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Undergraduate

# Type 2 Diabetes Research and Analysis Paper: Insight into Effective Treatment in Merced County

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## Authors Contribution:

T.P. wrote this manuscript. T.P. certifies that T.P. did not receive any help with the content of this manuscript and has complied with the University of California, Merced Academic Honesty Policy, including not representing the work of others as my own, and plagiarizing/failing to properly acknowledge the intellectual property of others.

## Introduction

The purpose of this study is to research the disease Type 2 Diabetes and to discover whether it is being effectively treated and prevented in Merced County, California. According to the National Institute of Health, Type 2 Diabetes Mellitus is a “chronic disease in which there are high levels of sugar (glucose) in the blood. It is also the most common form of diabetes”<sup>1</sup>. There are many risk and lifestyle factors associated with this disease, with the most prevalent being obesity (#1 risk factor), sedentary lifestyle, unhealthy eating habits, family history and genetics, increased age, high blood pressure and high cholesterol, and a history of gestational diabetes<sup>2</sup>. The long term complications from having type 2 diabetes can include but are not limited to: eye problems (cataracts and glaucoma), foot problems (neuropathy/ nerve damage), skin problems (infections), high blood pressure (which raises your risk for heart attack, stroke, eye problems and kidney disease), hearing loss, oral health issues, mental health issues and early death<sup>3</sup>.

Based on the quantitative data avail-

able, type 2 diabetes is a very serious issue affecting the residents of Merced County. Compared to all 58 counties in California, Merced ranks 50th in the number of deaths from this disease, with an age-adjusted mortality rate of 26.1 deaths per 100,000 of the population (2007-2009)<sup>4</sup>. In comparison, California’s age-adjusted average is 19.5 deaths<sup>5</sup>. However, we find that Merced fares better than the 65.8 deaths set as the target rate by Healthy People 2020<sup>6</sup>. In addition, healthypeople.gov has an overarching goal related to type 2 diabetes and health which is to reduce disease and lessen economic burden, while improving the quality of life for all persons who have, or are at risk for the disease<sup>7</sup>. They hope to achieve this through several measurable objectives which include: reducing the number of new cases and death rates related to diabetes in the population, improving glycemic control for persons with the disease, and increasing prevention for those at high risk for diabetes with prediabetes<sup>8</sup>. By understanding the risk factors and social determinants related to those with type 2 diabetes in Merced County, researchers and other health professionals can hope to

improve the overall health of those with the disease, and slow or prevent others with a predisposition to diabetes.

## Literature Review

The overabundance of literature and research regarding type 2 diabetes reveals a significant relationship between the disease and a person's behavioral and lifestyle choices. While researchers do not know why some individuals develop diabetes and others do not, what is known is that poor diet, lack of exercise, weight, family history, race, and lack of access to healthcare are key factors associated with the disease<sup>9</sup>. According to several recent studies, including a study from the World Health Organization, lifestyle factors, namely poor diet and obesity act as a catalyst for the disease as more and more people are eating a calorie-dense diet of processed foods riddled with refined sugars<sup>10</sup>. This behavior coupled with inactivity from a sedentary lifestyle may lead to type 2 diabetes mellitus. While behavior and lifestyle factors are closely associated with diabetes, there are several other significant considerations.

While it is often difficult to distinguish causal mechanisms related to disease, researchers are able to make very important correlations between factors. Alongside factors such as behavior and lifestyle, a person's race and ethnicity is also thought to play a key role in assessing risk factors related to type 2 diabetes. A study from the American Journal of Clinical Nutrition examines the relationship that particular races/ethnicities may have when it comes to diabetes<sup>11</sup>. Findings suggest that, in general, African American's were more likely to report diabetes than Caucasian's especially at older ages and at higher body mass indexes<sup>12</sup>. It should also be noted that in recent years, diabetes among Hispanics/Latinos has been steadily on the rise, primarily due to the

adoption of the Western diet of processed and refined foods as well as lack of physical activity. In addition, Hispanic boys ages 12-19 have shown the most significant increases in obesity among the U.S. population outpacing African American's and other minorities<sup>13</sup>. As demonstrated, factors such as race/ethnicity, behavior, and lifestyle are all part of a much larger pathway or trajectory that encompasses a person over their life course which contributes to poor health and the development of diseases like type 2 diabetes.

The likelihood of acquiring type 2 diabetes can be assessed by analyzing and evaluating the progression of factors and related social determinants related to the disease over the course of one's life. Beginning with the socioeconomic status (SES) of the parents; it is important to consider the impact that little or no education, low income, and unstable occupation can have on the health outcome of an unborn child. Studies have shown time and again that individuals of lower SES are more likely to have limited access to resources which include supermarkets, parks and other recreation spaces, and quality healthcare<sup>14</sup>. In addition to SES, maternal health is another social determinant that can have a substantial effect on the health of the unborn child. The mother's weight (obesity), family history of diabetes, and genetic predisposition, all play a pivotal role in their contribution to whether a child will go on to develop diabetes in later life.<sup>1</sup> Childhood obesity is an important social determinant and one of the fastest growing epidemics in the Western hemisphere. According to the Center for Disease Control and Prevention, obese adolescents are more likely to have prediabetes; which is a condition in which high blood glucose becomes a predictor for diabetes<sup>16</sup>. In addition to childhood obesity, studies are revealing that children who maintain an inactive, sedentary lifestyle, often go on to become obese young adults with poor eating habits and lack of phys-

ical activity. The lifetime accumulation of these social determinants lead to poorer health outcomes than those with a higher SES, who maintain a healthy weight, eat a proper diet, and exercise on a regular basis. These social determinants play key roles as predictors of whether or not someone is at high risk for a non-communicable disease such as type 2 diabetes. Discussion

Recent research about diabetes, its determinants, and who is most at risk, demonstrates the effects that a disease such as this has on a nation, at the state level, and in one's own community. In the United States alone, diabetes affects over 25 million people which is approximately 8.3% of the total US population (See Table 1)<sup>17</sup>. Of those affected, 18.8 million have been diagnosed, leaving over 7 million people undiagnosed and untreated. According to many studies and national sources, as previously mentioned, the attributing factors are directly correlated with behavioral and lifestyle factors, namely diet and lack of exercise (obesity), and predominantly affect those with low socioeconomic status. Among those diagnosed at the national level, we see that African Americans and Hispanics have the highest rates of prevalence at 12.6% and 11.8%<sup>18</sup>. When evaluating diabetes at the state level, health data shows that an overwhelming 1 in 7 Californians has been diagnosed with diabetes, with that number growing rapidly. The total number of cases in California has reached 13.8 million which comprises 13.8% of the state's total population (See Table 1). In addition, the prevalence of this disease among ethnic minorities reveals that over 830,000 Hispanics in California have diabetes<sup>19</sup>. Overall, the number of minorities, especially Hispanics, diagnosed with new cases of diabetes in the state is expected to grow significantly over the next decade.

Research and data from national, state, and local sources indicates that Merced County, California has an extremely high

prevalence rate of diabetes. In Merced County alone, there are approximately 15,000 diagnosed persons with diabetes, which is 8.9% of the total population (See Table 1). Most notably, the obesity rate in the County stands at 28.7% of the total population, which is significant when considering that obesity is one of the leading social determinants for developing this disease. In addition, Merced County ranks a staggering 50<sup>th</sup> out of 58 counties in the number of deaths from this disease (See Table 1).

Based on known risk factors, social determinants, and county demographics, Merced County's Hispanic population are at greater risk for poor health outcomes from this disease as they makeup over half of the population and comprise 41.3% of those diagnosed with prediabetes and diabetes (See Figure 1). Hispanic's are also at high risk of developing heart disease, having a stroke, needing a limb amputation, acquiring blindness, and dying of an early death from this disease. Research conducted by the University of California, Los Angeles Center for Health Policy supports the underlying data that the obesity rate in Merced County, race, poverty level, and even immigration status are major contributors to the rising cases of diabetes<sup>21</sup>. In order to lower incidence rates and slow the progression of new cases in Merced over the next decade, intervention, prevention, and outreach must be accessible to those most in at risk and in need.

Ongoing intervention care and preventative services are somewhat limited in Merced County. Research points to Mercy Hospital as the main provider of diabetic services in the area. Aside from direct doctor-patient care, there is only one formal diabetes support group and hotline offered through the hospital that individuals can take advantage of if they are interested in gaining outside support. Also, the Merced County Network of Health Educators offers diabetes education classes at their Health

Education Center and at the Mercy Medical Center several times a month at no cost<sup>22</sup>. Also, for those that are Veteran's of a foreign war, the Merced Community VA Outpatient Clinic has diabetes counseling services available. It is important to note that no mention of transportation is made for those who do not have access to these services due to geographical location and distance. Interestingly, there is a Hmong community outreach project delivering education and patient care among the Hmong community which is among several minority groups largely affected by diabetes in Merced<sup>23</sup>. While Merced County offers some services directed at ongoing intervention care, more is needed at the neighborhood level, such as a mobile diabetes education and health van, to reach those who lack the access to the above mentioned resources.

## Limitations

The research conducted about type 2 diabetes in this report is impacted by several limitations. First, the resources utilized for the purposes of this report are comprised mainly of secondary sources. The sources presented come from publications including journal articles reporting previous findings and websites analyzing data from primary and other secondary sources. Second, this is a brief research project with specific guidelines for educational purposes and the ability to conduct individual studies or experiments was not part of the assignment. Finally, access to current quantitative data is not always readily available for diseases and conditions such as type 2 diabetes due to the magnitude and size of the data being collected. Data used in this paper is from reports issued in 2010 and 2011 for pre-

vious years of data collection (2007-2009). For the purposes of future research on the topic of type 2 diabetes, primary sources, extended research, and current data would be beneficial.

## Conclusion

Based on project research, subsequent analysis, and key findings from local sources regarding type 2 diabetes, it would appear that the prevalence of this disease in Merced County is significant, as there appears to be a large portion of the population, especially among the poor and ethnic minorities (namely Hispanics) affected by this lifestyle disease. With over a quarter of Merced County residents suffering from obesity, it is likely that the rate of new cases will continue to grow. In addition to behavioral factors indicative of sedentary lifestyle choices, there are many other key social determinants contributing to the prevalence of diabetes in Merced. Low socioeconomic status, poor nutrition, and lack of access to quality healthcare and other vital resources, including transportation all play a pivotal role in the numbers of those affected by this disease. Local health organizations, including Mercy Hospital and a few others offer minimal support services for those with diabetes. Aside from the Hmong community, there are no mobile outreach interventions or other preventative neighborhood organizations currently addressing this growing issue. Clearly, Merced County has thousands of people suffering from a preventable disease. Additional funding from local government in conjunction with a massive outreach aimed at education and resource allocation seems the only way to truly address what has now become the epidemic of the 21<sup>st</sup> century.

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Tori Palmberg is a California native and third year transfer student majoring in Psychology at UC Merced. She is also currently employed as a Peer Fellow for the DARTS program where she assists transferring and returning students with various academic needs. In addition, Tori is actively involved on campus as a Research Assistant in the area of Health Psychology. Her main academic goal is to graduate with a B.A. in Psychology in the Fall of 2015 and then transfer to UOP as a Graduate student majoring in Student Affairs. Tori would one day like to become a Director of Student Affairs at the University level, working with students and college administrators to develop new programs and services designed to help students at various levels maximize success.