

# **When Our Water Returns: Gila River Indian Community and Diabetes<sup>1</sup>**

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*Abstract: The Gila River Indian Community (GRIC) of Arizona has the highest rate of diabetes in the world. Before white settlement of their homeland in central Arizona, their ancestors had an abundant water supply and a flourishing agricultural lifestyle. In the late 19<sup>th</sup> and early 20<sup>th</sup> century, non-Indian water use completely cut off their water supply. This depletion led to many years of starvation and then to a diet of highly processed foods that some say is responsible for the obesity and diabetes in the GRIC. After many years of negotiation, a water-rights settlement has been reached to return water to the ownership of the Gila River Indian Community. Research has shown that a diet that resembles the one that their ancestors ate when they were an agricultural people combined with increased physical activity can reduce the rate of obesity and diabetes. Will the return of their water enable the GRIC to return to their past agricultural practices? Can the members of this southern Arizona tribe again raise the kinds of crops as they did in the past? Can their previous healthy lifestyle of generations ago be restored?*

This case explores the high rate of diabetes on the Gila River Indian Community (GRIC). Part I provides a brief history of the GRIC and their recent historic water settlement. Part II looks at diabetes and possible causes of diabetes on the GRIC. The case concludes with the question of what has contributed to the GRIC having such a high rate of diabetes and whether a return to traditional foods can address this critical issue.

## **Part I: The Gila River Indian Community**

Historically the land along the central Gila River has been agricultural land, farmed by the Hohokam and their descendants the Akimel O’othom.<sup>3</sup> The Akimel, the River People, lived in village clusters along the river and used irrigation to raise crops of corn, squash and two species of beans, in addition to the non-food crop of cotton (Rea, p. 71). The Spanish who arrived along the Gila River in the late 1600’s gave these desert farmers a name which is still used today: the Pima.

The Gila River has been the principal water resource for south central Arizona for many centuries. The River looked very different in the 1600’s and 1700’s than it does today. It was a green ribbon of vegetation running through the Sonoran Desert. Cottonwood, willow trees, cattails and other reeds lined its banks. The riparian areas of the river extended for miles on each side, rich with mesquite bosques (groves), and grasslands.

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<sup>3</sup> There are alternative spellings for “O’othom.” This spelling is from the GRIC webpage. Hereafter Akimel.

There were fish in the river, and birds, beaver, deer, rabbits, and javelina lived in the riparian zones.

The Gila River Indian Community (GRIC), located in south central Arizona, thirty-five miles south of the city of Phoenix, Arizona, is home to both the Akimel (Pima) who historically lived by the Gila River and the Pee Posh (Maricopa) who migrated east from the lower Colorado River area. The reservation was established by Congress in 1859.<sup>4</sup> (Wilson, p. 143) This reservation occupies land on both sides of the Gila River from its juncture with the Salt River for about 65 miles southeast, encompassing some 371,933 acres. (Wilson, p. 10) The present population of the Gila River Indian Community consists of 11,257 inhabitants, of which 10, 578 are tribal members. (US Census, 2000).

Historically the Akimel planted crops that were irrigated by the Gila River, and fished, hunted animals and gathered wild plants. It has been estimated that about 50 to 60 percent of their total food supply came from their cultivated crops of corn, squash, and beans, and the remainder of their diet came from wild plants, and animals. (Castetter and Bell, pp 56-57). The major wild plants were mesquite, saguaro, agaves and chollas. The animal protein came from fish, small game such as rodents and rabbits, and birds. (Rea, 68, 71). The animals and birds were the species that lived in the lush riparian zones bordering the Gila River.

The first changes in the Akimel way of life appeared at the end of the 1600's and into the 1700s with the arrival of the Spanish explorers and settlers. Wheat was introduced as a new crop and by the 1850's it had become predominant because of its importance as a commercial crop. Watermelons and muskmelons were also introduced by the Spanish and became significant crops. The Spaniards also brought cattle and other livestock into the American Southwest which had a profound impact on the land and its peoples.

The Gila River became the boundary between the United States and Mexico in 1848.<sup>5</sup> The Gadsden Purchase of 1854 added a strip of land south of the Gila River in Arizona and in New Mexico necessary to build a southern transcontinental railroad and thereby established the current U.S. – Mexican border. After 1848, the numbers of surveyors, miners, explorers, immigrants and settlers coming to the Gila basin increased. Akimel agriculture played a major role in providing for the food needs of these passers-by and newcomers, resulting in a period of prosperity for the Akimel and Pee Posh. (Pima-Maricopa Irrigation Project, Lesson 1) It is estimated that between 1848 and 1854 more than 60,000 American gold-seekers passed through the Akimel and Pee Posh villages en route to California. (Hackenberg, p. 170) The indigenous people of the Gila River were

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<sup>4</sup> There was no ratified treaty with the Pima and Maricopa. The Pima and Maricopa were signatories on a treaty made April 9, 1863 under the auspices of the commander at Ft. Yuma. The Mohave, Papago, Quechan, Chemehuevi, Hualapai, Maricopa and Pima all pledged to allow prospectors to cross their lands and to abstain from intertribal warfare. The purpose of the treaty was to bring peace to the area, which would then allow mineral exploration to increase. RG 75, M734, *Records of the Arizona Superintendency*, Roll 8. (DeJong, personal correspondence, Aug, 2009) The Reservation was expanded in the 1860's, in the 1880's, and again in 1913.

<sup>5</sup> The Treaty of Guadalupe Hidalgo in 1848 ended the United States' war with Mexico. It ceded the territories of what is now New Mexico, most of Arizona, and California to the U.S.

known for their generosity to the white immigrants and settlers. An observer in 1850 noted: “Their regular fields, well-made irrigating ditches, and beautiful crops of cotton, wheat, corn, pumpkins, melons, and beans have not only gladdened the eye but also given timely assistance to the thousands of emigrants who have traversed Arizona on their way to the Pacific”. (Sylvester Mowry, in Rea, p. 67)

In the 1860’s more white settlers arrived to establish farms and ranches along the Gila River upstream from the Akimel and Pee Posh. The Homestead Act was enacted into law in 1862 and in 1877 Congress passed the Desert Land Act to encourage settlers to develop arid and semi-arid public lands. The Act permitted settlers to acquire 640 acres of land (later 320 acres) provided that the lands be reclaimed, irrigated, and cultivated within three years. Thus the Desert Land Act required settlers to irrigate their land. For the lands upriver from the Akimel and Pee Posh, this meant drawing water from the Gila River. As the non-Indian population increased, more and more water was diverted from the Gila River to irrigate these farms. McNamee in his *Gila: the Life and Death of an American River* states that non-Indian farming changed the face of the Gila basin. Mormon settlers on the middle Gila dammed the river to flood their fields. (p. 103). By the 1890’s over 100,000 acres of desert land were being irrigated from waters of the Salt and Gila Rivers.

### Gila River & the Gila River Indian Community



Map by Karl Musser: from Wikimedia Commons, the free media repository. Thanks to Karl Musser for supplying this map of the GRIC specifically for this case.

By the 1870's the amount of water from the Gila River reaching the Gila River Indian Community had decreased to a trickle. (Pima-Maricopa Irrigation Project, lesson 5). In another 20 years most of the surface flow of the river had been appropriated by upstream non-Indian farmers and cattle ranchers. Water diversions and environmental changes upstream in the Gila River watershed were now challenging the very existence of the GRIC. (DeJong, 2004, p. 37) A drought struck the southwest in the years 1892-1904. Combined with the loss of the waters of the Gila River, the Akimel and Pee Posh could not grow sufficient crops to sustain themselves. Instead of selling wheat, they had to accept government commodities. They were well aware of what had happened to the Gila River.

White people began to take water from the river about forty years ago. The first diversion being so small we hardly noticed it, but they gradually took more out each year till we noticed our loss by not being able to irrigate all our fields. We were forced to abandon them little by little, until some twenty years ago when we were left high and dry.  
Chir-purtke, Pima elder, June 1914 (DeJong, 2004, p.29).

The Gila River had disappeared. What was once a "ribbon of green" running through the lands of the Akimel and Pee Posh was now a dry bed of sand. The lush riparian habitat of cottonwood, mesquite, willow trees, reeds, and grasses and the shelter provided for wildlife and birds was gone. The mesquite trees had been cut down to sell as firewood when the people had no other means of support. The Gila River riparian zone dried up from lack of water. The wildlife and birds disappeared. The people of the river had lost their means of living. The period from 1880 to 1920 was one of famine and deprivation for the Akimel and the Pee Posh.

The 1880's and beyond is known as the period of assimilation and allotment in federal Indian policy.<sup>6</sup> Ironically, at the same time that the policy of the federal government was to transform Indians into farmers in order to "civilize" them, the Akimel and Pee Posh who had, in fact, successfully raised crops near the Gila River for hundreds of years, were deprived of their critical water and forced to abandon their agriculture. By 1895 the people who had so generously supplied the early settlers and immigrants with food were destitute and received 250,000 pounds of wheat from the Indian Agent. In 1901 they received some 675,000 pounds of wheat, 60,000 lbs. of beans, and 7,675 pounds of bacon as rations. (Wilson, p. 282)

The Akimel and Pee Posh began a century long appeal to the federal government for the return of their water. When the Gila River Indian Community saw the water in the Gila River drying up in the 1880's due to upstream use, they began their fight to regain their water. Wee Paps, a farmer, stated in 1895: "Until the past few years we have always had plenty of water to irrigate our farms, and we never knew what want was.... The

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<sup>6</sup> The Dawes (Allotment Act) was passed in 1887. Allotment of the GRIC under the Dawes Act began in 1914. Each tribal member was to receive ten acres of "irrigated land." Later this was increased by another ten acres of pasture land. (Wilson, pp. 340-341) However there was no water to irrigate the original ten acres.

Government refuses to give us food and we do not ask for it, we only ask for our water...” (DeJong, 2007, p.63) Chief Antonio Azul petitioned President Theodore Roosevelt for redress in 1903, stating: “our water supply during low water has been taken from us by whites, and there has been much suffering for the necessities of life.” ((DeJong, 2007, p.63). This was the first of many such appeals and petitions. These claims were ignored or deemed too expensive to investigate by the Indian Service. The U.S. Congress did not want to address Indian water rights because of strong opposition from western congressmen. (DeJong, 2007, p. 64)

### **Struggles to Save the River: The San Carlos Project and the IRA**

In 1924, a bill was passed in Congress to authorize the San Carlos project, which was the construction of a dam on the Gila River to benefit the GRIC. This legislation, sponsored by Congressman Carl Hayden from Arizona, was one of the first water projects to use what is now called the “Indian blanket.” Hayden quite blatantly used the public perception that the project would benefit the Indians to get the bill passed. (August, p. 56) Although the GRIC ostensibly was granted first rights under the legislation, the real beneficiaries were the Gila River valley non-Indian farmers.<sup>7</sup> Completed in 1928 the project, initially seemed to benefit the Gila River Indian Community, but not for long. In *A Pima Remembers*, George Webb states.

What came of this was the San Carlos Dam, later called Coolidge Dam. This dam was built up in a canyon of the Gila River, and its purpose was to conserve water especially for the use of the Pima Indians. ...Lands were made ready for the flow of irrigation water, and the people were happy, thinking that now they would be able to farm again... And there was (plenty of water). For about five years. Then the water began to run short again. After another five years it stopped altogether. (Webb, p. 123)

In terms of benefiting the Gila River Indian Community, the San Carlos Project was a failure. Although the legislation required that the Indian part of the project be built first, it was never completed, and the off-reservation portion took priority. (Lewis, testimony, 2008) Furthermore, the reservoir filled up sporadically through the years. Also the San Carlos Reservoir began silting up almost instantly. (McNamee, p. 151) An added factor was that the non-Indian farmers in the area were using more ground water, i.e., drilling wells for irrigation, particularly to irrigate the burgeoning cotton fields, further depleting the flow of the Gila River. In short, the non-Indian farmers ended up with the larger share of the project water.<sup>8</sup>

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<sup>7</sup> The dam was built on the western edge of the San Carlos Apache Reservation. In building this dam “to aid the Indians” one of the results was to flood the best farmland in the area, causing a temporary famine throughout the Apache nation. ((McNamee, p. 151) Linda Moon Stumpff, San Carlos Apache tribal member and Evergreen faculty notes that the Coolidge Dam waters also flooded the San Carlos cemetery and other cultural and historic sites.

<sup>8</sup> The *U.S. v. Gila Valley Irrigation District* decision of 1935 (Globe Equity Decree) gave farmers upstream from the Gila River Indian Community the right to divert water from the San Carlos Project, disregarding the Akimel and Pee Posh water rights.

By the 1930s it had become clear that allotment was not working. Nevertheless, on the Gila River Indian Community the policy of re-creating farming to fit the models of white society continued. The Bureau of Indian Affairs (BIA) officials prepared the lands of the Gila River Indian community for the San Carlos Project water: “The program they began, called *subjugation*, was meant to reorganize the farms and provide new means of irrigation. Instead, it caused the physical destruction of the age-old Pima and Maricopa fields and canals.” (Dobyns, pp. 84-85)

When the San Carlos Project returned some water to the Gila River Indian Community in the 1930’s and farming was resumed, it was modeled on that of the larger, non-Indian society. In his book, *Neither Wolf nor Dog: American Indians, Environment, and Agrarian Change*, David Rich Lewis writes about the federal government’s policy of equating “civilization” with agriculture (12), but with the clear understanding that what was meant was the Euro-American model of farming. Traditional subsistence agriculture with its cultural and environmental adaptations was disdained. Prior to the San Carlos project, the Akimel and Pee Posh farmers grew largely edible crops such as wheat, corn, and beans.<sup>9</sup> The BIA now required that cash crops such as alfalfa and barley be raised instead of their traditional crops. (Hackenberg, 1955). The requirements for this kind of agriculture were totally unknown to these farmers. They had no knowledge of this type of farming, nor did they have the necessary farm equipment or the credit to obtain it. In addition, the allocation of the water necessary for their crops was controlled by the BIA, who managed the San Carlos Project, and not by the Indians themselves. The transformation of the Akimel and Pee Posh from raising food crops to “commercial” cash crop farming was complete, but now the farms were essentially run by the BIA. (Wilson, p. 361, Hackenberg, 1955, p. 91.)

Wilson in his history of the Pimas and Maricopas states: “Water deprivation had, over a number of decades, turned the Pimas and Maricopas into non-farmers. When water again became available on a modest scale, few were interested. Those few generally lacked access to capital, credit, and the larger-size land holdings that made economies of scale possible.” (p. 405)

A new era was coming to Indian nations across the country with the passage of the Indian Reorganization Act (IRA) in 1934. This ended the allotment policy and also provided “model constitutions” for American Indian nations who chose to govern themselves under these constitutions. Among those accepting the IRA constitution was the Gila River Indian Community. By 1939 the new GRIC constitution and an elected Tribal Council were in place.<sup>10</sup> Membership in the GRIC were the Akimel and the Pee Posh people.

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<sup>9</sup> David DeJong states that the Akimel were more than subsistence farmers. They grew surplus crops as early as the late 17<sup>th</sup> century, trading in Santa Fe. By the early 19<sup>th</sup> century and continuing until the 1870’s the Akimel were commercial farmers, selling their crops as far north as Prescott and as far south as Magalena, Mexico. (Personal correspondence, Aug, 2009)

<sup>10</sup> In 2009 a Gila River Tribal Constitution Reform Project Task Force is in the process of revising the GRIC constitution. (Gila River Indian News, May, 2009, p.1)

Though the Gila River Indian Community now had an elected Tribal Council, the BIA continued to be in charge of decisions on their land and resources. One of the many decisions made by the BIA was to lease tribal land on the GRIC to non-Indians. By the 1940's 11,500 acres of irrigated lands were leased to four different non-Indian farmers. Much of the water for irrigation had to come from drilling wells and alfalfa, which requires a great deal of water, was the primary crop.

Changes were slow ones. Regaining control of their lands was primary. In 1949 the Gila River Indian Community for the first time was able to hire its own attorney, Z. Simpson Cox. Unfortunately they had to have BIA permission to do this. "Not until 1983 was the GRIC able to hire its own Counsel without BIA approval." (DeJong, personal communication, Aug, 2009)

Though the Indian Reorganization Act of 1934 formally brought the allotment period to an end, it was followed in the Eisenhower administration (1953-1961) by the equally disastrous termination policy.<sup>11</sup> Tribal leaders, Indian people and their allies continually fought to "reassert some measure of tribal sovereignty... In the 1960's growing political and legal action by Indian people and tribes resulted in tremendous political, social and education gains." (Wilkins & Lomawaima, p. 7) The GRIC worked to exercise their sovereignty and take charge of making their own decisions. Loyde Allison, Governor of the Gila River Indian Community, (GRIC) 1965-1971, capitalized on the Office of Economic Opportunity (OEO)<sup>12</sup> programs and supervised the creation of a development plan called "It Must Happen Now." (Dobyns, p, 92) This plan sought to develop GRIC infrastructures to improve health and education, and to provide jobs, job training, and development. (Cobb, p. 7)

The GRIC website states:

This (period) was the beginning of a long climb out of the economic trenches. Men began to find work off the reservation following World War I and World War II as the introduction of cars made travel to booming Phoenix possible. Eventually, small businesses began to appear on the reservation as well, launched both by the community and individual tribal members. Schools, health centers and new housing appeared. Income levels slowly grew and famine was erased. These trends continue today as the Gila River Indian Community looks toward a promising future. ([www.gilariver.org/index.php/about-tribe/5-history/115-tribal-history](http://www.gilariver.org/index.php/about-tribe/5-history/115-tribal-history))

## **The Water Settlement Process: The Final Years**

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<sup>11</sup> Tribes such as the Menominee and the Klamath were actually terminated. This policy ended a tribe's existence as a sovereign nation. The tribe's lands were expropriated and the federal trust responsibility was ended.

<sup>12</sup> During the Johnson administration (1963-1969) the Economic Opportunity Act passed Congress in 1965. This legislation established the Office of Economic Opportunity (OEO) which sponsored joint projects with other federal agencies which tribes used to benefit Indian nations. (Cobb, p. 7)

The Gila River Indian Community has fought for the return of its water since the Gila River water was diverted. In the last thirty years this fight intensified. In 1976 the GRIC filed water claims in the Gila River system general stream adjudication. In addition they began negotiating a water settlement with the major water users on the Gila River. The GRIC has a very strong reserved water right<sup>13</sup> claim based on their location at the confluence of the two rivers, a clear history of irrigated agriculture, and large tracts of developable and irrigable land.

The GRIC recognized that their strong claim in the adjudication process gave them a good starting point to sit down with other basin water users to see if they could come to a negotiated settlement. The GRIC developed a Master Plan in 1985 which set out how the Community intended to deliver and use the water, how it was going to pay for the water delivery system, and the economic benefits expected from the water. “Over the next two decades, the Community has spent incalculable hours meeting with representatives of major water users – cities, counties, the State of Arizona, mines, irrigation districts, power companies, and other Indian tribes – working to develop the Gila River Indian Settlement Agreement.” (Lewis & Hestand, p. 40). The final seven years of this process was an especially concerted effort to structure and draft the settlement document. (Lewis, 2005)

The over twenty years of negotiations and court decisions in the water adjudication process finally resulted in the Arizona Water Settlement Act of 2004 which restored to the GRIC 653,500 acre-feet of water annually. The Arizona Water Rights Settlements Act became enforceable on January 1, 2008. “The restoration of water to Pimas and Maricopas is unparalleled in the history of Native Americans in the United States and is especially dramatic in the arid Southwest. The determination, tenacity, and patience of Pimas and Maricopas in litigation and negotiations caused this amazing turn of events to occur.” (Lewis & Hestand, p. 34)

This settlement does not return water flow to the Gila River itself. Most of the water will come from the Colorado River delivered by the Central Arizona Project (CAP). The Central Arizona Project is a 336 mile long system of canals, tunnels, pumping plants and pipelines that brings 1.5 million acre-feet of Colorado River water to central Arizona. (Central Arizona Project, <http://www.cap-az.com/>) The settlement increases the GRIC water allocation to 23% of total CAP water. (Bark, p. 9)<sup>14</sup> Other water comes from groundwater, additional water from the Coolidge Dam, a smaller amount from the Salt River Project, the Roosevelt Water Conservation District, several similar sources, and some reclaimed water to total the 653,500 annual acre-feet of the water budget. In her analysis of the settlement Bark notes that the diverse nature of these water sources is comparable to those of other large water providers in Arizona such as the Salt River Project and the city of Phoenix. “The agreement elevates the GRIC to a large water manager (and user) in the State. The Community has the opportunity and mandate to

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<sup>13</sup> See Appendix A on Indian Reserved water rights.

<sup>14</sup> The resulting total allocation to Arizona Indian tribes now equals more than half of the total CAP water. (Bark, p. 9)

refine its institutional and professional capacities for water management.” (Bark, pp. 9-10).

Since this water will not flow again in the Gila River,<sup>15</sup> it must be physically delivered to GRIC lands with pipelines, canals, and pumping stations. In 1995 the Gila River Indian Community used the authority of the Indian Self-Governance Act to assume control over the Central Arizona Project Indian Distribution Division and renamed it the Pima-Maricopa Irrigation Project. Funded by the U.S., Bureau of Reclamation, the Pima-Maricopa Irrigation Project (P-MIP) is constructing a system to provide water to up to a projected 146,330 acres of GRIC land. This project has been a major undertaking. The system has to be designed, the necessary National Environmental Protection Act (NEPA) clearances obtained, rights of way secured, and Community input and involvement brought in. When the Pima-Maricopa Irrigation Project is completed, it will have more than 2,400 miles of canal, pipeline and ditches to deliver water to irrigate GRIC land and for domestic and industrial uses. “What makes P-MIP unique is that it is the first irrigation project in the United States being planned and constructed by an Indian tribal nation through self governance.” (Pima-Maricopa Irrigation Project, Project Status, <http://www.gilariver.com/status.htm>)

Writing about the return of the water, Pima poet, Nathan Allen has written

*One Day*

We are *Akimel O’othom*, people of the River Gila

Just as our crops come from Mother Earth.

We, *Akimel O’othom*, come from Mother Earth

*Jevid Maai*, earth doctor, brought us forth.

Since then,

We have farmed the valleys,

Our crops have flourished from the waters of the *Akimel*,

Today

The songs and legends of the *Old Ones*, can no longer be heard,

The waters of the *Akimel* no longer flow,

But they still linger in our hearts and minds,

And in our hands and land.

We, *Akimel O’othom*, long for the sweet music of flowing water.

One day, we, *Akimel O’othom*, will hear the sweet music of flowing water.... (Allen, in Weinstein, pp. 97-98)

### **The Gila River Indian Community Today**

Today within this period of self-determination and self-governance, the GRIC has a strong and diversified economic base. The 16,000 acre Gila River Farms grows a variety of crops and provides year-round employment for many tribal members. In 2008 the farms had more than \$10 million in gross sales. (Akimel Dua’kik, p. 36) In addition to the Gila River Farms another 22,000 acres of tribal land are farmed by independent

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<sup>15</sup> Portions of the River could be restored however. (DeJong, personal communication, Aug, 2009)

operations. Crops grown on Community, individual, and corporate farms include cotton, alfalfa, and potatoes, as well as fruits, vegetables, and small grains.

The GRIC has also developed three industrial parks that house a variety of light and heavy industries. Located near Interstate 10 these facilities provide easy access to the Phoenix metropolitan area. Currently the GRIC has three casino properties, and the Wild Horse Pass Resort Hotel. The gaming facilities provide nearly 2,000 jobs, 60% of which are filled by GRIC members. (Gila River Indian Community, Economic Development Department) A new hotel and casino are under construction in the summer of 2009.

Can the return of the Gila River Indian Community's water help address the serious issues of diabetes in the Community?

## **Part II: Health – The Gila River Indian Community and Diabetes**

Diabetes with its myriad interrelated health complications presents Native Americans and tribal governments with the single most pressing health concern facing them in the twenty-first century. It is not a new threat, but rather one that has been bubbling during the past sixty years. (Kozak, 2008)

Diabetes is a serious, widespread and costly chronic disease, that affects not only over 23 million individuals in the United States, but also negatively impacts their families and communities. In the decade 1990-2000 diabetes among adults increased by 33%, with the disease growing fastest among younger adults. A total of 23.6 million people or 7.8 % of the population of the United States have diabetes. Diabetes is a disease in which one's blood glucose, or sugar, level is too high. Glucose is produced by the foods we eat. Insulin is a hormone that enables the glucose to enter our cells to create energy. In Type 1 diabetes one's body cannot make insulin. While in Type 2 diabetes, one's body does not make or use insulin effectively. Without enough insulin, the glucose remains in the bloodstream. (NIH) In adults, Type 2 diabetes accounts for about 90% to 95% of all the diagnosed cases of diabetes. (CDC, Nat. Diabetes Fact Sheet, 2007) Diabetes was the sixth leading cause of death listed on U.S. death certificates in the year 2000.

American Indians have one of the highest rates of diabetes in the world. On average, American Indians and Alaska Natives are 2.2 times as likely to have diabetes as non-Hispanic whites of similar age. There are significant regional differences in the rate of diabetes among American Indians and Alaska Natives. It is least common among Alaskan Natives (8.2%) and most prevalent among the Pima<sup>16</sup> Indians of the Southwest. Fifty percent of the Pima Indians of Arizona who are between the ages of 20 and 64 have

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<sup>16</sup> Although most of the diabetes research has been done on the GRIC, the researchers use the term "Pima." For example Smith-Morris carried out her research on the GRIC but titled her 2006 book: *Diabetes Among the Pima*.

Type 2 diabetes. (*Pima Indians: Pathfinders for Health*) See Appendix B: An Overview of Diabetes.

As noted above diabetes is a disease in which the body cannot make or use insulin properly and which occurs as Type, I, Type 2 and gestational diabetes. In Type 1 diabetes, the person's own body has destroyed the insulin-producing beta cells in the pancreas. When one's own body destroys cells in one's body in this way, this is called an *autoimmune disease*. Diabetes Type 1 is known as an autoimmune disease. A person with Diabetes Type 1 does not produce insulin at all. People with Type 1 have to take insulin regularly in order to stay alive. (Medical News Today, <http://www.medicalnewstoday.com/articles/7504.php>) About 5 to 10 per cent of all diabetes patients have Type 1.

Type 2 diabetes is the more common type of diabetes in which one's body does not make or use insulin well. When we eat, our digestive system breaks down food into glucose and other simple sugars. After eating, our glucose rises quickly, which triggers the release of insulin from the pancreas. This insulin changes blood glucose into a useable form of energy that the body either uses or stores for later use. Without enough insulin, the glucose stays in the blood. Over time having too much glucose in the blood can cause serious problems including damage to ones eyes, kidneys, and nerves. Diabetes can also cause hypertension (high blood pressure), heart disease, stroke, and even require amputation of a limb.

Pregnant women can also get diabetes, called "gestational diabetes." This can disappear with the birth of the baby, but women who have had gestational diabetes have a 20 to 50% chance of developing Type 2 diabetes within five years. (See Appendix B).

As Type 2 is more prevalent, it is important to know its symptoms. The symptoms of Type 2 diabetes can include fatigue, weight loss, blurred vision, and frequent urination. Some people do not have any of these symptoms so a blood test is necessary to diagnose diabetes. In the case of Diabetes Type 2, its onset can be related to obesity, activity level, and lifestyle. Exercise, weight control, and sticking to a sound nutrition plan can help control diabetes. It is also necessary to monitor ones glucose level and to take medicine if prescribed. (National Institutes of Health, "Diabetes," ASU CLC, courses, "Diabetes"). Appendix B provides an explanation of the three types of diabetes.

Although Type 2 diabetes has been considered an adult disease (and was designated "adult onset" diabetes) it is now being diagnosed more frequently in children and adolescents, particularly among American Indian youth today. American Indian youths have the highest prevalence of Type 2 diabetes. In the 15-19 age group the current figures are:

- 4.5 per 1000 for all U.S. American Indian populations.
- 50.9 per 1000 for Pima Indians.

Dr. Frank Vinicor, Director of the Centers for Disease Control and Prevention's (CDC) Diabetes Program has stated:

Because these children have acquired type 2 diabetes so very young, they will have more years of disease burden and a higher probability of developing serious diabetes-related complications at a younger age – complications that will threaten their life expectancy, reduce their quality of life, and lower their productivity during the prime years of their lifetime. (U.S. Dept of Health & Human Services, “Diabetes in American Indians.”)

There is a link between obesity and diabetes as the increasing rate of obesity in both the general population and the American Indian population is clearly contributing to increases in diabetes. (Vinicor) Smith-Morris notes that diabetes and obesity are the “twin epidemics,” with the presence of obesity correlating highly with the development of diabetes. (p. 125) Obesity is linked to both quantity and quality of food consumed and low levels of physical activity. Research has shown that improving nutrition, maintaining normal body weight, increasing physical activity, controlling glucose levels, and improving access to proper medical treatment can delay or stop, the onset and progression of diabetes complications. “...There is strong evidence that prevention or delay of the onset of diabetes is possible if we can develop effective strategies and interventions targeting weight loss or preventing obesity, increased physical activity, and improved nutrition.” (Vinicor)

The Gila River Indian Community is the most studied population in the world with regard to diabetes. Researchers from the U.S. National Institutes of Health have been studying the GRIC since 1965 to find out why there is such a high rate of obesity and diabetes in the Community. To date three-fourths of the Community have been involved in the research. This research has changed the way doctors look at diabetes and it has helped establish the diagnostic definition of diabetes. The work with the Community also helped narrow down some of the most important risk factors for diabetes, such as insulin resistance, being overweight, and lower rates of insulin release into the bloodstream. (Curry)

While this research at the GRIC has benefitted the larger society, it has not yet helped the Community itself. Carolyn Smith-Morris in her book *Diabetes Among the Pima: Stories of Survival* says: “The world owes a huge debt of thanks to the Pimas for the knowledge of diabetes they made possible. More than receiving thanks, I think, they would like to be viewed for their resilience, their adaptability, and the strength of cultural and family ties uniting them against this common predator.” (p. 161)

One of the reasons for this ongoing research is the decades long emphasis on the “thrifty gene” theory proposed by geneticist James Neel in 1962 to explain why so many Pima are overweight. Neel theorized that indigenous peoples who relied on hunting, gathering, and farming, such as the Pima, experienced alternating periods of feast and famine. He believed these people developed a particular gene that allowed them to adapt to these extreme changes. This gene allowed them to store fat in times of plenty so that they would not starve during times of famine, thus the “thrifty” designation. (Stories from

The *Pima Indian Pathfinders for Health*, NIDDK) Ethnobotanist Gary Paul Nabhan has noted that the “thrifty gene” argument has been cited in hundreds of scientific papers on diabetes and drove the first thirty-five years of research at the NIH Diabetes Project in Phoenix, Arizona. “Hundreds of millions of research dollars later, it is clear that their focus on a single gene and on sheer food **quantity** (emphasis original) has blinded researchers to a variety of gene-food-culture interactions that may trigger or prevent diabetes.” (Nabhan, 2008, p. 375)

In 1999 Neel conceded that the term “thrifty genotype” had already served its purpose, overtaken by the growing complexity of modern genetic medicine. Now most biomedical researchers are more direct in stating that there is no single thrifty gene that confers susceptibility to Type 2 diabetes in hunter-gatherers or in the larger society. (Nabhan, 2008, p. 375, citing Neel, 1999) Genetic research continues to be a significant avenue of investigation, but it is no longer focusing on one “thrifty” gene. William C. Knowler, Chief of the NIDDK Diabetes Research in Phoenix stated in 2007 “There is a large body of scientific evidence that obesity and Type 2 diabetes have major genetic determinants, and there have been considerable advances in technologies to identify genes for such complex health conditions.” (Knowler)

In addition to leading researchers to focus on food quantity rather than on food quality, the thrifty gene theory has had other negative impacts. Ferreira and Lang in their book *Indigenous Peoples and Diabetes: Community Empowerment and Wellness* note that the thrifty gene theory has had some perverse consequences.

The message that ‘being Indian means to be diabetic’ can lead to devastating consequences, such as what Kozak (1997) refers to as “an attitude of surrender.” This message disempowers individuals and their communities because it blames them for being who they are, rendering them inactive: “nothing can be done about it.” We suggest that such a notion can be considered another stereotype that should be of great concern to those working with communities to achieve healthy lifestyles. (p. 15).

### **Traditional Foods of the GRIC**

Ethnobotanist Gary Paul Nabhan has suggested that traditional GRIC foods have particular characteristics which provided significant nutrients which are absent from their diets today. For example native beans such as tepary beans have a wide range of minerals, B vitamins, and essential amino acids which pinto beans (now a staple of GRIC diets) do not. Most important tepary beans are very high in fiber. (Nabhan, 1985, pp 120-121). He says also that recent studies show that “many desert foods contain mucilaginous polysaccharide gums that are viscous enough to slow the digestion and absorption of sugary foods. These mucilages have probably evolved in many desert plants to slow water loss from the seeds, seedlings, and succulent tissues of mature plants.” (Nabhan, 1998, p. 175.

Mesquite was the most important source of the wild foods. As we have seen mesquite bosques lined the Gila River before the water was diverted. Rea in *At the Desert's Green Edge: An Ethnobotany of the Gila River Pima* calls mesquite “the staff of life for the Pima.” (p. 68) Two crops came each year, the first in June and the second in September. Mesquite pods were stored for use as flour, as a cooked food, and as a beverage. Saguaro provided another abundant crop, usually in midsummer. The sweet pulp and seeds were used in a variety of ways. Pulp was also dried and seeds used for cooking or made into a paste like peanut butter.<sup>17</sup> A third major harvest was cholla buds gathered in the spring. They were pit roasted or dried for future use. Rea says that pit roasted agave hearts may have been the fourth important wild harvest. This took the Indians away from the security of their villages into the outlying desert. Various kinds of wild greens were an important part of the diet. In addition Rea mentions seeds as another important wild harvest. (Rea, p. 69)

In addition to their wild harvest six cultivated crops were the mainstay of the Gila River Akimel aboriginal agriculture: maize or corn, squash and pumpkins, tepary beans, lima beans, and grain amaranth and chenopod. As noted earlier fish, small animals and birds supplied animal protein. (Rea, p. 69).

The question becomes which are historic “traditional” foods. Two types of foods that are now common and are considered “traditional” on the Gila River Indian Community, are clearly not in the lists above. As noted below the Mexican cuisine of the Southwest is now considered traditional food. This includes pinto beans, chorizo sausage, tortillas, tamales, tacos, and related dishes.<sup>18</sup> Another food now considered “traditional” is fry bread. The common origin of fry bread is attributed to the Navajos’ Long Walk to Bosque Redondo, New Mexico, when they were removed from their land in the 1860’s and imprisoned in Fort Sumner. The army gave them white flour and lard. The result was a flat bread deep fried in lard.<sup>19</sup> Fry bread is now a Pan-Indian food.

### **Why do Gila River Indian Community Members Have Diabetes?**

One theory is that the high rate of diabetes in the Gila River Indian Community has been caused by the changes that they have undergone since the arrival of the Spanish at the beginning of the 18<sup>th</sup> century. The Spanish introduced wheat and cattle. Wheat began to be grown as a cash crop and replaced some of the traditional foods in their diet. Cattle brought in a high quality protein source, but also one that contained more fat than their traditional sources of protein from birds, fish and small game. The Akimel and Pee Posh farms along the Gila River provided important sources of food for the miners and settlers journeying west. It was not until the 1870’s that this began to change, as more and more water was diverted upstream from their farms. As we have seen the Akimel and Pee

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<sup>17</sup> As this is being written in July, 2009, members of the GRIC are conducting their annual saguaro harvest.

<sup>18</sup> The primary ingredients of Mexican cuisine such as pinto beans and corn tortillas are certainly nutritious. However they do not have the same nutritive advantages found in the historic traditional Pima diet. Modern sweet corn, for example contains highly digested starches and sugars, which raise sugar levels in the blood, while the hominy-type corn of the traditional diet has little sugar and starch that is slowly digested. Similarly pinto beans are far more rapidly digested than tepary beans. (Brody)

<sup>19</sup> Although fry bread can be fried in vegetable shortening, as well as lard, it is still a source of dietary fat.

Posh at the end of the 19<sup>th</sup> century went from the position of supplying food to the larger community to that of receiving commodities to combat starvation. These commodities were white flour, lard, and sugar. As lard became readily available: “A new kind of cooking appeared: grease frying unknown in aboriginal cuisine.” (Rea, p. 73) The diets of the Indians changed drastically.

In addition to a vastly altered diet, the Akimel and Pee Posh lives were transformed in other ways. Displaced from their agrarian culture, they became wage laborers on and off the GRIC and their traditional farm lands were shaped into large-scale industrial farms. This reconfiguration of the land, combined with a continuing short supply of irrigation water, made small scale individual farming a thing of the past.

By the 1930’s both federal and state administered food distribution programs were firmly in place at the GRIC. Food products such as bacon, lard, cheese, and beans were mostly staple items. After World War II the U.S. Department of Agriculture expanded this list of staple foods to include canned meats, vegetables and fruit, dry cereals and dried or evaporated milk. The Community members made use most of the commodity foods, and their impact has been extensive because food was shared among families. (Smith, Manahan, Pablo, p. 415.) During this period the GRIC diet changed the most. This diet “changed the tall, lean Pima into an obese people.” (Rea, p. 73)

Today over 95% of the GRIC with diabetes struggle with obesity which is the level at which their body weight becomes a health problem. The definition of obese is measured by the ratio of one’s body weight over height squared. This is the body mass index or BMI. The normal ratio is between 25 and 29.9. Higher than this means one is obese.<sup>20</sup> (Smith-Morris, p.121, 125)

Smith-Morris states that the processed foods<sup>21</sup> included in these government commodities and later available in the “fast food” market, “have had a highly negative and steadily worsening impact on GRIC health. The circulation of foods new to the Community such as high-fat and high-salt content snacks and high-sugar drinks, also effected change in their diets. (Smith-Morris, p. 111) The influence of Mexican cuisine in the Southwest was incorporated into their diet including white flour and corn tortillas, pinto beans, chorizo sausage, ground beef and gravy, menudo, refried beans (pinto beans

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<sup>20</sup> The formula for calculating BMI is: weight (lb) / [height (in)]<sup>2</sup> x 703 . To calculate BMI divide weight in pounds (lbs) by height in inches (in) squared and multiply by a conversion factor of 703. (For example: Weight = 150 lbs, Height = 5'5" (65") Calculation: [150 ÷ (65)<sup>2</sup>] x 703 = 24.96) (CDC website, [www.cdc.gov/healthyweight/assessing/bmi/adult\\_bmi/index.html](http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html)) The CDC has on on-line BMI calculator:

[www.cdc.gov/healthyweight/assessing/bmi/adult\\_bmi/english\\_bmi\\_calculator/bmi\\_calculator.html](http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/english_bmi_calculator/bmi_calculator.html)  
There is some criticism of using BMI as an indicator of obesity. For example, BMI cannot distinguish between individuals who have large bodies because of increased muscle mass or increased body fat. (Genovese, p. 392)

<sup>21</sup> Processed foods have been altered from their natural state for safety reasons and for convenience. Many processed foods are healthy, such as pasteurized milk, frozen vegetables, and vegetable and fruit juice. There are other, numerous processed foods that are not healthy. These include foods made with trans fats, saturated fats, and large amounts of sodium and sugar.

mashed and fried in bacon grease or lard), tacos, tamales, and enchiladas. (Smith – Morris, p. 111) The preparation of this cuisine can use considerable amounts of lard or shortening.<sup>22</sup> “A rise in Pimas’ dietary intake of fat from 15 percent in the 1890’s to 40 percent in the 1990’s is another important factor in the high rate of diabetes in this community.” (Smith Morris, p 112.)

Recent research has not provided definitive evidence indicating the adaptation of an Anglo diet increases the risk of developing diabetes in Pimas; however, it is widely accepted that the traditional lifestyle of hunter-gatherer-horticulturalist would have protected against it. (Smith-Morris, p. 113)

Most observers state that it is not just the change from traditional foods to a foreign diet that causes diabetes. Ferreira and Lang in their book *Indigenous Peoples and Diabetes: Community Empowerment and Wellness* consider the perverse effects of domination, demoralization and poverty on Indigenous peoples as a contributor to diabetes. Their book looks at the world-wide diabetes epidemic beyond the usual biologic and genetic paradigm and into the fields of social relations, history, and the politics of Indigenous identity. This approach considers “diabetes as a *reaction of the organism* to adverse life conditions, rather than a morbid or pathological phenomenon superimposed on the organism” (p. 16) They cite a growing amount of research that reflects a new direction in the relationship between stress/trauma and diabetes. Ferreira and Lang state that there is plenty of evidence that trauma and stress do indeed place Indigenous peoples worldwide at high risk for Type 2 diabetes. (p 16) Joe and Young in *Diabetes as a Disease of Civilization: The Impact of Change on Indigenous Peoples* state “The premise of this book is that diabetes is a new disease among Indian peoples and is the consequence of drastic lifestyle and cultural changes that have occurred since World War II.” (pp. 7-8) Morris-Smith in *Diabetes Among the Pima* cites several studies that investigate the diabetes-stress-trauma relationship. (pp 137-139)

One of the interesting issues about the high incidence of diabetes on the GRIC is the fact that Pima Indians living in Mexico do not have similar rates of diabetes. Schulz, et al, 2006, studied a group of Pima Indians in Sierra Madre mountains of Mexico. Glucose tolerance tests, assessments for obesity, physical activity, and other risk factors were made. The prevalence of Type 2 diabetes in the Mexican Pima Indians was less than one-fifth of that in the U.S. Pima. Also obesity was much lower in the Mexican Pima. The Mexican Pima are much more physically active - they are subsistence farmers plowing their fields with oxen or mules and harvesting their crops by hand. The authors state: “Thus, much of their physical activity is occupational in nature and related to providing food and sustenance for the families.” (p. 1869) They conclude:

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<sup>22</sup> As noted above frying food in fat was not a traditional cooking method of the Akimel and Pee Posh. The Spanish introduced cattle and pigs with emphasis on more fatty meats. Lard became a common ingredient as a staple distributed by the federal government. Today these remain significant ingredients in GRIC food preparation.

The low prevalence of type 2 diabetes and obesity in the Pima Indians in Mexico in a more traditional rural environment contrasts sharply with that in the U.S. Pima population living in a Westernized environment. The difference in diabetes prevalence in these populations is mirrored by the differences in physical activity and obesity. The findings indicate that, even in a genetically highly susceptible population, type 2 diabetes is not inevitable and is preventable in environments that promote low levels of obesity and high levels of physical activity. (Schulz, et al, p. 1870)

This conclusion is very much in agreement with current nutrition guidelines. The American Diabetes Association provides nutritional recommendations and interventions for diabetes. Their 2008 guidelines include: 1) weight loss is recommended for all individuals who have or are at risk for diabetes, 2) physical activity and behavior modification are important components of weight loss programs, 3) “Individuals at high risk or type 2 diabetes should be encouraged to achieve the USDA recommendation for dietary fiber (14g fiber/1,000kcal) and foods containing whole grains.” 4) Low-glycemic foods that are rich in fiber and other important nutrients are to be encouraged. (ADC, 2008)

### **Should the GRIC Return to a Traditional Diet?**

There has been research into the value of traditional foods in combating the diabetes epidemic. Boyce and Swinburn presented a paper at a 1989 symposium on “Diabetes in Native Americans”. After examining a traditional Pima diet from historical records they concluded: “The Pima Indian diet of the last century was much higher in carbohydrate and lower in fat compared with the modern-day Pima diet. Any changes that this diabetes-prone population can make toward their traditional diet may help to decrease their incidence of diabetes. (Boyce & Swinburn) Tuefel in a 1996 article found: “In the Southwest, high-fiber, nutrientdense precontact foods requiring a moderate level of regular physical activity to gather, hunt and process have been replaced with readily accessible, low-fiber, high-fat and high-sugar foods and beverages.” (Tuefel, p. 1)

Conti in a 2006 article states: “The disruption of the traditional food systems of Native Americans is generally believed to have contributed to the epidemic levels of Type 2 diabetes and obesity present on U.S. Indian reservations today. Tribes are increasingly engaged in disease prevention and health promotion efforts including restoring components of their traditional food system.” (Conti). Another 2006 paper concludes: “Although the best methods to restore health and reduce obesity are not yet clear, limited evidence supports an emphasis on traditional Indian foods that provide increased nutrient but lower energy intake and an enhancement of physical activity. (Compher, p.222) The 2009 guidelines from the Indian Health Service state that nutrition counseling should include the use of traditional foods. (Indian Health Service, <http://www.ihs.gov/medicalprograms/diabetes>)

An article appeared in the *New York Times* in August, 2008 by Randal Archibold titled: “Indians’ Water Rights Give Hope for Better Health.” The article describes the historic GRIC water settlement, a GRIC community garden that raises traditional foods, and asks

the question: “Can a healthier lifestyle lost generations ago be restored? The article was featured on the official GRIC web site for several months.

Wiedman writing about American Indian diets has noted that the positives of “healthy communities” should be promoted rather than the negatives of “disease prevention” and “individual regimes.” He goes on to say:

...It is critically important that efforts be focused on the larger issues: (a) empowering tribal communities and leadership with nutritional knowledge presented in understandable and culturally appropriate ways; (b) increasing the number of American Indians in health professions, including nutrition; (c) influencing accessibility to economic and healthful choices of foods in community stores; (d) collaborating with church cooks and tribal religious leaders; (e) enhancing activity levels with design of transportation systems, work, and exercise facilities; (f) promoting the redevelopment of traditional subsistence farming, gardening, ranching, hunting and fishing; and (g) coordinating actions and policies with the relevant sectors of the national, state, and local community. (Weidman)

Smith-Morris in her *Diabetes Among the Pima* states: “To actually reduce diabetes rates across an entire community or nation demands nothing short of revolution.” She goes on to say that the GRIC transformation out of this epidemic is brewing and will be marked by changes in all sectors of Community life. As Community members become more discerning, they will make decisions about how to structure and restructure their future efforts. “Their attention will be on healthy and valued lives lived in safe communities, among healthy families, and in energized movement. Pimas know more about this disease and how to fight it than anyone else. So they will certainly know best how to be rid of it.” (p. 158, pp.161-62)

Knowledge of traditional Akimel and Pee Posh foods still exists. In the Foreword to Rea’s *At the Desert’s Green Edge: An Ethnobotany of the Gila River Pima*, Nabhan states that Pima elders on the GRIC can still call out more than 260 native names for plant species and their varieties. He states: “The depth of this one work alone should enlighten anyone who maintains that the Pima long ago lost all their traditions, as well as their interest in desert life.” Nabhan goes on to say the Rea’s detailed study of the Pima and their plants can provide insight into several hotly debated issues, the first being the prevalence of adult-onset diabetes among American Indians. (pp. xv-xvi).

The GRIC has the physical elements that it needs to restore traditional food to the Community diets. The water settlement is in place and a modern and functional irrigation system funded and in the construction phase. There are some existing community gardens on the GRIC growing traditional foods. There is a source of seeds for these plants. Native Seeds/SEARCH is a nonprofit conservation organization located in Tucson, Arizona. It began in 1983, when the Tohono O’odham wished to grow traditional crops, but could not find the seeds. Native Seeds/SEARCH now conserves, distributes and documents the diverse varieties of agricultural seeds of the American Southwest and northwest Mexico. (Native Seeds/SEARCH web page,

[www.nativeseeds.org](http://www.nativeseeds.org)) Rea's *At the Desert's Green Edge* provides a detailed ethnography of the Gila River Pima. This is a compendium of information about traditional plants. The GRIC, Public Health Education Division, has started "Healthy Food Stands" in several places in the Community. Community members can sample the food and take home recipes for the food they like. (Gila River Indian News, March 2009) So there has been a beginning and the essential parts exist to make it possible to restore traditional foods.

The Pima-Maricopa Irrigation District (P-MIP) has developed a "Vision Statement" for the future. It is written as a newspaper article dated **October, 2020**.

Current and former P-MIP employees will gather at Wild Horse Pass Resort this Wednesday evening to celebrate 25 years of success. They will be treated to a traditional dinner of tepary beans, roasted corn and tortilla soup. These traditional foods, all of which were grown by individual Akimel O'otham and Pee Posh farmer have played an important role in reducing the high rate of diabetes that once plagued the Community. Other native and traditional foods – both cultivated and those growing naturally – are being used in medical research to help reduce the chronic health challenges within the Community... Today, with a firm supply of water secured through a long, complicated settlement process, the Community has not only restored its agricultural heritage and self-sufficiency, but has also once again become the "Breadbasket of Arizona." (Pima-Maricopa Irrigation Project, Vision Statement).

Will this vision happen? Is the return of their water sufficient to enable the members of the Gila River Indian Community to return to their agricultural past? Will they be able to raise the kinds of traditional food crops that they did in the past? Can their healthy lifestyle of generations past be restored? What steps does the GRIC need to take to make this happen?

## Appendix A: Indian Reserved Water Rights

Non-Indian water rights in the western part of the United States are based on the prior appropriation doctrine. The prior appropriation doctrine is defined as “first in time, first in right.” This means that whoever diverts water from a river or stream and puts it to “beneficial use” has the legal right to that water. Beneficial use includes irrigation, household use, watering stock, mining, and similar uses.<sup>23</sup> In other words, any practical use of water is considered “beneficial.” When the non-Indian farmers and ranchers arrived in the Gila River watershed beginning in the 1850’s and 1860’s this was the “law of the river.” The first person who began using the water had the continuing legal right to that quantity of water and has senior water rights over later water users. Later users who established “junior” rights could not infringe on the rights or quantities of water used by the senior water users. The prior appropriation doctrine is administered under the laws of the individual states. Water rights under the state prior appropriation doctrine date from the time the water is diverted and put to use.

American Indians were ignored in this use. In watersheds throughout the western United States EuroAmerican settlers arrived upstream from Indian reservations, withdrew water from the rivers and streams, and impacted native peoples. Though some Indian agents objected to this and pointed out the negative impact this had on Indian lands, as did some in regard to the loss of Gila River water, nothing was done until 1908. At this time the federal government did go to court on behalf of the Gros Ventre and Assiniboine Indians on the Fort Belknap Reservation in Montana. (Lewis & Hestand, p. 35) Non-Indian farmers had diverted enough water from the Milk River upstream from the Reservation to seriously impact Indian farming. The U.S. Supreme Court in *Winters v. United States* ruled that when an Indian reservation was established it was implied that sufficient water had been reserved to fulfill the purposes of the reservation. This doctrine of federal reserved rights “established a vested right whether or not the resource was actually put to use, and enabled the tribe to expand its water use over time in response to changing reservation needs.” (Wilkinson, p. 66) Federal Indian reserved water rights date from the establishment of the Indian reservation. These rights are federal water rights and are not dependent on state law or state procedures. (Lewis & Hestand, p. 36)

This doctrine was later expanded in *Arizona v. California* (1963) to include reserved water rights for Indian tribes established by executive order (rather than treaty) and for public lands such as national forests and national parks. This decision also created the “practicably irrigable acreage” (PIA) standard. This meant that the amount of water reserved was the amount of water necessary to irrigate the amount of acreage on the reservation that could be actually irrigated. (Wilkinson, p. 66)

Indian tribes’ federal reserved water rights remain theoretical rights until the tribe moves to quantify these rights, either in negotiated settlements with other water users or through adjudication. Some tribes have been reluctant to quantify their water rights, fearing that such quantification may not meet the future needs of their reservations. Many other

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<sup>23</sup> This term later came to include industrial use, hydropower generation, and recreational and environmental use

tribes have quantified their water rights. Unfortunately, when Indian tribes use the court system (litigation) to adjudicate their water rights, they have to do so in state court, although the case is judged according to federal law. The McCarran Amendment, passed by Congress in 1952, gives state courts, rather than federal courts, jurisdiction over Indian water rights cases. (Wilkinson, p. 67)

The importance of the Gila River Indian water settlement is that it rejected the “practicably irrigable acreage” (PIA) standard in favor of the “homeland test.” Between 1976 and 2004 several court decrees were handed down in the adjudication process. One of these (Gila V) stated that the PIA was not the only standard for water rights.

The court recognized that Indian tribes and communities would use their *Winters* waters for agricultural production, commercial development, industrial, residential and recreational uses, as well as cultural purposes, natural resource development, and wilderness....Such a construction is necessary for the tribes to achieve the twin goals of Indian self-determination and economic self-sufficiency. (Lewis & Hestand, p. 39, quoting General Adjudication at All Rights to Use Water in the Gila River systems and Source, 35 P.3d 68, 74(Arizona 2001) (Gila V))

The “homeland test” establishes a new standard for the quantification of reserved Indian water rights.

## Appendix B: An Overview of Diabetes

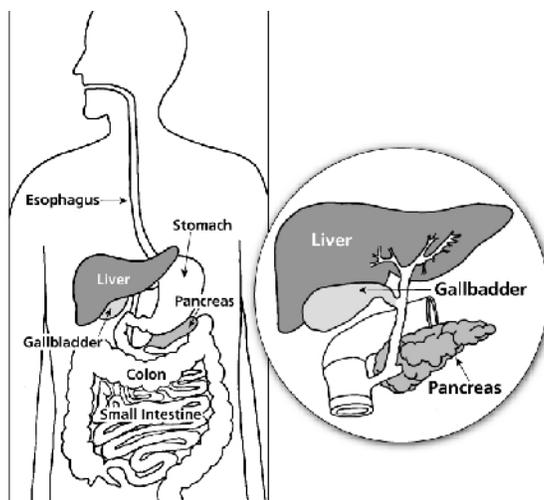
From: *Life in Balance: Diabetes Education Tribal Schools. Diabetes and American Indian/Alaska Native Health*

Almost everyone knows someone who has diabetes. An estimated 20.8 million people in the United States—7.0 percent of the population—have diabetes, a serious, lifelong condition. Of those, 14.6 million have been diagnosed, and 6.2 million have not yet been diagnosed. In 2005, about 1.5 million people aged 20 or older were diagnosed with diabetes.

### What Is Diabetes?

Diabetes is a disorder of metabolism—the way our bodies use digested food for growth and energy. Most of the food we eat is broken down into glucose, which is the form of sugar in the blood. Glucose is the main source of fuel for the body.

After digestion, glucose passes into the bloodstream, where it is used by cells for growth and energy. For glucose to get into most cells, insulin must be present. Insulin is a hormone produced by the pancreas, a large gland behind the stomach (figure 1).



**Figure 1:**  
Digestive tract and pancreas.

For most people, when we eat, the pancreas automatically produces the right amount of insulin to move glucose from the blood into our cells. In people with diabetes, however, the pancreas either produces too little or no insulin, or the cells do not respond appropriately to the insulin that is produced. Glucose builds up in the blood, overflows into the urine, and passes out of the body in the urine. As a result, the body loses its main source of fuel even though the blood contains large amounts of glucose.

### What Are the Types of Diabetes?

The three main types of diabetes are

- type 1 diabetes,
- type 2 diabetes, and

- gestational diabetes.

### Type 1 Diabetes

Type 1 diabetes is an autoimmune disease. An autoimmune disease results when the body's system for fighting infection (the immune system) turns against a part of the body. In diabetes, the immune system attacks and destroys the insulin-producing beta cells in the pancreas. The pancreas then produces little or no insulin. A person who has type 1 diabetes must take insulin daily to live.

At present, scientists do not know exactly what causes the body's immune system to attack the beta cells, but they believe that autoimmune, genetic, and environmental factors, possibly viruses, are involved. Type 1 diabetes accounts for about 5–10 percent of diagnosed diabetes cases in the United States. It develops most often in children and young adults but can appear at any age.

### Type 2 Diabetes

The most common form of diabetes is type 2 diabetes. About 90–95 percent of people with diabetes have type 2. This form of diabetes most often occurs in adults and in people who are obese, have a family history of diabetes, have a previous history of gestational diabetes, are physically inactive, and are of certain ethnicities. About 80 percent of people with type 2 diabetes are overweight. Type 2 diabetes is increasingly being diagnosed in children and adolescents.

When type 2 diabetes is diagnosed, the pancreas is usually producing some insulin, but for unknown reasons the body cannot use the insulin effectively, a condition called insulin resistance. After several years, insulin production decreases. The result of this condition is the same as for type 1 diabetes—glucose builds up in the blood and the body cannot make efficient use of its main source of fuel.

The symptoms of type 2 diabetes develop gradually. Symptoms may include fatigue, frequent urination, increased thirst and hunger, weight loss, blurred vision, and slow healing of wounds or sores. It is also important to realize that some people have no symptoms.

### Gestational Diabetes

Some women develop gestational diabetes late in pregnancy (figure 2). Although this form of diabetes usually disappears after the birth of the baby, women who have had gestational diabetes have a 20–50 percent chance of developing type 2 diabetes within five to 10 years. Maintaining a reasonable body weight and being physically active may help prevent the development of type 2 diabetes.

**Figure 2:**  
Checking for gestational diabetes.

*(Source: National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health)*



### **How Is Diabetes Diagnosed?**

The fasting blood glucose test is the usual test for diagnosing diabetes in children and nonpregnant adults. It is most reliable when performed in the morning. However, a diagnosis of diabetes can be made based on certain test results, which are confirmed by retesting on a different day.

### **What Is Pre-diabetes?**

People with pre-diabetes have blood glucose levels that are higher than normal, but not high enough for a diagnosis of diabetes. This condition raises the risk of developing type 2 diabetes, heart disease, and stroke.

### **What Are the Scope and Impact of Diabetes?**

Diabetes is widely recognized as one of the leading causes of death and disability in the United States. In 2005, it was the sixth-leading cause of death. However, diabetes is likely to be underreported as the underlying cause of death on death certificates. About 65 percent of deaths among those with diabetes are attributed to heart disease and stroke.

The high blood glucose levels of diabetes are associated with long-term complications that affect almost every part of the body. The disease may lead to blindness, heart and blood vessel disease, stroke, kidney failure, amputations, and nerve damage. Uncontrolled diabetes can complicate pregnancy, and birth defects are more common in babies born to women with diabetes. Diabetes also carries emotional, spiritual, and financial burdens for the individual, family, and community.

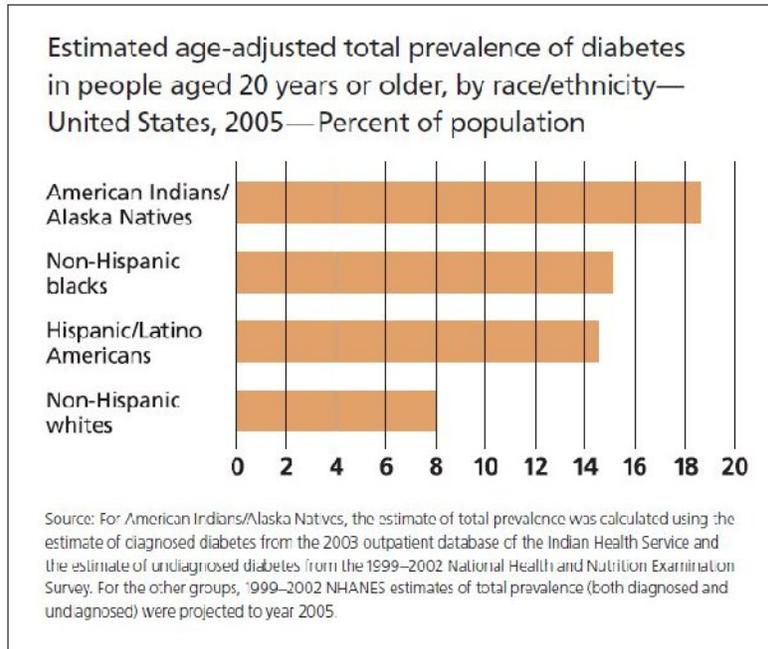
### **Who Gets Diabetes?**

Diabetes is not contagious. People cannot “catch” it from each other. Certain factors can increase the risk of developing diabetes.

Type 1 diabetes occurs equally among males and females but is more common in whites than in non-whites. Data from the World Health Organization’s Multinational Project for Childhood Diabetes indicate that type 1 diabetes is rare in most African, American Indian, and Asian populations.

Type 2 diabetes is more common in adults, especially in people who are over-weight. It occurs more often in African Americans, American Indians, some Asian Americans, Native Hawaiians and other Pacific Islander Americans, and Hispanic/Latino Americans. On average, non-Hispanic African Americans are 1.8 times as likely to have diabetes as non-Hispanic whites of the same age. Mexican Americans are 1.7 times as likely to have diabetes as non-Hispanic whites of similar age. (Data are not available for estimating diabetes rates in other Hispanic/Latino American groups.)

American Indians have one of the highest rates of diabetes in the world. On average, American Indians and Alaska Natives are 2.2 times as likely to have diabetes as non-Hispanic whites of similar age (figure 3). Although prevalence data for diabetes among Asian Americans and Pacific Islanders are limited, some groups, such as Native Hawaiians, Asians, and other Pacific Islanders residing in Hawaii (aged 20 or older) are more than twice as likely to have diabetes as white residents of Hawaii of similar age.



**Figure 3: Prevalence data**

### How Is Diabetes Managed?

Before the discovery of insulin in 1921, everyone with type 1 diabetes died within a few years after diagnosis. Although insulin is not considered a cure, its discovery was the first major breakthrough in diabetes treatment.

Today, healthy eating, physical activity, and taking insulin are the basic therapies for type 1 diabetes. The amount of insulin must be balanced with food intake and daily activities. Blood glucose levels must be closely monitored through frequent blood glucose checking (figure 4).



**Figure 4: Keeping Track of Glucose Levels**

*(Source: National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health)*

Healthy eating, physical activity, and blood glucose testing are the basic management tools for type 2 diabetes. In addition, many people with type 2 diabetes require oral medication, insulin, or both to control their blood glucose levels.

People with diabetes must take responsibility for their day-to-day care. Much of the daily care involves keeping blood glucose levels from going too low or too high. When blood glucose levels drop too low—a condition known as hypoglycemia—a person can become nervous, shaky, and confused. Judgment can be impaired, and if blood glucose falls too low, fainting can occur. A person can also become ill if blood glucose levels rise too high, a condition known as hyperglycemia. The goal of diabetes management is to keep levels of blood glucose, blood pressure, and cholesterol as close to the normal range as safely possible.

### **How Can People Lower Their Risk of Diabetes?**

People can do a lot to lower their risk. Some ways to do that include the following:

- Reach and maintain a reasonable body weight
- Make wise food choices most of the time
- Be physically active every day (figure 5)

Doing these things can reduce the risk of developing type 2 diabetes.

**Figure 5:**  
It's important to exercise every day.



*(Source: National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health)*

### **Solutions through Research**

In 1996, NIDDK launched its Diabetes Prevention Program (DPP). The goal of this research effort was to learn how to prevent or delay type 2 diabetes in people with pre-diabetes, a strong risk factor for type 2 diabetes. The findings of the DPP, released in August 2001, showed that people at high risk for type 2 diabetes could sharply lower their chances of developing the disorder through diet and exercise. In addition, results of the oral diabetes drug metformin had a smaller reduction of diabetes risk.

In other research before the DPP, with the help and participation of many Akimel O'odham (Pima) Indians over the years, scientists at the National Institutes of Health identified several ways people with diabetes can improve their health. Scientists found that keeping blood glucose, blood pressure, and blood cholesterol under control is very

important. Pregnant women with diabetes need to keep their blood glucose under control so that their babies will be healthy and have a lower risk of getting diabetes. Breastfeeding, even for a few weeks, helps protect babies from becoming overweight and developing diabetes.

Many people who might otherwise develop type 2 diabetes can prevent it by exercising regularly, lowering the amount of fat and number of calories they eat, and losing weight if they are overweight. Researchers are also studying the genetic and environmental factors that can lead to pre-diabetes and diabetes. About 100 tribes are evaluating demonstration programs to reduce the risk of developing type 2 diabetes or of developing heart disease, a complication of high blood glucose of diabetes that is not well controlled.

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<http://www3.niddk.nih.gov/fund/other/dets/>

## References

- Akimel Dua'kik: Spirit of the River*. (2008) The official publication of the Gila River Indian Community and its Enterprises.
- Allen, N. (2002) The Akimel O'othom: Pima people. In L Weinstein, (Ed) *Native peoples of the Southwest: Negotiating land, water, and ethnicities*. (pp.89-98) Westport, CT: Bergin & Garvey.
- American Diabetes Association. (2008) Nutrition recommendations and interventions for diabetics. *Diabetes Care*, 31:Suppl 1 S61-S78.
- Archibold, R.C. (2008) Indians' water rights give hope for better health. *New York Times*, August 31. Downloaded 7/05/09 from: <http://www.nytimes.com/2008/08/31/us/31diabetes.html>
- Arizona-Sonoran Desert Museum. Center for Sonoran Desert Studies. Downloaded 5/15/09 from <http://www.desertmuseum.org/desert/sonora.php>
- Arizona State University. Community Learning Centers. Courses. *Diabetes*. Downloaded 6/28/09 from: <http://clc.asu.edu/files/courses/Diabetes.pdf>
- August, Jr., J.L. (1999) *Vision in the desert: Carl Hayden and hydropolitics in the American Southwest*. Fort Worth: Texas Christian University Press.
- Bark, R.H. (2006) Water reallocation by settlement: Who wins, who loses, who pays? (Electronic version) *bepress Legal Series Paper 1454*. Retrieved 5/22/09 ([law.bepress.com/expresso/eps/1454/](http://law.bepress.com/expresso/eps/1454/))
- Boyce, V.L. & Swinburn, B.A. (1993) *Diabetes Care* 16:1 369-371
- Brody, J.E. (1991) To preserve their health and heritage, Arizona Indians reclaim ancient foods. *New York Times*, May 21. Downloaded 9/25/09 from: <http://www.nytimes.com/1991/05/21/science/to-preserve-their-health-and-heritage-arizona-indians-reclaim-ancient-foods.html>
- Castetter, E.F. and W. H. Bell (1942) *Pima and Papago Indian agriculture*. Albuquerque: University of New Mexico Press.
- Centers for Disease Control. (CDC). See U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
- Cobb, D. M. (1998) Philosophy of an Indian war: Indian community action in the Johnson's Administration war on Indian poverty, 1964-1968. *American Indian Culture and Research Journal*, 22:2, 71-102

- Colby, B. (2008) Essential (but often forgotten) tribal economic and financial strategies in water negotiations and litigation. PowerPoint presentation. Indian Land and Water Working Group, Annual Conference, Tucson, AZ November, 2008.
- Compher, C. (2006) The nutrition transition in American Indians. *Journal of Transcultural Nursing* 17:3 217-223
- Conti, K.C. (2006) Diabetes prevention in Indian Country: Developing Nutrition models to tell the story of food-system change. *Journal of Transcultural Nursing* 17:3 234-245
- Curry, A. "At work with the Pima," Diabetes Forecast: The healthy living magazine May 2008, <http://forecast.diabetes.org/magazine/ada-research-profile/work-pima> (6/27/09)
- DeJong, D.H. (2004) Forced to abandon their farms: water deprivation and starvation among the Gila River Pima, 1892-1904. *American Indian Culture and Research Journal*, 28(3), 29-56.
- DeJong, D. H. (2007) "The sword of Damocles?" The Gila River Indian Community Water Settlement Act of 2004 in historical perspective. *Wicazo Sa Review* 22(2), 57-92.
- Dobyns, H.F.(1989) *The Pima-Maricopa*. New York: Chelsea House Publishers.
- Ferreira, M.L & Lang, G. C. (2006) Eds, *Indigenous Peoples and Diabetes: Community Empowerment and Wellness* Durham, N.C.: Carolina Academic Press.
- Genovese, J.E.C. (2009) Can Body Mass Index (BMI) be used as a proxy for somatotype? *Social Science Journal* 46:2 390-393/
- Gila River Indian Community. Official Website: <http://www.gilariver.org/>
- Gila River Indian News* <http://www.gilariver.org/index.php/news>
- Hackenberg, R. A. (1983) "Pima and Papago ecological adaptations." In *Handbook of North American Indians*. v. 10: Southwest. Washington, D.C.: Smithsonian Institution.
- Indian Health Service (2009) [IHS Standards of Care for Patients with Type 2 Diabetes](http://www.ihs.gov/medicalprograms/diabetes) downloaded 7/05/09 from: <http://www.ihs.gov/medicalprograms/diabetes>
- Joe, J. R. & Young, R.S. (1994) Eds, *Diabetes as a disease of civilization: The impact of culture change on Indigenous Peoples*. New York: Mouton de Gruyter.
- Knowler, W.H (2007) Diabetes research in American Indians. Testimony before the U.S. Senate, Committee on Indian Affairs. National Institute of Health.
- Kozak, D (2008) Diabetes among the Pima: Stories of survival. (Review of Smith-Morris book) *American Indian Culture and Research Journal* 32-4, 151-153.

Kozak, D.L. (1997) Surrendering to diabetes: An embodied response to perceptions of diabetes and death in the Gila River Indian Community. *Omega – Journal of Death and Dying* 35:4 347-360.

Lewis, D. R. (1994) *Neither wolf nor dog: American Indians, environment, and agrarian change*. New York: Oxford University Press.

Lewis, R. B (2005) Gila River Indian Community Water Settlement. *Arizona State University, Decision Center for a Desert City*, Retrieved 5/30/09 from: <http://dcdc.asu.edu/detail.php?cid=28&ID=93>

Lewis, R. B. (2008) Indian water rights settlements. Testimony before U.S. Congress, House Committee on Natural Resources, Subcommittee on Water and Power. April 16.

Lewis, R.B & Hestand, J.T. (2006) Federal reserved water rights: Gila River Indian Community Settlement. *Journal of Contemporary Water Research & Education*, 133, 34-42.

McNamee, G. (1994) *Gila: the life and death of an American river*. Albuquerque: University of New Mexico Press.

Nabhan, G. P. (1998) Food, health, and Native-American farming and gathering. In Scapp, R. and Seitz B. (Eds) *Eating Culture*, Albany: State University of New York Press.

Nabhan, G. P. (1985) *Gathering the desert*. Tucson: University of Arizona Press.

Nabhan, G. P. (2008) Rooting out the cause of disease: Why diabetes is so common among desert dwellers. In Counihan, C. and P.V. Esterik, (Eds.) *Food and culture: A reader* NY: Routledge.

Neel, J.V. (1962) Diabetes mellitus: A “thrifty genotype” rendered detrimental by progress. *American Journal of Human Genetics*, 14:4, 353-362

Neel, J.V. (1999) The thrifty genotype in 1998. *Nutrition Review*, 57:5 S 2-9.

*Pima Indians: Pathfinders for health*, U.S. National Institute for Diabetes and Kidney Diseases. (NIDDK) downloaded 7/3/09 from: <http://diabetes.niddk.nih.gov/dm/pubs/pima/>

Pima-Maricopa Irrigation Project, Education Initiative. Lessons. Downloaded 5/15/09 from: <http://www.gilariver.com/education.htm>

Pima Maricopa Irrigation District, *Vision Statement* Downloaded 7/05/09 from: <http://www.gilariver.com/vstate.htm>

- Rea, A. M. (1997) *At the desert's green edge: an ethnobotany of the Gila River Pima*. Tucson: University of Arizona Press.
- Schulz, L.O., et al (2006) Effects of traditional and western environments on prevalence of type 2 diabetes in Pima Indians in Mexico and the U.S. *Diabetes Care* 29:8 1866-71
- Smith-Morris, C (2006) *Diabetes Among the Pima: Stories of Survival*. Tucson: University of Arizona Press
- Smith, C. J., Manahan, E.M., Pablo, S.G. (1994) Food habit and cultural changes among the Pima Indians. In Joe, J.R. and Young, R.S. (Eds) *Diabetes as a disease of civilization: The impact of culture change on Indigenous Peoples*. New York: Mouton de Gruyter.
- Teufel, N.I. (1996) Nutrient-health associations in the historic and contemporary diets of southwest Native Americans. *Journal of Nutritional and Environmental Medicine*, 6:2 179-190
- U.S. Census (2000) <http://www.census.gov/main/www/cen2000.html>
- U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2001) "Diabetes in American Indians: the public health problem and the response – challenges and opportunities." Testimony by Frank Vinicor before the Senate Finance Committee Chairman. [www.dhhs.gov/asl/testify/t010813.html](http://www.dhhs.gov/asl/testify/t010813.html)
- U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (2007). *National Diabetes fact sheet 2007: general information*.
- Webb, G. (1959) *A Pima remembers*. Tucson: University of Arizona Press
- Wiedman, D. (2005) American Indian diets and nutritional research: Implications of the Strong Heart Dietary Study, phase II, for cardiovascular disease and diabetes. *Journal of the American Dietetic Association*, 105:12 1874-1880
- Wilkins, D. E. and Lomawaima, K. T.(2001) *Uneven ground: American Indian sovereignty and federal law*. Norman: University of Oklahoma Press.
- Wilkinson, C & American Indian Resources Institute (2004) *Indian tribes as sovereign governments: a sourcebook on federal-tribal history, law, and policy*. Oakland, CA: American Indian Lawyer Training Program
- Wilson, J.P. 1999. *Peoples of the middle Gila: a documentary history of the Pimas and Maricopas, 1500-1945*. Researched and written for the Gila River Indian Community, Sacton, Arizona. Rept. No. 77. Downloaded 5/15/09 from: <http://www.gricrmp.com/PDF%20Files/Peoples%20of%20the%20Middle%20Gila.pdf>

*XA Chaqwelyk: Sudac Neok*, Water Talk, (2001) vo. 1:3 Downloaded 5/15/09 from:  
<http://www.gilariver.com/newsletters%5Cjulycommunity.pdf>

#### Websites

American Diabetes Association: [www.diabetes.org](http://www.diabetes.org)

Centers for Disease Control and Prevention (CDC) <http://www.cdc.gov/>

Indian Health Service. Division of Diabetes Treatment and Prevention.  
<http://www.ihs.gov/medicalprograms/diabetes/>

Juvenile Diabetes Research Foundation International: [www.jdrf.org](http://www.jdrf.org)

National Diabetes Education Program: [www.ndep.nih.gov](http://www.ndep.nih.gov)

National Diabetes Information Clearinghouse: [www.diabetes.niddk.nih.gov](http://www.diabetes.niddk.nih.gov)

National Library of Medicine. American Indian Health:  
<http://americanindianhealth.nlm.nih.gov/>

U.S. Dept of Health & Human Services. Office of Minority Health. *Diabetes and American Indians/ Alaska Natives*.  
<http://www.omhrc.gov/templates/content.aspx?ID=3024>