Reducing Diabetes in Indian Country:
Lessons from the Three Domains Influencing Pima Diabetes

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The prevalence of diabetes among Pima (Akimel O'odham) Indians involves three important domains: political-economic, genetic, and cultural. Programs in diabetes education have made noteworthy improvements in the last two decades in addressing cultural information and attitudes. It is less common to see political-economic factors addressed, particularly the structural barriers to care that include poverty and unemployment. The genetic contributions to modern rates of diabetes have, perhaps, been overemphasized in the past, contributing to a sense that this disease is inevitable in American Indian populations. I review six lessons drawn from these domains and from diabetes prevention and treatment programs in Indian country: 1) the basic importance of cultural sensitivity; 2) the strengths of community participation; 3) the influential but not dominant significance of genetics; 4) some relevant structural changes in forms of health care; 5) the need for political-economic change within tribes to sustain communitywide change; and 6) the significance of a stable financial foundation for diabetes programs.

Key words: diabetes, political economy, community participation, Pima Indians

Pima Indians are better known around the world for their diabetes than for their culture and history. More than half of all Pima Indians over age 35 have diabetes, a condition arising from a body's decreased ability to metabolize glucose (Knowler et al. 1990). Adult onset, noninsulin-dependent diabetes, now called type 2 diabetes, is the most common form of diabetes among Pima Indians. Data from research conducted by the National Institutes of Health since 1965 reveal the incidence of Pima diabetes to have increased for three successive decades in both men and women (Bennett, Burch, and Miller 1971; Narayan 1997:173). Among the Pima, it is a leading cause of extremity amputation and acquired renal disease, is associated with an increased risk for ischemic heart disease and infections (Narayan 1997:178), contributes to higher risk for depression, and is, in turn, made worse by depression and alcoholism (Harwood 1981; Lang 1990; Scheder 1988). Diabetes-related conditions account for 19.5 percent of all (age-adjusted) Pima deaths—four times that of whites and two times that of blacks in the United States (Newman et al. 1993).

Three domains of influence contribute to Pima diabetes: political-economic, genetic, and cultural. Stemming in part from attention paid to diabetes by anthropologists, but also from increasing involvement of native people in program development, diabetes programs are improving their cultural relevance. Genetic contributions to modern rates of diabetes have been overemphasized in the past, contributing to a sense that this disease is inevitable in Native American populations (e.g., Kozak 1997). It is rarer to see political-economic factors addressed, although it is possible for programs to deal with structural issues even if they cannot resolve them. In this discussion, I review how each of these three domains influences diabetes rates at Gila River, then apply this knowledge in calling for holistic planning and programs that might best be able to reduce rates of this disease. First, I provide a brief profile of the Gila River Indian Community, where I conducted an ethnographic study on diabetes between 1997 and 2001. Foci of that study included the political-economic and historic factors in Pima diabetes, with an ethnographic focus on the health and health care experiences of pregnant women and mothers. Methods for that research included: an outcome study of women enrolled in the Diabetes Education Center's prenatal classes; lengthy interviews with 90 community members including 27 pregnant women who spoke with me several times over the course of their pregnancy;
behavioral (and diet) observations of Pima women; extensive participation observation, including attendance with women of prenatal appointments; and a written survey of health providers on the reservation.

Community Profile

There are approximately 14,000 Gila River Indians, with 11,257 living on the reservation at time of the 2000 census. The tribe’s principal industries are agriculture, industrial parks, and recreational parks. Of the reservation’s 372,000 acres, 12,000 are being farmed by the tribe’s Gila River Farms and produce cotton, several grains, olives, and citrus, for a total value in 1999 of more than $25 million. Industrial parks employ close to 1,000 workers, almost one-quarter of whom are Pima. The tribal economy is also supported by two casinos. Nevertheless, the 2000 U.S. Census reported an unemployment rate of 24 percent, a median family income of $18,769, and 47 percent of families below the poverty level.

The reservation town of Sacaton is home to the Hu Hu Kam Memorial Hospital, the Diabetes Education Center, and most government buildings. Public health nursing, environmental health services, and other Indian Health Service (IHS) programs are active on the reservation. There is a small market with groceries, a few school supplies, minimal household supplies, and a kitchen that serves breakfast and lunch in Sacaton, and another smaller market in Casa Blanca (District 5). There is also a gas station with a food mart in Gila Crossing (District 6). Prices are relatively high in these
The Indian Service, which had proved increasingly unable to manage the diverse and complex task. The Indian health care in 1955, assuming this responsibility from tribes through local area offices. Public Law 93-638, the fostering improved communication between the IHS and tribes with the growing mechanization of farming around the Phoenix area. The Hohokam who occupied southern and central Arizona for about 1,100 years between about A.D. 400 and A.D. 1500 (Bahti and Bahti 1997; Fagen, King, and Erick 1995). The eventual loss of natural resources (e.g., water, land), the development of dependency on the federal government for food, and the eventual resurgence of Pima autonomy and self-sufficiency have mirrored the experience of many Native American groups.

The 19th century brought tremendous change to all Native Americans. The Indian Removal Act of 1830 threw open the door for Anglo population expansion south and west across what would become U.S. territory. The Pima, like other tribes, were threatened by removal to Florida and Oklahoma until the Gila River Indian Reservation was created in 1859 (Bahti and Bahti 1997). As populations in the West grew, access to water became increasingly contested. Before the 1860s, Pimas had maintained their agricultural fields and irrigation canals based on knowledge from a long history of agricultural subsistence. There is archaeological evidence of Hohokam irrigation farming dating as far back as A.D. 800 (Castetter and Bell 1942:28). But growth fostered by the building of railroads, in addition to eventually oversupplying the market with goods and flooding the Southwest with tourists and migrants, brought a heavy toll in the lives and liberty of Native Americans.

By the end of the 19th century, almost all of the Pima farms had dried up due to Anglo violations of the Pimas’ “prior appropriation” rights to the Gila River water flow (see Kelsey v. McAteer 1879 as described in Doynbs 1989). Small-scale Indian farms were increasingly unable to compete with the growing mechanization of farming around the Phoenix area. The Pima transition from subsistence farming in the 1800s to almost total reliance on wage labor and land lease fees had occurred by the mid-1900s (see Hackenberg 1955a, 1955b).

The U.S. Public Health Service (PHS) took charge of Indian health care in 1955, assuming this responsibility from the Indian Service, which had proved increasingly unable to manage the diverse and complex task. The PHS, working through its Division of Indian Health, made significant improvements in Indian health, primarily by enlisting the staff of registered nurses and physicians working in Indian Country. In 1970, the IHS replaced the Division of Indian Health and further decentralized health care administration, fostering improved communication between the IHS and tribes through local area offices. Public Law 93-638, the Indian Self-Determination and Education Assistance Act, was passed in 1975 to, in effect, move many programs away from the Bureau of Indian Affairs while maintaining U.S. legal and moral support for these services. This law allows tribes to take much of the responsibility and control for tribal health services away from the IHS, giving them more freedom to design and administer tribal programs. However, this makes tribal funds vulnerable to political attitudes and the changing federal priorities of each new administration (Joe 1991). Tribal health administrators continue to work with IHS area offices and the Washington, D.C., headquarters for their budgets, a relationship that has its strengths and weaknesses (see Noren, Kindig, and Sprenger 1998). The Gila River Indian Community participates in this contracting and has, in recent years, administered much of the tribal health programming through its own Gila River Health Care Corporation.

Political-Economic Factors

The decline of farming set the stage for the diabetes epidemic in two ways. First, the change in subsistence activities from farming to wage labor increased sedentism. A cultural value of “exercise for exercise's sake” had never been necessary in the precontact Pima culture, given the demanding tasks of daily life. Second, the need for alternative sources of food led—not inevitably but certainly—to subsequent reliance on government commodities and other processed foods. Commodities held a leading position in the introduction of capitalist relations at Gila River, especially fatty and sweet foods and drinks. These processed foods, made available first through government rations and later in the fast food market, have had a highly negative and steadily worsening impact on Pima health.

A rise in dietary intake of fat from 15 percent in the 1890s to 40 percent in the 1990s is considered another necessary but not sufficient condition for the high rate of diabetes in this community (NIDDK 1996:19). Indeed, approximately 95 percent of Pima Indians with diabetes are overweight (ibid.:16). Foods from federal and state-administered distribution programs include eggs, bacon, potatoes, lard, cheese, beans, canned meats, vegetables and fruits, dry cereals, and dried or evaporated milk. Smith, Manahan, and Pablo (1994:415-416) describe a variety of foods that reflect a Mexican influence common in the Southwest: chili beans, chorizo sausage, corned beef and gravy or potatoes, and others. These authors also suggest that Pima men serving with the U.S. forces during World War II developed a preference for Anglo and Mexican foods. “Traditional” foods from before federal commodity days, such as tepary beans, are eaten today by few Pimas.

Nabhan (1992) and Nabhan, Weber, and Berry (1985) argue that tepary beans may even ameliorate diabetes problems through their slow digestion and lower insulin-raising properties (see also Trimble 1993:382). Recent research has not provided definitive evidence that the adoption of an Anglo diet increases the risk of developing diabetes in Pimas.
increased sedentism and diets high in fats and carbohydrates characterize many Americans, but these factors are insufficient, in and of themselves, to explain the high rates of diabetes in Native American populations. Instead, they have interacted with genetic and cultural factors to exacerbate the situation of the Pima.

The political-economic history of Gila River’s transition out of farming is relevant here. Farming is not particularly lucrative, is difficult work (especially in the Sonoran Desert), and requires substantial start-up investment. For these and other reasons, only a few Pimas are still farmers. Furthermore, in recent decades, farmers in this area primarily grew cotton and alfalfa. The Gila River Farm also produces olives and citrus for sale, but very little farm produce is sold in the community. The majority of community members, therefore, maintain little cognitive connection to farming or to the source of their foods, a cultural change that not only underlines many Pimas’ reliance on grocery store and commodity foods, but also undermines the growing of gardens. The Gila River Farms and irrigation offices are working to bolster farm production as recent water allotments have been corrected upward.

It would be beneficial for Pimas to grow, consume, and share or sell a wider variety of foods, including beans, squash, and other vegetables. It remains to be seen if and how this would affect the diet of average community members. Continued and even further tribal council and health care corporation initiatives are needed for programs and events that encourage community awareness of, if not participation in, the Gila River Farms. These directions are common topics among tribal council and farm board members. The Gila River Indian Community has made good progress toward Indian-centered policies for development in the quarter century since the Indian Self-Determination Act. Health care policy, however, and specifically the management and structuring of health services on the reservation, has only recently come under tribal control.

Genetic Factors

Several theories on the etiology of diabetes in Native Americans have been debated (Benyshek, Martin, and Johnston 2001; Shapiro 1997). James Neel (1962, 1982) provided seminal work that described a “thrifty” genotype suited to the feast and famine conditions of early hunter-gatherer existence, either through a “quick insulin trigger,” fewer receptor cells for glucose, or enhanced fat metabolism. Wendorf and Goldfine (Wendorf 1989; Wendorf and Goldfine 1991) further argue that a lack of food resources encouraged increased mobility among Paleonadians, for whom kill sites became short-term camps. This argument means that a thrifty gene had already evolved as a physical adaptation to food scarcity (or unreliability) in eastern Beringia. However, this thrifty genotype hypothesis is not considered a sufficient explanation for the post-World War II rise in diabetes prevalence among the Pimas and other Native American groups (Knowler et al. 1990:9; Neel 1962). As Scheder (1988) found among mobile Mexican laborers, acculturative stress may also have played a role in Pima weight gain and increased incidence of hypertension, two factors in diabetes.

Prehistoric environmental changes, including dietary change, are critical components of the diabetes profile of Pimas (Knowler et al. 1983; Knowler et al. 1990; Ravussin et al. 1994; Weiss 1985). Szathmary (1993) found that early hunters who efficiently metabolized fat in a carbohydrate-poor environment were more adaptive. But these adaptations, when present in individuals exposed to modern high-carbohydrate, low-protein diets, are more likely to lead to type 2 diabetes. The “New World Syndrome” is posed as another explanation (Weiss et al. 1989) for type 2 diabetes insofar as it is one of a number of problems associated with dramatic environmental change resulting from colonial events in the New World. These problems include obesity, gallbladder disease, and some digestive-system cancers.

In a paper focused on the complexity of diabetes etiology, Benyshek, Martin, and Johnston (2001) point out that two important problems exist with the hypothesis of a genetic basis for type 2 diabetes. First, there is little evidence that early hunter-gatherers experienced the periodic starvation that would favor an insulin resistant gene. Second, some of the groups with the highest rates of diabetes (e.g., the Pimas, Pueblos, and River Yumans) also have the longest history of intensive agricultural subsistence. For this and several other reasons, Benyshek, Martin, and Johnston (2001:35) suggest that diabetes is an “acquired characteristic” beginning in utero. Their fetal-origins model outlines two phases in the emergence of type 2 diabetes: first, a thrifty phenotype generation experiences severe famine conditions in utero and goes on to develop abnormal insulin-glucose metabolism (especially when obese) in adulthood; and second, the subsequent generation(s) who, while not experiencing severe food shortage, develop hyperinsulinemia, insulin resistance, and eventually glucose intolerance in adult life as a result of excess fuels supplied to them in utero by glucose intolerant mothers (Freinkel 1980). Studies have shown a greater transmission of diabetes from mothers than from fathers (Dornier and Mohnik 1976) and from mothers who had diabetes during pregnancy than from mothers who were not diabetic during pregnancy (Pettitt et al. 1988; Pettitt et al. 1996).

Cultural Factors

Cultural factors in the prevalence of diabetes at Gila River have mainly to do with foodways, although other relevant cultural characteristics include styles of communication, attitudes about disease prevention, and practices related to personal autonomy and giving of advice. Traditional foods such as beans and, more recently, frybread are pervasive at (and symbolic of) social, religious, and even work-related...
gatherings. Pima cooks take great pride in their frybread and are generous with a variety of other fried and sweet foods. To please guests and family with food is the centerpiece of good hospitality and is quintessentially "the Pima way." Serving of food to visitors is common and a "serious obligation" among many Native American groups (Jackson 1994:381; Wolf 1982:3-23), while declining food that is offered can be a significant social error (Lang 1989). Weight gains resulting from all this hospitality also make their way into cultural assumptions; for example, Hagey (1989:26) reported that thinness could be considered a sign of weakness or of poverty.

Among all peoples, diet can be "a way to reestablish or break ties with tradition in a rapidly changing world" (Nichter and Nichter 1981). In the case of the Pima, who have experienced some of the greatest cultural pressures of all the Southwest tribes due to the length and form of their contact with Europeans, definitions of "Indianness" are drawn from historical and environmental contexts that include a political economy of health. "Diseases of development," such as diabetes, obesity, and alcoholism, are recognized by Pimas to be "white man's diseases" (Joe and Young 1994; Lipsman 1988), somehow attributable to white contact or influence. Yet Pimas recognize diabetes to be a pervasive problem in their community and, therefore, a particularly Piman problem. Diabetes, thus, symbolizes the experience of culture contact for Pimas.

Clearly, a strict attempt to unify traditionalism with dietary practice is increasingly irrelevant and impossible. Changing foods on the reservation, just like changing clothes, language, and healing practices, should not be viewed as a "loss" of culture. Indeed, these new cultural features have an element of co-opted power based on their inextricable links with colonial domination and forced change. By adopting some but not all biomedical health practices, Pimas demonstrate their control over how much culture contact and change they wish to accept. Gretchen Lang (1990:309) makes the point this way:

While it may appear to be an ironic contradiction that there is reluctance to change food habits, given the commonly-expressed idea that "white man's foods have made us sick," foods and foodways constitute complex codes for social relations and symbols of cultural identity. Many contemporary preferred foods, while incorporated into a traditional food systems...are also recognized to have entered Dakota culture relatively recently, during a period recalled as one of great deprivation. Diabetes, especially as it affects food patterns, from an outsider's viewpoint appears to have provided the Dakota with another means through which to reflect and comment upon matters of continual concern regarding their history and their place with respect to the majority of society.

As the fairly recent addition of frybread to the Pima's diet reveals, cultures are highly adaptive and what is "traditional" need not be limited by abstract notions of historic ideas. When important cultural symbols, such as the eating of frybread, are in conflict with biomedical messages about healthy behavior, creative programming is required to construct symbolic bridges between the relevant value systems. Altering dietary habits in slow increments has been the goal of many nutritionists' messages at Gila River. First, certain foods may be associated with affluence or comfort and therefore would be particularly valued by hosts and guests alike. These foods can increase the symbolic importance of an event and may improve a host's status. These food habits are less likely to change, so ancillary foods become the focus for fat and starch reduction. Second, foods associated (either truly or fictively) with the past, tradition, or Pima authenticity carry great symbolic value. Arguments about the nutritional content of such foods are difficult to make since it is not for nutrition's sake that these foods are so carefully prepared, served, and consumed. Other cultural characteristics particularly important for diabetes programs to address include: the cost of food available on the reservation; limited access to transportation to hospitals and clinics; communicative patterns that make the transmission of sensitive or personal information in short (10-minute) appointments difficult or impossible; notions of authority and respectful behavior, including limited eye contact, not questioning directives or advice, and providing answers one thinks are wanted or expected, rather than answers from one's own opinion and knowledge (Smith-Morris n.d.). In many Native American communities, leaders and supervisors may be more highly valued and respected for advising, rather than ordering, those in their charge. Marie Chona, a Papago (Tohono O'odham) Indian woman discussed this in her autobiography, cowritten with Ruth Underhill (1979).

Several researchers have worked within the Gila River Indian Community on the problem of diabetes. The National Institutes of Health (NIH) longitudinal diabetes research in this community has been of critical importance to the fight against diabetes worldwide. Community knowledge and opinion of this research varies. While many Pimas have participated in various NIH research projects, the medical findings are not well understood by community members. Reports of findings are made in each of the seven districts, but these district meetings are attended by only a very small fraction of the population. Some see this type of research as exploitative (see Sevilla 1999a, 1999b), while others appreciate these clinical trials for providing greater understanding and, in particular, medications and treatment for diabetes and its complications.

Ritenbaugh's 1974 dissertation gives a broad view of the factors associated with diabetes among the Pima, including discussions of the early genetic findings produced by the National Institute of Diabetes and Digestive and Kidney Disorders (NIDDKD). It does not include recorded interviews with Pimas, and she calls on others to "gain more information on the life histories of selected individuals in various [health] categories" (Ritenbaugh 1974:111). Kozak (1997) has conducted ethnographic interviews with Pimas on the topic of diabetes and suggests the concept of "surrender" to describe the Pima approach to its prevention and treatment. In this context, "surrender" is:
an emotion whereby individuals and a segment of a
community feel unable to control what they perceive as
an inevitable fact of life that lies outside of their direct
influence. This is not so say that these people have “given
up on life” in a fatalistic sense, nor is it simply a “learned
helplessness”. Rather, emotionally, they have created a
hypothetical life history of themselves where they expect
to be sickened by, and to die from, diabetes because the
weight of day-to-day experience throughout their lifetime
reveals this to be an appropriate and accurate assessment
of reality (Kozak 1997:349).

My own work at Gila River has examined specific
conflicts between biomedical and Pima health cultures, par-
ticularly conceptual disagreements. Of the major conceptual
issues identified in this ethnography, I have already mentioned
that the concept of exercise for exercise’s sake is foreign or
impractical for some community members. A second area
of disagreement stems from Western, biomedical notions of
individual responsibility for health that are not universally
accepted or even practical in the Pimas’ kin-focused society.
Kinship is still very important as a subsistence resource (and,
for some, as a subsistence strategy in and of itself). Kin re-
gard relationships affect income, access to food and transpor-
tation, and many other resources that determine a patient’s
ability to follow a diabetes treatment program. Pimas who remain
this dependent upon and connected to kin networks will have
a fairly consistent problem with treatment plans that
assume individual responsibility for disease prevention and
treatment.

While community members have adopted many aspects
of Anglo culture (e.g., the English language, Western-style
clothing), Pimas have not necessarily adopted the concepts
of exercise for exercise’s sake and individual responsibility
for health. Biomedical providers encourage the adoption of
these views as a way to achieve good health. Their efforts to
convince Pimas of these concepts might be viewed as mo-
moments of culture contact. Viewing clinical encounters in this
perceptual light, local ideas should be given greater weight,
regardless of the nontraditional appearance of the patient
involved.

Lessons Learned from the Three Domains

There are, to summarize, three major domains of influ-
ence on Pima diabetes: political-economic, genetic, and cultural—health programs in Indian Country are making the most headway in cultural matters. The most successful examples of diabetic health programs are ones with a community-based focus (Narayan et al. 1998;
Teufel and Ritenbaugh 1998) or ones that strive for cultural
sensitivity and relevance (Breuer 2001; Griffin et al. 1999;
Hagey 1989; Sanchez, Plawecki, and Plawecki 1996). These
programs use, for example, cultural stories and metaphors for
learning, may be offered in native languages, and are in other
ways tailored to the local native population. Yet, as Tripp-
Reimer et al. (2001) have discussed, diabetes programs that are
culturally sensitive are now the most elementary form of
intervention in Indian country; only programs with the
vision and breadth to create communitywide transformation
will have an impact on diabetes prevalence, and these are
now the goal.

“Wellness” is a method of planning and pro-
graming that recognizes the centrality of local goals, values,
and initiative in any successful program of change (Hood et
al. 1997; Stewart 1999). This approach is increasingly recog-
nized as the most viable and effective form of intervention in
this and other Native American communities (Wilson et
al. 1994). A “community-based” focus mandates certain priori-
ties and methods. Among these, early and thorough efforts
must be made to involve community members in the project
(Daniel et al. 1999; Wang et al. 1999). Local community
goals, rather than those of external funders, development
agencies, or other institutions, must be clarified and, as much
as possible, agreed upon by community members themselves
(Crewe and Harrison 1998). Also, planners, whether com-
munity members or nonmembers, must address the structural
barriers to certain goals.

From these domains, we should take several lessons
about the most effective and appropriate approaches to pre-
nvention. In considering some of these lessons, I will offer
examples from diabetes programming in Indian Country.
Certainly, each domain is represented in these programs.
However, the diabetes treatment and prevention efforts
among Native Americans have had only moderate success
since World War II because rarely are all three domains
tackled together. Indeed, in most cases, programmatic “su-
cess” is measured by the number of participants enrolled
in and completing programs, rather than by a net reduction
of diabetes within the community. Thus, while I highlight
important lessons and strengths in recent approaches, I
also propose further areas where our lesson plan has been
deficient.

Lesson 1: The importance of cultural sensitivity
and relevance in health programs is axiomatic.
Programs aimed at community transformation
must be the goal if there is to be an overall
reduction in diabetes.

Of the three domains influencing diabetes—political-
economic, genetic, and cultural—health programs in Indian
Country are making the most headway in cultural matters. The
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barriers to certain goals.
Lesson 2: Community-based and participatory models are increasingly popular but as hard as ever to design, build, implement, and maintain.

Several weaknesses in the community participation model have been identified over the years, particularly through anthropological critiques of international aid and development programs (Morgan 1987, 1989, 1993; Nichter 1984, 1987; Sauerborn, Nougatara, and Diesfeld 1989; Stone 1992; Woelk 1992). The first dilemma is identification of the “community,” which can be based on a number of things: geographic boundaries or spaces; politics of identity and ethnicity; demographic or other variables determined to be relevant for a particular research question; and fabricated ties that ignore diaspora, globalization, media, and the multiplicity of self-identification. Also, while a great deal of community knowledge, needs, priorities, and buy-in are essential, “participation” may or may not include these. Conversely, turning over the reigns of health programs to community members who are neither prepared, informed, skilled, positioned, nor inclined to manage them can be equally disastrous (Bastien 1990; Berman, Gwatkin, and Burger 1987). Participation should be by persons who are informed and representative and should occur in a manner that is timely and well-documented.

The most critical reviews of the participatory and community development models focus on unsustainable programs (Stone 1992; Woelk 1992)—those that provide only initial funding with no mechanisms for project modification and change, that disperse funds too thinly across an unreasonably large target population, or that are simply ill conceived for the time, place, problem, and resources given. To ignore these potential pitfalls not only weakens the community’s ability to reach its goals, but sets up a potential for failure and disillusionment with the entire process (Gittelsohn et al. 1995; Nichter 1984). To very briefly summarize the essential criteria for community-based interventions, programs should:

1. Carefully identify or define the community being targeted, with consideration for the fluidity with which community boundaries may be crossed by people.

2. Obtain participation early and continuously, giving a variety of community members relevant and empowered positions through which to involve themselves.

3. Manage community participation in ways that are savvy about, if not deferential to, local knowledge and power structures, and ensure that community members’ investments in the process will be valued and employed appropriately.

4. Build programs that are economically and logistically sustainable as well as flexible to the changes natural in the life cycle of any community.

Several examples of community-based programs in Indian Country deserve a brief mention here. The Zuni Diabetes Project is a community-based exercise and dieting program targeting the general Zuni public. Using incentives and competition, the program boasted a mean weight loss of 4 kilograms for participants with diabetes and a mean fasting blood glucose value drop from 13.2 to 10.8 millimoles per liter (molecular count) (Heath et al. 1991; Wilson et al. 1994; Young 1993). The New Mexico Native American Diabetes Project “interweaves its health message with the traditions and stories that have been—and continue to be—an essential aspect of the Native American culture” (Perez 1998:49). The Gestational Diabetes Intervention Project for pregnant Cree women is also notable because researchers and a Cree advisory group together published their reactions to the research (Gray-Donald et al. 2000; Special Working Group 2000).

The Gila River Quest Program is based in tribal elementary schools where children learn the basics of good nutrition and exercise, as well as the risks and complications of diabetes. The Strong Heart Study, aimed at understanding and preventing heart disease is also active at Gila River, as is the new Look Ahead project, designed to determine the long-term health effects of weight loss in people with type 2 diabetes. The Diabetes Prevention Project of NIDDK, a national prevention program, was well attended and liked by Pimas with whom I spoke. It employed tribal members and improved long-term participation in diet and exercise programs by sending health educators into the neighborhoods, not only to talk with participants, but to eat and exercise with them on a regular basis. The Pima Action/Pima Pride study was another that found, with ample support and participatory interventions, several improvements in diabetic health could be measured (Narayan et al. 1998).

And there are many programs I have not mentioned that are likewise meeting with programmatic success. I could devote a dozen sublessons here to the various cultural details to which attention must be paid; such as the importance of food ways in the lives of Native Americans (Lang 1990; Smith and Wiedman 2001) or Indian forms of communication (Basso 1996; Hagey 1984, 1989; Roubideaux et al. 2000). But despite all this “success,” diabetes incidence rates continue to rise.

Lesson 3: Genetic factors in diabetes are very important, but they do not outweigh the other domains.

The genetic risk for diabetes associated with certain ethnicities, including Pima ethnic identity, are clearly relevant to the epidemic. Yet, treatment and prevention of diabetes are challenging clinical problems in any population, especially where poor compliance with treatment regimens has been well documented (Beckles et al. 1998; Broussard, Bass, and Jackson 1982; Narayan et al. 1998). Benyshek, Martin, and Johnston (2001) suggest that genetically focused researchers have ignored or downplayed the nongenetic influences in Native American diabetes rates. Such “monocausal etiological model(s)” (Benyshek, Martin, and Johnston 2001) have to a large degree permeated ideas about diabetes etiology among the Pima and may, thereby, foster “surrendered” attitudes (Kozak 1997) toward prevention and self-care. If programs
and interventions are to be successful, this monicausal perspective must give way to a simultaneous understanding of the many factors, including political-economic and cultural, influencing diabetes rates in Native American communities.

When, in the early years of epidemic rates of diabetes at Gila River, the etiology of diabetes was not well understood, it was appropriate that research and health care efforts blanketed the Pima reservation. As the etiology and risk factors associated with diabetes were better understood, intervention strategies became more focused and tailored to specific risk behaviors, cultural beliefs, and patient groups (e.g., dietary habits among adult Pimas). We can see in the most recent decades the development of prevention programs, aimed not only at younger Pimas but at pregnant women. We approach an “endemic” phase of diabetes at Gila River, when the scale of success measured by intervention programs is considered inadequate and the call for structural and communitywide change to combat diabetes grows loud. Through this process, genetic factors in Pima diabetes, while they remain important, are seen as only one part of the causal landscape.

Lesson 4: Structures of care need to match Native American, not IHS or Anglo, ideals of format, access, and values.

Despite so many “successful” programs in Indian Country, none have produced a net reduction in diabetes. For this kind of communitywide impact, the structure of tribal health programming may need remodeling. The Western or biomedical prototype hospital—while providing excellent acute care, centralized services, and standardized treatment—may not be a good model for reservation communities where the population is dispersed, mobility is reduced, and cultural differences influencing the doctor-patient relationship are accentuated by the sterile environment of the clinic. Instead, greater investment in decentralized or satellite clinics and home nursing services may better serve the needs of remote residents on the reservation. These forms of care require different support structures (e.g., supervision and management of multiple “roaming” providers, “home-base” offices, travel funds, mobile equipment). Greater exploitation of existing community structures should be made, for example, with education and care occurring in community centers, fitness centers, and homes.

Special efforts are being made in health programs at Gila River to be both culturally and economically sensitive in the provision of care. One physician at Gila River has implemented a diabetes group visit clinic in which small groups of patients meet simultaneously with the doctor, a diabetes educator, a physical assistant, and medical assistant. Routine care and education are provided in this setting, with time allotted for one-on-one meetings with the doctor or educator as needed. Patients who are more comfortable with group settings, thereby, have regular care and access to both peer and professional support. This clinic is, by all reports, a popular and effective addition to Gila River’s constellation of diabetes-related services.

Lesson 5: Political-economic transformations within communities must occur alongside programmatic efforts.

As health care structures and formats change to promote a communitywide shift in the approach to diabetes, so too must tribal infrastructures. Each community will have different resources upon which to draw and different visions for the appropriate forms of change. Among the possibilities most appropriate for Gila River are:

1. Improved availability and affordability of local produce, especially for communities like Gila River where a few local farmers and the tribal farm are already growing fruits and vegetables for predominantly nonlocal markets.
2. Tribal or federal subsidies for diabetes-healthy foods in reservation stores and shops.
3. Diabetes prevention initiatives that are the agenda and responsibility of every dimension of government, not solely the tribe’s “health committee” and health providers.
4. Tribal lobbying efforts that target diabetes prevention—for example, in schools, among teenagers not in school, and for pregnant women—that are aimed at bringing this minority group’s health statistics in line with the rest of the nation.

Lesson 6: To produce community-level change, diabetes prevention must rest on constant and reliable financial ground.

The political nature of health funding for Native Americans is a primary concern for long-term, community-based initiatives. Studies of the delivery of health care to Native Americans reveal that services are often underfunded and can be slated for federal cuts on an annual basis (Joe 1991). Benyshek, Martin, and Johnston (2001) felt that an “unprecedented” amount of support would be necessary to ameliorate the political and economic problems that contribute to the Pima diabetes epidemic. Funding decisions must also be based on well-informed policy that dictates a collaborative and community-based approach in prevention and treatment programs. For example, involvement of Native Americans as research assistants and in patient education and self-care help facilitate local program success.

At Gila River, good opportunities for major change exist through gaming monies, which are dispersed through tribal programs rather than in individual checks. These funds provide the critical financial resources needed to build and maintain health programs on the reservation. Increased funding for the community-based initiatives of the public health office, including visiting nurses and community health representatives, will be some of the most cost-effective efforts possible at Gila River. In addition, new policy directions are being agreed upon by the tribal council and health care corporation that will give funding priority to programs for diabetes and related conditions. The tribe is also conducting research to
document and evaluate cultural institutions and values (especially those related to health), as these have evolved into the 21st century. Plans for a new community-based diabetes education and care center have been approved and construction begun on the reservation.

**Discussion**

The diabetes programs discussed above are conducting vital work, and these accomplishments deserve continued recognition. So it is in addition to—rather than instead of—these that I make any recommendations.

Diabetes is an exceptionally difficult disease to manage. For the individual, it requires a lifelong commitment to dietary change, exercise, and self-monitoring—if not also a medication regime (oral or injectable) and perhaps even dialysis. Diabetes care requires the work of a team of health providers—internal medicine or family practitioner, diabetes educator, nutritionist, podiatrist, dentist—ideally in regular communication with each other. This entire group must move as a unit whenever the patient’s health changes.

To control diabetes is, then, a gargantuan effort in the lives of individual sufferers. To reduce diabetes rates across an entire community is an even more daunting project. Disease reduction will not occur as a result of immunization, widespread availability of medications, or improved hygiene and sanitation, as was the case in the health transitions of the last century. The reduction of diabetes rates at Gila River will require a communitywide transformation that addresses all three domains influencing the epidemic. Political-economic factors must be built into programming and must become a major focus of the tribal council’s disease reduction agenda. Health benefits add reason to the council’s already substantial commitment to improving the tribe’s economy.

Genetic factors complicate the task of diabetes prevention by implying that the disease is unavoidable for Pimas. Instead, recent generations of undernourishment and stress during pregnancy have turned a genetic predisposition into a modern dilemma of catastrophic proportion. The critical problem with regard to genetic etiology is when perceptions of diabetes as inevitable become self-fulfilling prophecies. To address the genetic factors, both small and large, formal and informal programs of change must be in place and in constant adjustment to identified needs.

Cultural factors, which are certainly important and have benefited many of the participants in programs previously described, can only help guide the disease reduction effort—they will not, alone, define it. Ethnographic data help inform tribal policy and diabetes program directors by helping to identify local priorities and determine the most appropriate and culturally meaningful methods and processes. Cultural traits, oral histories, traditional practices, material culture, and history should be part of planning that moulds and defines the community’s future. For example, although farming is no longer a central occupation for the Pima, many programs in place through schools and social centers educate Pimas in starting and maintaining their own vegetable gardens with traditional and nontraditional plants. These interventions are good microprocesses supporting broader change. Cultural issues are also being employed by Gila River’s diabetes educators and health care providers, including: the meaning and importance of food and foodways in Native American cultures; the need for local relevance through community-based programming; the use of incentives and group or team competitions; and the employment of tribal traditions and stories.

I have argued here that the three-domain perspective on diabetes would build upon existing strengths at Gila River, taking advantage of lessons painstakingly learned in recent decades. For example, diabetes care is already individualized by providers who are deeply invested in the success of their patients; the services of numerous personnel are coordinated through case management work done through the Diabetes Education Center and by the providers themselves when necessary; transportation to appointments is made available, inexpensive food substitutions are offered in diabetes cooking classes, and Pimas have access to both individual and group settings for diabetes care, monitoring, and treatment. However, care can be further decentralized into additional clinic sites or home-nursing services. Educational materials can be made more culturally and economically meaningful in a modern sense by recognizing contemporary and historic aspects of Pima culture. These materials need not become so Indian-focused that they give an impression of diabetes as an “Indian disease.” And while there is excellent tribal council support for diabetes prevention efforts, this government resource has not been challenged with enough innovative, communitywide, transforming ideas that address the structural barriers to a net diabetes reduction at Gila River.

**Conclusion**

I have attempted to holistically focus on all three domains influencing diabetes rates—political economy, genetics, and culture. Each should be reflected in program models and tribal policies. Innovations in diabetes programs remain focused on cultural information that either elucidates a group’s risky and disease-causing behaviors or that could help translate biomedical instructions into locally meaningful metaphors. When political-economic factors are addressed, efforts are often aimed at individual needs (e.g., transportation, cost, access) rather than structural barriers, which are much harder to change. The ongoing debate over genetic contributions and the cumulative effect across generations possible with type 2 diabetes reminds us of the synergistic elucidating potential of the three combined domains.

It is tribal institutions, including the Gila River Tribal Council and health care corporation, rather than federal agencies, that are now driving health care policy and programming on reservation. To reduce diabetes, tribes must now make structural and programmatic breaks with the models they have inherited from Indian Health Service institutions. Only the more progressive political arenas—as Gila River’s health care
setting is poised to become—will offer creative new programming that simultaneously considers all three domains.

This paper raises several issues that call for further attention. The first issue is ubiquitously the local concepts of health, diabetes, living well, and healing, and how these might be better employed to create bridges between indigenous and biomedical practices in all Native American communities. Tribes are best positioned to employ culturally, politically, and economically sensitive approaches that reconsider the assumptions in existing biomedical health care policies. Another important issue is the convergence of political, economic, and cultural forces on the Pima body. Improved understanding of the physiological impact of political-economic stress will reveal important details about the lived experience of (and leading up to) this disease. Scheder's (1988) work in this area was ground breaking and deserves a closer look.

When Native American and biomedical health care beliefs blend—as they do in diabetes education and prevention programs—we should view these as moments of culture contact. Notions of Native American self-determination and community empowerment should be infused into these educational moments so that the broad and complex etiology of diabetes can be understood. Each community's ability to develop a meaningful and effective diabetes program—and ultimately to reduce incident rates of diabetes—will be constrained by its capacity for community-based programming, sustainable economic development, culturally appropriate health care goals and methods, and messages of diabetes prevention that begin to rectify assumptions about the genetic inevitability of this disease.

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