

**Non-insulin Dependent Diabetes Mellitus (NIDDM) among Mexican Americans in  
the Southeastern United States.**

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**11/09/2004**

**ANT 570**

**Text Pages: 2-20**

**References Sited: 21-24**

**Tables and Graphs: 5**

## **Introduction**

The fastest growing population rates of Hispanic immigrants from Mexico and Central America within the United States are located in the Southeast. With this influx of new people also comes challenges to the U.S. American channels of governmentally subsidized social support, specifically healthcare. One concern for healthcare professionals is the increasing rate of Non-insulin Dependent Diabetes Mellitus (NIDDM) within Hispanic communities.

This paper examines the increasing rates of NIDDM in Mexican Americans in the Southeastern U.S. The following pages include: an introduction to modern problems of NIDDM, a brief history of Mexican Americans, the genetic predisposition of NIDDM for Mexican Americans and the increased rates of NIDDM among those in the U.S., recommendations for applied policy, and a final synthesis of the information. The author expects to find causal relationships between changes in diet, physical exercise, social support, and genetic predisposition to NIDDM for Mexican Americans.

This paper should enhance contemporary understanding of the role of genetics, foodways and culture as factors in the high rates of NIDDM within Mexican American communities in the Southeast. This paper addresses the need for more research on Mexican American health in the Southeastern U.S. and the implementation of applied policy changes.

The information in this paper was gathered solely through library research. No original data collection or research was conducted. Therefore, it is based on the biocultural research of medical scholars and behavioral scientist and their attempts to understand the unique relationship between NIDDM and Hispanics. For the purpose of

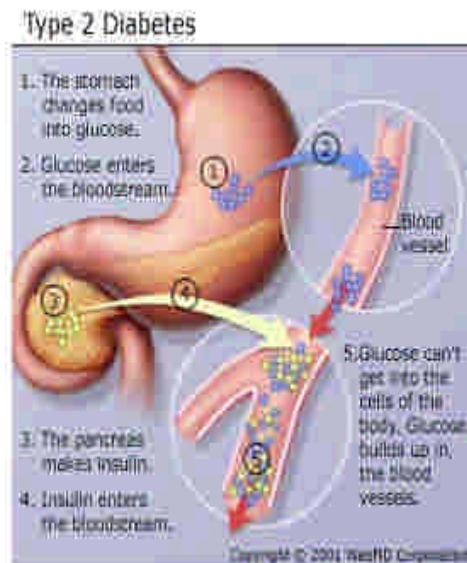
this paper, an attempt to limit sources to those specific to Mexicans and Mexican Americans was made. In some cases the literature is based on Puerto Rican or Brazilian Hispanics, as such it is still considered valuable but only in a comparative context.

### **NIDDM-Modern Issues**

#### **Clinical Evaluation and Population Demographics**

The pancreas is the organ responsible for insulin production. Insulin is secreted in response to rising blood glucose (sugar) levels. Insulin allows glucose to be absorbed by cells. As seen in Picture 1, without the proper insulin level glucose cannot be absorbed. There are three types of diabetes: Insulin Dependent Diabetes Mellitus (IDDM) in which the pancreas does not produce enough insulin, NIDDM in which cell receptors malfunction and insulin is not absorbed, and Gestational Diabetes which is short term and reversible.

**Picture 1:NIDDM**



The result of NIDDM on an individual is insulin resistance which leads to hyperglycemia- too much blood sugar. The health consequences of NIDDM include renal failure, loss of sight, loss of nerve endings, hypertension and if untreated, death.

The causes of NIDDM range from obesity, a genetic predisposition, lack of exercise, and a diet high in fat and sugar. The global increase in reported rates of NIDDM is shocking. The International Diabetes Federation (IDF) estimates that 14.2% of Mexicans and 8% of U.S. Americans between the ages of 20 and 79 have NIDDM (Table 1). Once known as Adult Onset Diabetes, or Type 2 Diabetes Mellitus, NIDDM is now commonly found in teenagers.

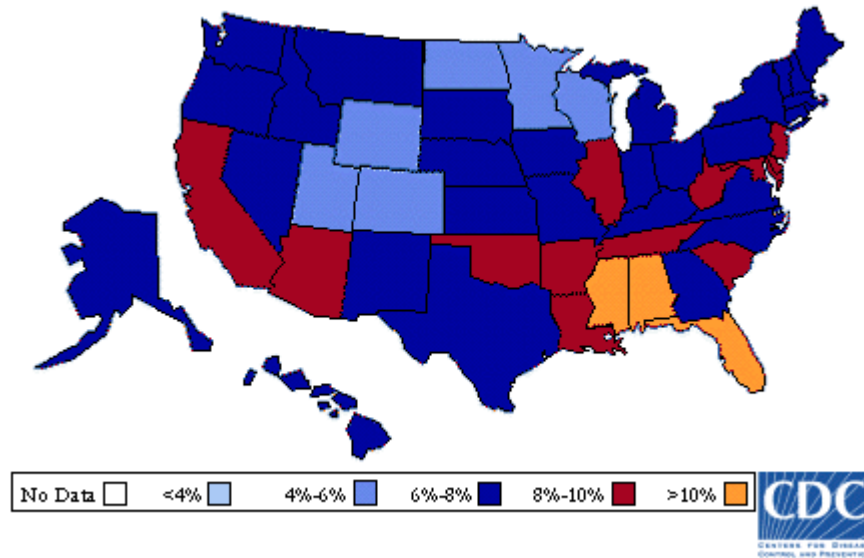
**Table 1: Prevalence estimates of diabetes mellitus - North American Region**

DM Prevalence		
Country	Population (20-79) (000's)	%
Mexico	55,174	14.2%
USA	190,081	8.0%
<b>Total</b>	<b>245,255</b>	<b>0.0%</b>

Source: Diabetes Atlas, International Diabetes Federation.

The distribution of NIDDM across the Southeastern U.S. is telling (Map 1). The Center for Disease Control (CDC) estimates that NIDDM rates in the Southeast have risen by over 10% in Alabama, Florida, and Mississippi, while rates in Arkansas, Louisiana, South Carolina, and Tennessee have risen by 8-10% in the last ten years.

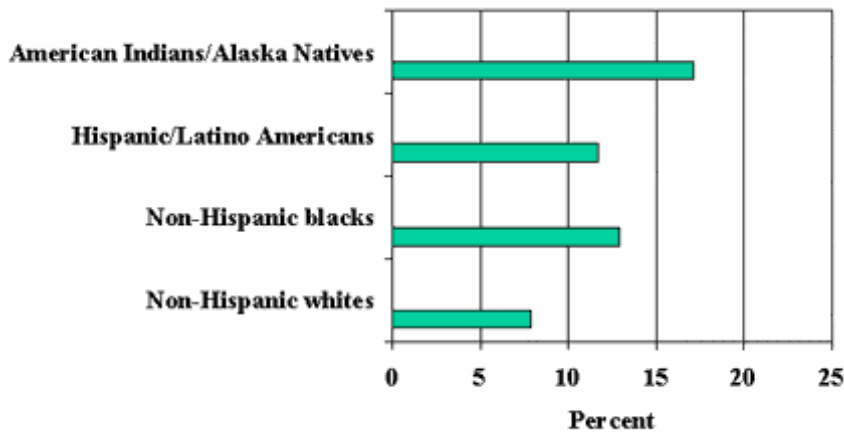
**Map 1: Diabetes and Gestational Diabetes Trends Among Adults in the United States, Behavioral Risk Factor Surveillance System, 2001**



Mokdad AH, Ford ES, Bowman BA, et al. Prevalence of obesity, diabetes, and other obesity-related health risk factors, 2001. JAMA 2003 Jan 1;289(1):76-9.

Not only does geographical location predict risk for NIDDM but ethnicity does as well. In 2002, Hispanics or Latin Americans were twice as likely to develop NIDDM as Non-Hispanic Whites (Table 2).

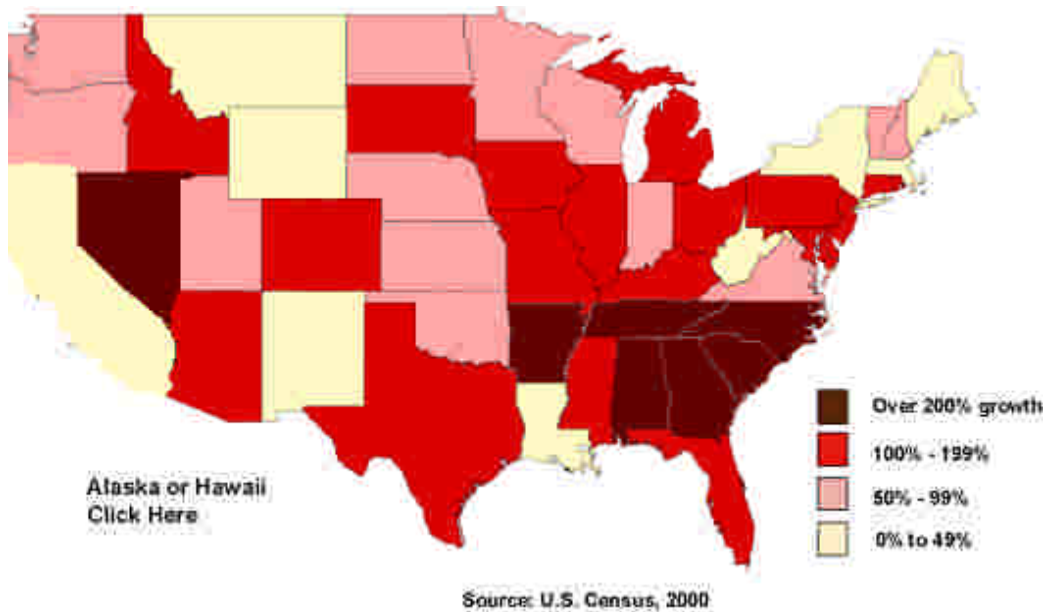
**Table 2: Age-Adjusted total prevalence of diabetes in people aged 20 years or older, by race/ethnicity—United States, 2002**



Source: 1999–2001 National Health Interview Survey and 1999–2000 National Health and Nutrition Examination Survey estimates projected to year 2002. 2002 outpatient database of the India

The increase of Hispanic immigrants into the Southeast is equally phenomenal. As the census data in Map 2 demonstrates, the rates of influx in Alabama, Arkansas, Georgia, North Carolina, South Carolina, and Tennessee are over 200% from 1990-2000.

**Map 2: Growth in the Latino Population (1990 - 2000)**



The ability of Southeastern policy makers and governmentally subsidized safety nets to effectively deal with such large numbers of Hispanic immigrants, most of which are from Mexico, is wanting. Recent research conducted in Memphis, TN demonstrates this point. A 2003 report based on inter-disciplinary research (of which this author was part of and co-authored ) found that U.S. births to mothers from Mexico increased by 523%, Mexican Americans make up 69% of the Hispanic population; median extended household income was \$36,319 at the time, the majority of immigrants are male laborers, few have health insurance, and 17% have been diagnosed with NIDDM. Also of interest is that 77% of the respondents planned to stay in the city (Mendoza et al. 2003).

Using the Memphis area as an indicator of the demographic changes that Southeastern cities will go through, it is safe to assume there will be similar trends . Current research of Hispanic population trends in Birmingham, AL (funded through the Robert Woods Johnson Foundation) will provide further insight once published.

The extreme increase of population rates of Mexican Americans in the Southeast is an anthropological issue for many reasons. The rate of NIDDM is on the rise in Non-Hispanic Americans, the influx of Mexican immigrants has increased over 200%, and as is seen later in this paper, Mexicans demonstrate a genetic predisposition to developing NIDDM. These factors coupled with low economic status, change of lifestyle, and loss of extended kin social support for Mexican Americans provide a huge challenge to U.S. systems of healthcare and health policy.

### **A Brief History of Mexican Americans**

#### **The First Americans**

The Pleistocene migration from Asia to the Americas is to some extent a subject of debate. Considering the time frame in which it happened from the perspective of most scholars, anatomically modern humans reached the New World within the last 20,000 years. The ways in which it happened, also a subject of debate, were most likely a combination of waves of migration over the land bridge Beringia and coastal rafting. There is however, some consensus as to the time in which the last migration must have occurred. The Bering Strait was covered by sea water sometime between 10,000 and 14,000 years ago, at a minimum, these inhabitants were cut off from the Old World from 10,000 years ago until large scale European colonialization (Relethford, 2003).

This isolation by distance contributed to some of the genotypic characteristics of Native Americans, many of which they share with East Asian groups. For instance, Relethford (2003: 128 ) describes physical similarities like straight black hair, lack of facial hair, and broad cheekbones as widespread across all Native American groups. Even as the new Americans spread through North, Central, and South America they retained a common ancestry and today still share classic genetic markers.

The ABO blood system is one example of such a marker. Native Americans have 80-100% consistently for the blood type O . The disease associations for which blood type O were not selected for include syphilis and smallpox (type A) and infantile diarrhea and typhoid fever (type B) . Perhaps this explains the devastating effects of Old World diseases, like smallpox, on the Native American populations in contact with Europeans.

The first Americans were big game hunter gatherers who survived the harsh Upper Paleolithic Ice Age through a diet high in protein, low in carbohydrates, low in dietary fiber, and low in fat and sugar. At the same time energy demands were high in order to produce body warmth and maintain activity levels. As Brown and Konner (1987) observed, there would have been no realistic possibility of becoming obese.

### **Modern Mexicans**

In Mexico today there are over 65 distinct cultural and linguistic groups who are descended from the first Americans. Genetic admixture with Europeans, Jews, and African Americans is common in most ethnic groups (Gorodezky et al., 2001). A study by Lisker, Ramirez, and Babinsky (1996), found that modern upper-class Mexicans have

more European genetic admixture while lower-class Mexicans have more Indian genetic admixture.

These ethnic class divisions are a result of the decades of European expansion into Mesoamerica and help to explain why lower-class Mexicans, more likely to migrate to the U.S., have a closer relation to Native Americans than do upper-class Mexicans who can afford to stay in Mexico. The work of Stern (1999) echoes this by demonstrating that the rates of NIDDM in Mexican Americans in San Antonio, TX fall into class categories. Lower-class individuals have more Native American admixture and higher rates of NIDDM than higher-class individuals.

Today, 14.2% of Mexicans have been diagnosed with NIDDM. The Pan American Health Organization (PAHO) estimates that since 1997 over 4 million people in Mexico actually have the disease and of that number, only 11% use health services (Velazquez, 2004).

The relationship between the genetic admixture of Mexican Americans and NIDDM is discussed in the next section, but it is clear that NIDDM is a health crisis in Mexico and that the consequences of it are surely felt in the U.S.

## **Mexican Americans and NIDDM**

### **Made to Hunt and Gather**

For the majority of time in which humans have inhabited the New World they practiced the food getting strategy of hunting and gathering . The adaptation effects this strategy had over the course of thousands of years were first investigated by Neel in 1962 in his influential paper “Diabetes Mellitus: a ‘thrifty genotype’ rendered detrimental by

‘progress’”. Here Neel investigated the high occurrence of NIMMD in some populations of Native Americans and Polynesians. He postulated there was a “thrifty genotype” in the groups that provided a selective advantage. Those with it were fit for their environment, as were their offspring. One of the more dangerous aspects of life as a hunter gatherer is often described as the energy balance needed to survive cycles of feast and famine. Neel’s theory suggested the selective advantage allowed for glucose storage in times of plenty and glucose reserves in times of less food.

Another component of his work attempted to explain the evolution responsible for sexually dimorphic differences in male and female body fat ratios. Women would necessarily require storage of glucose for periods of gestation and breastfeeding. The caloric needs of a pregnant woman and her offspring would select for the ability to store as much potential energy as possible in times of feasts.

Fast forward, once a selective advantage, now in times of plenty the “thrifty genotype” is a disadvantage to Native Americans and Polynesians because their bodies continue to store too much glucose. At the time of Neel’s work, decades of research on the Pima Indians of Arizona had been conducted. This tribe was unique because it had, and has, the highest incidence rates of diagnosed NIDDM in the world. The Pima also have some of the highest rates of obesity in any researched population. The Pima were considered living proof of the contrast between the biological build of the human body and the quickly changing modern world. NIDDM was classified as a disease of civilization, brought about by drastic diet changes and the body’s inability to compensate for so much glucose.

Other factors compounding NIDDM treatment and precipitating its onset are: smoking, alcohol consumption, consumption of refined grains, as well as higher amounts of carbohydrates, fats, and sugars in the diet. All of these were impossible to partake of in large quantities until very recently. The “thrifty genotype” was considered a magic bullet to understanding the high rates of NIDDM in the two groups.

More recently, Neel’s theory has been taken further by anthropologists. In 1987, Rittenbaugh and Goodby re-evaluated the theory. The two analyzed the metabolic consequences of the hunter gatherer ancestor with that of modern Native Americans. Their research was possible in large part because of scientific advances.

They found that insulin secretion has increased because of increased consumption of glucose in the diet and the relative inactivity of humans. Sedentary lifestyles without the need to store calories for famine have led to muscle atrophy that lessens the absorption rate of glucose. The more glucose production, the more one would experience more exhaustion, edema, gallstones, and low lipid profiles. This is later associated with heart disease. Essentially, people were getting fatter and unhealthier as a result of abandoning the hunter gatherer lifestyle.

In 1997, Bindon and Baker re-visited the “thrifty genotype”. Based on years of work with Samoan populations in American Samoa, Hawaii, and San Francisco, the two suggested that physical exertion was as important as diet. Their research sites were chosen to represent population samples from traditional, modernizing, and modern Samoans.

Oceanic populations, like the Samoans, are similar to Native Americans in that they have been subject to the capitalistic needs of the U.S. Modernization both on the

islands and in reservations, have caused drastic changes in lifestyles. Families who lived a rural, traditional life fifty years ago now participate in the wage labor market.

Samoans, already considered big by Western standards, continue to have some of the highest body mass indexes (BMI) in the world. What Bindon and Baker suggest is that they were selected to be so large. Without negating the work done before them, Bindon and Baker theorize that Samoans are a special case. Consider that most hunter gatherers are thin, like the !Kung, with this as the case the Samoans do not fit the mold. They were selected for large sizes to insure the energy needed to navigate long stretches of the ocean between islands in Polynesia, Micronesia, and Melanesia. The selected body type is very different from Native Americans but the end result has, unfortunately, been the same. Higher rates of NIDDM in modern groups are due to less physical activity and dietary habits strong on carbohydrates, fat, and sugar. The already present predisposition for large body sizes among Samoan men is now complicated by modernization.

Thus the “thrifty genotype” is a foundation for understanding the relationship between NIDDM and Native Americans. As was established earlier in this paper, lower-class Mexican Americans, more likely to immigrate to the U.S., have more genetic admixture with Native Americans and are thus genetically predisposed to NIDDM via the “thrifty genotype”. Like Samoans, they experience NIDDM due to modern diets coupled with sedentary lifestyles. The next section investigates the role of foodways in Mexican Americans and the impact of diet change for the immigrants.

### **Have a Coke and a Smile**

A recent article in a local Tuscaloosa, AL newspaper reported the difficulty a small business owner had in selling Coca-Cola made in the U.S. to Mexican immigrants. Quoted as saying that Mexicans prefer “Mexican Coke”, the owner explained the difference between the two. Coca-Cola produced for sale in the U.S. is made of refined sugars; the Coca-Cola made for sale in Mexico uses pure sugar cane thus producing a different taste.

This seemingly idiosyncratic story is actually very useful. Modern Mexico is not an untouched, virgin horizon full of noble savages waiting to be modernized. There is wide availability of sodas, snack foods, and processed foods. Mexicans, of which 14.2% of the population is diagnosed with NIDDM, are no strangers to sugar, fat, and carbohydrates in the diet.

In a 1987 study of Mexican social class and diet, Pelto found that eating preferences between lower-class, middle-class and upper-class groups was the same. The reality of what they could afford was, of course, different. Lower-class groups delighted in candy and sodas when they could afford them but most of their diet consisted of fruits, vegetables, and homemade tortillas with beans. Additionally, the males worked in jobs that required high energy outputs: farming and construction. Of note is that a large amount of the males’ caloric consumption was from *pulque*, the regional beer.

Among the middle class families most lived on traditional foods but included more prestigious items in their diet: soda, candy, desserts, and Western fast-food like

KFC. They too worked manual labor jobs but many had positions that required less caloric expenditure. The upper-class families, who have greater access to prestige foods, typically lived on market fresh fruits, vegetables, grain, and the occasional sweet. Their jobs consisted of management and white-collar work. The rates of NIDDM in these groups ranged from high to low in this order: middle-class, upper-class, and lower-class.

Pelto concluded that upper-class families who are typically more educated and concerned with Western ideas of body types and beauty, were less likely to develop NIDDM and they were better educated to its potential threat. The middle-class was more likely to indulge in prestige foods as signs of status, as would be the lower-class if they had access to the prestige foods.

In a more recent study of perceptions of food and social power, Dos-Santos, Dressler, and Oths researched socioeconomic factors and body size in Brazil. For this study they measured BMI, percent of body fat and lean to fat measures in relation to BMI. Like Pelto they found that the economic indicators formed a statistical line with which one could predict incidences of disease.

Socioeconomic status and body composition is an important point in this case, gender is important too. They found a curvilinear pattern in socioeconomic status and body composition for females. In other words, females in lower-class groups did not have the economic ability to overeat and expend less energy. The upper-class women did but privy to Western fashions and ideal body types these women avoided high sugar and carbohydrate foods. Like Mexico for Pelto, the association between obesity and economic status was found in the middle-class.

The work of Raminda Daniulaityte in 2004 adds even more to anthropological understanding of cognitive models of food consumption and NIDDM. She investigated NIDDM in clinic populations in Guadalajara, Mexico. Her study consists of models of food and models of diabetes causation. The results show there is a discrepancy between male and female knowledge of the biomedical meaning and causation of NIDDM. Women demonstrate a better understanding of the disease as they are the primary care givers in the family. However, most participants (male and female) identified NIDDM as new disease for which there was no traditional knowledge to rely upon.

In fact, despite a more biomedical etiological explanation of NIDDM, many women believe its causes are due to emotional and social distress. Essentially, diabetes in Mexico may be attributed to more than glucose levels; it is considered an imbalance of emotional and social support.

### **NIDDM among Mexicans in the U.S.A.**

#### **Welcome to the Jungle...**

David Himmelgreen and associates have studied Puerto Rican immigrants in Hartford, CT for years. In a 2003 article for the American Journal of Physical Anthropology, they published an article about Puerto Rican immigrants which began with the phrase, “The longer you stay, the bigger you get...” In this work the team studied the time it takes in the U.S. for an immigrant to gain weight. They concluded that for Puerto Ricans the average time for changes in BMI to occur is 1-2 years after a family arrives. If this is true for Southeastern Mexican immigrants as well, than of the 200% increase the area as seen since the 2000 census, most should have gained considerable weight by now.

Himmelgreen and his team go further and investigate the symbolic meanings of food, beauty, and health for Hispanic immigrants. Not surprisingly, they find Western views dominate within those individuals in the U.S. the longest and traditional views dominate among those recently immigrated.

The ability for minority groups to adjust to and embody the rules of a society and their efficiency in doing so has been described by Dressler as cultural consonance. Cultural consonance is proven to impact the effects of disease risk in populations and is also a measure of the relationship between disease and social support.

In a 1996 study of the Mississippi Choctaw, Dressler Bindon, and Gilliland found that acculturation impacted families differentially. More traditional families were better able to cope with the risk of disease and less susceptible to NIDDM. More acculturated families, perhaps with single parents or no extended kin were more likely to succumb to NIDDM, even after adjusting for behavioral factors such as smoking (Dressler et al., 1996). As they wrote:

“The results of this study challenge the notion that population genetic susceptibility is the sole basis for diabetes risk here. Rather, these results demonstrate that physical, behavioral, and sociocultural factors intersect to determine the risk.” (175).

To sum up, an individual’s socioeconomic position and psychosocial stressors do have an impact on her health. The existing kin networks, linguistic ability, and economic stability with which some Native Americans and Mexican Americans have to help them cope with acculturation to modern Western living are as positive an adaptation as was the “thrifty genotype”.

## **Southeastern Mexican Americans- Western U.S. Case Studies**

Without a doubt most work on Mexican American communities in the U.S. has been done in Western U.S. cities. This is not surprising, as immigration rates to such cities were the norm through the seventies and eighties. However, as demographics of immigration change, scholars must address the new areas of settlement. As mentioned in the beginning of his paper, the Southeastern U.S. now witnesses the fastest growing rates of Hispanics in the country. In order to predict avenues for policy changes one must study the best practices of cities that have already undergone change in demographics, and in most cases a public health crisis.

Two case studies out of the Southwest are extremely important. The first was conducted by Burke and his team in San Antonio, TX. Like the study by Stern mentioned earlier in this paper, Burke found NIDDM rates in San Antonio to be higher than the Non-Hispanic White national average. This particular study compared Mexican Americans to people Hispanics still in Mexico. The results indicate a higher propensity of NIDDM in the U.S., even after adjusting for age and economic status. They concluded that, diet, exercise, social support, and knowledge of the U.S. healthcare system were all contributing factors.

The second study, by Gonzalez and collaborators, researched Mexican Americans in southern Texas and groups in Mexico City. They used skin reflectance measurement techniques to establish Native American ancestry. The results exhibit similar findings to the work by Gorodezky et al. The darker the individual, the more Native American ancestry they have. For this project Texan immigrant men showed a 47% admixture and women a 37% admixture. In addition to the skin reflectance tests being consistent with

rates of NIDDM in Texas, the authors found that Mexicans showed a higher rate of caloric expenditure through physical activity than did the Texan sample. They concluded that among men and women together, physical activity rates related to labor decreased in the U.S. while caloric consumption increased.

The findings of these two studies exemplify the health consequences of moving from an area already prone to NIDDM to an area of increased sedentary lifestyle and Western diet. The individuals in both studies were lower-class people who, under their current circumstances, would never qualify as a powerful economic group. However, as history has shown, second and third generations Mexican Americans may well find the process of acculturation and Westernization to be easier than their parents.

### **As for the Southeast U.S...**

The lack of information on Mexican American immigration to the Southeast is as indicative of modern changes as the very migration itself. The new economic frontier of the Southeast for Mexican immigrants implies, at least to this author, that competition for jobs and resources has grown rough in traditionally “Hispanic” U.S. states. Although cities like Memphis and Birmingham have taken the opportunity to investigate their growing Hispanic populations, smaller towns such as Huntsville AL and Jackson TN have not had the available funding opportunities to undertake their own investigations, and as such they are sever a disadvantage.

The influx of Mexicans to the Southeast and the birth of Mexican Americans in the Southeast are of concern for healthcare workers, policy makers, and anthropologists.

Biocultural anthropologists alone could spend years studying the relationship between NIDDM and Mexican American origin.

The biological data is clear; people of Native American descent are at greater risk for developing NIDDM. Less clear, but sure, is the genetic evidence. On a daily basis scientists seem to find the next “magic bullet” for unlocking the mysteries of diabetes. Certainly the enthusiasm for the Human Genome Project may soon bring more definitive answers but until then scientists and policy makers must rely on the evidence presented by biomedical scholars and behavioral scientists as to the nature and pattern of NIDDM.

As a disease it strikes those most closely related to Native Americans. It is more often found in middle-class families who can afford the luxuries of a Western diet. It is associated with a sedentary lifestyle. It strikes those without social support and cultural consonance levels adequate for maneuvering through their social environment. Indeed it is a disease of civilization and its victims are usually the most helpless.

NIDDM in the Southeast must be investigated further. As the trends in both Mexico and Western states show, the longer left unchecked, the greater the disease impact will be.

### **Applied Policy Research**

Modern problems associated with NIDDM include hypertension, renal failure, and loss of sight. In the U.S. the rate of NIDDM is 8% and it is expected to rise. As more Mexican Americans, who are shown to be genetically predisposed to NIDDM, settle in Southeastern U.S. cities, those healthcare facilities and communities must be prepared to respond to what will be a health crisis.

This paper presents some of the data associated with NIDDM in Mexican Americans. There is little published information specific to the Southeast but the author expects that to change over the next few years as civic leaders realize the impact of Mexican immigration on their cities.

One of the limitations of this paper is the lack of original data collection. To fully support any theory of causal relationships between Mexican Americans, genetic tendency for NIDDM, and migration a multi-disciplinary approach should be taken. Ideally, it would include physical and biocultural anthropologists, biomedical specialists, and Mexicans in Mexico and in the Southeast U.S. Perhaps sooner than later it will be done.

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