

Looking Toward Food Sovereignty: Assessing the Roadblocks to Reintroducing

Traditional Agriculture to the Tohono O'odham Food System

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I want to acknowledge that this paper was written and my studies over the past four years have taken place on the traditional land of the Yesa People, whose descendants are the Monacans, Haliwai Saponi, and Tutelo speaking peoples. I want to recognize the history and present of these peoples, and honor with gratitude the land itself and the people who have stewarded it throughout the generations. This is one step we can take to correct the stories and practices that erase indigenous people's history and culture.

## **I. Introduction**

“In a very real sense, the destruction of the traditional food system is killing the Tohono O’odham” (Fazzino 2008). Among a tribe of Native Americans living in southern Arizona, a public health crisis has been unfolding for years. The Tohono O’odham tribe experiences some of the highest rates of obesity and diabetes in the world. This fact is even more concerning when considering that among the tribe, diabetes was virtually unknown among their population prior to the Second World War (di Cintio 2012). This naturally begs the question: what changed for the tribe? The answer is their food system.

The history of Tohono O’odham food and agricultural system, in the context of its contact with Europeans and European descendants, is riddled with attempts at change and “modernization.” The most comprehensive instance of this comes in the case of the United States influencing the Tohono O’odham food system after World War Two. More on this change will be discussed throughout this paper; however, the consequences of this change have been grave for the Tohono O’odham people.

These consequences need not be permanent, however. Currently there are several tribal organizations working to reinvigorate the traditional food system on the reservation. However, surmountable roadblocks barring the reinvigoration of traditional agricultural practices in the Tohono O’odham food system currently exist. This paper will seek to identify those roadblocks, as well as potential strategies to circumvent these roadblocks and allow traditional agriculture to become a vital part of the food system once again. Furthermore, this paper will analyze the scale of the role traditional agriculture could play in the modern Tohono O’odham food system, accounting for population changes and changes in work practices. In doing so, potential suggestions for the reinvigoration of Tohono O’odham agriculture could be further applied on a

macro scale, to other Native American communities nationwide as well as localized agricultural food system as well.

## **II. Literature Review**

According to the Center for Disease Control (CDC) National Diabetes Statistics Report published for the year of 2020, 34.2 million Americans (roughly 10.4% of the population) currently suffer from diabetes. On the Tohono O'odham Native American reservation of Southern Arizona as of 2012, roughly 60% of tribal residents had developed diabetes, more than quintuple the current national average (di Cintio 2012). Prior to the second World War, diabetes was virtually unknown to the Tohono O'odham people; now it is nothing short of a public health crisis on the reservation (ibid). To understand how this change occurred and what potential solutions exist, it is necessary to understand the history of the Tohono O'odham people, their food system, and their traditional agriculture.

The Tohono O'odham people are native to South Central Arizona and Northern Mexico, where their main reservation occupying a portion of their previous land straddles the US-Mexico border (Robinett 1999). They have inhabited this land since at least the early 16<sup>th</sup> century, after rising to dominate the land following the mysterious fall of the previous inhabitants (to whom their relationship is still the subject of debate), the Hohokam (Teague 2009). Hohokam sites within the basins of the Gila and Salt Rivers give evidence of advanced settlements and agricultural techniques, such as irrigation drawing from these rivers (Crown 1990). Its even theorized that their irrigation techniques, coupled with shifting weather patterns, contributed to their eventual collapse due to lack of water resources (Doolittle 1992). Following the collapse of the Hohokam, three distinct O'odham peoples (O'odham meaning people in their language) emerged in the several linguistically related peoples emerged in the Sonoran desert: the Akimel O'odham

(meaning “River People,” formerly referred to as the Pima), the Hia C’ed O’odham (“Sand Dune People”), and the Tohono O’odham (“Desert People”) (Erikson 2003). The Tohono O’odham warred with the neighboring Apache beginning in about the 15<sup>th</sup> century (Erikson 2003). Spanish explorers first arrived in the area in the 16<sup>th</sup> century; however, interactions with between the O’odham and the Spaniards were primarily trading until the late 17<sup>th</sup> century. At this time, efforts to Christianize the O’odham increased and were often centered around food security provided by Christian monasteries built in the region (Erikson 2003). Traditional agriculture in the region relied on flooding and could be an inconsistent food source. The Spanish agriculture incorporating irrigation (not unlike the Hohokam system) proved to be a more consistent food source, and drew many O’odham to the Spanish missions and Christianity (the latter somewhat nominally). Also, this cultural exchange introduced wheat into the O’odham food system for the first time (Erikson 2003).

The relations of the Spanish and O’odham would sour due to increasing Spanish presence and attempted control of the region, leading to a series of uprisings in the late 17<sup>th</sup> century (Erikson 2003). Though the missions would remain, the Spanish effectively lost control in the region following these uprisings and contact with outsiders would remain at a level of trading for the next century (Erikson 2003). However, following the Gadsden Purchase of 1853 the O’odham came under the administration of the United States (Erikson 2003). In the decades following the Gadsden Purchase, the O’odham remained resistant to widespread change in their practices. During the early 20<sup>th</sup> century, working in agriculture for American farmers off the reservation became a viable economic option for the O’odham (Meeks 2003). This practice of migratory farming actually fit the O’odham well, as the cotton picking they did occurred outside of ak chin season (ibid). Additionally, such migratory farming between villages of O’odham existed since

assumedly pre-European times, making this development easily compatible with the traditional system (ibid). Despite resistance to change, outside pressures continued to mount as more American settlers moved into the region. It is important to note that prior to US control, O'odham groups existed largely independent of one another, united for defense when necessary (Lucero 2014). This changed in 1937 when the O'odham adopted a constitution and formed a central reservation government in response to mounting outside pressure to adopt American culture (ibid). Many O'odham men would fight in the Second World War, and it is after this that dramatic changes in the food system would begin to occur.

Prior to this point, the agriculturally based food system of the Tohono O'odham had largely remained the same since the late 17<sup>th</sup> century. The traditional O'odham food system consisted of three main sectors: *ak chin* farming, gathering of wild fruits, and hunting (Reader & Johnson 2014). *Ak chin* farming centered around the summer monsoon rains, which spread water and nutrients over plains that the O'odham would then plant specially evolved varieties of crops that fit their brutally hot and dry home the best (Reader & Johnson 2014). The tepary bean was a staple of the O'odham food system, as it is highly resistant to heat and drought as well as being extremely nutritious (Fazzino 2010). Additionally, desert adapted varieties of corn, squash, amaranth, and fiber plants filled out the agricultural part of the traditional O'odham food system (Reader & Johnson 2014). For the purposes of this paper, traditional agriculture and traditional agricultural practices will refer to *ak chin* farming, unless otherwise clarified. Gathered food also played an important role in the traditional O'odham food system, with the fruit and seed pods of native cacti, agaves, mesquite, amaranth, and yucca plants further supplementing the agricultural production (Reader & Johnson 2014). Finally, hunting added vital nutritional value, with desert

mammals such as rabbits, mule deer, and bighorn sheep adding protein to the traditional O'odham diet (Reader & Johnson 2014).

Central to the traditional food system is also the concept of *himdag*, the collection of lifeways among the Tohono O'odham. *Himdag* has no literal translation to English and encompasses all aspects of Tohono O'odham cultural and spiritual life (Reader and Johnson 2014). Many of the ceremonies and rituals of the Tohono O'odham people center around agriculture, making the traditional food system not only a matter of health and environmental interaction, but a deeply cultural and spiritual part of O'odham society as well (Reader and Johnson 2014). Examples of this intersection come in two of the most important Tohono O'odham ceremonies, the Jujkida and the Salt Pilgrimage. The former is a communal ceremony designed to “sing down the rain” in order that the monsoons may come, and ak chin planting may commence (ibid). Participants in the ceremony for four nights sing sacred songs, dance, and engage in prayer leading up to final night (ibid). The participants then drink saguaro cactus wine (which has a very low alcohol percentage) until they vomit (“vomiting up the clouds”) in order to complete a cycle in themselves and summon back the monsoon rains so vital to their survival (ibid). This practice was one of the central points in communal Tohono O'odham spiritual life, and directly related to their traditional agricultural practice, exemplifying the interconnectedness of ak chin with the rest of Tohono O'odham life. The Salt Pilgrimage, central to the individual development of young Tohono O'odham men, also had a function relating to the traditional food system. The pilgrimage consists of a journey to the Sea of Cortez overland, on foot, in order to hopefully witness a vision telling one of their role in the Tohono O'odham community (ibid). Additionally as the name implies, the pilgrimage also brought salt from the sea back to the village, as a means of both seasoning and food preservation. Thus personal growth, fulfilment and purpose were tied

to the food system, further emphasizing how it as part of *himdag* influenced all parts of the Tohono O'odham traditional life.

How, then, did system so ingrained in a people's very identity come to be replaced? The answers lie in a series of events surrounding the Tohono O'odham nation in the mid-20<sup>th</sup> century. In the 1920s and 30s, the Tohono O'odham food system still retained its traditional practices, and was largely self-sufficient. 20,000 acres of O'odham land were dedicated to *ak chin* agriculture, and more than 1.4 million pounds of the staple tepary beans were produced in 1930 alone (Reader 2018). The population of the tribe in Arizona at the time was 5,163 (Truesdell 1937). As previously mentioned, diabetes was virtually nonexistent, and the tribe enjoyed a high degree of sovereignty. However by 1949 the acreage used for *ak chin* agriculture had declined to 2,500 acres, and by 2018 had dropped to less than 200 acres (Reader 2018). Furthermore, by 2001 less than 100 pounds of tepary beans were being harvested per year (Reader 2018). What brought about this decline and the subsequent consequences?

As previously mentioned, many Tohono O'odham men, who before had worked in agriculture, left to fight in World War Two. Upon their return, outside factors began acting to change the reservation food system, both intentionally and unintentionally. First, "well-intended" work programs took many veterans who had previously devoted their time to traditional farming both away from their farms and off the reservation for work (di Cintio 2012). These programs were meant to provide economic opportunity to the O'odham men, along with the more subversive goal of integrating them into wider American society. Young O'odham people were also sent away to boarding schools off the reservation, further depleting the population that could work in traditional agriculture, as well as putting barriers between these younger generations from the cultural ties held by the tribe to the land and the agricultural practices (Fazzino 2010). This again



was a political move to try and “Americanize” the young Tohono O’odham. Compounding the decrease in agricultural workforce was an increase in the availability of cheap surplus foods, often dairy products and processed starch products, supplied by the government commodity programs as a means to provide a cheap food alternative as the O’odham were moved away from their traditional food system (Fazzino 2010). For the purposes of this paper, this commodity food as well as other non-traditional food options (grocery stores, fast food, etc.) introduced to the Tohono O’odham may be referred to as convenient food. These products were supplied as the latest in attempts reaching back to the Spanish to find what outsiders believed was a more stable and predictable food system for the Tohono O’odham (Fazzino 2010). The decreasing production of traditional foods led to a decrease in their availability, and logically a decrease in traditional food consumption among the Tohono O’odham as these foods became more expensive (Fazzino 2010). This led the Tohono O’odham to turn to convenient food options to fill their diet.

Further compounding the dietary changes was the introduction of a more sedentary lifestyle for the Tohono O’odham. Throughout their history, the Tohono O’odham were noted for their distance running and endurance abilities. Even after running became less of a necessity, the people still had physically active lifestyles, often working as migratory farm workers off the reservation outside of their own farming season (Meeks 2003). However, as the Western economic system was imposed on the tribe, physical activity of all kind continually decreased, and compounded with the changes in diet.

The results of these changes on the Tohono O’odham have been extremely detrimental. In addition to the statistic mentioned at the beginning of this section, roughly 76% of O’odham children in grades 6-8 are overweight or obese, and current trends predict that as much as 75% of

O'odham children born after 2002 will develop diabetes during their lifetime (Reader 2018). The Tohono O'odham reservation already has the highest rate of diabetes in the world; without drastic change in the food system the situation is unlikely to improve (Reader 2018). While not the exclusive solution to the public health crisis facing the Tohono O'odham, an increase in consumption of traditional food has shown promise in curbing the prevalence of diabetes. In a clinical experiment done on the closely related Akimel O'odham, Boyd Swinburn demonstrated that a shift in diet to exclusively traditional foods (which the Akimel and Tohono O'odham share) was sufficient in controlling diabetes, without any additional medications or exercise (Fazzino 2010).

Additionally, the shift away from traditional agriculture has come with environmental detriments, specifically related to water and water usage. Modern agricultural practices, namely heavy irrigation and well use, have continuously depleted surface and groundwater accessible for farming, and water rights have become a contentious issue among all inhabitants of the region, not just the Tohono O'odham (Nabhan 1979). In addition to disrupting the natural ecosystem by removing water, this has also caused water pumping prices to skyrocket in part of southern Arizona (Nabhan 1979). Legal fights have also ensued over water rights, somewhat culminating in the Arizona Water Settlement Act of 2004, but continued to the present as well. Thus the water issues touches the environmental, economic, and political sectors of life for the Tohono O'odham, and its relation to modern agricultural is unquestionable. Ak-chin agriculture, by harnessing rainwater as its source, can help circumvent these shortages by utilizing water that would otherwise have been lost as runoff or evaporation as part of the agricultural system (Nabhan 1979).

Among the O'odham people, the potential benefit of reintroducing traditional agriculture has been recognized for some years. Organizations like the Tohono O'odham Community Action (TOCA) and Tohono O'odham Community College (TOCC) have pursued this sort of food system and food sovereignty since the mid-1990s, and their progress and efforts cannot be over-emphasized (Reader 2018). In the absence of reservation wide survey about the topic, the work and existence of several organizations encouraging traditional agriculture helps show there is an active interest in restoring traditional foods to the diet. In addition to TOCA and TOCC, the San Xavier Cooperative Farm (SXCF), Healthy O'odham Promotion Program (HOPP), and Native seeds/SEARCH all have taken steps in working to reinvigorate, or at least preserve, traditional agriculture (Fazzino 2008).

SXCF practices sustainable agriculture methods derived from traditional methods to grow both traditional crops and alfalfa for hay (ibid). The latter is particularly important, as it acts as the main income source that allows for the growth of traditional crops (ibid). Being located on a district outside the larger reservation also affords SXCF the choice of not being totally reliant on the monsoons, as they can draw from nearby water sources (ibid).

TOCA engages in a variety of efforts to encourage the consumption of tradition food, including supporting farming efforts and running community education programs on the benefits of traditional diets in efforts described as exemplifying the nature of *himdag* (ibid). In the past, they have helped tribal members start gardens, distributed seeds and food to tribal members, and offered workshops not only on agriculture topics, but also subjects such as how to work a digital camera (ibid). Most promisingly in terms of future success, TOCA in 2010 began the New Generation of O'odham Farmers program, which through its graduates became Project Oidag, a movement by young people to increase knowledge and access to traditional foods on the

reservation (Reader 2018). Project Oidag is encouraging for several reasons. First, its inspired by young people, bringing the hope of attracting other young people to learn traditional practices and keep these traditions alive. Also, it is a further extension of *himdag*, as the program focuses on intersectional aspects of society that relate to agriculture (ibid). Its community outreach potential is large and being realized. Additionally, TOCC has occupied a similar role, also engaging young tribal members in these efforts (Fazzino 2008).

HOPP assists in providing education and access to exercise opportunities for tribal members, and finally Native seeds/Search collects, catalogues, and distributes seeds of traditional foods to tribal members, many times to help them start their own personal gardens (ibid). The efforts of these organizations show there is an interest in revitalizing the traditional food system on the reservation and give hope to this future.

However, numerous roadblocks still exist that prevent widescale adoption of traditional agriculture. These roadblocks will be explored in further depth throughout this paper. The major roadblocks today come not from explicit bans or preventative policy, but less formal restrictions. In interviewing Tohono O'odham citizens in 2008, residents gave David Fazzino a number of reasons why there was not as much traditional food in their diet. These reasons included lack of convenience, lack of safety when collecting along the US-Mexico border, high cost of traditional foods, and lack of land access to grow foods. Outside of this study, loss of generational knowledge and scalability to the modern reservation population also present roadblocks to traditional agriculture. In a subsequent study in 2010, Fazzino further concluded that overemphasis on commodity crops, such as corn, wheat, and soy, by federal programs limited the potential for growth of traditional agriculture, in the sense that programs encouraging these crops limit the resources available for programs encouraging traditional agriculture. Cattle grazing has

also limited the available land for agriculture, though this limitation warrants further exploration later in this paper. The Tohono O'odham fight toward food sovereignty as it stands now is still hampered by these barriers, and the solutions may be found in policy, as well as structural, changes on the local, state, and federal level.

Beginning with convenience, as the Tohono O'odham began to assimilate into the cash economy of the wider United States, convenient food became an increasingly important factor in food choice. An increasingly daily workload separated from food process (i.e. farming and food prep) left the O'odham with less time to prepare foods in the traditional way (Fazzino 2008). This led many O'odham to naturally purchase foods that took less prep time in order to save time, and these foods included many of the processed surplus and non-traditional foods sold on the reservation (ibid). Thus the roadblock of convenience is mainly one on the consumption side; as less traditional food was consumed due to lack of convenience (related to systemic causes), less was sold, and less was grown, making these foods even more inconvenient to acquire and perpetuating the cycle. Furthermore, the issue of convenience is intrinsically tied with the economic and food system that replaced the traditional system of the reservation. It seems as long as potential agriculturalists continue to work in non-agricultural work, the barrier of convenience will continue to exist. If tribal members continue (and want to continue) working in this relatively new work settings, the time available to potentially prepare traditional foods will continue to be too low to warrant a large-scale shift.

Moving to next roadblock, even if interest in returning to the traditional agricultural system is prevalent among the community, loss of generational knowledge presents a challenge to those looking to revamp the system. The last generation that had these practices taught to them widely was born in the early 1930s (Nabhan 1979). Not only have many members of this generation

already passed away, many of those that still survive experienced a period of Westernized education in their adolescence that sought to separate them from their traditional values and practices, agriculture among them. Thus, many of the intricacies associated with traditional agriculture, though the general practice lives on, are lost, or are close to being lost. Lacking these intricacies may impede the total potential of traditional agriculture in the modern day.

When considering the plethora of issues surrounding the US-Mexico Border, the traditional food system among the Tohono O'odham is unlikely to be high on most policymakers lists of priorities. However, the dangers associated with the border severely limit the ability of the Tohono O'odham to practice gathering of wild foods, a vital part of their traditional food system. Continued operations of border control agents, as well as fears associated with encountering those shepherding migrants, have caused those practicing traditional gathering of food to severely limit the practice (Fazzino 2008). In addition to avoiding potential dangers, a portion of Tohono O'odham citizens still practicing this form of food gathering tend to try to avoid immigration officials likely also in the area, as they were born at a time when hospital visits and birth certificates among the tribe were not always seen as necessary (Fazzino 2008). While the number of people in this category is decreasing, and the number of people still participating in traditional gathering is quite small, gathering in the past made up a vital part of the traditional food system and deserves consideration when discussing any sort of future of that system.

While in the past traditionally grown O'odham food was not limited by social status, that is no longer the case. The high cost of purchasing the traditionally grown food still available on the reservation makes such food only available to those who have high amounts of disposable income, a condition not common among tribal members (Fazzino 2008). The limited number of people producing the traditional food at the moment also keeps the supply of traditional food

low, which in turn keeps the price up and makes it unavailable to the majority of reservation residents. Decreased accessibility to the food diminishes its potential health benefits, while also restricting large part of the population from gaining interest in the food. Hand in hand with convenience, high food prices diminish the accessibility of the food to the general population.

Since the decline of traditional agriculture began in the 1940s, land use and land availability for tribal members has also drastically changed. As in much of the American Southwest, livestock grazing became common on the Tohono O'odham reservation in the mid-20th century as a means to more lucrative economic opportunities (Robinett 1990). While cattle ranching continues to this day on the reservation, much of the land currently used as well as land disrupted by overgrazing could formerly have been utilized in traditional agriculture (ibid). Thus it is important to note that even the land potential for practicing traditional agriculture will likely be lower than in the past, limiting the scope that traditional agriculture can play in the food system. Also, while livestock grazing could have been a profitable industry for more Tohono O'odham than it is today, inequity in the past prevented this from happening. Cattle grazing in the region requires the possession of thousands of acres of land to be profitable, as the arid conditions make vegetation sparse (Wagoner 1952). In order to make up for this, white landowners bordering the reservation have been able to lease thousands of acres of land from the government, allowing them to profit (ibid). However, these same opportunities for leasing, due to land policy on the reservation from the federal government, were not available historically to Tohono O'odham (Wagoner 1952). This put them at a steep market disadvantage compared to ranchers in their area, and makes cattle ranching to this day not viable enough for widespread food production or monetary gain. Thus, due to government policy in the past, more Tohono O'odham land with the potential for agricultural use is being underutilized.

Finally, the issue of scaling the food system takes precedence when considering this case. It is important to consider how large of a role traditional agriculture could play in the food system, and what amount of effort could be put in to make this change in the system worthwhile.

Historically, the reservation could produce 1.4 million pounds of tepary beans on 20,000 acres annually as late as 1930 (Reader 2018). As previously mentioned, census data lists the 1930 population of the Tohono O’odham (listed as the Papago) as 5,163. According to the reservation website, currently 13, 055 registered tribal members live on the reservation as of 2020. Thus the modern population is more than double that of the last time the traditional food system was in place. Not only that, but despite the higher population, the manpower available for agriculture is almost definitely lower than it was in 1930, due to changes in Tohono O’odham lifestyle and the previously mentioned loss of generational knowledge. These aspects have the potential to limit the role of traditional agriculture in the modern O’odham food system.

### **III. Methodology**

In order to address the question of the roadblocks and benefits of the reintroduction of traditional agriculture into the Tohono O’odham food system, I have employed a variety of data sources. These data combine historical records, medical research, medical data, economic data, and primary testimony to tell the story of Tohono O’odham agriculture and the food system to the present day, as well as the effect changes to the food system in regard to agriculture have had and could have on the people of the reservation.

The data used to form this answer are both quantitative and qualitative. Quantitative data concerning measures of public health, disease prevalence, and economic conditions on the Tohono O’odham reservation were consulted in order to analyze the effects of the current food system on reservation residents, as well as economic factors influencing and influenced by the



food system. Qualitative data gleaned from literature concerning the history of the Tohono O’odham, their agriculture, and their present situation was used as well in order to accurately contextualize and define the Tohono O’odham history, agricultural practices, and the present situation of the food system. The majority of the qualitative and quantitative data sources were found using the search engine JSTOR, as well as Google Scholar. The authors of these sources were in most cases non-residents and not tribal members of the Tohono O’odham. The authors of the most recent qualitative sources were visitors to the reservation who worked with residents while on the reservation. Quantitative sources were authored by outside researchers. Additional qualitative and quantitative sources were provided by Professors Harvey Markowitz and Joseph Guse. These sources are part of a course taught by these two professors on the Tohono O’odham. Sources in this category included “History of the Cattle Industry” by Wagoner, “Indian Population Decline in the Pimeria Alta Region” by Jackson, and “The Ecology of Floodwater Farming in Arid Southwestern North America” by Nabhan. Access to sources was not a concern during the research process; for a nation that often does not make national headlines, there is substantial research and literature on the Tohono O’odham available.

Two major sources of information gathered through research came in the form of doctoral dissertations, which centered around studying the Tohono O’odham reservation food system and included valuable insights gained from interviewing reservation residents. These are “Traditional Food Security: Tohono O’odham Traditional Foods in Transition,” by David Fazzino and “‘Thereby We Shall Live’: Tohono O’odham Food Sovereignty and the Confluence of Quantum Leadership, Cultural Vitality, Public Health, and Economic Hybridity” by Tristan Reader. Other sources were made under the umbrella of or through consultation with the University of Arizona.

Sources also came in the form of statistics about diabetes number and agricultural subsidies drawn from government websites concerning these topics.

A potential issue presented by this methodology of research is that the breadth of literature and research about the Tohono O'odham and their agriculture that is accessible has not been carried out by tribal members or reservation residents. This does not necessarily mean there are any issues related to the data and information used in this paper; it appears most if not all of these authors and researchers possessed a deep knowledge of the Tohono O'odham prior to embarking on their respective projects. However, it is worth noting, for as outsiders to the reservation there is a chance that important context about the Tohono O'odham could have been missed or not fully understood by the authors and researchers. On the other hand, a position outside of the reservation could have helped reduce bias, as a detachment from the everyday life and politics of the reservation could allow researchers freedom from personal predispositions, attachments, or pressures.

The question this paper concerns touches a variety of subjects in the context of the Tohono O'odham, from public health, to agriculture, to historical oppression, to name a few. Thus, it becomes necessary to employ a methodology that draws in different types of data from wide ranging sources in order to fully encompass the issue. Simply going based on scientific study fails to incorporate the cultural and historical repercussions associated with the Tohono O'odham food system; similarly, solely relying on qualitative data and literature would leave out important details concerning public health impact and economic conditions. Furthermore, any sort of analysis on the reservation food system and traditional agriculture would be woefully incomplete without the voices of reservation residents and tribal members currently involved with these subjects. As mentioned above, much of the current research and literature about the Tohono

O’odham has been conducted by non-tribal members (as is this paper). In order to make up for this and ensure that the opinions and observations of tribal members and reservation residents are heard, its necessary to involve previously collected results of consultations with such parties in this research.

Other approaches to questions regarding Tohono O’odham agriculture and the food system, such as the previously referenced doctoral theses, have involved visitation and direct study on the Tohono O’odham reservation in Southern Arizona. This methodology of research included working alongside reservation residents in conducting research, as well as compiling historical analysis, health data, and economic details about the food system and traditional agriculture, all topics that are discussed in this paper as well. Admittedly, this methodology that contains a more direct line to the reservation and more direct contact with and observation of the food system likely is more effective at giving an accurate picture and accurate analysis of the situation than the methodology used in this paper. A great example of this sort of study is the dissertation entitled “Traditional Food Security: Tohono O’odham Traditional Foods in Transition” by David Fazzino II of the University of Florida. This study included direct research around and on the reservation, yielding detailed results about the state of the food system and traditional agriculture in the mid-2000s. However, for the purposes of this paper pursuit of similar methodology would be impossible. Under normal circumstances, time constraints as well as inability to leave campus for a long period of time would make such a study impossible; with the addition factor of the current COVID-19 pandemic, any such plan of direct research on the reservation would prove both impossible and irresponsible. Thus, this paper must rely on a less direct method of research, while employing sources that have directly studied and observed the reservation food system and traditional agriculture firsthand. While this lack of firsthand knowledge presents a barrier to a

full and complete analysis and conclusions regarding traditional agriculture and the food system, this barrier was at least partially circumvented through consultations with involved parties on the reservation and analysis of firsthand research.

#### **IV. Analysis**

As previously discussed, the current barriers against reintroducing traditional agriculture into the food system discussed in this paper are the following; lack of convenience, lack of safety when collecting along the US-Mexico border, high cost of traditional foods, and lack of land access to grow foods. This section will discuss how traditional agriculture could offer solutions to the problems stemming from the current food system of the Tohono O'odham, as well as policies that could overcome the current roadblocks. Furthermore, a look into the exact niche traditional food could cover, if any, in the current food system based on population and current land use will also be explored.

A reintroduction of traditional agriculture into the Tohono O'odham food system would address a number of the grave concerns facing that community. First, in the field of health, increased consumption of the food traditionally grown by the Tohono O'odham would serve to combat both the obesity and diabetes epidemics facing the tribe. As previously mentioned, a study done on the closely related Akimel O'odham showed that increasing the amount of traditional food in an individual's diet had positive outcomes for reducing the risk of developing diabetes and encouraging greater health in general. In addition to the health benefits, the economic benefit of reduced medical costs could accompany this transition in time, making for both a healthier and wealthier community.

Additionally, the reintroduction of traditional agriculture could also bring economic and environmental benefit as well. Practices such as well drawing have depleted the ground and surface water supplies in the area, leading to such environmental issues as increasing aridification. As ak chin agriculture draws its water not from the ground, but from rainwater that may otherwise be lost to evaporation, this form of agriculture conserves the more constant water resources while also allowing for groundwater rejuvenation. Furthermore, as access to water continues to be a tenuous issue in the region and prices remain high, traditional agriculture allows Tohono O'odham to save money on water, as well as increasing their autonomy as they will depend less on water disputed by non-tribal members and controlled by non-tribal forces.

Building on this idea of community autonomy, a reintroduction of traditional agriculture into the reservation food system will also increase reservation autonomy in general. Residents will have an increased variety of food to choose from, and will be less funneled by cost and availability into choosing cheaper options brought in from off the reservation. This decreased reliance on external actors for the most basic resources of survival will allow the tribe more freedom and self-sufficiency to act as they choose, as they will once again control their basic needs for survival. However, if the previously discussed roadblocks are not overcome, these benefits will likely go unrealized.

Beginning with the lack of convenience and high cost, an increase in supply of traditional agriculture products could help make these products more accessible to tribal members. Due to the nature of ak chin agriculture, this would necessitate an increase in the agricultural workforce, which would come into conflict with the economic system currently on the reservation. For most people, making a living off of solely traditional agriculture is not economically viable. This is not to say that a complete change in the economic system of the reservation is the only possible

way to overcome this barrier, though a further return of autonomy to the tribe appears a promising option to the Tohono O'odham in many respects. Federal subsidization of agriculture will be discussed in further depth later; however, it is important to note here that the possibility exists for federal aid encouraging a certain type of agriculture. A program subsidizing traditional O'odham agriculture has the potential to make traditional agriculture among the O'odham if not a profitable career, at least a least a livable one. Removing the monetary barrier could encourage farmers to return to traditional agriculture, and by increasing the available supply of traditional food, help to overcome the convenience barrier. Such a program at the moment seems unlikely due to focus of government subsidies on commodity crops (ex. corn, wheat, soy); however, recent Farm Bills have shown a growing warmth to non-industrial agricultural practices, making the prospect more optimistic in the coming years (Stein 2018). In all, the convenience barrier would require a substantial change in policy based outside the reservation to be rendered null.

Overcoming the issue of loss of generational knowledge is more complex than simple policy can solve. Fortunately, much of this issue has already been addressed in the Tohono O'odham community. Though some technical knowledge may have been lost, much knowledge and the basic practices of ak chin have been preserved and recorded by organizations like TOCA and individuals still practicing traditional agriculture. Efforts undertaken by TOCA, SXCF, TOCC, and Native Seeds/SEARCH have in part focused on combining traditional crops with more modern agricultural techniques. For example, at SXCF traditional crops are grown using irrigation farming as opposed to ak chin. By adapting traditional crops to modern methods, there exists a possibility to circumvent the loss of generational knowledge. Also, especially in the case of Native Seeds/SEARCH and TOCA, efforts by these organizations appear to have been able to slow the decline of traditional agriculture, though not promote its rebound. This is not to fault

these organizations, nor suggest that they must do any more than they do currently. On the contrary, its simply to say that without systemic change regarding the economic viability of traditional farming on the reservation, the sheer extra effort required to increase the amount of traditional food available will continue to turn potential farmers away from the practice. The irrigation practiced at SXCF is not viable for the wider reservation, as there is simply not enough water. Initiatives like Project Oidag, however, provide evidence that the traditional knowledge lost to much of the community is being returned to the youth. This is an encouraging development, and an asset that is pivotal in reversing the loss of intergenerational knowledge.

Allowing for the continuation of foraging, currently impeded by border issues, garners consideration as it is a longstanding and important part of the complete tradition food system. However in a theme becoming increasing common when discussing such issues, forces outside the reservation, namely US and Mexican border policy, continue to maintain this roadblock toward the traditional food system. While a calmer border would help to assuage such issues, this goal is far outside the reservations reach in terms of policy. This topic warrants further research; however, currently there seems to be little to be done about making this aspect of the food system safe again. Allowing the tribe to control its border more fully with Mexico on its own looks promising, as the tribe could then regulate traffic without having to worry about US Border Patrol officials interfering with the day-to-day goings of tribal members. However, to the US this appears to create the possibility of a hole in the border, even though the Tohono O'odham have vested interest in monitoring and protecting their border and have done so on their own in the past. Thus, an increase in tribal autonomy with respect to the border seems unlikely to come down from US officials, at least until such a time that border concerns are not as divisive of a topic.

Steps to remediate the roadblock of land use and ranching are limited; trying to limit cattle operations run by tribal members runs counterintuitive to increasing tribal sovereignty, and remediating land would prove difficult in the shifting desert environment. However, this does not preclude all reservation land from functioning in traditional agriculture; it only may limit the use of those lands that have been used in the past. Before gaining a better handle on how ranching fit into the land, much of the reservation land that was either grassland or arable for ak chin was disrupted by overgrazing (Robinett 1990). Due to the nature of ak chin, it is difficult to distinguish what in the past could have been arable land and what was simply grassland. Further research determining the extent of ak chin land now located on ranch land would be extremely beneficial to determining the seriousness of this barrier to overall production potential. Should such research find that sizable amount of ak chin land are located on what is now ranch land, this could either result in the non-viability of these lands for agriculture, or the negotiation of for the use of these lands with tribal landowners. Cattle grazing was not a concern for the majority of the run of the old traditional food system; negotiating its coexistence with the revived system will be critical to ensuring both tribal prosperity and food system success.

Penultimately, and perhaps most consequentially for the O'odham, is the issue of scale. It would be unreasonable to assume that overnight thousands of tribal members would, even if the opportunity presented itself, revert back to an agriculture lifestyle. Even if economic incentives existed to encourage this, convincing and training workers to work in hard agricultural conditions will take time. Current trends such as Project Oidag do give hope of a more sizable and ready agricultural base than initially anticipated. However, assuming the practices remained the same, there would still likely be less manpower available for production in the traditional agricultural sector. In this sense, traditional agriculture would likely be unable to occupy the



entirety of the modern Tohono O'odham food system. However, optimistically the possibility remains for traditionally grown foods to occupy a substantial niche in the food system, should they become economically available to a wider range of reservation residents. Even if they do not return to their pre-World War II production scale, an increase in the growth of traditional agricultural products, spurred by subsidies to make the growing of these products economically viable, could push the products to occupy a larger niche in the food sector. This in turn could allow tribal members to still purchase and realize the benefits of these products, without the somewhat unrealistic goal of a complete overhaul of the entire food system, and without requiring a majority of the population to revert to agriculture as their way of life.

The final consideration for analysis is another issue of scale, but in a different sense. With regards to this project as a look into how to help restore Native American food systems, how applicable are these conclusions to Native American groups facing similar issues to the Tohono O'odham surrounding the food system nationwide? Food systems vary almost tribe by tribe, meaning several of the issues addressed are uniquely Tohono O'odham, and not directly applicable on a national scale. An example of this is the land use and cattle grazing issue, as well as the border issues as well. However, recommendations such as returning more tribal land sovereignty and subsidizing indigenous food systems are more widely applicable to whole United States. This more blanket proposals essentially give the tribes increased freedom to create the food system that fits their needs the best, which in the past was not something that needed to be legislated. To this end, the subsidy portion of these blanket proposal should allow for the tribes to define what is their desired food system, be it traditional, a hybrid, or otherwise. This will allow the legislation to form to fit the needs of individual tribes, and best allow them to reform their food system should they see fit to do so. To those expressing concern that this will

lead to tribes abusing this system, a suggestion would be to look at long history of violence perpetrated by the US government against the Native American groups of this country, and ask whether there is not at least some room for redressing this violence in allowing freedom of choice in the food system. While individual tribes will have more specific issues to address concerning their own food systems, such blanket suggestions should at least make this easier for them to do so.

## **V. Conclusion**

The Tohono O'odham people, longtime inhabitants of southern Arizona, face a hefty slate of issues rooted in their forced transition away their traditional food system. Chief among these issues are public health issues associate with obesity and diabetes; worth considering also are economic and environmental issues stemming from this transition.

The traditional agricultural practices of the Tohono O'odham, along with the food resulting from these practices, offers a promising development in combatting each of the issues currently faced by tribal members. Many of the current roadblocks facing the reinvigoration of traditional agriculture can be overcome through policy; namely, subsidization of traditional foods such as maize and tepary beans grown in traditional ak chin flood agriculture could make traditional agriculture economically viable. This in turn would help overcome issues of convenience, price, access, and somewhat issues of scale. An increase in traditional agriculture would lead to health benefits associated with decreased rates of obesity and diabetes, as well as financial benefits stemming from reduced health and water costs. Additionally, controlling a larger part of the food system could lend itself to increased autonomy for the Tohono O'odham tribe, as they could further control their own supply of food.

However, it is both unreasonable and unrealistic to assume that traditional agriculture could reassume its role as the sole provider of food for tribal members. The population of the tribe has increased since the transition from the traditional system, and many Tohono O'odham have become accustomed to a non-agricultural lifestyle. Likely, the most beneficial and realistic outcome based on the current situation would be a mixed food system. Traditional agriculture would ideally occupy a larger niche and be available as an affordable option to all tribal members; however, outside food options will still be available for purchase. Assuring these options will be healthier would require another project entirely. Optimistically, there are and have been persons on and off the reservation concerned with these very issues. In the future, there is hope that traditional ak chin agriculture could once again provide for the Tohono O'odham people.

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