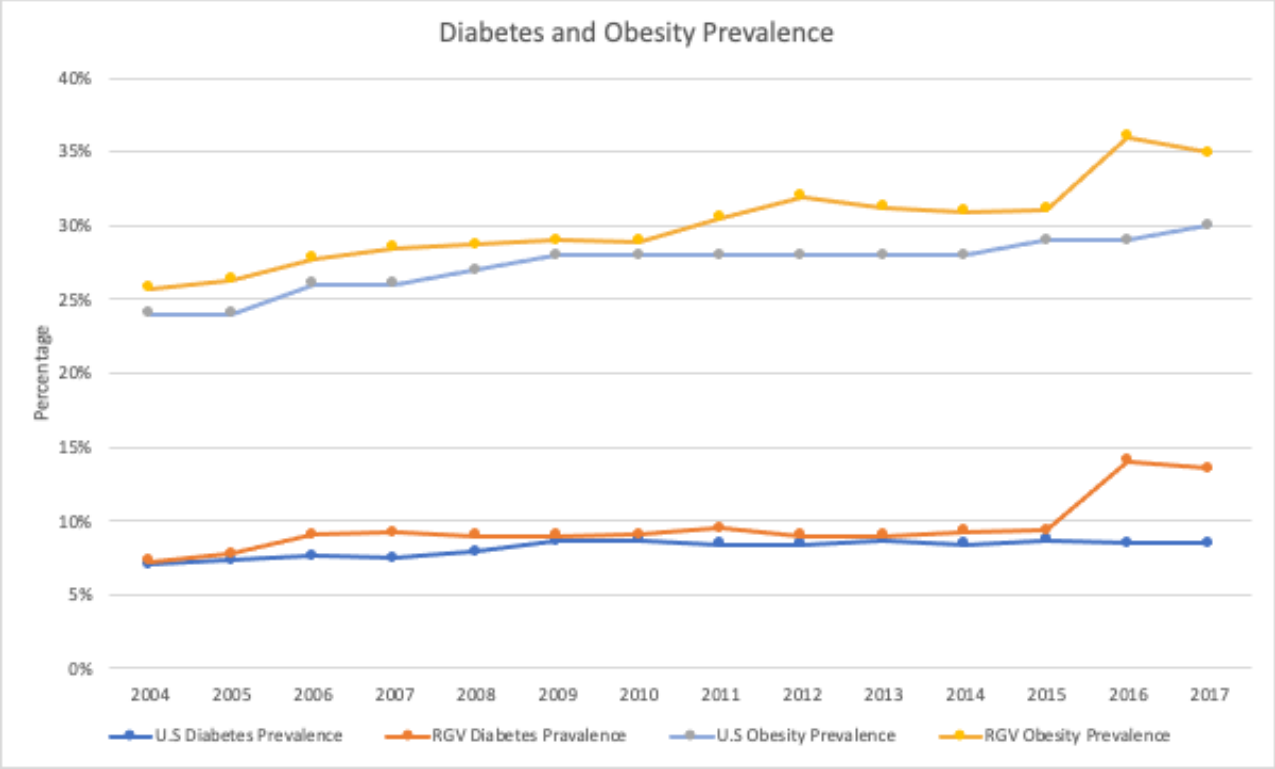

Figure 5. Prevalence of diabetes and obesity between the United States and the Rio Grande Valley.

Figure 6 shows the percent increase of the United States and Rio Grande Valley for the diabetes and obesity prevalence between 2004-2017. The percent difference between the United States and Rio Grande Valley for the increase in diabetes prevalence was 4.83%. The percent difference between the United States and Rio Grande Valley for the increase in obesity prevalence was 3.15%.

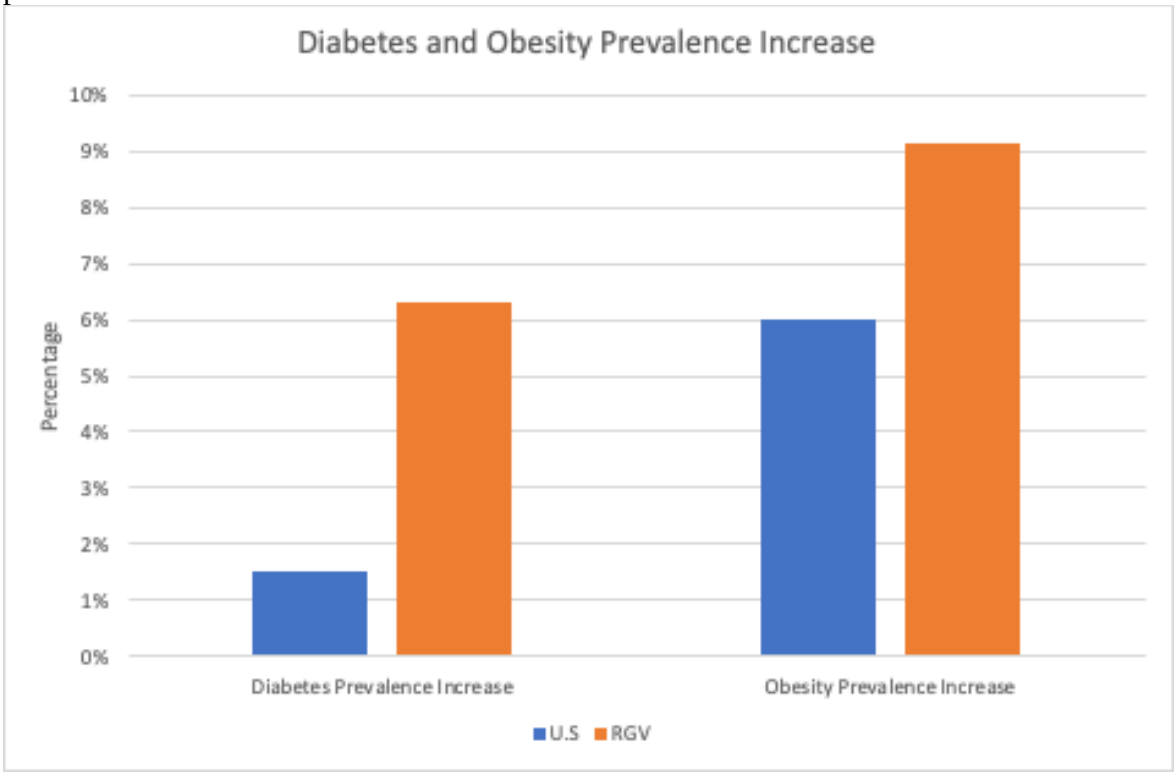

Figure 6. Percent increase of the diabetes and obesity prevalence between 2004-2017, for the United States and Rio Grande Valley.

Discussion:

Diabetes mellitus is a disease of abnormal carbohydrate metabolism which results in hyperglycemia. Type 1 diabetes involves the impairment of insulin secretion, while type 2 diabetes involves varying degrees of peripheral resistance to the action of insulin. Diabetes is one of the most common chronic diseases within the United States with adverse socioeconomic impacts. In addition, it is also associated with a high morbidity and mortality due to the development of related complications.

The residents of the Rio Grande Valley have a high risk of developing diabetes partly because of its racial and ethnic makeup. More than 90% of the population within the Rio Grande Valley is of Hispanic or Latino heritage. “If you're a Hispanic [or] Latino American adult,” the chance of you developing diabetes “is more than 50%, and you’re likely to develop it at a younger age” (*Centers for Disease Control and Prevention, 2020*). According to the results of this study, the Hispanic race-ethnic group has one of the highest prevalence rates between 10% and 13% in the United States, when compared to other groups (*Figure 3*). Between the measured period of 2004-2017, there was a 2.4% increase in diabetic diagnoses among Hispanics within the United States. Furthermore, among children and adolescents, a national study conducted in 2002 -2015 reported that there was a “4.8% increase per year for type 2 diabetes and a 1.9%

increase per year for type 1 diabetes, [which] had a steeper increase observed in black and hispanic youth" (*Divers, 2020)*.

The data analysis of prevalence and incidence (*Figure: 1,2*) also demonstrates the risk to this population. The results show that collectively the Rio Grande Valley, and its four counties have passed the United States in both prevalence and incidence rates between the measured period. For example, in the United States, the prevalence of diabetes only increased by 1.5%. Whereas the Rio Grande Valley's prevalence grew by 6.33% which is a significant difference.

Another contributing factor to the high risk of diabetes within the Rio Grande Valley is obesity. "Physical activity helps control blood sugar, weight, and blood pressure, as well as [manage] cholesterol levels" (*Complications, 2021)*. Therefore, people who are overweight, or considered obese, are at significant risk of developing diabetes. The data analysis of obesity (*Figure: 4*) indicates that the Rio Grande Valley and its counties are also surpassing the United States in obesity prevalence, which could contribute to future diagnoses of diabetes. For example, the prevalence of obesity in the United States had increased by 6% between 2004 and 2017, while in the Rio Grande Valley the prevalence increased by 9.15%.

The progression of diabetes is important to mention because this disease is associated with many complications; cardiovascular disease, diabetic ketoacidosis, and end stage renal disease are some of the most significant complications for diabetic patients. For example, cardiovascular disease is the "number one cause of death in people living with diabetes, resulting in two-thirds of deaths in people with [diabetes]" *(Complications, 2021)*. The likelihood of developing cardiovascular disease is significantly greater in the diabetic population and increases with age. Diabetic ketoacidosis (DKA) results from "high levels of ketones" developing in the body which makes it "more acidic" resulting in a "serious condition that can lead to diabetic coma or even death" *(Complications, 2021)*. In diabetic end stage renal disease (ESRD), the high levels of blood sugar as a result of diabetes, creates stress on the kidneys and can "[cause them] to lose [their] filtering abilities". Eventually, "waste products [accumulate] in the blood" and then the kidneys fail *(Complications, 2021)*. Kidney disease in general is very common in diabetics and approximately one out of every three adults with diabetes has a kidney disease.

Although diabetes can cause significant harm to the affected individual, it also takes a toll on national and local economies experiencing high prevalence rates. A study conducted in the Rio Grande Valley by Brown et al. (2005) determined that the "indirect costs of diabetes extend beyond the costs to those with diabetes alone for the reason that adults with diabetes who are not working spend less" which ultimately hurts the local economy. The researchers determined that "for every dollar of labor income lost by adults with diabetes, a further income reduction of $0.36 occurs in the community". This study supported the implementation of policies that prevent the development of diabetes in high-risk regions such as the Rio Grande Valley. Nationally, the "estimated costs of diagnosed diabetes in the United States in 2017 was $327 billion" dollars (*National Diabetes Statistics Report, 2020)*. The direct and indirect costs have been increasing each passing year.

Summary:

The purpose of this project was to track the progression of diabetes within the Rio Grande Valley with the most recent data available through previous research. The study used data sets provided from the CDC, to analyze the prevalence of diabetes and obesity within each of the four counties that comprise the Rio Grande Valley between the time period of 2004-2017 compared to the prevalence and incidence of the disease in the United States. The findings of this research indicate that the Rio Grande Valley population has a high-risk for complications from diabetes and obesity especially those of the Hispanic race-ethnic group. More research and studies are encouraged within this region to provide more current, quantitative data, raise awareness, and promote discussion of potential interventions for this historically at-risk population.

References:

- Brown, H. S., Estrada, J. K., Hazarika, G., & Bastida, E. (2005). Diabetes and the labor market: The community-wide economic cost in the lower rio grande valley. Diabetes Care, 28(12), 2945-7. doi:http://dx.doi.org/10.2337/diacare.28.12.2945

- Centers for Disease Control and Prevention. Division of Diabetes Translation. US Diabetes Surveillance System. Available at https://www.cdc.gov/diabetes/data

- Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2020. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2020.

- Complications. Retrieved from http://www.diabetes.org/living-with-diabetes/complications

- Diabetes Statistics. Retrieved from http://www.diabetes.org/diabetes-basics/diabetes-statistics

- Divers J, Mayer-Davis EJ, Lawrence JM, et al. Trends in Incidence of Type 1 and Type 2 Diabetes Among Youths — Selected Counties and Indian Reservations, United States, 2002–2015. MMWR Morb Mortal Wkly Rep 2020;69:161–165. DOI: http://dx.doi.org/10.15585/mmwr.mm6906a3external icon