

Nutritional Value and Health Impacts of Traditional Native American Foods: A Literature Review

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Table of Contents

Abstract & Acknowledgements	3
Executive Summary	4
Introduction	
Historical Background of Native American Foods Systems	5
Contemporary Food Security & Health in Indian Country	9
Background on USDA Nutrition Assistance Programs	12
Traditional Foods by Region	14
Alaska, Arctic, & Pacific Northwest	16
Northern Plains & Great Lakes	19
Southwest & Southeast	23
Impact of Traditional Foods on Diabetes	26
Impact of Traditional Foods on Mental Health	29
Conclusion	31
2018 Farm Bill Provisions for Traditional Foods	32

Abstract

This literature review explores and summarizes the nutritional value and health impacts of consuming traditional Native American¹ foods². Themes covered include nutritional content, medicinal qualities, physiological and psychological benefits of traditional foods accruing to Native peoples. The discussion on traditional foods is an essential element in the overarching conversation on Native American health and food sovereignty. The reemergence of Indigenous preparation and consumption of traditional foods after historical displacement has proven to be a pathway to rebuilding indigenous health and welfare. This review also covers topics regarding federal nutrition assistance programs, diabetes, mental health, and the Farm Bill and their relation to traditional foods.

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¹ The language in this report utilizes the terms Native American, American Indian and indigenous to refer to the Native peoples of the United States. The acronym "AI/AN" is used which refers to "American Indian/Alaska Native" in census, survey and study data. The word "Tribe" is capitalized throughout this report to acknowledge Tribes as sovereign governments.

² For the purpose of this review, Native American traditional foods will include foods that were procured and consumed prior to colonial influences. For example, in contemporary culture, fry bread is a staple of many Native American diets but since it includes ingredients introduced by European settlers, it is not included in this review. Foods such as seal oil (consumed by Tribes in Alaska and Pacific Northwest), wild rice (popular in the Northern Plains and Great Lakes), and traditional corn (eaten in many regions) are all foods that are considered "traditional". This definition was chosen because this review highlights the change in dietary patterns and their effects on health, therefore only foods that existed prior to the shift will be discussed.

Executive Summary

The forced removal of Native Americans from their homelands has disrupted traditional foodways and forced people to rely on high calorie, low nutrient alternatives. The drastic change from Indigenous to contemporary diets along with high rates of poverty and food insecurity have resulted in many of the health disparities that exist in this community today. Type II Diabetes, for example, is a disease that was almost non-existent less than 100 years ago. Today, it is one of the top causes of death for Native Americans.

The health disparities mentioned above may be alleviated with the reintroduction of traditional foods into the diet, which have a variety of preventative qualities and are nutritionally dense. These foods vary from region to region, depending on species diversity, terrain, and metabolic needs of the peoples but the reemergence of Indigenous preparation and consumption of traditional foods after historical displacement has proven to be a pathway to rebuilding indigenous health and welfare.

Traditional foods in this review are broken into three regional groups. Foods of Alaska, Arctic, and Pacific Northwest are commonly rich in vitamin D, A, and C as well as omega-3 fatty acids, calcium, iron, magnesium, and unsaturated fats. Many of these foods had significantly higher concentrations of nutrients than contemporary alternatives. This region typically consumes a high protein, low carbohydrate diet. Plant foods in the Great Plains and Great Lakes contain high levels of fiber, calcium, magnesium, potassium, copper, niacin, vitamin B6, and vitamin C. Bison, a common protein source, has equal or higher concentration of certain vitamins and minerals without providing as much fat. Foods of the Southwest and Southeast are rich sources of vitamin A, D, E, K, and B12, as well as calcium, potassium, magnesium, iron, and zinc. Foods such as pumpkin, corn, and beans were found to have significant amounts of ACE inhibitors or compounds that can aid in hyperglycemia and hypertension management. The diets of people in this region were commonly high in carbohydrates and moderate in fat and protein.

Aside from general nutritional value, traditional foods also play a large role in reducing the risk of certain illnesses. When comparing the diets of indigenous communities following traditional diet patterns to those following contemporary diet patterns, rates of diabetes were far lower in the former group. The findings provided evidence that despite a genetic predisposition to the disease, dietary practices could halt the development of Type II diabetes. Other research highlighted the link between omega-3 fatty acids (commonly found in Alaska Native and Pacific Northwest traditional foods) and improved mental health.

Many of the sources in this review acknowledge the tremendous nutritional value of traditional foods and their ability to prevent the diseases currently plaguing Native American communities. Based on this information, the general consensus among researchers is to increase consumption as a way to rebuild health and wellness.

Historical Background of Native American Food Systems

Before continuing forward with the review, we must first recall the history of indigenous peoples in the United States. This historical background is necessary to provide context for readers about the pre-colonization state of Native foods systems as well as the disruptions that occurred following colonization. There is no simple summary for the thousands of years of Native history of diverse and unique Tribes that live in this country. Health disparities between Native Americans and the overall population of the United States began to emerge after colonization.³ From the purposeful introduction of foreign disease to forcing children to attend Indian reeducation boarding schools to the removal of Native people from their homelands, many policy decisions on the part of the United States government disrupted the lives of Native Americans and demolished traditional foodways. Figure 1 refers to changes in the relationship between indigenous Tribes and the United States government.

The removal of Native Americans from their homelands severely disrupted traditional foodways. The drastic change from traditional foodways to mainstream western diets is the root cause of negative health outcomes for Native people.⁴ “Contemporary food security concerns, particularly on Indian reservations, can largely be explained by our nation’s legacy of Indian removal from their traditional lands, which resulted in profound losses of sovereignty for Native American tribes and nations”.⁵ In what is referred to as the “nutrition transition”, there is a widespread, pronounced change from traditional diets to store-bought, western foods in Native communities.^{6,7} These changes were comprised of separation of Native peoples from their traditional hunting grounds and gathering areas as well as confinement into condensed areas.⁸ Reduced hunting and gathering activities also resulted in increasingly sedentary lifestyles.⁹ All of these cumulative events and their consequences can be summed up with the term “colonial health deficit” as coined by Bonnie Duran.¹⁰

³ EagleWoman, Angelique Townsend and Stacy L. Leeds. *Mastering American Indian Law*. Durham, NC: Carolina Academic Press, 2013.

⁴ Companion, Michèle. “An Overview of the State of Native American Health: Challenges and Opportunities.” *International Relief & Development*. (retrieved December 10, 2018).

⁵ Companion. “An Overview of the State of Native American Health”

⁶ Kuhnlein, Harriet V., Olivier Receveur, Rula Soueida, and Grace M. Egeland. “Arctic Indigenous Peoples Experience the Nutrition Transition with Changing Dietary Patterns and Obesity.” *The Journal of Nutrition* 134, no. 6 (2004): 1447-1453. doi:10.1093/jn/134.6.1447

⁷ Fazzino, David V. and Philip A. Loring. “From Crisis To Cumulative Effects: Food Security Challenges In Alaska.” *NAPA Bulletin* 32, no. 1 (2009): 152-177. doi:10.1111/j.1556-4797.2009.01033.x

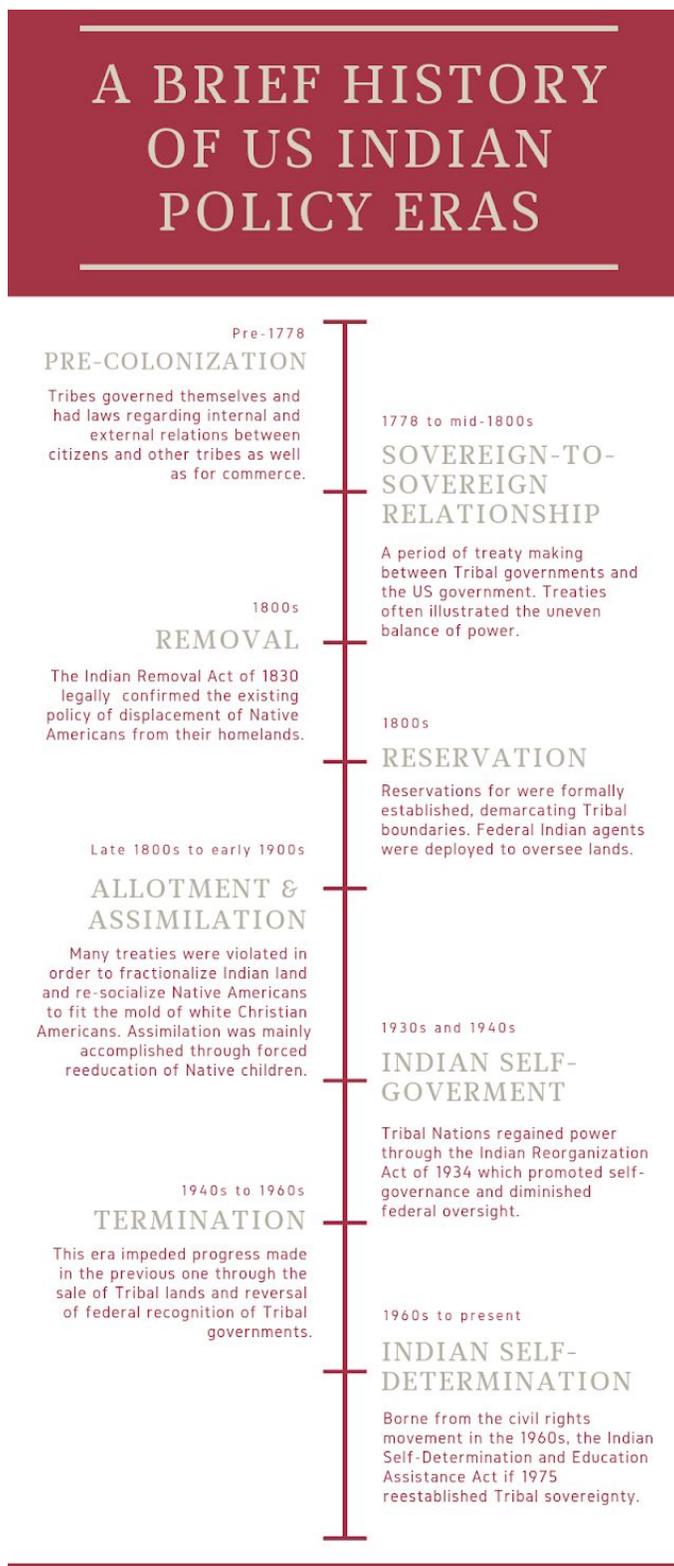
⁸ Gurney, Rachel M., Beth S. Caniglia, Tamara L. Mix and Kristen A. Baum. “Native American Food Security and Traditional Foods: A Review of the Literature.” *Sociology Compass* 9, no 8 (2015): 681-693. doi:10.1111/soc4.12284

⁹ Gurney et. al. “Native American Food Security and Traditional Foods”

¹⁰ Duran, Bonnie. “Director of the Center for Indigenous Health Research.”

<https://iwri.org/bonnie-duran-director-of-the-center-for-indigenous-health-research/> (retrieved December 10, 2018).

Figure 1: Timeline of US Indian Policy eras¹¹



¹¹ EagleWoman and Leeds. *Mastering American Indian Law*.

Some examples of dietary change research include studies on the Hopi Tribe using tooth composition analysis between the 16th century and late 20th century. In tooth samples from the 17th century, higher levels of strontium were found, signifying higher consumption of traditional foods due to the mineral's concentration in certain foods. These samples were compared with teeth from Hopi children in the 1970s, which determined much lower consumption of traditional foods based on lower levels of strontium.¹² In interviews regarding dietary practices, only one-fourth of Hopi women and children recalled eating a meal which featured a traditional food.¹³ Furthermore, another study found that of the traditional foods species surveyed by A.F. Whiting in the 1930s, only a few remained by the 1970s).¹⁴ As seen in Figure 2 below, a decrease in the number of plant and animal species is one cause of loss of traditional food systems.

Figure 2¹⁵

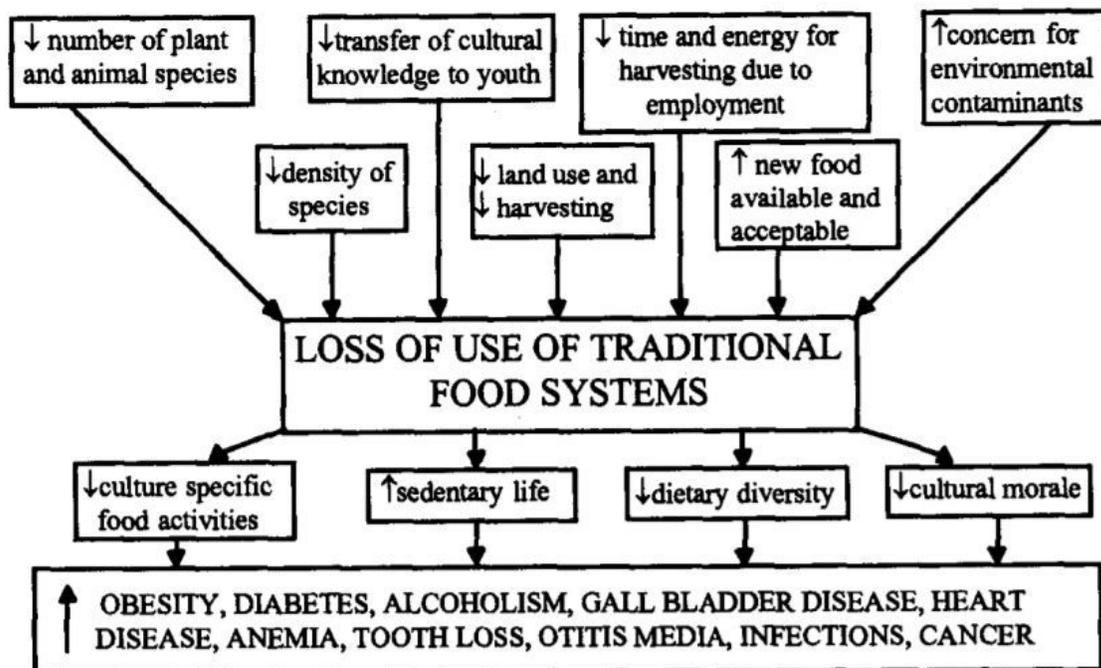


Figure 1 Factors influencing dietary change and consequences of change for indigenous peoples.

¹² Kuhnlein, Harriet V. and D. H. Calloway. "Minerals in human teeth: Differences between preindustrial and contemporary Hopi Indians." *The American Journal of Clinical Nutrition* 30, no. 6 (1977): 883-886. doi:10.1093/ajcn/30.6.883

¹³ Kuhnlein and Calloway. "Minerals in human teeth"

¹⁴ Whiting, Alfred F. *Ethnobotany of the Hopi*. New York: AMS Pr, 1978.

¹⁵ Kuhnlein, Harriet V. and Olivier Receveur. "Dietary Change and Traditional Food Systems of Indigenous Peoples." *Annual Review of Nutrition* 16, no. 1 (1996): 417-442. doi:10.1146/annurev.nutr.16.1.417

Indigenous foods are difficult to define due to the vast number of cuisines and dietary traditions. The study of “these food environments is complicated by the cultural and geographic diversity of Indigenous people and the effects of colonialism, land dispossession, relocation and forced settlement on static reserves, and increasing migration to urban areas”.¹⁶ Traditional foodways also vary depending on climate, terrain and species diversity of plants and animals.¹⁷ Generally, the traditional foods of various Tribes “varied widely by region, but were usually wild animals and wild or cultivated plant species; the diet, as a whole, was high in protein, full of complex carbohydrates, and had almost no sugar”.¹⁸

The indigenous study of nutrition “can be described as culturally and bioregionally specific food-related knowledge that results in a dietary pattern meeting basic nutritional needs while avoiding Western diseases”.¹⁹ Western diseases, those which have been more prevalent in westernized societies due to the lifestyle changes in consequence of the Industrial Revolution, are very rarely seen in hunter-gatherer civilizations. Such diseases are coronary heart disease, obesity, hypertension, type 2 diabetes, epithelial cell cancers, autoimmune disease, and osteoporosis.²⁰ Native science focuses on building knowledge by studying components as interconnected elements rather than in isolation.²¹ A story about scurvy reinforces this knowledge and practice.

“The early North American Indians were familiar with this disease and knew how to prevent it. In fact, the Indians of the Quebec area came to the rescue of Jacques Cartier in the spring of 1535. The Indians advised him to feed the crew a tea made from the needles and bark of the eastern white cedar— one of the many foods they used which was a rich source of vitamin c. The men quickly regained their health and learned a valuable lesson.”²²

¹⁶ Skinner, Kelly, Erin Pratley and Kristin Burnett. “Eating in the City: A Review of the Literature on Food Insecurity and Indigenous People Living in Urban Spaces.” *Societies* 6, no. 2 (2016): 7. doi:10.3390/soc6020007

¹⁷ Park, Sunmin, Nobuko Hongu and James W. Daily. “Native American foods: History, culture, and influence on modern diets.” *Journal of Ethnic Foods* 3, no. 3 (2016): 171-177. doi:10.1016/j.jef.2016.08.001

¹⁸ McCoy, Martha. “The Rise of Obesity and Diabetes with the Adoption of A Western Diet: A Case Study of Native American Communities.” <https://dash.harvard.edu/handle/1/11940214> (retrieved December 11, 2018).

¹⁹ Milburn, Michael P. “Indigenous Nutrition: Using Traditional Food Knowledge to Solve Contemporary Health Problems.” *The American Indian Quarterly* 28, no. 3 (2004): 411-434. doi:10.1353/aiq.2004.0104

²⁰ Carrera-Bastos, Pedro, Fontes, Okeefe, Lindeberg, and Cordain. “The Western Diet and Lifestyle and Diseases of Civilization.” *Research Reports in Clinical Cardiology*, 2011, 15. doi:10.2147/rrcc.s16919.

²¹ Milburn. “Indigenous Nutrition.”

²² Health Canada. *Native Foods and Nutrition: An Illustrated Reference Manual*. Ottawa: Medical Services Branch, Health Canada, 1995.

A limitation of this review is the lack of research regarding traditional foods. There is a paradoxical trend in nutritional research: while Native Americans are often included in studies as part of sampled populations, data is often not disaggregated by race, disguising important trends that would reveal health disparities among the communities.

“Racial and ethnic health disparities and inequities can only be eliminated if high-quality information is available by which to track immediate problems and the underlying social determinants of health. Such information can guide the design and application of culturally specific approaches to medicine and public health. Often, health outcomes are disaggregated only by broad racial and ethnic categories such as White, Black, or Hispanic. However, the great, and growing, diversity of the American population means that people’s actual experiences are much more specific.”²³

At the same time, these communities are over-studied in certain aspects to the point of exhaustion while many conditions remain stagnant. Although there is a need for more thorough research, “repeated violations of trust by researchers have justifiably soured American Indian interest in participating in research projects”.²⁴

Contemporary Food Security & Health in Indian Country

The most commonly utilized definition of food security is as follows:

“Access by all people at all times to enough food for an active, healthy life. Food security includes at a minimum: (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies).”²⁵

A direct consequence of the loss of foodways is the increase in food insecurity. In a review focused on the relationship between food security and traditional foods, Gurney et. al. state, “contemporary food security concerns, particularly on Indian reservations, can largely be explained by our nation’s legacy of Indian removal from their traditional lands, which resulted in profound losses of sovereignty for Native American tribes and nations”.²⁶

²³ Rubin, Victor, Danielle Ngo, Ángel Ross, Dalila Butler and Nisha Balaram. "Counting a Diverse Nation: Disaggregating Data on Race and Ethnicity to Advance a Culture of Health." http://www.policylink.org/sites/default/files/Counting_a_Diverse_Nation_08_15_18.pdf (retrieved January 15, 2019).

²⁴ Davis, Sally M. and Raymond Reid. "Practicing participatory research in American Indian communities." *The American Journal of Clinical Nutrition* 69, no. 4 (1999): 755-759. doi:10.1093/ajcn/69.4.755s

²⁵ Anderson, Sue A. "Core Indicators of Nutritional State for Difficult-to-Sample Populations." *The Journal of Nutrition* 120, no. 11 (1990): 1555-1600. doi:10.1093/jn/120.suppl_11.1555

²⁶ Gurney et. al. "Native American Food Security and Traditional Foods"

Data from the Current Population Survey (released in 2008) shows that 23 percent of AI/AN households identified themselves as food insecure, in comparison to 15 percent of all U.S. households.²⁷ For Native children, food insecurity rates are double that of all American children.²⁸ The chart below shows unemployment, poverty, homeownership, and food insecurity rates for the 15 counties with the highest AI/AN population.²⁹

Figure 3³⁰

MAJORITY-AMERICAN INDIAN COUNTIES AMONG HIGH FOOD-INSECURITY RATE COUNTIES, 2013

TABLE 05

State	County	Population	Unemployment Rate	Poverty Rate	Percent American Indian	Homeownership Rate	Food-Insecurity Rate
SD	SHANNON	13,829	12.9%	53.2%	94.8%	52.5%	26.2%
AK	WADE HAMPTON	7,678	22.1%	31.4%	90.4%	71.1%	25.8%
AK	BETHEL	17,356	15.4%	22.8%	80.9%	64.2%	21.0%
AK	NORTHWEST ARCTIC	7,624	15.2%	22.0%	80.9%	56.0%	21.4%
SD	TODD	9,783	8.8%	44.6%	79.3%	46.5%	22.8%
SD	BUFFALO	1,966	12.7%	35.6%	77.4%	37.3%	24.4%
SD	DEWEY	5,419	13.3%	33.3%	74.0%	58.2%	22.0%
NM	MCKINLEY	72,373	9.3%	35.0%	72.8%	72.6%	24.3%
AZ	APACHE	71,978	19.8%	36.2%	71.5%	76.5%	28.2%
SD	ZIEBACH	2,821	6.0%	42.3%	71.3%	51.7%	20.3%
AK	NOME	9,695	11.7%	27.7%	70.5%	55.1%	21.0%
AK	YUKON-KOYUKUK	5,656	14.8%	24.2%	69.6%	70.4%	20.8%
SD	CORSON	4,078	7.3%	44.2%	65.5%	52.9%	21.2%
MT	GLACIER	13,528	10.9%	33.7%	64.2%	59.5%	20.8%
MT	BIG HORN	12,939	15.3%	25.5%	62.5%	67.4%	20.3%

²⁷ Bureau of the Census and USDA Economic Research Service. "Current Population Survey, December 2008: Food Security Supplement."

<https://www.icpsr.umich.edu/icpsrweb/RCMD/studies/29645> (retrieved December 10, 2018).

²⁸ Gordon, Anne and Vanessa Oddo. "Addressing Child Hunger and Obesity in Indian Country: A Report to Congress." <https://fns-prod.azureedge.net/sites/default/files/IndianCountry.pdf> (retrieved December 10, 2018).

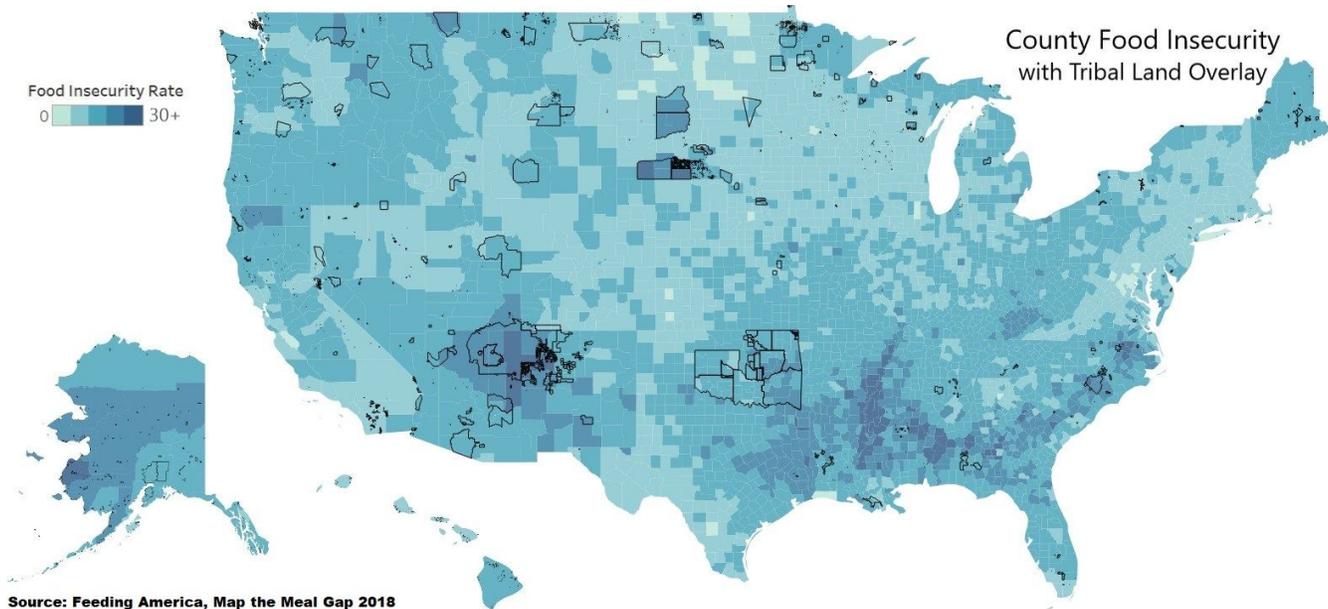
²⁹ Feeding America. "Map the Meal Gap 2015: Highlights of Findings for Overall and Child Food Security."

<https://www.feedingamerica.org/sites/default/files/research/map-the-meal-gap/2013/map-the-meal-gap-2013-exec-summ.pdf> (retrieved December 11, 2018).

³⁰ Feeding America. "Map the Meal Gap 2015"

Food insecurity rates are also influenced by poverty levels.³¹ According to Feeding America’s Map the Meal Gap report, almost three-fourths of majority AI/AN counties ranked consistently as “persistent-poverty counties”, meaning their poverty levels have been above 20% for the last 30 years.³² The average poverty level for these counties is around 37%.³³ Only about 1% of the total U.S. population identifies as American Indian but this community disproportionately experiences poverty, which is a primary cause of food insecurity.³⁴

Figure 4³⁵



Food insecurity rates can give us insight into one of the causes of health disparities among Native communities. Low access to affordable and healthy foods forces people to rely on cheaper alternatives that tend to be high calorie and nutrient scarce.³⁶ Before the era of colonization, “Native Americans have a rich history of healthy food systems and prosperous agricultural economies”.³⁷ There is literature discussed later in this review that recommends a return to this type of food system that would possibly help to alleviate the rates of disease among Native Americans, particularly diabetes. Figure 5 and 6 below show the rates of diabetes among the AI/AN population and white population. The ratios show

³¹ Wight, Vanessa, Neeraj Kaushal, Jane Waldfogel, and Irv Garfinkel. “Understanding the Link between Poverty and Food Insecurity among Children: Does the Definition of Poverty Matter?” *Journal of Children & Poverty* 20, no. 1. (2014): 1-20.

³² Feeding America. “Map the Meal Gap 2015”

³³ Feeding America. “Map the Meal Gap 2015”

³⁴ Feeding America. “Map the Meal Gap 2015”

³⁵ Feeding America. “Map the Meal Gap 2018”

<https://www.feedingamerica.org/sites/default/files/research/map-the-meal-gap/2016/2016-map-the-meal-gap-all-modules.pdf> (retrieved December 10, 2018).

³⁶ Edwards, Karethy and Beverly Patchell. “State of the Science: A Cultural View of Native Americans and Diabetes Prevention.” *Journal of Cultural Diversity* 16, no. 1 (2009): 32–35.

³⁷ Edwards and Patchell. “State of the Science”

that there are two and a half to three times more people with diabetes in AI/AN communities compared to the white population.

Figure 5³⁸

Age-adjusted percentages of persons 18 years of age and over with diabetes, 2004-2008

	American Indian/Alaska Native	White	American Indian/Alaska Native/ White Ratio
Men and Women	17.5	6.6	2.7
Men	18.2	7.2	2.5
Women	16.2	6.2	2.6

Figure 6³⁹

Age-Adjusted Percentage of persons 18 years of age and over with diabetes, 2014

American Indian/Native American	Non-Hispanic White	American Indian/Native American/Non-Hispanic White Ratio
17.6	7.3	2.4

Background on USDA Nutrition Assistance Programs

Federal nutrition programs provide food for a large number of Native Americans. In 2016, there were approximately 571,000 AI/AN Supplemental Nutrition Assistance Program (SNAP) participants.⁴⁰ This program, formerly known as food stamps, provides families with benefits to purchase food items each month. Access to traditional foods through this program is dependent on access to stores or merchants that supply them. AI/AN participants in SNAP are overrepresented in this program. The chart below shows a

³⁸ Centers for Disease Control. "Health Characteristics of the American Indian and Alaska Native Adult Population (Table 4)" (2004-2008)

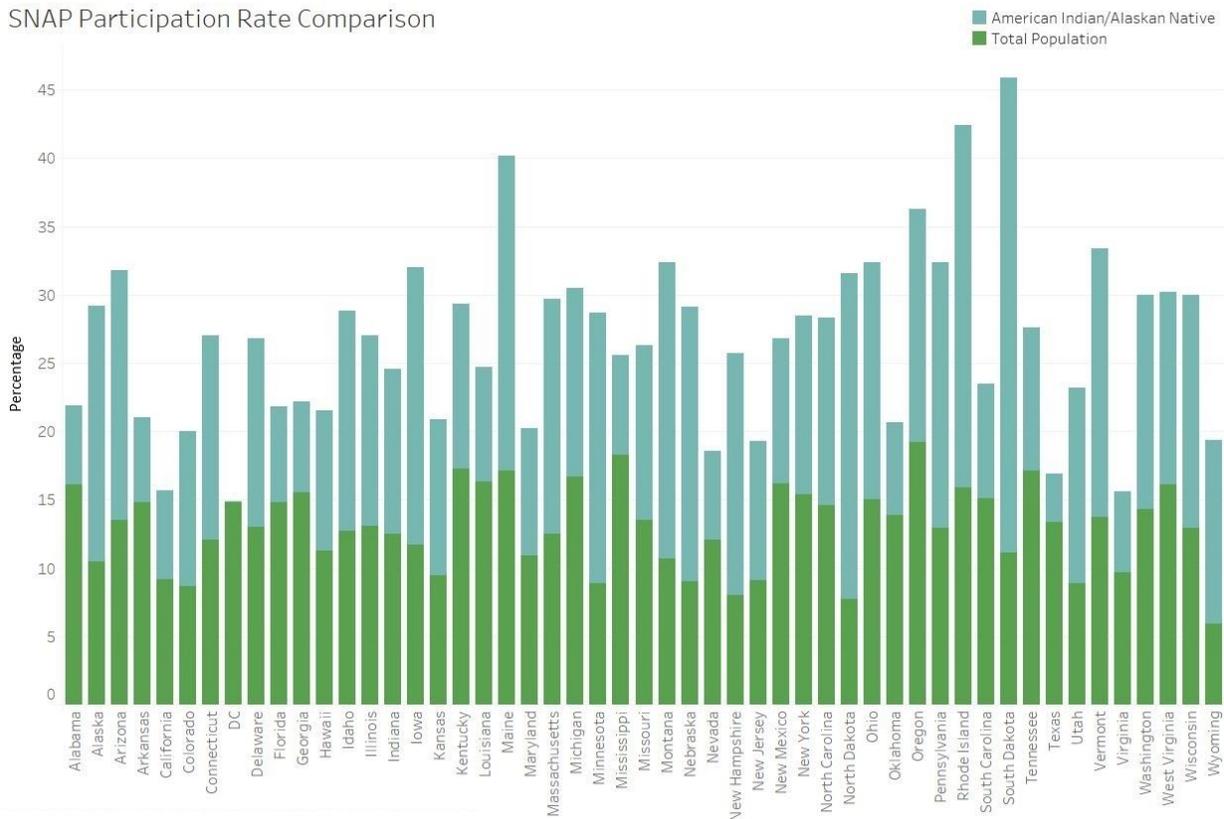
³⁹ Centers for Disease Control. "Summary Health Statistics: National Health Interview Survey (Table A-4)" (2016)

⁴⁰ Gray, Kelsey F., Sarah Fisher, and Sarah Lauffer. "Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2016."

<https://www.fns.usda.gov/snap/characteristics-supplemental-nutrition-assistance-program-households-fiscal-year-2016> (retrieved December 10, 2018).

comparison between the participation rates between the AI/AN population and the total population in each state. In every state, SNAP participation rates are higher among the AI/AN community compared to the total population. In some states, such as South Dakota, the rates are four times as high.

Figure 7 ⁴¹



Native Americans living on reservations can also participate in the Food Distribution Program on Indian Reservations (FDPIR) as an alternative to participation in the SNAP program. The FDPIR program serves those living on rural reservations that lack access to SNAP retailers, representing more than 90,000 people per year.⁴² The FDPIR program provides families with commodity food packages which include a few traditional foods such as bison, blue cornmeal, wild rice, catfish and salmon.⁴³ The FDPIR Food Package Review Work Group, formed in 2002, consists of officials from the National Association of FDPIR (NAFDPIR), leaders from Tribal organizations and state agencies, health professionals, and

⁴¹ American Community Survey. "5 Year Estimates." (2011-2015)

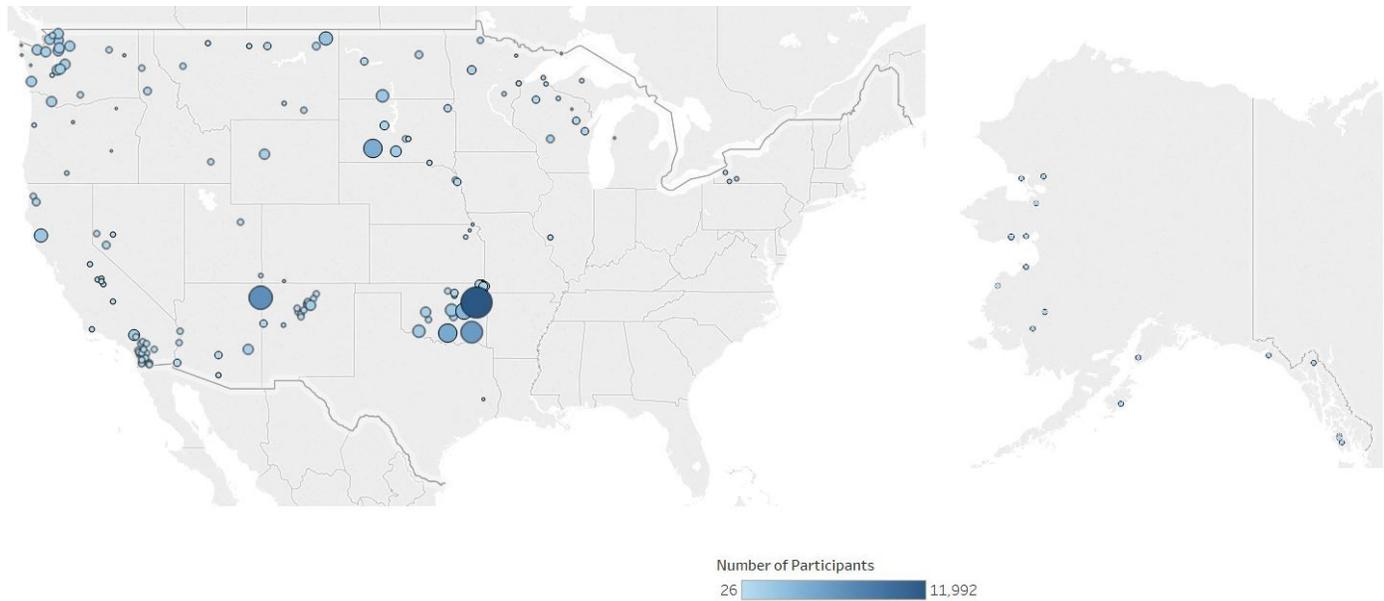
⁴² National Data Bank. "FDPIR Number of Participants." (2017)

<https://fns-prod.azureedge.net/sites/default/files/fdpi/fy17-fdpi-participation.pdf> (retrieved December 10, 2018).

⁴³ USDA FNS. "USDA Foods Available List for Food Distribution Program on Indian Reservations (FDPIR)." <https://fns-prod.azureedge.net/sites/default/files/fdpi/FDPIR-Foods-Available.pdf> (retrieved December 10, 2018).

USDA staff.⁴⁴ The purpose of the working group is to periodically review the contents of the FDPIR package and propose changes that would increase nutritional value and inclusion of traditional foods without impacting the cost of the program. However, traditional Native American cuisine varies drastically by region, making it a challenge to determine authentic traditional foods for a program that serves Native people nationwide. Below is a map of FDPIR sites across the US and the correlating participation rates for each site.

Figure 8 ⁴⁵



Traditional Foods by Region

“Many examples of traditional dietary patterns resistant to Western disease can be found in North America, and they are characterized by both high carbohydrate, low fat diets (for example the corn and bean diets characteristic of culture groups from the Southwest to the Northeast) and high protein, low carbohydrate diets (for example, the animal-based Northern Cree and Inuit diets).” ⁴⁶

There are stark regional differences that exist between Indian Tribes and their traditional food practices. These differences are a testament to the fact that there is no single diet most appropriate for all Native Tribes. As the above quote illustrates, variance in diets is dependent on environmental factors and metabolic needs. For example, in colder

⁴⁴ USDA FNS. “Food Distribution Program on Indian Reservations (FDPIR).” <https://www.fns.usda.gov/fdpir/fdpir-food-package-review-work-group> (retrieved December 10, 2018).

⁴⁵ American Community Survey. “5 Year Estimates.”

⁴⁶ Milburn. “Indigenous Nutrition”

climates, people have different metabolic requirements to properly heat the body⁴⁷ and there are different flora and fauna which exist depending on the type of terrain in a specific area. The key takeaway of this review is that a departure from traditional diets, whatever they may be, has resulted in health deterioration. A general consensus is that traditional foods are superior to western foods for maintaining good health for Native peoples.⁴⁸ The graphics below describe the importance of various macronutrients and micronutrients and their basic physiological functions. Many of these will be referred to in the following sections as we discuss the nutritional value of select traditional foods and their impact on health.

Figure 9⁴⁹

Key nutrients and their functions

Nutrients	Functions
MACRONUTRIENTS	
Carbohydrates	<ul style="list-style-type: none"> Provide energy
Fiber	<ul style="list-style-type: none"> Keeps digestive tract healthy Helps create a full feeling in the stomach May reduce level of cholesterol in the blood
Omega-3 fatty acids	<ul style="list-style-type: none"> Help reduce risk of heart disease Anti-inflammatory
Protein	<ul style="list-style-type: none"> Important for growth Provides energy
Saturated fats	<ul style="list-style-type: none"> Provide energy Reducing intake can cut risk of heart disease and lower blood cholesterol
Unsaturated fats	<ul style="list-style-type: none"> Provide energy Promote heart health Lower harmful (LDL) blood cholesterol
VITAMINS	
Vitamin A	<ul style="list-style-type: none"> Important for night vision Helps prevent infection Keeps skin healthy
B-vitamins	<ul style="list-style-type: none"> Convert food into fuel to make energy
Folate	<ul style="list-style-type: none"> Used in the body for making proteins and DNA Prevents birth defects when taken during pregnancy
Vitamin C	<ul style="list-style-type: none"> Keeps teeth and gums healthy Fights infections and helps heal wounds
Vitamin D	<ul style="list-style-type: none"> Helps maintain calcium levels in the body to keep bones and teeth healthy
Vitamin E	<ul style="list-style-type: none"> Protects body against cell damage that may lead to the development of heart disease and cancer
Vitamin K	<ul style="list-style-type: none"> Blood clotting

B vitamins and their functions

Vitamin B₁ (thiamine)	Plays a central role in producing energy in the body from carbohydrates. It also plays a role in making nucleic acids (DNA and RNA) and conducting nerve impulses.
Vitamin B₂ (riboflavin)	Works with the other B vitamins; important for body growth and the production of red blood cells.
Vitamin B₃ (niacin)	Helps maintain healthy skin and nerves; has cholesterol-lowering effects.
Vitamin B₅ (pantothenic acid)	Essential for the metabolism of food; plays a role in the production of hormones and cholesterol.
Vitamin B₆ (pyridoxine)	The body needs vitamin B6 for more than 100 enzyme reactions involved in metabolism; involved in brain development and immune function.
Vitamin B₇ (biotin)	Essential for the metabolism of proteins and carbohydrates and in the production of hormones and cholesterol.
Vitamin B₉ (folic acid, folate)	Protects against heart disease and birth defects. It works with vitamin B12 to help form red blood cells; needed for the production of DNA, which controls tissue growth and cell function. Any woman who is pregnant should be sure to get enough folate. Low levels of folate are linked to birth defects such as spina bifida. Many foods now contain added folic acid. Sources of folic acid in the traditional diet include berries, wild celery, seaweed, and sea urchin. Other sources include fortified cereals, bread, fruits and vegetables, and oranges.
Vitamin B₁₂ (various cobalamins)	Important for metabolism; helps form red blood cells and maintain the central nervous system.

Minerals and their function

Mineral	Function of mineral
Calcium	<ul style="list-style-type: none"> Helps build strong bones and teeth Needed for healthy muscles, heart, and nerves
Copper	<ul style="list-style-type: none"> Helps in formation of red blood cells Helps in keeping blood vessels, nerves, immune system, and bones healthy
Iron	<ul style="list-style-type: none"> Needed for healthy blood Helps transport oxygen Gives us energy to live, grow, and be healthy
Magnesium	<ul style="list-style-type: none"> Found in bones and teeth Needed for making protein, muscle contraction, nerve transmission, immune system health
Manganese	<ul style="list-style-type: none"> Helps body form connective tissue, bones, blood clotting factors, and sex hormones Plays a role in fat and carbohydrate metabolism, calcium absorption, and blood sugar regulation Needed for normal brain and nerve function
Phosphorus	<ul style="list-style-type: none"> Helps build strong bones and teeth Filters out waste in kidneys Helps body store and use energy Plays role in tissue growth and repair
Selenium	<ul style="list-style-type: none"> Helps regulate thyroid and immune system May help prevent certain cancers and cardiovascular disease
Sodium	<ul style="list-style-type: none"> Used by body for regulating blood pressure Reducing intake can cut risk of high blood pressure
Zinc	<ul style="list-style-type: none"> Helps our bodies fight off illness and infections Helps with cell growth and healing wounds

⁴⁷ Irving, Laurence. "Adaptations to Cold." *Scientific American* 214, no. 1 (1966): 94-101. doi:10.1038/scientificamerican0166-94

⁴⁸ Kuhnlein and Receveur. "Dietary Change and Traditional Food Systems of Indigenous Peoples."

⁴⁹ Unger, Suanne. *Qaqamiigux: Traditional foods and recipes from the Aleutian and Pribilof Islands: Nourishing our mind, body and spirit for generations*. Anchorage, AK: Aleutian Pribilof Islands Association, 2014.

Alaska, Arctic, & Pacific Northwest

We will begin with the diets of Indigenous peoples of the far north, which primarily includes Alaska Natives and peoples of the Arctic. Diets typically consist of fish, sea mammals, wild game, birds, berries and greens.^{50,51} In the Aleutian Islands and south-east Alaska, deer, salmon, and shellfish are most commonly consumed.⁵² In the interior regions of the state, moose and caribou are more common.⁵³ Along the western edge of the state, marine mammals are preferred.⁵⁴ Availability and access to these foods have become more challenging for Native people in recent times, particularly due to the effect of changes in climate on mating between species⁵⁵ and plant growth⁵⁶. Access may also be limited by increased costs of procuring traditional foods, specifically for procuring foods through hunting, fishing, and gathering.⁵⁷ Despite this, over 92% percent of Alaska Native participants in a study by Redwood et.al. said they consumed at least one traditional food in the past year and over 70% had participated in a harvesting activity.⁵⁸

In a study of vitamin D composition of traditional Alaskan foods, Phillips, Pehrsson, and Peterson showed that Alaskan meats, fish and oils had high levels of the micronutrient and that consuming traditional foods would improve vitamin D intake in the population.⁵⁹ Per serving, salmon, steelhead trout, sheefish and smelt (both fresh and dried) had the highest amounts of vitamin D compared to other species of fish.⁶⁰ Amongst sea mammals, beluga whale meat had the highest amount of Vitamin D.⁶¹ The most significant source of Vitamin D was seal oil, an ingredient consumed by many Alaskan Tribes.⁶² A study by

⁵⁰ Johnson, Jennifer, Elizabeth D. Nobmann and Elvin Asay. "Factors related to fruit, vegetable and traditional food consumption which may affect health among Alaska Native People in Western Alaska." *International Journal of Circumpolar Health* 71, no. 1 (2012): 17345.

doi:10.3402/ijch.v71i0.17345

⁵¹ Phillips, Katherine M., Pamela R. Pehrsson and Kristine Y. Patterson. "Survey of vitamin D and 25-hydroxyvitamin D in traditional native Alaskan meats, fish, and oils." *Journal of Food Composition and Analysis* 74 (2018): 114-128. doi:10.1016/j.jfca.2018.09.008

⁵² Redwood, Diana G., Elizabeth D. Ferucci, Mary C. Schumacher, Jennifer S. Johnson, Anne P. Lanier, Laurie J. Helzer, Lillian Tom-Orme, Maureen A. Murtaugh, and Martha L. Slattery. "Traditional foods and physical activity patterns and associations with cultural factors in a diverse Alaska Native population." *International Journal of Circumpolar Health* 67, no. 4 (2008): 335-348.

⁵³ Redwood et. al. "Traditional foods and physical activity patterns"

⁵⁴ Redwood et. al. "Traditional foods and physical activity patterns"

⁵⁵ McNeeley, Shannon M. and Martha D. Shulski. "Anatomy of a closing window: Vulnerability to changing seasonality in Interior Alaska." *Global Environmental Change* 21, no. 2 (2011): 464-473.

doi:10.1016/j.gloenvcha.2011.02.003

⁵⁶ Hupp, Jerry, Michael Brubaker, Kira Wilkinson and Jennifer Williamson. "How are your berries? Perspectives of Alaska's environmental managers on trends in wild berry abundance." *International Journal of Circumpolar Health* 74, no. 1 (2015): 28704. doi:10.3402/ijch.v74.28704

⁵⁷ Fazzino and Loring. "From Crisis To Cumulative Effects"

⁵⁸ Phillips, Pehrsson, and Patterson. "Survey of vitamin D and 25-hydroxyvitamin D"

⁵⁹ Johnson et. al. "Factors related to fruit, vegetable and traditional food consumption"

⁶⁰ Johnson et. al. "Factors related to fruit, vegetable and traditional food consumption"

⁶¹ Johnson et. al. "Factors related to fruit, vegetable and traditional food consumption"

⁶² Johnson et. al. "Factors related to fruit, vegetable and traditional food consumption"

O'Brien et. al. noted a correlation in decreased Vitamin D levels in Alaska Native women who were consuming less marine animals between the 1960s and 1990s.⁶³

In traditional Aleutian foods, seal oil, fish liver, clams, and caribou liver are all important sources of Vitamin A, which is the traditional alternative to consuming this nutrient through fruits and vegetables.^{64,65} In Suanne Unger's book, *Qaqamiiġux*[^], a variety of foods are assessed for nutritional value. Traditional berries which are high in Vitamin C are salmonberries, lowbush cranberries and cloudberry (which have 198% of the daily recommended intake in a single serving).⁶⁶ Traditional fats and oils are also typically higher in unsaturated fats than saturated fats.⁶⁷ Seal oil, in particular, is over 80% unsaturated fat and also contains high amounts of heart-healthy omega-3 fatty acids.⁶⁸ Bearded seal oil contains around 4000 milligrams in one tablespoon while spotted seal oil contains just shy of 2000 milligrams, both of which are much higher than other fat sources such as canola oil, vegetable oil, and vegetable shortening.⁶⁹ Fish is also another source of omega-3s with over 1000 milligrams in a 3-ounce serving.⁷⁰ Iron is abundant in both seal and clams, both of which provide nearly the full daily amount required in a single serving.⁷¹ Wild greens are also typically higher in calcium, iron, magnesium, and vitamin C than cultivated plants.⁷² Traditional fish, lean meat from wild game and sea mammals are all lower in saturated fats and higher in micronutrients than other meats, making them a superior protein choice for Native people.^{73,74}

Tribes in the Pacific Northwest share some foods eaten by Alaska Natives. Thus, much of this nutritional information is also applicable to Pacific Northwest Tribes. This region includes Tribes in Washington, Oregon, Idaho, Northern California, and Northwest Montana. According to Krohn and Segrest, Pacific Northwestern Tribes commonly consume fish, shellfish, wild game, berries, fruits, wild greens, nuts, and roots.⁷⁵ Tribal members most commonly procured foods through hunting, fishing, and gathering, but many of these traditional foods are difficult to

⁶³ O'Brien, Diane M., et. al. "Declines in traditional marine food intake and vitamin D levels from the 1960s to present in young Alaska Native women." *Public Health Nutrition* 20, no. 10 (2016): 1738-1745. doi:10.1017/s1368980016001853

⁶⁴ Johnson et. al. "Factors related to fruit, vegetable and traditional food consumption"

⁶⁵ Unger, Suanne. *Qaqamiiġux*[^]: *Traditional foods and recipes from the Aleutian and Pribilof Islands: Nourishing our mind, body and spirit for generations*. Anchorage, AK: Aleutian Pribilof Islands Association, 2014.

⁶⁶ Unger. *Qaqamiiġux*[^].

⁶⁷ Unger. *Qaqamiiġux*[^].

⁶⁸ Unger. *Qaqamiiġux*[^].

⁶⁹ Unger. *Qaqamiiġux*[^].

⁷⁰ Unger. *Qaqamiiġux*[^].

⁷¹ Unger. *Qaqamiiġux*[^].

⁷² Health Canada. *Native Foods and Nutrition*.

⁷³ Johnson et. al. "Factors related to fruit, vegetable and traditional food consumption"

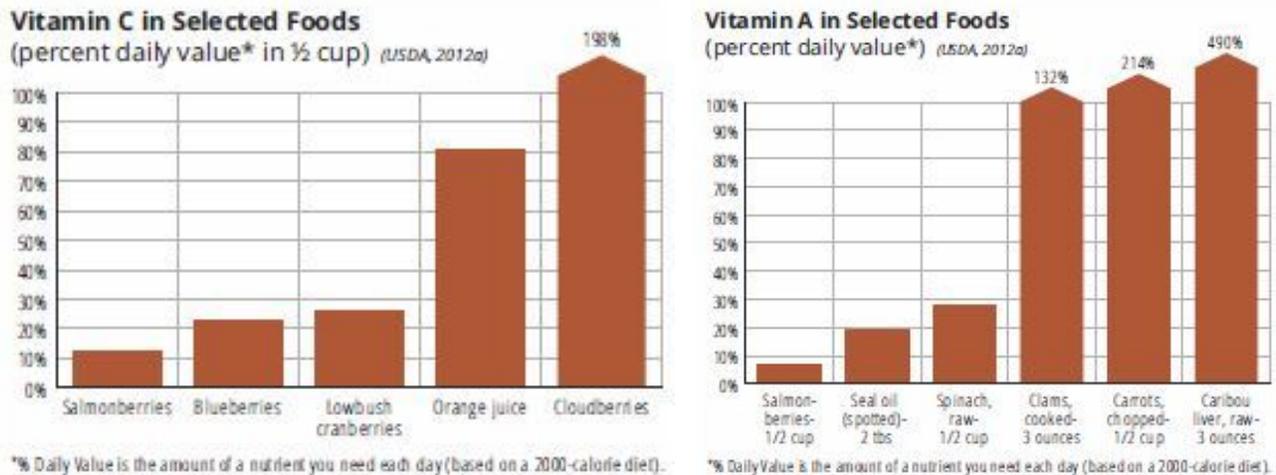
⁷⁴ Health Canada. *Native Foods and Nutrition*.

⁷⁵ Krohn, E and Valerie Segrest. *The Traditional Foods of Puget Sound Project Final Report 2008-2010*. Bellingham, WA: Northwest Indian College Cooperative Extension Office, 2010.

acquire in the current age.⁷⁶ Foods such as camas, soapberry, gooseberry, and eulachon have become scarce.⁷⁷

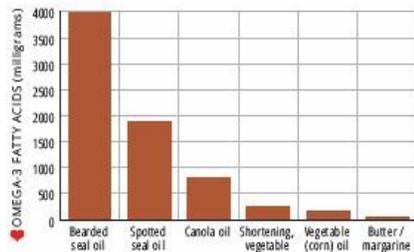
A regional staple in the Pacific Northwest, which is also eaten by Alaska Natives in some areas, is oolichan (also known as ooligan or eulachon) grease. This grease is sourced from the oolichan fish, a small species commonly found in the Pacific Northwest.⁷⁸ This grease is a more nutritious alternative to fats like lard, containing more vitamin A, vitamin E, unsaturated fats and fatty acids.⁷⁹

Figure 10, 11, and 12⁸⁰



**Nutrient highlight:
OMEGA-3 FATTY ACIDS**

Compare the amounts of heart-healthy omega-3 fatty acids in one tablespoon of different fats.



⁷⁶ Krohn and Segrest. "The Traditional Foods of Puget Sound".

⁷⁷ Krohn and Segrest. "The Traditional Foods of Puget Sound".

⁷⁸ Kuhnlein, Harriet and Chan, Laurie. "Ooligan grease: a traditional food fat of western Canada and Alaska." *International Journal of Circumpolar Health* 57, no. 1 (1998): 211-214.

⁷⁹ Health Canada. *Native Foods and Nutrition*.

⁸⁰ Unger. *Qaqamiiġux* ^.

Figure 13 & 14 ⁸¹

**Nutrient highlight:
VITAMIN D**

3 ounces of sockeye salmon has the same amount of vitamin D as over 3 cups of milk (2%). Both provide 94% of the vitamin D you need in one day.* (Kuhnlein, 2006)

*% Daily Value is the amount of a nutrient you need each day (based on a 2000-calorie diet).

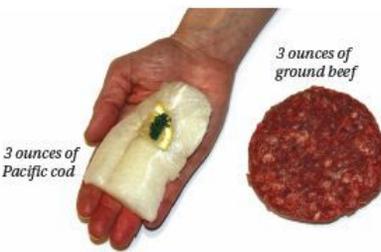


Nutrient highlight: FAT

Compare the differences in fat between Pacific cod and ground beef (85% lean) (3 ounces each). (USDA, 2012)

Nutrient	Pacific cod	Ground beef
Total fat	1%	20%
Saturated fat	0%	25%

*% Daily Value is the amount of a nutrient you need each day (based on a 2000-calorie diet).



3 ounces of Pacific cod

3 ounces of ground beef

Pacific cod has:

- much less total fat
- nearly no saturated fat; ground beef is high in saturated fats
- over twice as many heart-healthy omega-3 fatty acids

Northern Plains & Great Lakes

In this section, we will discuss foods eaten by indigenous peoples of the Northern Plains and Great Lakes regions. The Northern Plains are comprised of Montana, North Dakota, South Dakota, Wyoming, and Nebraska. The Great Lakes region is comprised of Minnesota, Wisconsin, Iowa, Illinois, and Michigan. Traditional foods of the Northern Plains region, which includes the Dakotas and Minnesota typically include prairie turnips, fruits (chokecherries, Juneberries, plums, blueberries, cranberries, strawberries, buffalo berries, gooseberries), potatoes, squash, dried meats (venison, buffalo, jack rabbit, pheasant, and prairie chicken), corn, and wild rice. ⁸²

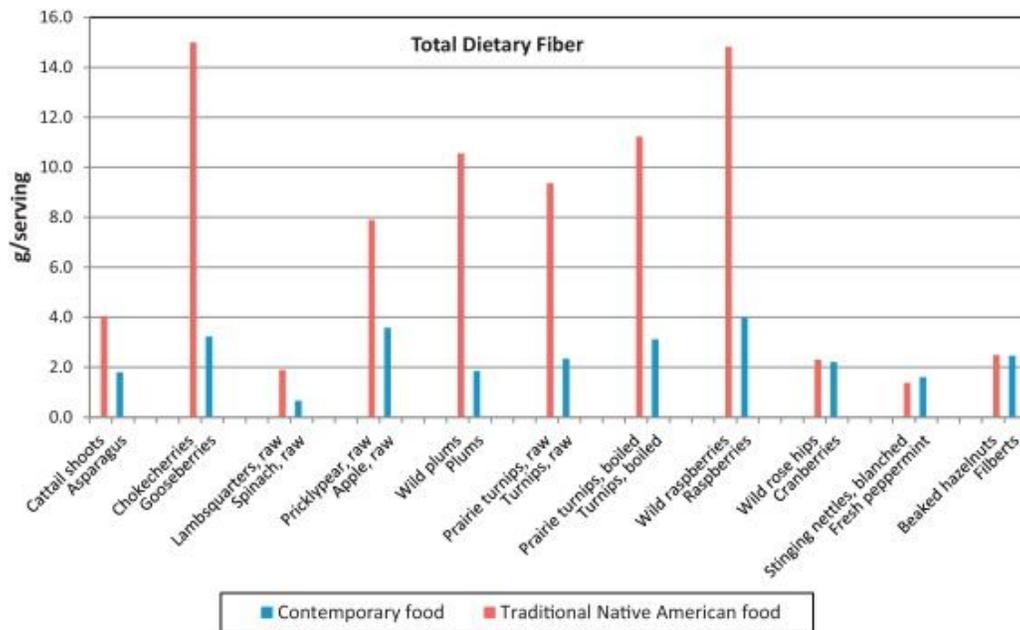
⁸¹ Unger. *Qaqamiiġux* ^.

⁸² Colby, Sarah E., Lleander R. McDonald and Greg Adkison. "Traditional Native American Foods: Stories from Northern Plains Elders." *Journal of Ecological Anthropology* 15, no. 1 (2012): 65-73. doi:10.5038/2162-4593.15.1.5

In a study of the nutrient content of traditional plant foods by Kindscher, Martin, Corbett, and Lafond, many species were found to be significant sources of protein and fiber.⁸³ Foods from the Great Plains region include ram's horn pods, golden currants, chokecherries and ground cherries. Ground cherry fruits have also often been used for their anti-cancer properties.⁸⁴

Phillips et. al. also did a study of the nutritional composition of ten different plant foods commonly eaten by Tribes in North Dakota. The foods surveyed were: cattail broad leaf shoots, chokecherries, beaked hazelnuts, lambsquarters, plains prickly pear, prairie turnips, stinging nettles, wild plums, raspberries, and rose hips.⁸⁵ The study found that many traditional foods, when compared with contemporary alternatives (listed beside each traditional food in the charts below), often were comparable or superior in terms of nutritional value.⁸⁶ All of the traditional foods except wild rose hips, stinging nettles, and beaked hazelnuts had double the amount of fiber compared to the contemporary alternative, as seen in Figure 15 below.⁸⁷

Figure 15 ^{88,89}



⁸³ Kindscher, Kelly, Leanne Martin, Steve Corbett and David Lafond. "Nutritional Properties of Native Plants and Traditional Foods from the Central United States." *Ethnobiology Letters* 9, no. 2 (2018): 214. doi:10.14237/ebl.9.2.2018.1219

⁸⁴ Kindscher et. al. "Nutritional Properties of Native Plants and Traditional Foods"

⁸⁵ Phillips, Katherine M., Pamela R. Pehrsson, Wanda W. Agnew, Angela J. Scheett, Jennifer R. Follett, Henry C. Lukaski, and Kristine Y. Patterson. "Nutrient Composition of Selected Traditional United States Northern Plains Native American Plant Foods." *Journal of Food Composition and Analysis* 34, no. 2 (2014): 136-52. doi:10.1016/j.jfca.2014.02.010.

⁸⁶ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

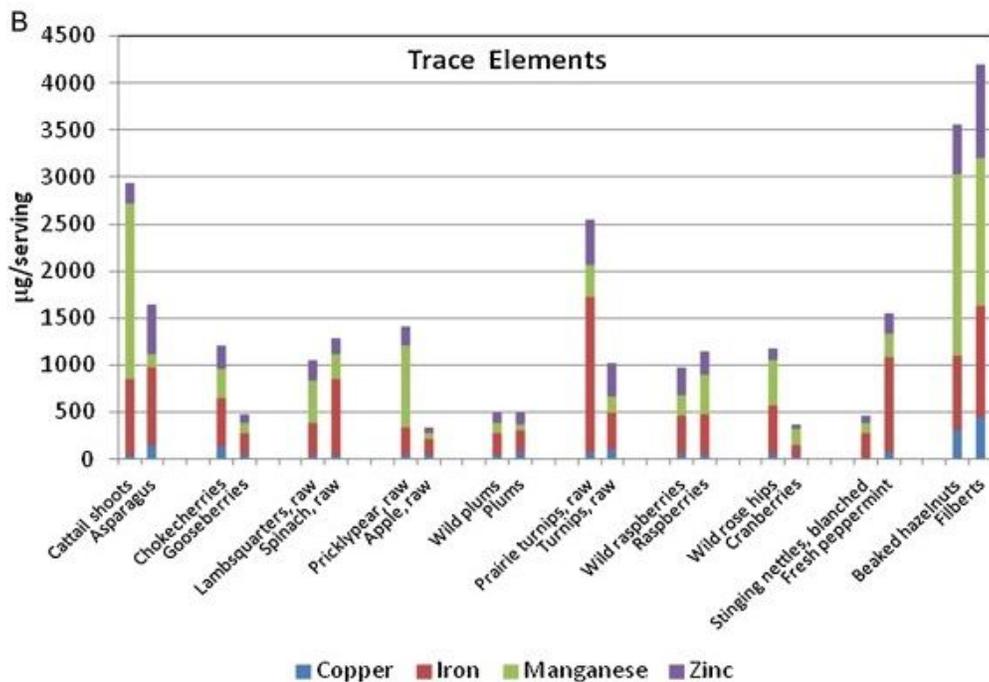
⁸⁷ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

⁸⁸ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

⁸⁹ It is important to note that foods in this assessment are wild versions of the commercial options that are widely available, possibly resulting in higher nutritional value.

When comparing the concentrations of trace elements and macroelements, the results were more varied but showed that all foods except for stinging nettles, provided a similar amount, if not more than the contemporary alternative (see Figure 16).⁹⁰ Boiled prairie turnips, beaked hazelnuts, broiled plains prickly pears, raw and steamed lambsquarters, cattail broad leaf shoots, chokecherries, wild plums, wild raspberries, and blanched stinging nettles were all rich sources of calcium.⁹¹ Raw and boiled prairie turnips, raw plains prickly pears, raw and steamed lambsquarters, cattail broad leaf shoots, and chokecherries provided significant amounts of magnesium.⁹² Lambsquarters, chokecherries, cattail broad leaf shoots, and wild plums had higher concentrations of potassium compared to their contemporary equivalents. Beaked hazelnuts, lambsquarters, and chokecherries were also the best sources of copper.⁹³

Figure 16⁹⁴



When comparing vitamin content, prairie turnips contained double the amount of niacin as contemporary turnips and significantly more vitamin B6. Rose hips showed the most drastic difference, with larger concentrations of all vitamins, especially vitamin C.⁹⁵ Overall vitamin

⁹⁰ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

⁹¹ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

⁹² Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

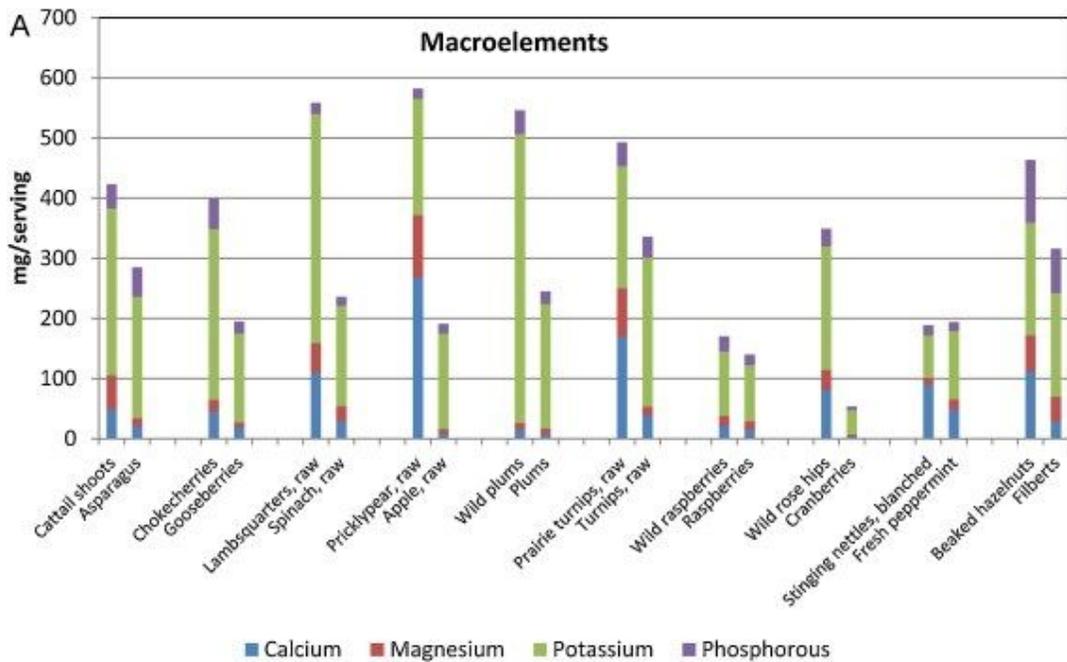
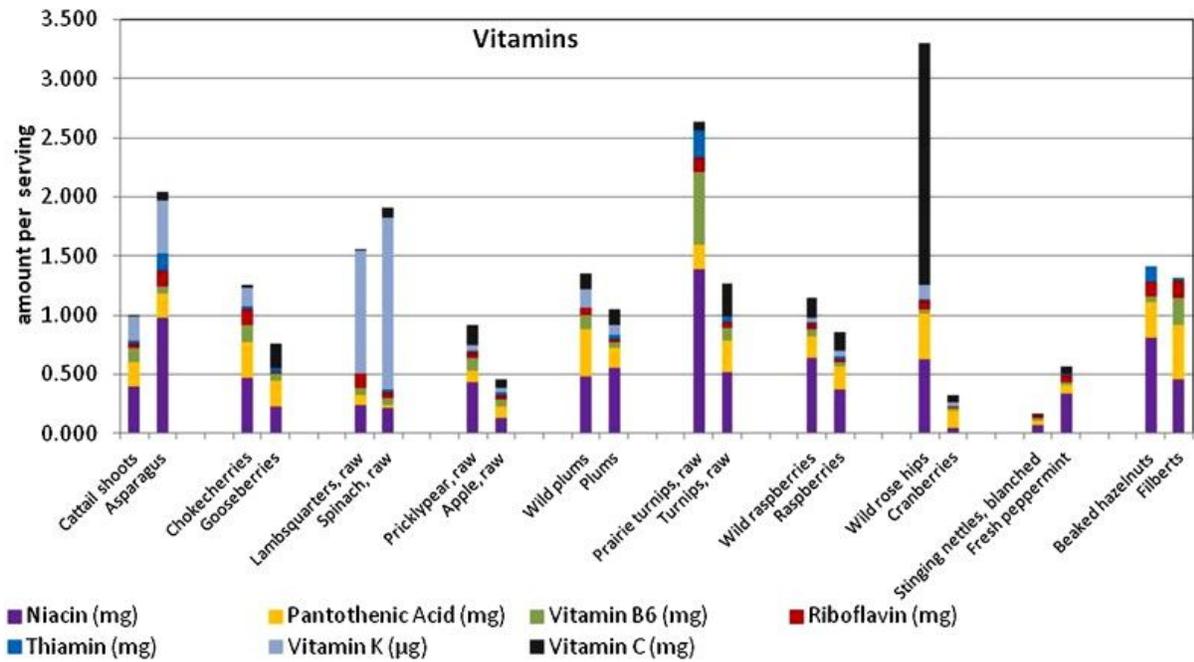
⁹³ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

⁹⁴ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

⁹⁵ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

content was higher in traditional foods except for in cattail shoots, lambsquarters, and stinging nettles.⁹⁶

Figure 17 & 18 ⁹⁷



Bison, also known as the North American buffalo, are repopulating quickly after a time of nearing extinction due to overhunting.⁹⁸ Historically, this mammal has been an important source

⁹⁶ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

⁹⁷ Phillips et. al. "Nutrient Composition of Selected Traditional United States Northern Plains."

⁹⁸ Marchello, Martin. "Nutrient Composition of Grass- and Grain-Finished Bison". *Great Plains Research: A Journal of Natural and Social Sciences* 11 (2001). 65-82.

of meat for Native Americans, particularly in the Northern Plains, Great Lakes and Central regions of the United States.⁹⁹ In a study by Marchello et. al., muscle samples from bison were analyzed to determine nutritional value. The study found that bison had higher concentrations of phosphorus, calcium, iron, and magnesium compared to beef.¹⁰⁰ Some fatty acids such as stearic and linoleic acid were also more abundant in the bison samples.¹⁰¹ Concentrations of protein in bison were comparable to pork or beef, but bison contained considerably less fat.¹⁰² A later study by Marchello found that grass-fed bison was significantly higher in selenium than grain-fed bison.¹⁰³ Overall, bison is a nutrient dense protein option that provides comparable vitamins, minerals, and protein as other meat sources, without as much fat.¹⁰⁴

Wild rice is an aquatic grass that grows in the Great Lakes region as well as along other waterways across North America. Wild Rice is a dietary staple for many Tribes in the north and central United States.¹⁰⁵ A study by Wang et. al. found that nutritionally, wild rice is different from most other cereal grains as it is a rich source of protein.¹⁰⁶ In a review by Anderson, the author gathers that concentrations of various amino acids¹⁰⁷ are well balanced, making this a complete protein.¹⁰⁸ Compared to white and brown rice, wild rice contains higher levels of all minerals except for calcium, making it very mineral rich.¹⁰⁹ It is also a rich source of many B vitamins including thiamine, riboflavin, and niacin.¹¹⁰

Southwest & Southeast

In this section, we will cover foods traditionally eaten by indigenous peoples in the Southwest and Southeast regions of the United States. Geographically, the southwest is comprised of Arizona, New Mexico, and portions of Colorado, Utah, Nevada, California, Texas and Northern Mexico. When speaking about the Southeast region, we are referring to Texas, Oklahoma, Kansas, and other southern states.

⁹⁹ Isenberg, Andrew C. *The Destruction of the Bison: An Environmental History, 1750-1920*. Cambridge: Cambridge University Press, 2000.

¹⁰⁰ Marchello, Martin, W Slanger, D Milne, A Fischer and P Berg. "Nutrient composition of raw and cooked Bison bison." *Journal of Food Composition and Analysis* 2, no. 2 (1989): 177-185. doi:10.1016/0889-1575(89)90079-3

¹⁰¹ Marchello et. al. "Nutrient composition of raw and cooked Bison bison"

¹⁰² Marchello et. al. "Nutrient composition of raw and cooked Bison bison"

¹⁰³ Marchello et. al. "Nutrient composition of raw and cooked Bison bison"

¹⁰⁴ Marchello et. al. "Nutrient composition of raw and cooked Bison bison"

¹⁰⁵ Wang, H. L., E. W. Swain, C. W. Hesseltine, and M. R. Gubbman. "Protein Quality of Wild Rice." *Journal of Agricultural and Food Chemistry* 26, no. 2 (1978): 309-312.

¹⁰⁶ Wang et. al. "Protein Quality of Wild Rice."

¹⁰⁷ Protein is made up of several smaller building blocks, or amino acids. There are 20 amino acids total and nine of these cannot be created by the human body. In order to fulfill the need, they need to be consumed through food.

¹⁰⁸ Anderson, R. A. "Wild rice: nutritional review." *Cereal Chemistry* 53 (1976): 949.

¹⁰⁹ Anderson. "Wild rice: nutritional review."

¹¹⁰ Anderson. "Wild rice: nutritional review."

In the Pueblos of Arizona and New Mexico, the traditional “diet was dominated by agricultural products, predominantly corn, beans, and squash, supplemented with sunflower seeds, chilies, onions, and garlic as well as wild plant and animal foods”.¹¹¹ Teufel also explains that this diet was high in carbohydrates and moderate in protein and fat.¹¹² Animal foods of this region are high in many micronutrients. Blood and organ meats are a rich source of iron and vitamin A and bone marrow is a significant source of calcium and fatty acids. The meat itself has high concentrations of B12 and fat-soluble vitamins such as A, D, E and K.¹¹³ In another work, Teufel notes that meat from wild animals provided a proper balance of amino acids from proteins.¹¹⁴

The “Three Sisters” are the commonly recognized foods of corn, beans, and squash.¹¹⁵ Milburn recognizes that these three components do not contain all of the essential amino acids when eaten alone.¹¹⁶ When eaten in combination, they compensate for each other's deficiencies, thus becoming a complete protein source.¹¹⁷ When grown together, the three plants work symbiotically to support each other.¹¹⁸ Corn requires high levels of nitrogen to grow and bean plants help to provide that nitrogen by converting it into a form that corn can better absorb.¹¹⁹ Corn plants act as a structure to help bean plants grow, particularly pole beans.¹²⁰ The squash's purpose is to provide shade to the soil below to prevent weed growth and keep pests away with its prickly leaves.¹²¹ The integrative approach to agriculture stems from Native knowledge of how organisms are connected and work together to grow.¹²²

Corn itself is low in some nutrients like niacin¹²³, but a process called nixtamalization can help increase the bioavailability of this and other nutrients. This process consists of mixing corn grains with an alkaline solution which is usually composed of limestone or wood ash.¹²⁴ Nixtamalization has also been shown to increase calcium content in corn.¹²⁵ In a study of corn, beans and pumpkin, Kwon, Apostolidis, Kim, and Shetty studied the ability of these foods for

¹¹¹ Teufel, Nicolette I. “Nutrient-Health Associations in the Historic and Contemporary Diets of Southwest Native Americans.” *Journal of Nutritional & Environmental Medicine* 6, no. 2 (1996): 179-89. doi:10.3109/13590849609001044.

¹¹² Teufel. “Nutrient-Health Associations in the Historic and Contemporary Diets”

¹¹³ Teufel. “Nutrient-Health Associations in the Historic and Contemporary Diets”

¹¹⁴ Teufel, Nicolette I. “Nutrient Characteristics of Southwest Native American Pre-contact Diets.” *Journal of Nutritional & Environmental Medicine* 6, no. 3 (1996): 273-84. doi:10.3109/13590849609007254.

¹¹⁵ Milburn. “Indigenous Nutrition”

¹¹⁶ Milburn. “Indigenous Nutrition”

¹¹⁷ Milburn. “Indigenous Nutrition”

¹¹⁸ Milburn. “Indigenous Nutrition”

¹¹⁹ Milburn. “Indigenous Nutrition”

¹²⁰ Milburn. “Indigenous Nutrition”

¹²¹ Milburn. “Indigenous Nutrition”

¹²² Milburn. “Indigenous Nutrition”

¹²³ Milburn. “Indigenous Nutrition”

¹²⁴ Wachter, Carmen. “Nixtamalization, a Mesoamerican technology to process maize at small-scale with great potential for improving the nutritional quality of maize based foods.” (2003): 735-744.

¹²⁵ Health Canada. *Native Foods and Nutrition*.

hyperglycemia and hypertension management. The authors tested the foods for α -glucosidase, α -amylase, and angiotensin I-converting enzyme (ACE) inhibitory activities, all of which aid in glucose absorption and reduction of hypertension.¹²⁶ Pumpkin had the best overall concentration of these compounds, making it the most preferable for this purpose.¹²⁷ Maize had moderate levels of antioxidants for glucose absorption, while beans had high levels of ACE inhibitors.¹²⁸ Those two foods were found to be individually beneficial in hyperglycemia and hypertension management, respectively.¹²⁹

Research studying the mineral content of traditional Hopi foods, Kuhnlein shows that many traditional grains have higher mineral concentrations than the commodity counterparts, as seen in Table 19 below.¹³⁰ This occurs due to high mineral levels that exist in the terrain of northern Arizona, where the Hopi people live.¹³¹ Loss of agricultural lands and traditional foodways has resulted in a disconnection between the minerals that exist in the soil and dietary intake.¹³²

Figure 19 ¹³³

TABLE 2.—*Approximate Percentage of Desired Daily Intake^a Provided by 200 g Portions of U.S.D.A. Commodity and Hopi Cereals.*

Element (need)	Calcium (800 mg)	Magnesium (350 mg)	Manganese (7 mg)	Iron (15 mg)	Zinc (15 mg)
Cereal	(% of above contained in 200 g) ^b				
<i>Commodity</i>					
Corn Meal	1	23	7	36	8
White rice	1	15	34	41	16
White flour	5	15	17	35	7
Rolled Wheat	9	72	91	45	35
<i>Hopi</i>					
Corn meal	2	80	18	43	35
Piki bread	40	102	56	121	55
Bivilviki	142	159	57	224	49

^aDesired intakes are arbitrary but reflect presumed upper needs levels of healthy adults or NRC allowances (1973).

^bProducts contained 88-92% dry solids, i.e. "as is" dry product basis.

¹²⁶ Kwon, Y. I., E. Apostolidis, Y. C. and K. Shetty. "Health benefits of traditional corn, beans, and pumpkin: in vitro studies for hyperglycemia and hypertension management." *Journal of Medicinal Food* 10, no. 2 (2007): 266-75.

¹²⁷ Kwon et. al. "Health benefits of traditional corn, beans, and pumpkin"

¹²⁸ Kwon et. al. "Health benefits of traditional corn, beans, and pumpkin"

¹²⁹ Kwon et. al. "Health benefits of traditional corn, beans, and pumpkin"

¹³⁰ Kuhnlein, Harriet V. "Dietary mineral ecology of the Hopi." *Journal of Ethnobiology* 1 (1981): 84-94.

¹³¹ Kuhnlein. "Dietary mineral ecology of the Hopi."

¹³² Kuhnlein. "Dietary mineral ecology of the Hopi."

¹³³ Calloway, D. H., R. D. Giauque, and F. M. Costa. "The Superior Mineral Content of Some American Indian Foods in Comparison to Federally Donated Counterpart Commodities." *Ecology of Food and Nutrition* 3, no. 3 (1974): 203-11. doi:10.1080/03670244.1974.9990382.

A study by Wolfe, Weber, and Arviso analyzed the nutritional composition of traditional Navajo foods. Corn-based foods were found to have more fiber than white bread alternatives, which are highly processed and devoid of many nutrients.¹³⁴ As discussed earlier, corn foods showed significantly more calcium, potassium, and magnesium when prepared with ash as part of the nixtamalization process.¹³⁵ Similar results were found with hominy corn. In a test with contemporary baking soda, the same increases in minerals were not observed as with traditional juniper ash.¹³⁶ For plant foods, wild greens were found to be a rich source of vitamin A.¹³⁷ Half a cup of Navajo spinach had almost four times as much of this vitamin as the daily recommended intake.¹³⁸ Traditional plant ashes and rock salts were also both found to be excellent sources of essential minerals.¹³⁹ Greasewood ash was particularly high in iron.¹⁴⁰ Pinyon nuts were a good source of protein and fat, as well as potassium, magnesium, iron, and zinc.¹⁴¹ Navajo blood sausage was also found to be a better source of iron compared to commercially available sliced meats.¹⁴²

Impact of Traditional Foods on Diabetes

Of all racial and ethnic groups in the United States, American Indians and Alaska Natives have the highest Type II diabetes rates.¹⁴³ As of 2009, diabetes was the fourth most frequent cause of death in Native communities, but this has not always been the case.¹⁴⁴

“Less than 100 years ago, diabetes was virtually unknown in native communities. It was not until after World War II that diabetes cases began to be reported by IHS providers. In fact, a century ago, all chronic diseases, including diabetes, were practically nonexistent in Indian country. As recently as 1955, diabetes was unrecognized as a leading cause of death as evidenced by its absence in a listing of the 10 most frequent causes of death for this population.”¹⁴⁵

¹³⁴ Wolfe, Wendy S., Charles W. Weber and Katherine D. Arviso. “Use and nutrient composition of traditional Navajo foods.” *Ecology of Food and Nutrition* 17, no. 4 (1985): 323-344. doi:10.1080/03670244.1985.9990906

¹³⁵ Wolfe, Weber, and Arviso. “Use and nutrient composition of traditional Navajo foods.”

¹³⁶ Wolfe, Weber, and Arviso. “Use and nutrient composition of traditional Navajo foods.”

¹³⁷ Wolfe, Weber, and Arviso. “Use and nutrient composition of traditional Navajo foods.”

¹³⁸ Wolfe, Weber, and Arviso. “Use and nutrient composition of traditional Navajo foods.”

¹³⁹ Wolfe, Weber, and Arviso. “Use and nutrient composition of traditional Navajo foods.”

¹⁴⁰ Wolfe, Weber, and Arviso. “Use and nutrient composition of traditional Navajo foods.”

¹⁴¹ Wolfe, Weber, and Arviso. “Use and nutrient composition of traditional Navajo foods.”

¹⁴² Wolfe, Weber, and Arviso. “Use and nutrient composition of traditional Navajo foods.”

¹⁴³ McLaughlin, Sue. “Traditions and Diabetes Prevention: A Healthy Path for Native Americans.” *Diabetes Spectrum* 23, no. 4 (2010): 272-277.

¹⁴⁴ McLaughlin. “Traditions and Diabetes Prevention”

¹⁴⁵ McLaughlin. “Traditions and Diabetes Prevention”

Traditional foods have been known to prevent western diseases.¹⁴⁶ Research by Milburn has found particular genetic markers that signify an increased risk for certain medical conditions or characteristics.¹⁴⁷ In a study of the Purepecha people in Mexico however, the relationship between genetics and health was shown to be halted by lifestyle choices.¹⁴⁸ The traditional Purepecha diet is high in fiber and complex carbohydrates but low in fat.¹⁴⁹ Those who followed traditional lifestyle patterns in diet and physical activity showed no difference in LDL cholesterol (commonly referred to as the “bad” cholesterol) and insulin resistance levels when comparing people with and without the genetic markers.¹⁵⁰ In populations that followed a westernized lifestyle, those with the genetic markers showed higher levels of both LDL cholesterol and insulin resistance.¹⁵¹ It appears that traditional practices can help to counteract genetic predisposition to disease.

In certain communities, such as the Pima Indians and select Southwestern Tribes, the diabetes rate exceeds 50%, the highest in the world.¹⁵² These rates are in part due to genetic predisposition which was exacerbated by the changes from traditional to western diets.¹⁵³ The Pima Indian counterparts in Mexico have demonstrated a lower risk for diabetes despite having a similar genetic makeup, providing evidence that the incidence of diabetes is largely influenced by environmental factors.¹⁵⁴

A study by Schulz et al. in 2006 found that U.S. Pima Indians consumed higher quantities of calories from fat and lower quantities of fiber than Mexican Pima and non-Pima Mexicans and also had lower levels of physical activity compared to their Mexican counterparts.¹⁵⁵ The Mexican groups consumed mostly beans, potatoes, wheat, and corn-based tortillas.¹⁵⁶ The U.S. groups more commonly consumed foods of a typical American diet and infrequently consumed traditional foods such as wild spinach, tepary beans, cholla cactus and puddings

¹⁴⁶ Satterfield, Dawn, Lemyra Debruyn, Carolee D. Francis and Aiko Allen. “A Stream Is Always Giving Life: Communities Reclaim Native Science and Traditional Ways to Prevent Diabetes and Promote Health.” *American Indian Culture and Research Journal* 38, no. 1 (2014): 157-190.

doi:10.17953/aicr.38.1.hp318040258r7272

¹⁴⁷ Milburn. “Indigenous Nutrition”

¹⁴⁸ Milburn. “Indigenous Nutrition”

¹⁴⁹ Milburn. “Indigenous Nutrition”

¹⁵⁰ Milburn. “Indigenous Nutrition”

¹⁵¹ Milburn. “Indigenous Nutrition”

¹⁵² Milburn. “Indigenous Nutrition”

¹⁵³ Knowler, William C., David J. Pettitt, Peter H. Bennett, and Robert C. Williams. “Diabetes Mellitus in the Pima Indians: Genetic and Evolutionary Considerations.” *American Journal of Physical Anthropology* 62, no. 1 (1983): 107-14.

¹⁵⁴ Schulz, Leslie O., Peter H. Bennett, Eric Ravussin, Judith R. Kidd, Kenneth K. Kidd, Julian Esparza and Mauro E. Valencia. “Effects of Traditional and Western Environments on Prevalence of Type 2 Diabetes in Pima Indians in Mexico and the U.S.” *Diabetes Care* 29, no. 8 (2006): 1866-1871.

doi:10.2337/dc06-0138

¹⁵⁵ Schulz et. al. “Effects of Traditional and Western Environments on Prevalence of Type 2 Diabetes”

¹⁵⁶ Schulz et. al. “Effects of Traditional and Western Environments on Prevalence of Type 2 Diabetes”

made from mesquite beans or berries.¹⁵⁷ A study by Williams et al. also compared the impacts of diet choice in Pima Indians and “showed that those who reported consuming an Anglo-type diet were 2.5 times more likely to develop diabetes, and those consuming a mixed diet were 1.3 times more likely to do so than those consuming the traditional diet”.¹⁵⁸

Further evidence for the benefits of a traditional diet was found in a study by Swinburn et. al. Participants in the study were broken into two groups, one consuming a traditional Pima high-carbohydrate diet and the other consuming a modern high fat diet. The group on the modern diet showed decreased glucose tolerance compared to those on the traditional diet.¹⁵⁹ A study by Ravussin et. al. also recommended a diet lower in animal fats and higher complex carbohydrates as a protective measure against cardiovascular disease risk, obesity, and diabetes mellitus.¹⁶⁰

In Alaska Native populations, diabetes rates appear to be lower than the US average according to Naylor et. al.¹⁶¹ The authors have attributed this to the consumption of salmon and seal oil, dietary supplements that may decrease the risk of glucose intolerance.¹⁶² “Thus, promoting the continued consumption of traditional foods through nutrition education may protect against the development of diabetes.”¹⁶³ However, this may be challenging, as the study notes that many Alaskan Natives have shifted away from their traditional diets.¹⁶⁴

As mentioned previously, removal from lands and traditional foodways was one of the main causes of the rise in diabetes rates among Native communities.¹⁶⁵ “For many tribal nations, the amount of fertile land for growing and hunting traditional foods continued to shrink as

¹⁵⁷ Smith, Cynthia J., Robert G. Nelson, Sterling A. Hardy, Elaine M. Manahan, Peter H. Bennett and William C. Knowler. “Survey of the Diet of Pima Indians Using Quantitative Food Frequency Assessment and 24-Hour Recall.” *Journal of the American Dietetic Association* 96, no. 8 (1996): 778-784. doi:10.1016/s0002-8223(96)00216-7

¹⁵⁸ Williams, Desmond E., William C. Knowler, Cynthia J. Smith, Robert L. Hanson, Janine Roumain, Aramesh Saremi, Andrea M. Kriska, Peter H. Bennett, and Robert G. Nelson. “The Effect of Indian or Anglo Dietary Preference on the Incidence of Diabetes in Pima Indians.” *Diabetes Care* 24, no. 5 (2001): 811-816. doi:10.2337/diacare.24.5.811

¹⁵⁹ Swinburn, B A., V L. Boyce, R N. Bergman, B V. Howard and C Bogardus. “Deterioration in Carbohydrate Metabolism and Lipoprotein Changes Induced by Modern, High Fat Diet in Pima Indians and Caucasians.” *The Journal of Clinical Endocrinology & Metabolism* 73, no. 1 (1991): 156-165. doi:10.1210/jcem-73-1-156

¹⁶⁰ Ravussin, Eric, Mauro E. Valencia, Julian Esparza-Romero, Peter H. Bennett and Leslie O. Schulz. “Effects of a Traditional Lifestyle on Obesity in Pima Indians.” *Diabetes Care* 17, no. 9 (1994): 1067-1074. doi:10.2337/diacare.17.9.1067

¹⁶¹ Naylor, JL., CD Schraer, AM Mayer, AP Lanier, CA Treat and NJ Murphy. “Diabetes among Alaska Natives: A review.” *International Journal of Circumpolar Health* 62, no. 4 (2003): 363-387. doi:10.3402/ijch.v62i4.17581

¹⁶² Naylor et. al. “Diabetes among Alaska Natives: A review.”

¹⁶³ Naylor et. al. “Diabetes among Alaska Natives: A review.”

¹⁶⁴ Naylor et. al. “Diabetes among Alaska Natives: A review.”

¹⁶⁵ Satterfield et. al. “A Stream Is Always Giving Life”

industrial development escalated, reducing both the access to local foods and curtailing the physical activity associated with hunting, gathering, and growing foods.”¹⁶⁶

Many responses to the diabetes epidemic focus on a combination of traditional knowledge of ecology and food with storytelling and messaging.¹⁶⁷ The Special Diabetes Program for Indians (SDPI), which is run by the Indian Health Service (IHS), and the Native Diabetes Wellness Program (NDWP) at the Center for Disease Control (CDC) are two examples of efforts to reduce diabetes rates and provide support to those at risk by balancing Western medicine and Native knowledge. Both programs utilize traditional foods as a preventative mechanism.¹⁶⁸ In 2008, the CDC created a funding opportunity called “Using Traditional Foods and Sustainable Ecological Approaches to Promote Health and Prevent Diabetes in American Indian and Alaska Native Communities,” also known as the “Traditional Foods Project” which collaborated with Tribal leaders to synchronize traditional food access with health promotion efforts.¹⁶⁹

Impact of Traditional Foods on Mental Health

In addition to changes in physical health, widespread changes in mental health have occurred due to shifts in dietary practices. In a review of mental health in circumpolar peoples by McGrath-Hanna et. al., findings show that mental health has declined consistently alongside the increase in health problems such as obesity, diabetes, and cardiovascular disease.¹⁷⁰ This decline is characterized by an increase in rates of depression, anxiety, seasonal affective disorder, and suicide.¹⁷¹ The authors hypothesize that diet plays a key role in mental health, particularly omega-3 fatty acids and micronutrients, nutritional components that are abundant in some traditional diets.¹⁷² When comparing isolated circumpolar peoples with those in more westernized societies, the former group showed lower rates of depression and seasonal affective disorder and also demonstrated lifestyles much closer to those of traditional peoples.^{173,174,175}

¹⁶⁶ Satterfield et. al. “A Stream Is Always Giving Life”

¹⁶⁷ Satterfield et. al. “A Stream Is Always Giving Life”

¹⁶⁸ Milburn. “Indigenous Nutrition”

¹⁶⁹ Satterfield, Dawn, Lemyra Debruyn, Marjorie Santos, Larry Alonso and Melinda Frank. “Health Promotion and Diabetes Prevention in American Indian and Alaska Native Communities — Traditional Foods Project, 2008–2014.” *MMWR Supplements* 65, no. 1 (2016): 4-10.
doi:10.15585/mmwr.su6501a3

¹⁷⁰ McGrath-Hanna, Nancy K., Dana M. Greene-Schloesser, Ronald J. Tavernier and Abel Bult-Ito. “Diet and mental health in the Arctic: Is diet an important risk factor for mental health in circumpolar peoples? - a review.” *International Journal of Circumpolar Health* 62, no. 3 (2003): 228-241.
doi:10.3402/ijch.v62i3.17560

¹⁷¹ McGrath-Hannah et. al. “Diet and mental health in the Arctic:”

¹⁷² McGrath-Hannah et. al. “Diet and mental health in the Arctic:”

¹⁷³ Magnússon, Andrés., and Jón G. Steffánsson. “Prevalence of Seasonal Affective Disorder in Iceland.” *Archives of General Psychiatry* 50, no. 12 (1993): 941.
doi:10.1001/archpsyc.1993.01820240025002

Research has linked lower levels of fatty acids with higher levels of depression. In various studies, there is an apparent inverse correlation between fish consumption (which is naturally high in omega-3 fatty acids) and levels of depression.^{176,177} Stoll et. al. also found that increased consumption of omega-3 fatty acids improved the condition of patients with bipolar disorder.¹⁷⁸ Fish is an essential component of traditional foods in coastal Tribes in Alaska and the Pacific Northwest, as discussed in previous sections.

From a non-nutritional perspective, a book about Inuit peoples of Canada noted a strong connection between the consumption of traditional foods and overall mental wellbeing.¹⁷⁹ Indigenous history illustrates the deep connections that peoples have had with their land and food. These complex relationships and their impact on mental wellbeing cannot be summarized simply, but the loss of land and food sovereignty have had a significant impact on cultural practices and traditional lifestyles¹⁸⁰. These losses have resulted in distress and trauma over many generations and are very likely to have impacted modern mental health.^{181,182} “This loss affects the practice of consuming traditional foods and the teaching of food preparation and foodways across generations, between genders, and within families. This loss of traditional food practices is connected to a loss of human connection, a loss of community strength.”¹⁸³

Additional research on this topic would be beneficial for understanding the connection between traditional foods and mental health as there have not been many studies on the subject so far. Research on general nutrition has shown that dietary deficiencies may play a role in the

¹⁷⁴ Magnússon, Andrés, J Axelsson, M Karlsson and H Oskarsson. “Lack of Seasonal Mood Change in the Icelandic Population: Results of a Cross-Sectional Study.” *American Journal of Psychiatry* 157, no. 2 (2000): 234-238. doi:10.1176/appi.ajp.157.2.234

¹⁷⁵ Näyhä, Simo., Väisänen, E and J Hassi. “Season and mental illness in an arctic area of northern Finland.” *Acta Psychiatrica Scandinavica* 89, no. S377 (1994): 46-49. doi:10.1111/j.1600-0447.1994.tb05802.x

¹⁷⁶ Tanskanen, Antti, Joseph R. Hibbeln, Jaakko Tuomilehto, Antti Uutela, Ari Haukkala, Heimo Viinamäki, Johannes Lehtonen, and Erkki Vartiainen. “Fish Consumption and Depressive Symptoms in the General Population in Finland.” *Psychiatric Services* 52, no. 4 (2001): 529-531. doi:10.1176/appi.ps.52.4.529

¹⁷⁷ Hibbeln, Joseph R. “Fish consumption and major depression.” *The Lancet* 351, no. 9110 (1998): 12-13. doi:10.1016/s0140-6736(05)79168-6

¹⁷⁸ Stoll, Andrew, W. Emanuel Severus, Marlene Freeman, Stephanie Rueter, Holly Zboyan, Eli Diamond and Lauren Marangell. “Omega-3 Fatty Acids in the Treatment of Bipolar Disorder: A Double-Blind, Placebo-Controlled Trial.” *PsycEXTRA Dataset* 56, no. 5 (2008): 407-412. doi:10.1037/e651082010-001

¹⁷⁹ Kirmayer, Laurence J., Christopher Fletcher and Robert Watt. *Locating the Ecocentric Self: Inuit Concepts of Mental Health and Illness*. Vancouver, BC: University of British Columbia Press, 2009.

¹⁸⁰ Kirmayer, Fletcher, and Watt. *Locating the Ecocentric Self*.

¹⁸¹ Kirmayer, Fletcher, and Watt. *Locating the Ecocentric Self*.

¹⁸² Vu, Jeremy, Kellie Thompson, Steven Hayworth, Jennifer Gallagher, Miquela Ibrao and Molly Tovar. “Reviving Traditional Native American Food with the Hunt. Fish. Gather. Program,” *Journal on Race, Inequality, and Social Mobility in America* 1, no. 1 (2017): 1-40. doi:10.7936/K78P5ZX6

¹⁸³ Vernon, Rachel V. “A Native Perspective: Food is More Than Consumption.” *Journal of Agriculture, Food Systems, and Community Development* 4, no. 4 (2015): 1-6. doi:10.5304/jafscd.2015.054.024

prevalence of depression, anxiety, and other disorders.¹⁸⁴ “The dietary intake pattern of the general population in many Asian and American countries reflects that they are often deficient in many nutrients, especially essential vitamins, minerals, and omega-3 fatty acids. A notable feature of the diets of patients suffering from mental disorders is the severity of deficiency in these nutrients.”^{185,186} Native American communities following western diet patterns are likely to have similar deficiencies, and thus, a return to a traditional diet could possibly alleviate some of these nutritional deficits.

Conclusion

The intent of this review is to gather existing information on traditional foods to reinforce the importance of their role in strengthening indigenous health. The sources reviewed here resoundingly agree that increasing consumption of traditional foods can result in better nutritional and health outcomes. Across regions, foods and diets are very distinct. Despite the differences, these foods have been shown to provide the best nutrition for the peoples who have historically consumed them. Due to the variation in cultural and geographic characteristics and available research, this review is limited in its depth and scope. A significant number of sources used in this review are from the latter half of the 20th century. Many of the topics covered in these studies have not been researched again since then, meaning that much of this information is outdated. Revisiting these topics will be beneficial to communities that aim to reintroduce traditional foods to their diet.

There are numerous challenges and considerations involved in increasing access and consumption of traditional foods, but this review serves as a reference to support their inclusion. There are significant opportunities to support indigenous communities in rebuilding their food systems and strengthening food sovereignty. Traditional foods are just one component of this important movement. The following section provides information on policy opportunities within the 2018 Farm Bill that support traditional foods, indigenous food systems, and food sovereignty.

¹⁸⁴ Rao, T S., M R. Asha, B N. Ramesh and K S. Rao. “Understanding nutrition, depression and mental illnesses.” *Indian Journal of Psychiatry* 50, no. 2 (2008): 77-82.

¹⁸⁵ Rao, Asha, Ramesh, and Rao. “Understanding nutrition, depression and mental illnesses.”

¹⁸⁶ Diagnostic And Statistical Manual of Mental Disorders: DSM-IV. Washington, DC: American Psychiatric Association, 1994.

Policy Applications for Traditional Foods in the 2018 Farm Bill

*“Indian Country must not only have a seat at the table during the Farm Bill debate, but must be a chorus of voices speaking loudly and strongly for our food and agriculture producers and our tribal communities. Improving the Farm Bill for Indian Country will help bolster our work to achieve the truest form of sovereignty: feeding ourselves in our own food systems with our own foods.”*¹⁸⁷

The Farm Bill is an invaluable source of support for Native farmers and ranchers. The titles cover everything from research and innovation to health and nutrition. This bill provides important policy opportunities to enhance opportunity and increase access to resources. Each title has a different impact on Indian Country and although there are few programs specifically regarding Native Americans, there are many opportunities that exist within.¹⁸⁸

The latest Farm Bill features many successes for Native food and agriculture. There are three provisions included in the conference bill that support the purchase and production of traditional foods. In the Nutrition Title (IV), there is an expansion to the existing traditional foods provision that adds the term “regionally grown” as a purchasing preference for foods included in the FDPIR program.¹⁸⁹ The addition of traditional foods, particularly those grown locally by Tribal producers can help stimulate and strengthen economies, agricultural production, and food systems. There is another provision in this title which adds eligibility for state, county and local education programs to receive traditional food donations.¹⁹⁰ This would be beneficial for school districts looking to increase the number of traditional food ingredients in school meals.

Finally, a third provision in the Horticulture Title (X), establishes Tribal eligibility in the Local Agriculture Management Program (LAMP).¹⁹¹ This is a new program that combines the previously successful the Farmers Market and Local Food Promotion Program (FMLFPP) and the Value-Added Producers Grant Program (VAPG) to support and invest in local food systems.¹⁹² With eligibility, Tribes will be able to cultivate, process and sell traditional foods at a variety of alternative merchandising models such as farmers markets and community-supported agriculture programs. For SNAP participants, this would be an opportunity to spend funds on locally produced traditional foods.

¹⁸⁷ Hipp, Janie S. and Colby D. Duren. *Regaining Our Future: An Assessment of Risks and Opportunities for Native Communities in the 2018 Farm Bill*. Prior Lake, Minnesota: Shakopee Mdewakanton Sioux Community, 2017.

¹⁸⁸ Hipp and Duren. *Regaining Our Future*.

¹⁸⁹ GovTrack.us. “H.R. 2 — 115th Congress: Agriculture Improvement Act of 2018.” <https://www.govtrack.us/congress/bills/115/hr2> (retrieved January 15, 2019).

¹⁹⁰ GovTrack.us. “H.R. 2 — 115th Congress: Agriculture Improvement Act of 2018.”

¹⁹¹ GovTrack.us. “H.R. 2 — 115th Congress: Agriculture Improvement Act of 2018.”

¹⁹² GovTrack.us. “H.R. 2 — 115th Congress: Agriculture Improvement Act of 2018.”