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An Exploration of Gardens in Maycoba, Mexico: Change in the Environment of a Population Genetically Prone to Diabetes

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Abstract: Gardens are an important part of the environment as they play multiple roles and are central to the lifestyle and economy of many communities. The investigators use qualitative methods to explore patterns and perceptions about changes in gardening and cultivation in the community of Maycoba, Mexico. Maycoba is home to a large community of Pima Indians, an Indigenous population genetically prone to diabetes. Pima Indians living in the United States have been shown to have an extremely high prevalence of diabetes, but the genetically comparable Pimas in Maycoba, Mexico, were found to have little diabetes in the early 1990s. The authors examine home gardens and other cultivation in the area as an element of a changing environment and lifestyle during the past 15 years. Methods include interviews and focus groups. Preliminary findings are presented in this paper.

Keywords: Pima Indians in Mexico, Diabetes, Indigenous Women, Home Gardens, Lifestyle

IN THIS PAPER we use qualitative methods to explore gardens, cultivation, and change in Maycoba, Mexico (figure 1). Gardens are an object of study because they play a significant role in health and society in many ways: nutrition, culture, and lifestyle. Maycoba lies in the Sierra Madre Mountains of Northern Mexico in the state of Sonora, and this vicinity is home to a population of indigenous people, the Pima, who have inhabited the Arizona and Northern Mexico region for centuries. Background information on the Pima people's experience with the cultivation of plants allows us to compare what is known from Pima history with information about gardens of the Pima in the mountains of Mexico today.

Genetically related Pima tribes living in the United States have extraordinarily high rates of diabetes and study of tribal members with diabetes has allowed researchers to learn more about the disease. Pima in Maycoba have a low prevalence of diabetes, providing compelling evidence that the environment has a strong influence on diabetes. Gardens are one element in the environment of Maycoba that appear to be changing. The prevalence of diabetes is dramatically increasing in both the United States and Mexico, and documenting changes in the environment which contribute to changes in lifestyle may prove significant to developing interventions for diabetes in both countries.



Figure 1: Map Locating Maycoba, Mexico

Gardening for Health and Society

Gardens have a variety of functions and play important roles in Latin American and indigenous health and culture. Home gardens in research and literature are identified as dooryard gardens, house lot gardens, kitchen gardens; all the terms reflect a space that is cultivated and managed near the home (Akinnifesi, et al., 2010; Bain, 1993; Finerman & Sackett, 2003; Kumar & Nair, 2004). A garden is a place of in-situ conservation, it is a living seed bank for plants that are not necessarily widely planted anymore, but are significant to traditional knowledge systems. Home gardens generally have a high level of biological diversity (Akinnifesi, et al., 2010; P. L. Howard, 2003; Huai & Hamilton, 2009; Padoch & de Jong, 1991). Gardens serve as outdoor laboratories where experimentation with potential crops in larger fields can take place (P. L. Howard, 2003; Kumar & Nair, 2004). There is evidence of different roles that gardens play based on rural or urban context. In rural settings, gardens are predominantly a woman’s space, where household subsistence crops are grown. In an urban setting, gardens begin to shift roles, children and men are more likely to participate, and gardens become a source of household income (Akinnifesi, et al., 2010; P. Howard, 2006; WinklerPrins, 2002; WinklerPrins & de Souza, 2005). The role of plants as food, health, and healing is apparent (Balick, et al., 2000; Ososki, et al., 2002). In immigrant and colonial contexts, home gardens are also significant spaces of cultural, gender, and societal

stability. Gardens become a space of cultural practice, where immigrants negotiate their host and native cultures (Morgan, Rocha, & Poynting, 2005).

Home gardens play a variety of personal and societal roles. In various contexts where women's roles may be limited by larger societal and political structures, home gardens often represent a space where women can exercise their skills, show pride, express themselves, share their history and culture with younger generations and contribute to their household well-being (Bain, 1993; P. Howard, 2006; Murrieta & WinklerPrins, 2003; Nazarea, Piniero, & Mula, 2003; Piniero, 2002). A woman will use gardens to cultivate a living pharmacy for her use as her family's primary health care provider (Finerman & Sackett, 2003); she can demonstrate her management skills in an acceptable space and manner through her gardening abilities (Finerman & Sackett, 2003; P. Howard, 2006); she can also use gardens as a space of expression (WinklerPrins & de Souza, 2005). Gardening and harvest activities allow for numerous social networking activities to occur, such as sharing planting materials, transferring traditional local knowledge, and gift-giving (Ban & Coomes, 2004; Buchmann, 2009). These activities can also reflect a family's social and health status (Finerman & Sackett, 2003; P. Howard, 2006). In the face of food insecurity, gardens provide a tool for resilience of both culture and health (Buchmann, 2009).

Pima and Cultivation in Mexico

Indigenous peoples were living in the Sonora and Sierra Madre regions in Arizona and Northern Mexico when the Spanish first came to the area in the early sixteenth century. The *O'odham*, *O'ob*, or *Pima* are descended from the ancient *Hohokam* people who inhabited the area for centuries. Groups of Pima spread into different geographical areas within the region: in the deserts, near rivers and in the mountains, and they were sometimes called by different names. The Pima in Mexico have been called the Pima Bajo; *O'ob* is the name for the people in their own language in Mexico, and *O'odham* is the name used north of the border. Though hunting and gathering were the primary subsistence activities prior to Spanish colonization, cultivation was part of native Pima culture "for more than a millennium before Spanish contact" (Radding, 1997, p. 26). Pima people had been gathering seeds and developing useful products from wild plants for centuries.

For all the Pima groups, cultivation patterns were tied to the availability of water. Before colonial contact it is estimated that the desert dwelling Pimas obtained about one-fifth of their total food supply through cultivation. Pima communities in the mountains had abundant rainfall, and were thus able to cultivate more products, which they planted on terraces and in arroyos (Radding, 1997, p. 24). Approximately two and a half centuries of colonial rule, supported by Spanish missionaries, introduced the Pimas to the use of oxen, wooden plows, and metal implements which further expanded agriculture and cultivation, though the cultivation patterns remained basically the same. Most families had home gardens as well as larger lots further from their dwellings where they planted. Mountain dwellers planted gourds, beans, cotton, squash, and different varieties of corn, and "native garden plots provided food, fiber for weaving, dyes, medicinal herbs, and ornamental plants" (Radding, 1997, p. 52). Spanish missionaries introduced orchard trees including figs, peaches, apricots, pomegranates, quince, grapes, citrus, plums, and apples. Radding explains that native plants such as corn, amaranth, chile, tobacco, and native beans grew together with foods of European origin, such as melons, wheat and other legumes. (1997, p. 54).

Since the eighteenth century, written records exist of Pima consistently living in the Sierra Madre community of Maycoba, Mexico to the present day, though most of the Pima in other parts of northern Mexico have dispersed. Pennington observes, "It is clear that only the Mountain Pima have maintained themselves in approximately the same numbers as at Contact. It must be that the factor of distance, the undesirability of their habitat. . . , and a general distrust of the sierras. . . have made possible the survival of the Mountain Pima in such numbers" (1980, pp. 51-52). In the middle of the 19th century, the United States of America acquired land that was part of northern Mexico and further distanced the desert dwelling Pima in Arizona from those in the Mexican mountains.

Diabetes and the Environment

For the past century Pima have lived in the Maycoba area of the Sierra Madre mountains in Mexico and have continued to cultivate and produce the majority of their own food for subsistence (Pfeifer & Rodríguez, 2001). The environment of the Pima in Arizona, on the other hand, changed dramatically in the twentieth century. In the 1960s researchers found extremely high rates of diabetes in the Pima in the United States (Bennett, Burch, & Miller, 1971; Knowler, Bennett, Hamman, & Miller, 1978). The importance of environment as a factor in diabetes was underscored by a study conducted in 1995 comparing Pima Indians living in the United States and Pima Indians living the Sierra Madre community of Maycoba. Genetic study confirmed that the populations were comparable, but there was little evidence of diabetes in the population living in Mexico. "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" (Schulz, et al., 2006).

When researchers went to Maycoba in the early 1990s, a highway had recently been constructed leading through the community, and there was speculation that life in the community would begin to change as people were exposed to more outside influences. Recently investigators have returned to Maycoba to determine whether there has been any increase in the amount of diabetes in the community. As of 2010, the study is still ongoing and incomplete. We have, however, been able to use qualitative methods to investigate change in the environment. Gardens are part of the environment playing significant roles, as described earlier, in the health, culture and society of people. In examining gardens, we view how an aspect of the environment might change and influence a society which has relied on subsistence cultivation for hundreds of years.

Research Methods and Data

Focus Groups

We conducted two focus groups with key informants. Participants were selected based on age, geographic location of residence, self-identified ethnicity, and key informant knowledge status. All the informants were over 35 years of age and identified by a community leader/recruiter as people who were both cultural experts and effective communicators. One group consisted of seven people, five women and two men. The two men were the present governor and former governor of the Pima *ejido* (common land surrounding settled communities),

near Maycoba. The people in this group were located in areas approximately four miles away from the main village of Maycoba and all of them identified themselves as Pima. The other group was composed of three people, two women and one man who resided within the village of Maycoba and identified themselves as non-Pima. Each group discussion lasted approximately ninety minutes and consisted of questions about gardening, change, health, and physical activity. There were two investigators for the focus groups; one took notes while the other person led the discussion. The proceedings were digitally recorded, transcribed and translated into English.

Focus Group Themes about Gardening

Themes emerged during the focus group discussion about gardens and gardening. Figures 2 and 3 are two examples of home gardens in the Maycoba region. These themes were triangulated and assigned terms by the investigators: 1) everyone works to help each other and we take care of each other, 2) gardening is good work that you can always do, 3) water is important, 4) change is good but we need to be careful not to lose ourselves as things change.



Figure 2: Home Garden Right off Highway 16 in Maycoba



Figure 3: Home Garden 4 Miles from the Village of Maycoba

Everyone Works to help each other and we take care of each other

Participants in the focus groups told us that the whole family works in cultivating not only the adults but, “many times the older people enjoy it [working in the garden] and the children too, when they get out of school.” Gender was apparent in respect to the location of gardens. Participants said that home gardens are tended mostly by women, but cultivation in larger lots located farther from people’s homes are mostly worked by men. Everyone worked together on a reforestation project after a lumber mill operation had cut down many trees. Participants talked about how the people had come together for that project and planted hundred of trees together. This reforestation project demonstrated another aspect of taking care for each other: the trees were intended for the succeeding generations rather than the present generation. “It is good that [the trees] are growing again, but it won’t affect us, it will affect our children and grandchildren.” It was also evident that people enjoyed sharing their produce with their neighbors and friends, “If there is someone who needs it, we share.” A participant told how she needed a specific herb for an illness and went to her neighbor who grew it. All participants insisted that they would share their produce with their neighbors even if they had little. “We like to share,” was a common sentiment.

Gardening is Good Work that you can always do

In recent history a lumber mill had employed most of the people in the area, and its closing was a significant event in the lives of the participants. The mill had been operating in the early 1990s, but it was closed by 2009. People in the focus groups were generally sad about the closing of the mill. They appreciated having paid work to provide needed income for their families, and the closing of the mill meant that young people left the community to look for paying work. But the participants saw cultivation as work that would continue even without the mill. “The lumber mill provided work for people, which was good, but it also meant that people stopped planting as much,” one person explained. Other comments supported the theme. “From the time there was a mill there has been work, but now that no more wood comes, people will go back to planting; it will be like it was way before.” “Well, now the people are thinking that the only work for us is to grow beans and corn.” “It is good to grow because there are no jobs and it is expensive to buy things.”

People in the focus groups appeared to enjoy talking about their gardens and the plants they grew. One person said, “If the whole world would do what we do [gardening, cultivation], the world would be much better, but many people say they prefer to go to the store.” Participants spoke about their fruit trees and other plants, like prickly pear and herbs, which did not need to be planted every year as well as the things they planted every year: onions, cilantro, peppers, squashes, corn, spinach, beans, and others. When asked if people in Maycoba liked to work in the garden or if they only did it because they needed the food, the consensus was that people liked to do it and would do it even if they didn’t need to.

Another important advantage of home gardens mentioned were the plants, either wild or cultivated, which could be used as medicine. It appeared that some of the informants knew about and used ethnomedicine more than others, indicating the presence of medical pluralism. A comment from one of the key informants was, “I think that natural medicine is good and I have taught my children about it. Sure, you have to go to the doctor, but I always look for medicinal plants. I have a lot of faith in natural medicine.” The discussion about medicine was particularly poignant when we conducted the focus groups because of recent events that had occurred in the village. Normally the village was served periodically by a physician fulfilling national service in this isolated, rural setting. The Unidad Medica IMSS-Solidaridad, governmental medical service, stopped sending doctors to the area because of violence presumably due to drug cartels.

Water is Important

When asked about the difficulties of gardening and what would make it easier, the participants all responded that the lack of water was the most difficult aspect of cultivation. The lack of rain was spoken about as a relatively recent phenomenon. “[When the investigators were in Maycoba around 1995] there were people that planted corn, beans, and plantings everywhere, but not any longer; there has been a change in that. I think it is because they plant, and it doesn’t grow much. They stay small most of the time because it doesn’t rain early and nothing grows.” “In May water is a problem, everything dries out and there isn’t any [rain].” When a year is dry and little grows, the informants explained, seeds are then scarce for the following year. People made statements such as “Before they planted corn, beans and they sold or consumed it, and now you have to buy corn and beans because there is no longer any

harvest to plant. “We used to be able to grow everything we need; but now it is less, and more things are bought at the stores.”

Change is Good, but we need to be Careful not to Lose Ourselves as Things Change

In general, the focus group participants saw changes in the community as good, but they were aware that some of the changes might be detrimental. “Last time [investigators were here] there were not many roads, and now there is much traffic. “Before, people did not leave.” “Today there is light for all the ranches, and it is a big help.” A few participants made comments about children enjoying to watch television. From the informants’ perspective, the most important change was the school. While a primary school existed earlier, now there is a video-assisted secondary school. People spoke with pride about the *telesecundaria* school. One of the informants offered this about the benefits of school, “Sometime young people did not speak well in Spanish or didn’t understand it. They were ashamed because they didn’t know it or didn’t know how to read. They were afraid that someone would laugh at them, so they didn’t go out much, now the young people know how to express themselves.” Another informant responded to the last statement by saying, “Yes, in that sense studying is good, but there are things that are being lost, like the language [indigenous language]. We speak it, but it is being lost because the children don’t speak it anymore. I know that if the language ends, that day we end.” This prompted the following statement about responsibility, “If we teach each one of the children they will learn; if we don’t teach them, they won’t learn.”

The mixed feelings about changes were pertinent to knowledge about gardening as well. The informants explained that they learned to garden from their parents. “Our parents taught us, and their parents taught them.” “[Knowledge about gardening] came with our parents and we teach our children with the oxen and the hoe, but there are other ways to do it more easily.” [Now often adults do the planting] “...because the young people want to do other things. At least before when they [children] were planting corn, they helped the *ejido*, and now since there is almost no planting, the kids hardly know what it is to plant.”

Survey

In addition to the focus groups, we conducted a survey of a sample of households in the Maycoba area. Using census data we estimated that there were 275 households in the geographic area of interest who had at least one adult over 35 years of age and who had lived in the area since 1995. Local key informants disputed this number telling us that there were far fewer households. The individual who collected the census data insisted that there were no more than 180 households in Maycoba. We selected a random sample of 71 households in which to conduct the interviews. Key informants identified five women to conduct the interviews. Four of the women were fluent in both Pima and Spanish, and they all knew how to contact each household. We spent a day training the interviewers, and they assisted us with the wording of the survey, which was written in Spanish. They were instructed to explain the objectives of the survey and information about the protection of human subjects in accordance with our Institutional Review Board approvals. The interviewers were asked to interview only one adult in each household who was over 35 years of age and who had lived

in the area since 1995. The interviewers were also instructed to use a mutually agreed upon phrase when asking questions about 15 years in the past, the time when the researchers did previous work in the community. The interviewers suggested the phrase, “when Julian was living here before;” they offered that residents would all remember the time when Julian, an investigator on the previous study, lived there. Additional training included instructions on asking the questions in an open-ended manner by waiting for a response rather than giving the participant a choice of answers. We collected a small amount of demographic information about the participants as well as answers to questions on gardening, food, plants, health and beliefs.

Survey Data

We interviewed 30 men and 41 women whose stated ages ranged from 35 to 72 years old. Nine people did not know their ages, but they were likely to be over 70 years of age. Forty one percent of the participants said that they had not ever attended school. Of the people who did go to school, the average age at which they left was 12 years of age. We asked the survey participants to identify themselves ethnically, and 76% identified themselves as Pima; another nine percent said they were Mestizo. Combining these two groups, about 85% identified themselves as indigenous people. Nine percent identified as Blanco, of European ancestry, and the remaining four percent did not know or answer this question.

We wanted to confirm the gender aspect to gardening revealed in the focus groups because it defines a planting pattern and because the theme of everyone working together was also strong in the focus groups. Thus the survey included a question about whether women did most of the home gardening. Slightly over 87% of the survey participants said they believed that women did most of the gardening. It was interesting, however, that when we asked who actually did the major amount of work in their own gardens, 49 % answered men, 49% said women, and 27% said children (more than one answer was possible). The English translations of other questions about gardening are listed below preceded by an identifier for the question; the answers to these questions are represented in table 1.

G10. Does (did) your family have a garden this year?

G95. Did your family have a garden [in 1995]?

F26. Do you use food from a local ranch or agriculture?

F28. Do you think that the amount of your food that comes directly from those who grew it has changed since [in 1995]?

Gfam. For most of the families locally, do you think that the amount of work they do gardening these days is the same as it was [in 1995]?

Gnino. Do you think that the children work as much in the gardens these days as they did [in 1995]?

Table 1: Changes in Gardening and Cultivation

Question Identifier	Most Frequent Answers about Gardening, Cultivation and Beliefs	Frequency % (Percentage)
G10	Our family had a home garden in 2010	69
G95	Our family had a home garden in 1995	70
F26	Our family used cultivated food from local ranch in 2010	96
F28	Our family uses less food from cultivation than they did in 1995 (from ranch or garden)	59
Gfam	Participant believes that the amount of work most families puts into gardening is less than it was in 1995.	63
Gnino	Participant believes that children work at gardening less now than they did in the past.	63

Subsistence food plants the residents of Maycoba area said that they grew, cultivated or tended in 2010, ranked by most commonly answered first, included: fruit trees, corn, beans, squash, potatoes, onions, garlic, chili, tomatoes, herbs, and greens. The most frequently mentioned plants they used for common illnesses, which we did not translate from Spanish or botanically identify, included the following: *babisa*, *manzanilla*, *contrahierba*, *hierba buena*, *epazote*, *ruda*, *hierba de la vibora*, and *matarique*. Many of these, like the fruit trees, were not planted by the participant in the survey; but they were mentioned as a plant that they used or tended.

Discussion and Conclusions

As they have done for hundreds of years, most of the families in Maycoba still have home gardens as well as larger plots where they cultivate their food. This pattern persists even though discussion in the focus groups indicated that people are going to the stores more to buy food than they did in the past. The survey also suggested that the number of families who have gardens is the same as it was fifteen years ago as well. Even though a majority of people believe that they obtain less food from cultivation than they did in the past, a large percentage, about 40%, of the people believe that they obtain just as much, or more, food from cultivation than they did in the past. Beliefs about the amount of work that families and children do in the garden were similar: the majority believe that both adults and children do less work in gardening but a large percentage believe that the amount of work is the same as it was in the past. Ninety six percent of the survey participants said that they obtained food from land or gardens for consumption. These results suggest that gardening and cultivation is changing, but the change is not a dramatic one and the pattern of subsistence on locally cultivated food is still robust.

Both the focus groups and the survey suggested a pattern of women being responsible for home gardens, but the survey showed inconsistency because, when asked who actually did the major amount of work in their own garden, the answers were evenly split between men

and women. It could be that the participants interpreted this question to be about cultivation in general that occurs in both home gardens and larger plots, or that amount of work one does is not an indication of responsibility. Further study on differences between home gardens, ranch cultivation patterns, and gender differences is warranted to determine if these patterns will change as the residents experience more Westernization.

Many of the planting patterns indicated in our focus groups and survey suggest ancient patterns which have persisted. The Pima in Maycoba have gardens with a balance of annual, perennial, and wild plants as well as trees. This pattern harkens back to what Radding called “the blurred line between farming and gathering in O’odham culture” (1997, p. 49). Families having two kinds of cultivation areas, a local garden and a larger area, have also been described in early accounts of the Pima people. While access to sugary and processed products appears to be increasingly available in the local stores, consumption of cultivated staple foods is still the common diet. The availability or lack of water appears to be one of the most important factors in the amount and type of cultivation that takes place, a challenge to the Pima for centuries.

Cultivation activities contribute to a physically active lifestyle, and this is associated with a low prevalence of diabetes. Paid employment in the lumber mill was also very physically demanding work, and it appears that people are returning to more gardening and cultivation activities without the employment of the lumber mill. Clearly the physical activity level of the Pima in Mexico is still much greater than those in the U.S. The activity of cultivation is vital to the people’s survival and has the additional advantage of probably being protective against diabetes. The participants in this qualitative study indicated that reduction in the amount of gardening and cultivation was related to lack of water. Efforts to mitigate the effects of drought would appear to contribute to maintaining the traditionally active lifestyle of the Pima in Maycoba.

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Dr. Lisa S. Chaudhari

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Dr. Leslie Schulz is the Executive Dean of the College of Health and Human Services at Northern Arizona University in Flagstaff. She received her doctoral degree in nutritional biochemistry and has been involved in academia and diabetes research for thirty years. She is the principal investigator of this research project.

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Our community members and first time attendees come from all corners of the globe. Intellectually, our interests span the breath of the field of health and social sciences. The Conference is a site of critical reflection, both by leaders in the field and emerging scholars and teachers. Those unable to attend the Conference may opt for virtual participation in which community members can either or both submit a video or slide presentation with voice-over, or simply submit a paper for peer review and possible publication in the Journal.

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The Health, Wellness and Society Community enables members to publish through three mediums.

First, by participating in the Health, Wellness and Society, community members can enter a world of journal publication unlike the traditional academic publishing forums – a result of the responsive, non-hierarchical and constructive nature of the peer review process. [The International Journal of Health, Wellness and Society](#) provides a framework for double-blind peer review, enabling authors to publish into an academic journal of the highest standard.

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