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Policy and Social Factors Influencing Diabetes among Pima Indians in Arizona, USA

Clayton Booth
International Studies Program, University of Utah
215 S Central Campus Dr., Salt Lake City, UT 84112, USA

Maziar M. Nourian
School of Medicine, University of Utah
30 N. 1900 E, Salt Lake City, UT 84132, USA

Shannon Weaver
Department of Health, Kinesiology and Recreation, University of Utah
250 S. 1850 E., Salt Lake City, UT 84112, USA

Bethany Gull
Akiko Kamimura*
Department of Sociology, University of Utah
380 S 1530 E, Salt Lake City, UT 84112, USA

Abstract
The Pima Indians have the highest rate of type 2 diabetes in the world. While biomedical studies have identified a genetic variable associated with the high prevalence of diabetes among Pima Indians, genetics is only one factor that encompasses an individual's risk for developing a disease. Information on the social factors relating to the development of type 2 diabetes amongst this population is necessary. The purpose of this analysis is to review policy, social and historical factors associated with diabetes among Pima Indians. Governmental policies have affected this population's ability to eat a diet native to their culture. For example, the damming of the Gila River in the early 1920s resulted in diet and lifestyle changes, reducing traditional low fat, high fiber intake and physical activity, among the Pima population. U.S. Department of Agriculture (USDA) policies in place in the 1970s and 1980s did not allow Native Americans, the Pima included, to get farm help such as agricultural loans in times of need. These policies led to many Pima finding sedentary jobs, if they could find work at all, and adopting unhealthy lifestyles. While genetic factors have shown to be important predictors of diabetes incidence, the historical and social factors that changed US Pima Indians' lifestyles are significant factors which have contributed to the high prevalence of diabetes among this group. In order to address the high rates of diabetes among the Pima Indians, it is vital that emphasis be placed upon culturally appropriate interventions. U.S. government agencies, tribal leaders, and community elders would benefit from working together to establish healthier food sources, encourage physical activity, and utilize existing community networks to spread information on diabetes prevention and management practices. Future studies on diabetes among Pima Indians would include more policy, social and historical factors, develop programs with reflection of these factors, and evaluate the programs.
Keywords: Pima Indians, type 2 diabetes, Native American policies, social factors, USA

1. Introduction

The Pima are one of the tribes of American Indian and Alaska Natives and claim a population of approximately 20,000 members in 2010 (U.S. Census Bureau, 2010). The majority of Pima Indians live in Southern Arizona and are based on two reservations, the Gila River Indian Community (GRIC) and the Salt River Pima-Maricopa Indian Community (SRPMIC) (Ravussin et al., 1994). The Pima Indians have the highest rate of type 2 diabetes in the world with 34.2% for Pima men and 40.8% for Pima women compared to 9.3% in the United States (U.S.) general population and 16% in Native Americans amongst all tribes (Centers for Disease Control and Prevention, 2014; Schulz, 2006).

Biomedical studies identified the genetic cause of the extremely high prevalence of diabetes among Pima Indians (Pearson, 2015) with the finding that progressive β-cell dysfunction associated with type 2 diabetes is commonly found among the tribe (Weyer, Bogardus, Mott, & Pratley, 1999). Despite the importance of this finding, the overall prevalence of diabetes among Pima Indians has continued to increase for decades, with the prevalence among Pima youth increasing significantly (Pavkov et al., 2007). Although genetic factors affect onset of diabetes, physical activity, weight loss, and diet changes decrease the chance of developing type 2 diabetes (Centers for Disease Control and Prevention, 2016). While biomedical research has advanced the knowledge of diabetes among Pima Indians, it has so far proven insufficient in providing effective prevention

and interventions programs for this population.

Pima Indians have historically lived in Arizona, the U.S., living a sustainable, healthy lifestyle which included running, basket weaving, and farming (Salt River Pima-Maricopa Indian Community, 2016). This article will argue that a number of the U.S. government's past actions exposed the Pima Indians to environmental factors that resulted in the current high prevalence of diabetes among the Pima Nation (Salt River Pima-Maricopa Indian Community, 2016). Pima Indians who retain traditional lifestyle show lower rates of type 2 diabetes than those do not (Ravussin, Valencia, Esparza, Bennett, & Schulz, 1994). While genetics plays a role in predisposition to diabetes among the Pima population (Wendorf & Goldfine, 1991), this may be due to the fact that key environmental factors are in reality the primary causes of the increase in diabetes amongst Pima Indians (Schulz et al., 2006). Despite the multitude of evidence demonstrating the correlation between the treatment of Pima Indians by the U.S. government and increased rates of diabetes amongst the tribe, research focusing on policy, social and historical factors on diabetes among Pima Indians is lacking.

The purpose of this article is to review policies and social and historical factors which have led to high rates of diabetes among Pima Indians living in Arizona. Central to this paper is the exploration of the role that the U.S. government played in exposing the Pima Indians to social risk factors for diabetes, including limiting or destroying the tribe's traditional agricultural practices and creating a dependency for unhealthy government food rations. This article provides evidence that a genetic predisposition is one cause of diabetes among Pima Indians, with the primary drivers in this epidemic stemming from social and environmental influences.

2. Early History of Native Americans and European Settlers

When European settlers brought diseases such as smallpox and measles to the Americas in the 16th century, Native American tribes were decimated because they lacked immune systems capable of fending off these foreign diseases (Geisler, 2014; Ubelaker, 1988). As a result of the infectious disease pandemics in Europe and the Americas, the number of Native Americans declined from somewhere between 2 and 20 million in the 16th century to 530,000 by 1900 (Geisler, 2014). As European settlers moved on to native lands, they paved the way for an influx of new peoples, forcing the Natives to leave their ancestral areas (Geisler, 2014). In an attempt to preserve native lands, the Indian Trade and Intercourse Act of 1834 established a zone of "Indian habitation" spanning four states. However it did not take long until the new settlers' political, commercial, and agricultural interests reduced and eventually dissolved the landholdings, leaving the Natives vulnerable to invasion and forced relocation by settlers (Geisler, 2014). After years of defending native land, in 1887, The General Allotment Act was passed in an attempt to assimilate the Natives into mainstream American civilization by making them land owners.

According to their status in the tribe, Native Americans were given certain allotments of land and by government mandate were not allowed to sell their allotments for 25 years (Geisler, 2014). Congress continued to intervene in the late 19th century. Rather than providing a reliable and prosperous living for the tribe and integrating them into the broader society, the new arrangement left Native Americans on the periphery of American society (Dejong, 2007) and set the tribes on a downward trajectory which resulted in an even greater disparity with the white settlers. Indian agriculture declined when settler allotment increased. Land division discouraged natives from farming because of government bureaucracy, which slowed down farm development (Dejong, 2007).

3. Lifestyle Change

The Gila River in southern Arizona has been the home of the Pima Indians for more than 2,000 years. The tribe adapted to the desert climate, ate desert plants, and had an expansive knowledge of desert agriculture that used irrigation canals to produce corn, beans, squash, and cotton. The Pima also used the irrigation system to attract game and fish (Ravussin et al., 1994). With the coming of European settlers, the Pima, like many other Native peoples, were placed on a reservation and began to suffer from a lack of access to water for agricultural purposes. The tribe saw a 70% decrease in irrigation water between the years of 1866 and 1890 (Geisler, 2014). With the 1877 Desert Land Act and the 1902 National Reclamation Act, more and more settlers made their way into Arizona, intensifying the demand for water (Geisler, 2014). In 1928, the Coolidge Dam began diverting water from the downstream Pima (Kipple, 1977).

The construction of the dam dramatically changed the Pima's lifestyle. They were no longer hunting and farming, but subsisting on rations of bread, cheese and bologna provided by the government (Rather, 2002). The dam construction marked the end of Pima Indians' sustainable lifestyle and the beginning of Westernization (Ruvussin et al., 1994). It can be surmised that this drastic change in lifestyle correlates with the emergence of the Pima's diabetes epidemic. In the mid 1900's, the government's answer to the Pima's nutritional problem was to provide the Pima with "surplus commodities" similar to the preserved foods that were given to soldiers at war (Ravussin et al., 1994). Their food supply was replaced with low-nutrient foods, and changed from a high carbohydrate, high fiber, low-fat diet, to a diet consisting mainly of low fiber, high fat processed foods (Reid,

et.al., 1971).

By the 1970's, 40% of the Pima Indian's calories came from fat (Ruvussin et al., 1994). Their nutrient dense food disappeared, and with the limitations placed on their agriculture, their main source of exercise, farming, was gone. In the past, the Pima worked with their hands and were out in the fields and the desert, hunting. Currently, the Pima people have difficulties to find different jobs that promote a sedentary lifestyle. Taken together, these diet, lifestyle, and environmental factors combine to produce diabetes-advancing conditions. In addition, low nutrient dense foods and a lack of exercise both lead to obesity, which is a major risk factor in type 2 diabetes (National Institute of Diabetes and Digestive and Kidney Diseases, 2016).

4. U.S. Department of Agriculture (USDA) Regulations and Destruction of Pima Farming

In 1976, the Farm Bill was passed to support minority farmers by giving them USDA loan assistance (Geisler, 2014). In 1985, the USDA's Direct Loan Assistance Program was added to the Farm Bill to specifically help minority farmers again (Geisler, 2014). Under the Bill, up to 30,000 Native American farmers and ranchers were denied benefits, paid too late, or withheld assistance (Geisler, 2014). In addition, Native American lands were not officially enrolled in the Agriculture Stabilization and Conservation Service (ASCS), resulting in unreported production rates (Geisler, 2014). Moreover, because of the exclusion of Native Americans in the ASCS, Native American farmers had to lower the prices of their crops and consequently received one third of the income of an off-reservation farmer in the ACSC program (Geisler, 2014). This negatively affected Native American farmers and ranchers because in years of drought and hardship, the necessary help that was given to other farmers and ranchers in times of tribulation, were not given to Native American farmers and ranchers (Geisler, 2014). Many Native American farmers lost their business and filed for bankruptcy (Geisler, 2014). As a result, the Pima had to turn to sedentary jobs, or no jobs at all. This could have all been avoided if the USDA had properly supported the Native American farm and ranch productions. A sedentary lifestyle, high stress, and the inability to produce nutrient dense foods for consumption, all are correlated risk factors of type 2 diabetes (National Institute of Diabetes and Digestive and Kidney Diseases, 2014).

5. The Thrifty Gene Theory and Lifestyle Issues

The "thrifty gene" theory is a common argument that attempts to describe why Native Americans have such a high rate of diabetes (Wendorf & Goldfine, 1991). The thrifty gene theory states that prior to the European settlers, the Native Americans were required to endure times of famine. Those who made in through these periods of food scarcity possessed a "thrifty gene" which gave them an advantage in storing food in the form of fat. This gave them enough energy stores to survive until food was again readily available (Mailer & Hale, 2015). Thus, a "thrifty genotype" is one which allows Native Americans to store energy during times of excess in order to survive the times of famine (Mailer & Hale, 2015). In any case, the "thrifty gene" cannot be the only factor that plays into such a high rate of diabetes among Native Americans (Schulz et al., 2006).

Schulz and colleagues compared health outcomes among the Mexican Pima and the U.S. Pima and found that those in Mexico appeared to be in much better health (Schulz et al., 2006). Among the Mexican Pima Indians, 5.6% of the men had diabetes and 8.5% of the women did (Schulz et al., 2006). Among U.S. Pima Indians, the prevalence was 34.2% in the men and 40.8% in the women (Schulz et al., 2006). In addition, obesity was more than 10 times more frequent in the U.S. Pima than the Mexican Pima (Schulz et al., 2006). The Mexican Pima men were 2.5 times more likely than U.S. Pima men to engage in heavy to moderate physical activity, while the Mexican Pima women were 7 times more likely than the Pima women in the U.S. (Schulz et al., 2006). The Mexican Pima have lower insulin resistance and are more likely to sustain traditional lifestyles compared to the U.S. Pima (Esparza-Romero, Valencia, Martinez, Ravussin, Schulz, & Bennett, 2010). Among the Mexican Pima, lifestyle factors are the primary causes of type 2 diabetes (Esparza-Romero et al., 2015; Urquidez-Romero, Esparza-Romero, & Valencia, 2015). The dramatic change in U.S. Pima Indians' lifestyles and genetic factors seem to be significant causes in their far higher rates of type 2 diabetes over their Mexican counterparts.

6. Conclusion

The American Diabetes Association (2017) and the Indian Health Services (2017) have a number of resources and programs which target the treatment and prevention of diabetes among Native Americans. While beneficial in many ways, these programs focus on Native Americans in general rather than challenges faced by specific tribes. In order to address the high rates of diabetes among the Pima Indians, culturally appropriate interventions will need to be more emphasized. U.S. government agencies, tribal leaders, and community elders would benefit from working together to establish the following: healthier food sources, increased physical activity among all ages in the Pima population, and the utilization of existing community networks to spread information on diabetes prevention and management practices. Future studies on diabetes among Pima Indians should further analyze the influences of policy, social and historical factors in order to better understand the adversity faced by

the Pima Indians from years of oppression and displacement. Culturally specific health education programs could then be developed, in an attempt to reduce health disparities between Pima Indians and the general U.S. population.

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