

USING TRADITIONAL FOODS AND FOOD PRESERVATION OF THE GREAT PLAINS  
AMERICAN INDIANS TO ADDRESS FOOD INSECURITY AND CHRONIC DISEASE IN  
THE GREAT PLAINS TRIBAL REGIONS

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**Title**

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GREAT PLAINS AMERICAN INDIANS TO ADDRESS FOOD  
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TRIBAL REGIONS

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## **ABSTRACT**

The American Indian (AI) population has a history that goes back at least 10,000 years on the land of the Great Plains. Their traditional foods helped them survive on a land that no other human had ever stepped foot on; however, traditional foods and food ways were erased during colonial occupation of tribal lands and the relocation of tribes to resource poor reservations.

The purpose of this project is to evaluate how traditional AI foods and preservation of these foods can be used to address the high rates of food insecurity and chronic disease in the AI population. The project will explore the history, traditional foods, and traditional food preservation of the Great Plains AI. It will also consider modern day food preservation methods and how they can be used to preserve traditional foods.

Grant funding to North Dakota State University and Cankdeska Cikana Community tribal College allowed for the creation of online modules that teach how to preserve traditional foods using modern and traditional food preservation methods. These modules can be used to increase food preservation knowledge in Spirit Lake Nation along with other tribal communities. The hope is that the modules offer a way to empower AI individuals to increase food sovereignty and food security while lowering chronic disease in their own homes.

## TABLE OF CONTENTS

ABSTRACT .....	iii
LIST OF TABLES .....	vi
CHAPTER 1 INTRODUCTION .....	1
Overview of the Problem.....	1
Statement of Purpose .....	2
Summary of Literature.....	3
Great Plains American Indians .....	3
Traditional Dakota food preparation .....	4
Current day Spirit Lake Nation .....	5
Spirit Lake Nation current day traditional food use .....	6
Loss of traditional foods .....	7
The rate of food insecurity on AI tribal areas and its relationship to chronic disease .....	8
Frybread .....	12
Nutritional quality of traditional foods vs. current diet .....	13
Significance of Review .....	14
Definition of Terms .....	15
CHAPTER 2 REVIEW OF LITERATURE.....	18
Food Sovereignty .....	18
The Use of Traditional Foods to Address Food Insecurity .....	18
Traditional and Current Food Preservation Methods .....	22
Intervention .....	25
Recommendation .....	28
Conclusion .....	28
REFERENCES .....	30

APPENDIX A. FOOD PRESERVATION MODULE TOPICS .....	35
APPENDIX B. MODULE MATERIAL LINKS .....	36

## LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. AI Diabetes Diagnosis Rates per State. ....	11
2. Traditional Foods vs. Current Diet Nutiriton Comparison .....	14

## **CHAPTER 1 INTRODUCTION**

### **Overview of the Problem**

The American Indian (AI) population has a history that goes back at least 10,000 years on the land of the Great Plains (Pauls, 2022). Their traditional foods helped them survive on a land that no other human had ever stepped foot on; however, these traditional foods and food ways were driven away by the creation of isolated tribal areas in the region (Sherman & Dooley, 2017). Spirit Lake Nation is one of these tribal areas located in central North Dakota. The people living there are part of the original Dakota Nation, particularly the Dakota band and dialect. The Spirit Lake Dakota are further divided into the Sisseton and Wahpeton bands. As traditional food use decreased, so did the rate of food security for the AI population who were forced to reside within these tribal areas. This led to an increase in the rate of chronic diseases among AI people (Vantrease, 2013, CDC, 2019). Diabetes, heart disease, kidney disease, cancer, and hypertension are all high among the AI population (Cantrell, 2001). For example, in 2018, the AI aged 18 and older diagnosed with diabetes was 23.5% versus non-Hispanic whites who had an 8% rate (CDC, 2019). The loss of traditional foods and high food insecurity can lead to various forms of chronic disease, malnutrition, and a decrease in the community aspect that cultural food brings to the table.

It is important to highlight that the above issues only exist because of colonial influence. The AI population existed on their own for thousands of years, and the problems that were created because of colonialism are only recently being addressed. American Indian tribes were removed from the land where they harvested, grew, and preserved their food and medicines. They were sent on the run without alternative survival options (DeBruyn, et al., 2022). Eventually AI children were placed in boarding schools where their remaining practices were

taken away at the hands of settlers (Garcia, 1997). Considering the difficult past that AI communities have experienced, the solution is not for outside individuals to come into communities to fix the problem, but to empower AI communities to counteract the historical trauma they experienced.

### **Statement of Purpose**

Returning to traditional foods may help increase the rate of food security in tribal areas while improving overall diet quality. Learning to preserve these traditional foods can extend the shelf life and health benefits those traditional foods offer. Reincorporating traditional foods and learning to preserve them could lower the rate or severity of chronic illness present in the AI population.

The purpose of this project is to evaluate how traditional AI foods and preservation of these foods can be used to address the high rates of food insecurity and chronic disease in the AI population. The project will explore the history, traditional foods, and traditional food preservation of the Great Plains AI and Mni Wakan Oyate. An important aspect of this exploration is the understanding of how and why these foods were stripped from the AI population. It will also consider modern day food preservation methods and how they can be used to preserve traditional foods.

Search terms used for this review were AI/AN, American Indian, Native American, reservation, Great Plains, traditional foods, food preparation, food insecurity, food preservation, water bath canning, pressure canning, drying, and freezing. Search engines included PubMed, JSTOR, and Google Scholar. Inclusion criteria were, articles in the English language, all types of AI studies, and a publishing date within the last 10 years (with certain exceptions allowed for



articles regarding historic events). Exclusion criteria included non-English, non-AI studies conducted outside of the United States.

## **Summary of Literature**

### **The Great Plains American Indians**

There were more than 30 different tribes who lived on the Great Plains, and each of these tribes had their own unique religion, language, food, and traditions (U.S. Department of Interior, n.d.). The Lakota, Nakota, Dakota, Crow, Cheyenne, Blackfeet, Shoshones, Mandan, Hidatsa, Arikara people, and many more lived on the Great Plains (Elk, 2021).

Great Plains tribes relied on wild fruit, vegetables, and grain from the prairie to survive (U.S. Department of Interior, n.d.). The Three Affiliated Tribes, made up of the Mandan, Hidatsa, and Arikara, followed an agrarian culture, meaning they planted and cultivated gardens while also hunting game (Elk, 2021). When the Spanish arrived in America in the 1500s, they brought horses with them. Euro-Americans traded clothes, crafts, food, and animals with the Great Plains Indians. Through these trades, the local tribes received horses, improving their ability to hunt the roaming bison (U.S. Department of Interior, n.d.). Main food sources included deer, beaver, bison, and elk, but the beloved bison served as a primary and preferred meat. Bison soup, roasted intestines, jerked meat, and tongue were all enjoyed after a successful hunt (Vantrease, 2013). Soups were traditionally cooked over the fire in pouches made from the bison stomach and dried meats and vegetables were rehydrated in the soup (Cantrell, 2001).

All the food was harvested from the land. Nuts, roots, and herbs were used for traditional dishes as well as medicinal purposes. Alma Snell of the Crow Nation in Montana was raised using plants for both food and medicine, often with the same food serving both purposes (Elk, 2021). The women of many Plains Indian tribes harvested sunflowers, corn, squash, and beans

from their own gardens. They organized corn-husking feasts where each harvest was celebrated by preparing buffalo meat to bring to the men who came to help with the harvest. Traditional foods that were found and used by the Great Plains AI have lasted the test of time. Corn, sunflowers, juneberries, chokecherries, other berries, and herbs are all important contributions to the current American diet thanks to the American Indians (Elk, 2021).

### **Traditional Dakota food preparation**

The Dakota people lived off the land while in the Woodlands of Minnesota. They harvested fish from local streams and hunted wild game such as deer and waterfowl. They gleaned berries and roots from the land. In the fall, men hunted muskrats while women harvested wild rice. A three-month big game hunt of deer, elk, bison, and bear began later in the season. The meat and dried crops from the summer helped provide food through the winter months. Fish eggs were smoked and cooked in earthen pots filled with water and used as an alternate food supply. The Sisseton and Wahpeton also enjoyed soups made of corn meal and boiled meat (Garcia, 1997).

The Mni Wakan's food traditions were forced to change after moving to the Dakota territory. In the early 20<sup>th</sup> century, the people received supplemental food from the government which included items comparable to today's food commodity program. The government dispersed flour, sugar, and other dry goods, but gardens were the main source of vegetables while wild game was used to obtain fresh meat. Food harvested from the land included corn, chokecherries, juneberries, and wild turnips (called tipsina). The tipsina were abundant on the prairie. The Dakota people would dig them in the Spring, then braid and store them for use in soup or other warmed dishes (Garcia, 1997).

Squash was hearty traditional food that was peeled, sliced, and placed on a string to dry. Chokecherries and juneberries, two foods that can still be found growing wild in the Great Plains area today, were used by the Dakota. Chokecherries were ground very fine and shaped into a round patty for drying. When the time came to eat them, the patties were soaked overnight and cooked with flour, sugar, and a bit of fat to make a pudding (Garcia, 1997).

The Dakota adapted to live off the land. They still act in stewardship with the earth, showing respect when food is taken, and sustenance is received. A strong relationship with the earth has always been a core part of their identity (Garcia, 1997).

### **Current day Spirit Lake Nation**

Spirit Lake Nation is a tribal area located in East Central North Dakota, near the town of Devils Lake, North Dakota. It is 245,141 acres and made up of four districts, Fort Totten, St. Michael, Tokio, and Crow Hill (Spirit Lake Nation, n.d.). These districts are spread out within the tribal area, making transportation from one district to the next difficult. Through personal observations it was noted that there are convenience stores with fast food available in various locations, but the tribal area has one grocery store on the entirety of the nearly 250,000 acres near the Spirit Lake Casino just north of St. Michael. The Northern border of Spirit Lake Nation is 10 miles south of Devils Lake, ND.

The Dakota people who reside in this area are known as Mni Wakan Oyate - translated as “the people of the Spirit Water” – and are made up of the Sisseton and Wahpeton bands. These Dakota who once lived in Minnesota were driven to Canada and the plains of the Dakota Territory by the Dakota conflict of 1862 (Garcia, 1997). They settled in the northern part of Dakota Territory, and in 1867 the Spirit Lake tribal area was established. As of 2021, Spirit Lake

Nation has over 7,500 enrolled members with over 2,000 people living on Spirit Lake Nation land (Spirit Lake Nation, n.d.).

### **Spirit Lake Nation current day traditional food use**

Much of the traditional knowledge that what passed down from generation to generation was lost with the disappearance of wild game and the creation of boarding schools (Garcia, 1997). However, some foods of the Mni Wakan Oyate survived. These include a beef or bison soup made with dried corn called hominy and tripe soup, made with the stomach lining of cattle. Wild game are less available but are still hunted in the area. It was noted through personal observation that Spirit Lake Nation also owns a buffalo herd that is raised on tribal land. The meat can be purchased for use in stews, as a roast, or as a beef alternative.

A large part of the Mni Wakan Oyate food history is the practice of drying foods. The modern made dehydrator has made it easier to dry meat, while still passing on much of the food history. “Indian corn”, as it is called locally, is one of the most common foods that is still dried. It is often added to soups and distinguished from the popular sweet corn by its larger size. It was noted through personal observation that the Food Distribution Program in Fort Totten tries to reintroduce the traditional methods back into the community by hosting lessons on dehydrating and making dishes that use dehydrated foods, such as corn soup. Not only do these lessons hope to bring a sense of cultural belonging to those who participate, but they also demonstrate ways that healthy foods can be stored for use when they may be harder to access or less available in the winter.

It was noted through personal observation that Cankdeska Cikana Community College (CCCC) located in Fort Totten has a green house where they keep plants year-round. They start growing tomatoes when Spring approaches and then plant them, along with pumpkins, corn, and

many other foods in their multi acre garden. They have also started construction on a hydroponic greenhouse that will be available for use year-round. The college also provides community access to local gardens in the spring, summer, and fall. With the help of food preservation, these foods can be consumed year-round as a healthy, culturally relevant, and accessible option, especially in rural areas.

### **Loss of traditional foods**

A traditional food system is defined as the food prepared and consumed that is available from natural resources and accepted by that culture (Sarkar, et. al, 2019). Food in AI communities has a strong connection with sentimental memories, cultural practices, and traditional ceremonies. Unfortunately, the traditional food system of AI has all but disappeared (Sarkar, et. al, 2019). By the 1900s, the Plains Indians had almost all been sent to tribal areas. Hunting and gathering were once used to connect spiritually with the land and to stay physically active but are now much more difficult for individuals who live on tribal areas due to limited acreage. Tribes were often rounded up by military forces and removed from their traditional land which grew the foods that they relied on, leaving them without time or resources to regain their original food ways. Tribes who were relocated to land that did have wild game received very limited permission to hunt or were banned from it altogether (DeBruyn, et, al, 2020). The new land that tribes were forced to move to was often unfamiliar to them, offering different vegetation than what they were familiar with and making it difficult to gather food (DeBruyn, et. al, 2020, U.S. Department of Interior, n.d.).

Fort Totten was a military fort built on the Spirit Lake reservation in 1867 and took up much of the limited space allotted to the Dakota people. The wild game available for the tribe to hunt decreased dramatically as the once open prairie was taken over by the buildings and people

of Fort Totten. Paired with the harsh winters and summertime droughts, the Dakota lost the ability to provide for themselves and depended more on the government fort and the reservation system for survival (Garcia, 1997). Dependence on the government for their food led to an decrease in food security and a transition to government-supplied commodity foods for survival.

Boarding schools also played a role in the change of culture forced upon the American Indians across the country, including the Mni Wakan Oyate. The first boarding school at Spirit Lake, created in 1874, forced AI children into the school, stripped them of their cultural identity, and taught skills such as tailoring, carpentry, and farming. Girls were taught cooking, sewing, and nursing. They were shown how to make strictly “white” foods such as bread and noodles with no mention of any culturally relevant foods. One woman who was forced into a boarding school came home with the skills to make the “best noodles”, but without any knowledge of the foods that her parents and grandparents had grown up with, leaving a disconnect between generations (J. Walette, personal communication, December 1<sup>st</sup>, 2023). The boys were expected to learn a trade skill and were kept at the school until they had completed their course of study. The last boarding school, located in Fort Totten, closed its doors in 1935 (Garcia, 1997).

It is believed that the reason the Spirit Lake tribe eventually succumbed to government pressure was the frigid winter and increased risk of starvation. Despite the initial refusal of the previously independent and mobile Dakota to move to their current area, they were left with no choice but to rely almost solely on the so called “supplemental” government commodity foods (Garcia, 1997).

### **The rate of food insecurity on AI tribal areas and its relationship to chronic disease**

Food insecurity on tribal areas across the U.S. is a multifactorial issue, and the loss of the traditional food system is a part of it. Berryhill et. al (2018) aimed to identify the prevalence of

food insecurity among AI in the Midwest and any correlation this may have to health outcomes. Food security was defined for this study as a safe and nutritious food supply that was consistent with food preference and cultural acceptance. This study recruited AI individuals 18 or older who completed a digital survey on dietary intake information, health characteristics, and food security. The questions were multiple choice or short answer, and each person who completed the survey received a \$10 gift card. Surveys were scored and each participant was assigned a category: high/marginal food security, low food security, or very low food security. Those with lower food security were more likely to consume fast food ( $p= 0.0420$ ). Out of 362 participants who were 18 and older, 72.1% (261 out of 362) said that within the last 12 months, they did not eat when they were hungry due to lack of money for food, and 58% (210 out of 362) of participants had a low or very low food security level. Of those who did not have health insurance 59% (214 out of 362) were designated as having low or very low food security. Lack of health insurance proved to be the greatest predictive factor for food insecurity based on statistical analysis using Pearson's Chi squared test ( $p< 0.0001$ ). Other indicators of food insecurity included education no higher than a high school degree and low-income levels. While income levels were not assessed to maintain the privacy of the participants, education was stated as being predictive of income levels.

Cantrell (2021) hoped to learn more about the habits and food patterns of Plains Indians to develop a culturally appropriate diabetes education program. Hour-long adult focus groups with an unspecified number of participants were held at four different tribal areas across the Great Plains: Pine Ridge Sioux, Rosebud Sioux, Yankton Sioux, and Winnebago. Each focus group was served a meal in accordance with the AI tradition of sharing food at gatherings. Focus groups were used out of respect for the oral word in AI culture and discussed beliefs and eating

patterns. Results of these focus groups emphasized addressing barriers by starting change with the younger generation, focusing education on traditional foods and their health benefits, as well as starting gardens. Fruits and vegetables were described as scarce and expensive, making it hard to justify buying them. A grocery store on one of these tribal areas had a produce section that consisted of three apples, one pear, and two bags of potatoes. Preparation of traditional foods was seen as beneficial for the body and mind. Participants viewed traditional foods such as wild game, soup, and dried vegetables as healthy while “modern” traditional foods such as fry bread and wild rice soup were seen as unhealthy. Foods such as flour, salt, sugar, and lard were identified as “white” foods as they were not introduced to the AI until Europeans came to their land. It was noted that these “white” foods are the ones that tribal areas receive through distribution from the government, i.e., the Food Distribution Program on Indian Reservations (FDPIR). Concerns about the FDPIR are common and centered around the availability and desirability of the commodity foods distributed. Considering the feedback, it is essential to tailor nutrition education programs to the available foods and the specific needs of the AI who live on that tribal area. A potential strategy to improve nutrition is to provide education using the FDPIR foods.

Vantrease (2013) provided a unique look into modern traditional foods. This study gathered research and interviews with fellow AI to inform the reader about commodity foods that are distributed on tribal areas and how these foods have impacted history. FDPIR foods, often known as commodity foods, are provided by the government to over 250 tribal areas and were designed to be a supplemental food to prevent starvation; however, due to forced removal of traditional foods, they have become a primary food source for many food insecure individuals living on these tribal areas. Commodity foods, like the ingredients used in frybread (flour, sugar,



oil), five-pound blocks of commodity shelf-stable “cheese product”, and bottled juice are connected to AI’s current day home and culture. Vantrease (2013) included quotations from participants such as, “It is something you grew up with, so it makes you feel good about who you are and where you come from.” On the other hand, many American Indians view these foods as “America’s leftovers” and resent the government dietary assimilation associated with the foods. Another quote from Vantrease (2013) noted that “It’s a food that has contributed to our downfall. In our history we have replaced a lot of our food with fry bread, and it is not a superior food compared to what we had before.”

As time goes on, there is a growing awareness of the relationship between commodity foods and chronic disease. In 2013, the rate of diabetes in AI across the nation was 15.8% and ten years later the rate had increased to over 23% (CDC, 2019). Tribal diabetes rates vary across the country. North Dakota has a larger percentage of diabetes in the AI population than both its southern and western counterparts as shown in Table 1. California currently has the highest AI diabetes rate in the nation at just over 26% and Alaska has the lowest at 7.7% (United Health Foundation, 2022).

**Table 1:** AI Diabetes Diagnosis Rates Per State

State	North Dakota	South Dakota	Montana	California	Alaska
AI Diabetes %	19%	12.8%	15.7%	26.5%	7.7%

(United Health Foundation, 2022)

At Spirit Lake, 99% of diagnosed diabetes is Type 2 meaning 99% of the diabetes diagnoses on the reservation could be delayed or prevented (C. Scallon, personal communication, February 28, 2023). A recent study also found that nearly 58% of individuals in the Spirit Lake community had incomes of less than \$10,000 (Lindquist et al. 2018).

American Indians have at least twice the likelihood of developing diabetes than white Americans, and some believe the reliance on commodity foods contributes to this. The food packages that a person receives each month is valued at only \$52 (North Dakota Department of Public Instruction, n.d.). The term “commodity” is used colloquially to describe what occurs when one relies solely on commodity foods for nutrition. The author writes that there is a draw to move away from government supplied foods, not only for health reasons, but also because of the connection to a traumatic history and forceful movement to tribal areas that so many AI experienced.

### **Frybread**

Frybread is a product of the commodity system and has become a “traditional” food in AI communities across the nation, including Spirit Lake Nation. Frybread is a dough made of flour, salt, baking soda or yeast, and sometimes a bit of sugar. The history of frybread dates back to 1864 when the Navajo people were removed from their home in Arizona and forced on the “Long walk” to New Mexico. They lost connection not only to their land, but to the foods that came from it, leading to a reliance on government commodities and the creation of fry bread (Miller, 2023). The dough is rolled into a ball, flattened into a pancake shape, and punctured in the middle. It is then placed in oil or lard and deep-fried until it is puffed up and golden brown (Miller, 2019; Tapia, 2019).

An interesting aspect of modern traditional foods like frybread is the dichotomy that exists between the necessity to use the commodity foods and the ingenuity that tribes used to survive off these foods. Some tribal members recognize frybread as a terrible part of their history and resent how it came to exist, while others acknowledge the history of the food but celebrate what it means to tribes today. Frybread can be found at almost any tribal gathering from

powwows, to funerals, to family celebrations. Frybread taco sales are often used as a fundraiser for families or organizations on tribal areas. It is a symbol of government influence in many ways while existing at the same time as a symbol of their people's resilience (J. Walette, personal communication, December 1<sup>st</sup>, 2023).

### **Nutritional quality of traditional foods vs. current diet**

The nutritional information of various foods shows the differences between the current diet and the traditional diet of AI across the nation, and specifically in the Great Plains region. One piece of frybread, weighing about 150 grams, contains 500 calories, 19 grams of fat, 10 grams of protein, and 74 grams of carbohydrate. Frybread does not provide a significant number of vitamins, minerals, or fiber besides what is found in the commodity foods of flour, sugar, and fat that are used to make it according to the U.S. Department of Agriculture (2019).

In comparison, the traditional food, wasna, sometimes known as pemmican and consumed by AI who lived on the Great Plains, is nutrient dense, providing energy without excess calories (Great Plains Good Health and Wellness Program, n.d.). Wasna comes from the word "wa" meaning anything and "sna" meaning ground up. The traditional method of making it used ground bison, dried berries, and animal fat or bone marrow. These three ingredients are ground together and dehydrated to make a dish that is high in protein while being both energy and nutrient dense. A one-ounce serving of wasna contains 84 calories, five grams of fat, and one gram of carbohydrate (Great Plains Good Health and Wellness Program, n.d.). Another traditional delicacy that many Great Plains AI consumed were chokecherry patties, made with one simple ingredient: ripe chokecherries. The chokecherries are ground whole into a fine consistency and then shaped into thin round patties and dehydrated. A 100-gram chokecherry patty contains 156 calories, one gram of fat, three grams of protein, 34 grams of carbohydrate,

and 17 grams of fiber (Great Plains Good Health and Wellness Program, n.d.). Chokecherries also provide the vitamins A, E, and K which function as antioxidants to prevent cell damage and contain free radicals (U.S. Department of Agriculture (2019)).

**Table 2:** Traditional Foods vs. Current Diet Nutrition Comparison

<b>Food</b>	<b>Calories</b>	<b>Carbohydrates</b>	<b>Protein</b>	<b>Fat</b>
<b>Wasna (28 grams)</b>	84	1 gram	4 grams	5 grams
<b>Chokecherry Patties (100 grams)</b>	156	34 grams	3 grams	1 gram
<b>Frybread (150 grams)</b>	500	74 grams	10 grams	19 grams

(Great Plains Good Health and Wellness Program, n.d, U.S. Department of Agriculture, 2019)

### **Significance of Review**

The traditional foods listed in this review provide insight into how the Great Plains American Indians once lived. However, since the forced transition to commodity-based foods and a continually increasing rate of food insecurity, the AI population, specifically those living on tribal areas, is facing an elevated rate of chronic disease. Tribal nations can harness the power of their ancestors’ nutrient dense diet by focusing on traditional foods. This could help reduce food insecurity and chronic disease in their communities.

Melding traditional and modern foods of the AI community may be a good way to blend the past and the present histories of the population. Frybread tacos are often topped with high fat ground beef, sour cream, and cheese. A traditional alternative would be to incorporate beans, corn, lean beef, wild game, wild rice, and squash as toppings while still using the modern frybread. By blending the two types of diets, a person reduces the amount of fat in the meal and increases the micronutrients thanks to the beans, corn, and squash. Some are already at work to make blended food items like this more common. An indigenous catering business in Fargo,

North Dakota makes frybread tacos that are topped with vegetables and grain traditional to the AI community.

For those living in Spirit Lake Nation, there is a grant funded opportunity to re-introduce methods of food preservation such as drying, while also incorporating modern methods such as canning and freezing in classes at the local community college. Learning to preserve traditional food could decrease the rate of food insecurity by providing access to fruits, vegetables, and lean meats all year long. These lessons could also help bring back the culture that was taken from AI communities across the nation many years ago.

### **Definition of Terms**

**American Indian (AI):** a member of any of the indigenous peoples of North, Central, and South American, especially those indigenous to what is now the continental United States

**Antihyperglycemic:** preventing the accumulation of excess sugar in the blood

**Antihypertensive:** ability to lower blood pressure

**Antioxidant:** a substance that inhibits the action of free radicals

**Bison/Buffalo\*:** humpbacked, long-haired mammal native to North America.

\*For the purpose of this paper, buffalo and bison are interchangeable.

**Cache Pit:** a large subterranean pit, usually lined with bark, clay, reeds, and grasses and used to store foods such as dried meat, plants, seeds, and dehydrated foods (First Nations Development Institute, 2022)

**Cankdeska Cikana Community College (CCCC):** The two-year community college located on Spirit Lake Reservation in the district of Fort Totten

**Colonialism:** the policy or practice of acquiring full or partial political control over another country, occupying it with settlers, and exploiting it economically

**Food Commodities:** foods that the federal government has the legal authority to purchase and distribute

**Food Distribution Program on Indian Reservations (FDPIR):** program on Indian Reservations that allows Indian Tribal Organizations to operate a food distribution program as an alternative to the Food Stamp Program for those living on or near an Indian reservation

**Food Insecurity:** the condition of not having access to sufficient food, or food of an adequate quality, to meet one's basic needs

**Food Preservation:** processes that make food more resistant to microorganism growth and slow the oxidation of fats

**Food Sovereignty:** the right of people to make their own decisions about policies, strategies, production, distribution, and consumption of food (DeBruyn, et. al, 2020)

**Fort Totten:** one of the four districts of Spirit Lake Reservation

**Free Radical:** unstable atoms that can damage cells, causing illness and aging

**Great Plains American Indians:** indigenous people that are native to the states of Montana, North Dakota, South Dakota, Wyoming, Nebraska, Kansas, Colorado, Oklahoma, Texas, and New Mexico

**Historical Trauma:** the cumulative emotional harm of an individual or generation caused by a traumatic experience or event

**Jerked Meat:** thin slices of lean meat that have been preserved through drying

**Mni Wakan Oyate:** the group of American Indians who reside on or are associated with Spirit Lake Nation

**Phenolic Bioactives:** powerful antioxidants found in traditionally used medicinal and industrial crop plants

**Pressure Canning:** a form of food preservation that uses very high temperatures under pressure to produce steam that cooks, sterilizes, and seals food in a glass jar

**Sisseton:** a band of the eastern or Dakotah American Indians who, with the Wahpeton, make up the Mni Wakan Oyate people

**Spirit Lake Nation:** an American Indian tribal area located in Northeast North Dakota home to the Mni Wakan Oyate people

**Tipsina:** wild turnips used in traditional Great Plains American Indians food preparation

**Tribal Area:** an area of land reserved for a tribe or tribes under treaty with the United States or executive order from the federal government and where the federal government holds the land in trust on behalf of the tribe; also known as a reservation

**Wahpeton:** a band of the eastern or Dakotah American Indians who, with the Sisseton, make up the Mni Wakan Oyate American Indians

**Wasna:** dried meat, pounded and mixed with chopped, tart berries and tallow grease

**Water Bath Canning:** a form of food preservation for acidic foods that uses pressure, created by boiling water, to prevent harmful bacteria from growing and seals food in a glass jar

## **CHAPTER 2 REVIEW OF LITERATURE**

### **Food Sovereignty**

Food sovereignty (FS) is a growing topic of concern that has only become more important over the last several years. It is described by the U.S. Food Sovereignty Alliance as the right of people to have access to “healthy and culturally appropriate food that is produced through ecologically sound and sustainable methods” (n.d.). Food sovereignty is driven by farmers, fishers, AI tribes, and others who are impacted by food insecurity. The focus of FS is to bring culturally relevant, healthy, and sufficient food to all people. It prioritizes the sharing of food knowledge and encourages passing skills down through family members (USFSA, n.d.). The creation of tribal areas and boarding schools contributed to the loss of food sovereignty that AI experienced in the past. Tribal areas constricted access to traditional foods from the land and boarding schools prevented the passing of skills to children who had not yet learned the methods from their families. Regaining food sovereignty is essential, not only to improving the health of the AI community, but also to begin healing historical trauma. The following section will focus on how to reestablish food sovereignty in AI communities.

#### **The Use of Traditional Foods to Address Food Insecurity**

Sarkar, et al. (2019) focused on the health of traditional foods and reviews the specific properties that the foods contain. In their paper, traditional foods were tested to combat the growing chronic disease epidemic in AI primarily because the traditional foods of the Great Plains American Indians have an extensive list of health benefits (Sarkar et. al, 2019). The three sisters’ crops, aptly named by the Iroquois and Cherokee but used by many others, can help each other grow as a family. The “three sisters” are corn, climbing green beans, and squash. The beans absorb nitrogen from the air and convert it to nitrates which fertilize the soil for the corn and



squash to grow. The beans climb on the corn stalks for support as they grow, and the squash leaves provide ground cover which helps to prevent weed overgrowth. The three sisters have high antioxidant content which can help prevent chronic disease (National Agricultural Library, n.d.). Purple corn's 2,2-Diphenyl-1-picrylhydrazyl (DPPH) radical scavenging-based antioxidant activity provides 77% inhibition of free radicals which is notably higher than the yellow corn that is enjoyed today which has an average of 10-30% inhibition rate of free radicals (Sarkar et al., 2019). Many of these plants have antihyperglycemic ability to prevent a blood sugar spike as well as antihypertensive ability to prevent high blood pressure. Traditional round orange pumpkin squash provides 60% inhibition of the alpha-amylase enzyme that breaks down carbohydrates, whereas butternut squash, commonly eaten today, has a 20% inhibitory rate (Sarkar et al., 2019). Traditional squash also can act as a natural angiotensin converting enzyme (ACE) inhibitor known to help reduce blood pressure levels. Berries such as juneberry and chokecherry are high in phenolic bioactives which also have high antioxidant potential. Bioactives are defined as a chemical found in certain foods that promotes overall good health. Research on bioactives is being conducted in cancer and heart disease prevention (National Cancer Institute, n.d.). Traditional foods also stand up well against weather changes and the fierce winds that blow across the Plains (Sarkar, et al., 2019).

Current access to traditional foods on tribal areas is less than 10% of total foods available, and many tribal areas do not have traditional foods present (Sarkar et al., 2019). Traditional foods can promote a balanced diet and help reduce chronic disease. The author writes that traditional corn, squash, and roots can be added to a healthful diet of vegetables, whole grains, and fruit to help maximize nutrient density of the diet (Sarkar et. al, 2019). When considering re-implementing these foods, it is essential to remember that traditional food

knowledge is no longer common in the AI community. It could be revived through the engagement of elders and through education of community members on the health benefits these foods provide and how to grow, store, cook, and eat them.

Lumpkins (2021) used a community-based participatory research approach and a team of AI and non-AI members to assess whether tribal community leaders see themselves as health communicators and leaders in tribal communities in the Central Plains. Thirty-nine in-depth interviews were conducted with leaders in the communities. The interviews followed a semi-structured guide and lasted from 30 to 100 minutes. Topics covered perceptions of health in the community, role in health promotion, and beliefs about health promotion. The results showed that those interviewed did not often recognize themselves as health communicators. Participants noted that spiritual leaders within the tribe helped identify and distribute health information in their community. Others mentioned that the health promoter should be from within the community and that any health advocacy should start with tribal leadership. It was shared that any health programs should include the entire household; by involving the youth, the parents will be encouraged to attend. The need for trusted leaders, reliable sources of information, and a focus on culture when starting any health programs are all evident take aways from this study. The historical trauma experienced by the AI population is real and present, especially for those living on tribal areas (Lumpkins, 2021). Addressing this trauma in a way that is inclusive to the culture may help mend some of the hurt that has occurred for many years (Lumpkins, 2021).

DeBruyn, et al. (2020) discussed the implementation of a traditional foods project and how it has positively impacted individuals living on AI tribal areas. The creators of this project hoped to address chronic health issues using traditional foods, community involvement, and physical activity. The project ran from 2008-2009 and was completed with 17 different tribal

partners in locations across the United States. Each partner catered their implementation to their own community to make behavior changes. Some participants focused primarily on gardening while others added traditional games such as stick ball to increase physical activity and community participation.

There were many positive results from this study. Sixteen of 17 Traditional Foods Project (TFP) partners reported gardening activities during the summer. There was an increase in healthy foods available in at least one site where the individuals routinely bought food. The availability of traditional foods, reported as just under 20% at the beginning of the project, jumped to over 62% at the end (DeBruyn, et. al, 2020). Sustainability methods, such as composting, were used in 11 locations, and in one case, the positive effect was visibly evident. Corn had been planted on ground that was infertile, but adding compost boosted the growth of the corn which impressed many community members, especially elders (DeBruyn, et. al, 2020). Storytelling was also an effective tool to teach about traditional foods. Old and new stories were shared between tribal members throughout the program. Traditional Foods Project partners shared traditional food at gatherings, embraced the history and culture of the tribal nation, and expanded physical activity over the one-year span. Good relationships proved to be integral to the process and helped increase the project's effectiveness.

DeBruyn, et al. define food sovereignty as the right of people to make their own decisions about policies, strategies, production, distribution, and consumption of food (2020). The Traditional Foods Project took a step towards food sovereignty by placing the decision and participation in the hands of the tribal members. The hands-on approach made it more effective and attainable to increase the use of traditional foods and decrease the rate of chronic disease.

## Traditional and Current Food Preservations Methods

Food preservation has been used for thousands of years, but how food is preserved has changed with advancing scientific discoveries. Canning is among the most recent food preservation methods. It was first discovered in the 1790s after a Frenchman noticed that heat would seal a glass bottle and keep food from deteriorating. In 1864, Louis Pasteur connected the presence of microorganisms to the prevalence of foodborne illness. In 1851 the pressure canner was created to can foods at high temperatures to destroy bacteria. However, it wasn't until the 1920's that the connection was made between the extreme heat of pressure canning and the ability to destroy *Clostridium botulinum*, a toxin-producing bacterium, which is known to cause foodborne illness especially in the anaerobic environment of canned food, and in severe cases, death (Nummer, 2002). Ever since this discovery, there have been new recommendations implemented for preserving at home and regulations enacted for commercial canning. Food preservation is a way to feed families and also a way to preserve the customs of the past with the advances of scientific discovery. Food preservation techniques are updated regularly to ensure safe, high-quality products. The United States Department of Agriculture published the first iteration of the *Complete Guide to Home Canning* in 1988. Since then, there have been five updates: 1989, 1994, 2006, 2009, and 2015 (*The USDA Complete Guide to Home Canning*, 2022).

Food preservation concepts are taught to home food canners in various ways (online, face-to-face, etc.) to increase food safety knowledge. The methods outlined below have been researched and tested for safety by multiple food safety experts at federal agencies, local land grant universities, and land grant offices at tribal colleges. There also have been ongoing updates to drying and water bath canning preservation methods based on federal and local research and

testing. It is less common nowadays to dry foods in the sun due to possible safety concerns; however, there are still ways to sun dry food with updated regulations that keep the food safe. Modern food preservation techniques are well-studied, and there are ways to meld traditional and modern food preservation methods while keeping safety in mind (Nummer, 2002).

One of the most common methods used by AI of the Great Plains was drying. American Indians knew that moist environments were prime areas for bacteria to grow, so they began harnessing the power of the sun, wind, and fire to dry and preserve their food. The first contributor to the drying effort was the sun. Fruit and meat were laid out on rocks or other flat surfaces to sun dry. Fire, or more accurately smoke, was often used to dry and cook fish and vegetables. When it came to nuts, seeds, or various grains, roasting was used to quickly kill any bugs or larvae that were present before drying (First Nations Development Institute, 2022). The smoking process was completed outdoors with access to all three drying powers: sun, wind, and smoke from a fire. Traditional food preservation methods made for a safe environment to prevent foodborne illness (First Nations Development Institute, 2022).

The freezer may seem like a new invention, but AI in the Great Plains were using cache pits and cellars long before the modern deep freeze was around. A cache pit is “a large subterranean pit, usually lined with bark, clay, reeds, and grasses and used to store foods such as dried meat, plants, seeds, and dehydrated foods (First Nations Development Institute, 2022). Cache pits extended the shelf life and served as a safe storage spot for the preserved food over winter. There were permanent areas just below the ground designated for food with a layer of permafrost acting as a freezer (First Nations Development Institute, 2022).

Today's food preservation methods contain all the same ideas as the traditional methods except with equipment that runs off electricity instead of the sun. Freezing and drying are still used today with the more recent addition of pressure and water bath canning added to the list.

Freezing is one of the simplest ways to preserve food. Almost all foods can be frozen safely, although some foods, such as leafy greens or gravy, may have a different texture or consistency after freezing. All that is needed are freezer-safe containers or bags and a deep freezer or fridge/freezer combination (National Center for Home Food Preservation, n.d.). Once food is placed in the freezer it stays at high quality for multiple months, depending on the food. The biggest safety precaution comes into play when thawing the food. It might be tempting to leave meat or other perishable goods on the counter to thaw, however the safest method is to keep the food in a leak-proof container on the bottom shelf of a refrigerator until it is ready to be used (National Center for Home Food Preservation, n.d.).

Drying foods today follows many of the same practices that AI used, however it is more common to use an electric dehydrator to remove moisture instead of the sun. Electric dehydrators must be run for multiple hours, depending on the food, but they are a safe and uncomplicated way to preserve food. One of the most common foods that is dehydrated today is meat, but fish, fruit, and seeds are also popular choices for use in a dehydrator (National Center for Home Food Preservation, n.d.). Despite the popular use of dehydrator, sun-drying methods are still taught and practiced in many AI communities. Sun-drying is commonly used to preserve fruits and vegetables for later use in soups or other traditional dishes (Botzet et al., 2023).

Pressure canning is used to preserve the texture, flavor, and nutrients of many different kinds of foods. All that is needed is a reliable pressure canner, jars, canning lids, metal screw bands, and a rubber scraper. The rubber scraper is used to remove air bubbles that may form in

the jars after filling them. Removing the air bubbles from the jars prevents that air from releasing during the canning process and causing an improper seal. The jars and the metal screw bands can be reused, but the canning lids with the seal cannot. It is important to pay close attention to the pressure gauge on the canner to keep it as close to the safe pressure as possible. There is a decrease in the temperature that it takes to boil water at higher altitudes; if a person is located at a different altitude the amount of pressure needed is higher to destroy bacteria. Some of the most common foods that are pressure canned include vegetables, meat, and soups. Pressure canning is used for foods that are low in acid because the high pressure creates an environment where bacteria are destroyed, lowering the risk of foodborne illness. High acid foods can be water bath canned because the amount of acid they contain prevents bacterial growth (National Center for Home Food Preservation, n.d.).

Water bath canning is similar to pressure canning in many ways, but the equipment needed is slightly different. Water bath canning requires a large pot with a canning rack. These are usually sold together, but any large pot that fits a canning rack can be used. The same style of jars, canning lids, and metal screw bands used in pressure canning are used in water bath canning. Air bubbles should be removed from canned goods that are going to be water bath canned. Altitude changes can affect water bath canning. Instead of a pressure increase however, the process time is increased. This ensures that heat-resistant bacteria are destroyed before enjoying canned food. Fruit, pickles, and jellies are some of the most common foods that can be safely water bath canned.

### **Intervention**

Given the information reviewed in this paper so far, a potential area to focus an intervention is home food preservation lessons. Modules focusing on food preservation have

been developed thanks to funding from the United States Department of Agriculture National Institute of Food and Agriculture Food Safety Outreach Program (2022-70020-37999) to teach individuals how to preserve foods using traditional and modern techniques. The project was a collaboration between North Dakota State University Extension and Cankdeska Cikana Community College. Cankdeska Cikana Community College staff have repeatedly been asked for culture-based food preservation and foraging workshops which is the reason for the focus on food preservation with a secondary focus of food safety.

The project was designed as a series of micro-credential modules with significant food safety components integrating the Food Safety Modernization Act principles to improve food security on the reservation. The grant had three main objectives: identify and justify specific food safety education and training needs and other resources for various target audiences within local communities, second, support the establishment, development, growth and/or expansion of new or already existing food safety education and training programs within communities, and ensure that they are consistent with new FSMA guidelines, and finally, leverage partnerships with non-governmental organizations, community-based organizations, extension, socially disadvantaged farmers, small processors, and small fresh fruit and vegetable merchant wholesalers. The modules were created with information from the Home Food Preservation website and NDSU Extension. Information was also gathered by Cankdeska Cikana Community College, located in Fort Totten, about traditional food drying methods.

South Dakota Extension conducted a similar traditional food preservation drying project that guided the development of our modules. SDSU Extension employees gathered information from members of the Sisseton Wahpeton (SWT) and Cheyenne River Sioux Tribes (CRST) to gather information on methods currently used to dry meat, corn, and berries (Botzet et al., 2023).



The average age of those interviewed ranged from 41 to 50. Ninety-three percent of individuals interviewed learned corn and berry drying methods from their families. Sun-drying was the main method used, however CRST members noted that drying meat has been modified from the traditional sun form to the use of a dehydrator for (Botzet et al., 2023). The information they gathered was used to create a curriculum focused on youth from AI and non-AI communities. Lessons were created to practice sun-drying corn and wild berries using traditional methods. Topics included AI foods, history behind sun-drying, food safety risk, sun-drying process, and recipes to be made with sun-dried products. This intervention provided helpful information on how to set up our own modules for use in AI and non-AI groups.

The main topics for the NDSU/CCCC modules are water bath canning, pressure canning, freezing, and drying. All topics have their own subtopics which detail how to preserve specific foods such as meat, fruits, and vegetables using the main topic method. There is also a beginner, equipment, and safety subtopic for each of the main topics. A complete module contains an online accessible handout with preservation directions and pictures, a set of slides with a voiceover describing how to complete each process, and questions at the end to reiterate key points from each topic. A full list of module topics and an example of the handout, slides, voiceover and questions can be found in appendices A and B.

The modules were created to teach beginner level individuals how to can, freeze, and dry foods for use in winter months when an outdoor garden is not an option. The end goal was to increase food security and food sovereignty and decrease chronic disease by teaching people who live in tribal areas how to preserve their traditional foods such as fruits, vegetables, meat, and soups. This may help individuals become less reliant on pre-packaged convenience foods that play a role in chronic disease. Canning is not a traditional AI food preservation method;

however, it was decided to include water bath canning and pressure canning in these modules to offer a greater variety of ways to preserve food in addition to requests from individuals at CCCC expressing interest in learning modern canning methods in addition to traditional ways. Leaders at the college were able to purchase equipment to teach these methods as part of the lessons.

### **Recommendation**

A recommendation moving forward from this point is to collect data using the created modules. The information included in the lesson has been edited and reviewed by experts in the food preservation field, however it would also be beneficial to have NDSU Extension agents who are versed in food preservation to take the course and provide feedback. Once agents have completed a pilot course, it can then be taken to the community at CCCC. Pre-tests and post-tests with subjective and objective questions could be conducted to assess the effectiveness of each lesson and the overall course. A few of the questions at the end of each lesson could be chosen to include on the pre-test to assess objective knowledge. Subjective knowledge could be assessed using confidence scales about food preservation skills and comfort level. The data collected can guide the next steps for the food preservation course. The main purpose for this course is to increase the knowledge of food preservation skills and knowledge surrounding traditional foods in AI communities, resulting in decreased food insecurity and chronic disease. Decreasing food insecurity and chronic disease are secondary outcomes in this project, but essential to the improvement of AI experiences in Spirit Lake Nation and beyond.

### **Conclusion**

The AI in the United States have experienced years of hardship and negative bias. The Great Plains AI grew up in the land of the current day Midwest. Spirit Lake Nation is an AI tribe that was pushed from Minnesota into current day North Dakota. The tribal area is located in

Northeast North Dakota and has about 7,200 enrolled members (Spirit Lake Nation, n.d.). The Spirit Lake people harvested foods from the land such as wild game, corn, beans, squash, berries, and more. Unfortunately, tribal areas and boarding schools that were created are a large reason for the loss of food sovereignty in AI communities. The loss of food sovereignty brought with it increased rates of food insecurity and chronic disease. Members of Spirit Lake and beyond were forced to rely on government commodity foods for survival. The nutritional quality of commodity foods is much lower than traditional foods that came from the land.

There are multiple projects that are fighting for the re-introduction of traditional foods and food preservation methods in tribal areas. Online modules were created by NDSU Extension and CCCC tribal college on traditional drying and modern food preservation techniques such as canning. The modules were based on information from Spirit Lake Community members personal drying techniques and input from food preservation experts. All modules contain a handout and slides with recorded instructions. The modules will be open to the Spirit Lake community with plans to extend the training to others. The goal for this project was to create a learning environment where AI individuals would be eager to learn or re-learn how to preserve their nutrient-dense traditional foods safely. In turn, we hope they learn the skills to preserve food for the winter, improving food sovereignty and food security while reducing the rate of chronic disease.

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## **APPENDIX A. FOOD PRESERVATION MODULE TOPICS**

1. Freezing Equipment
2. Freezing for Beginners
3. Freezing Safety
4. Freezing Fruit
5. Freezing Meat
6. Freezing Vegetables
7. Pressure Canning Equipment
8. Pressure Canning for Beginners
9. Pressure Canning Safety
10. Pressure Canning Carrots
11. Pressure Canning Corn
12. Pressure Canning Green Beans
13. Pressure Canning Meat
14. Pressure Canning Peas
15. Pressure Canning Potatoes
16. Pressure Canning Soup
17. Pressure Canning Squash
18. Water Bath Canning Equipment
19. Water Bath Canning for Beginners
20. Water Bath Canning Safety
21. Water Bath Canning Fruit
22. Water Bath Canning Jelly
23. Water Bath Canning Pickles
24. Water Bath Canning Salsa
25. Water Bath Canning Tomatoes
26. Drying Equipment
27. Drying for Beginners
28. Drying Safety
29. Drying Fruits and Vegetables
30. Drying Meat
31. Drying Herbs
32. Traditional Drying Methods
33. Fermenting Sauerkraut

## **APPENDIX B. MODULE MATERIAL LINKS**

Handout: <https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:88e3e201-c05c-4f3d-9043->

f969accda24

Voiceover Script: <https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:ab81472a-6200-475f-926d->

3dcd622cf760

Slides: <https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:d24a11ac-bfd0-4c2f-b622->

f73116792b1e

Questions: <https://acrobat.adobe.com/id/urn:aaid:sc:VA6C2:e96241f4-27b8-415d-87e3->

604507c4cbfa