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DIET AND DISEASE ON THE PLAINS: DIABETES AMONG THE OMAHA

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Abstract. *Non-insulin dependent diabetes is a rising health concern among the Omaha Tribe. The problem has developed from negligible levels in the 1960s to a significant health threat today. As of 1992, 35% of the Omaha Tribe adult population residing on the reservation had been diagnosed with the condition, and the actual proportion of people with the condition is probably much higher. The age of onset of the disease is decreasing so that people as young as 10 years of age are diabetics. The increase in diabetes is at least partly due to changes in diet practices that include the emergence of new "traditional foods" and the consumption of prepared or convenience foods. Preliminary observations suggest that the modern diet that includes federally subsidized food programs may contribute to the problem.*

Non-Insulin Dependent Diabetes Mellitus (NIDDM or type II) is a disorder of protein, fat and carbohydrate metabolism that results from an unavailability, absolute or partial, of insulin from the pancreas. NIDDM is that type of diabetes which is seen now in high rates among Native Americans and other indigenous peoples. It is characterized by insulin deficiency resulting from insulin antagonists or demands on insulin due to persistent stress or obesity (Luckman and Creason-Sorenson 1980). It has been diagnosed as controllable by oral hypoglycemic agents, those agents in conjunction with diet, or by diet alone (Luckman and Creason-Sorenson 1980). W. Knowler et al. (1983) describe NIDDM as a condition with inappropriate insulin secretion, resistance to the action of insulin, or a combination of these, often with an asymptomatic onset. A common criterion for the condition is a post-load plasma glucose level of $>$ or $=$ to 200 mg/dl.

In healthy individuals, the blood glucose level is maintained within a narrow range. When an individual consumes food, blood glucose levels rise. This rise stimulates the pancreas to release insulin, which in turn stimulates the liver to create glycogen, the storage form of glucose found in the liver and muscle tissue. Insulin also stimulates muscle and fat cells to take up more

glucose. By stimulating the storage and movement of glucose out of the blood stream, the blood glucose level is kept from rising too high (Wardlaw et al. 1992).

In an individual with NIDDM, large fat cells cause a resistance to insulin. The pancreas can still produce some insulin, but body cells and fat cells in particular resist insulin action. The result is the loss in the ability of glucose in the blood to be transported out of the blood stream to storage. This state is referred to as hyperglycemia, or high blood glucose.

This disease not only affects the metabolism, but it also impacts almost every system of the body. The long term effects of uncontrolled type II diabetes can be traumatic. One acute metabolic complication is a hyperosmolar coma due to profound dehydration with a mortality rate of greater than 50%. Other complications, both circulatory and neurological, include arteriosclerosis and retinopathy, which may cause blindness, and nephropathy, leading to renal disease or failure. Diabetic neuropathy is particularly prevalent and plays a role in the development of ulcers of the lower extremities and feet. Ulcers lead to gangrene and result in amputation.

No single causal factor has been identified for NIDDM, but it is associated with several factors such as obesity, diet, and physical activity. A genetic factor, in the case of Native Americans and other indigenous peoples, has also been hypothesized (Neel 1962, 1982).

In 1962, J. Neel's "thrifty gene" hypothesis suggested that those who develop type II diabetes were equipped with a quick insulin trigger in response to a greater than normal amount of glucose in the blood (hyperglycemia). This quick trigger was postulated to be an asset in early human evolution when the hunter-gatherer lifestyle was the mode of subsistence and when periods of abundance alternated with periods of want. The quick trigger was beneficial because it reduced calories lost to urinary excretion through storage as fat. With a steady and sufficient food supply, this quick trigger became over accelerated and this led, through time, to NIDDM.

Diet and NIDDM

Because diabetes is a disease of metabolic abnormalities diet is important: it affects the way the body deals with food intake. It is also known that diabetes is often controllable through diet and weight control. Ritenbaugh and Goodby (1989) investigated Paleo-Indian migration into North America and focused on the implications of a northern hunting adaptation in terms of metabolism. This adaptation is described (Ritenbaugh and Goodby 1989) as

a diet based on animal sources, high in carbohydrate, low in dietary fiber, moderate in fat, and high in protein. The lifestyle required high energy demands for activity and warmth and included seasonal shortages of macronutrients.

Ritenbaugh and Goodby (1989) studied the physiologic adaptations to this type of diet in the context of agricultural subsistence systems and in industrial societies. They concluded that modern acculturated Amerindians have a lifestyle that is marked by a diet high in carbohydrate, low in fiber, and moderate in fat and protein, based on grocery stores and modern food technology. Energy requirements for sedentary leisure activities and work are low but the authors note that feasting is common. They studied Dogrib Indians (who maintain much of the northern hunting lifestyle) for obesity and diabetes rates and found that they have a low prevalence of both.

Other researchers who have conducted studies among native populations have focused on the types of foods these groups consumed prior to the appearance of high rates of NIDDM. Kerin O'Dea (1984) tested the effect of reversing the urbanized lifestyle of diabetic Australian Aborigines. Ten volunteers living as hunter-gatherers for seven weeks in a traditional environment were given oral glucose tests before and after the experiment. Volunteers were overweight when the project started and all were age 53.9 plus or minus 1.8 years. The test results showed improved fasting glucose and postprandial glucose, as well as improved response to insulin and weight loss. The metabolic abnormalities of NIDDM were greatly improved or normalized completely after only seven weeks. Analysis of the special diet showed an overall low energy intake, a high proportion of animal food, and a low proportion of fat.

Australian Aborigines were also the focus for Thorburn and her colleagues' further investigation into diet and diabetes (1987). One study compared responses of traditional staples of Aborigines and Pacific Islanders to that of western foods. Of the traditional foods, 26 of 30 were more slowly digested than the western foods tested. Six of the eight bushfoods produced smaller glucose values than western potatoes in healthy Caucasians, and starch digestibility was correlated with the glucose response. These findings are consistent with the hypothesis that carbohydrates of these traditional foods are slowly digested and absorbed, and were, therefore, possibly protective against diabetes.

The early Native American diet was an aspect of adaptation to the environment. The rapid changes brought about by acculturation did not allow for the continuance of the adaptive diet. To summarize the literature, dietary

changes have occurred in many native populations due to outside forces involved with acculturation. Any physiological adaptation of the past is no longer beneficial in the context of the new diet and new environment. Diet related diseases, now seen in higher proportions of aboriginal peoples and their ancestors, are the result. This may be due to the change in the overall composition of the diet, the differences in nutritive properties of specific "traditional" foods compared to "modern" foods, and the change in the level of physical activity, or a combination of all three.

NIDDM and the *Umo'ho* (Omaha)

The Omaha Tribe of Nebraska reservation is located in Thurston, Cumings, and Burt counties, covering 130,000 square miles of northeastern Nebraska. The reservation is bordered on the east by the Missouri River and on the north by the Winnebago Indian Reservation.

According to Bureau of Indian Affairs standards for enrollment (Omaha Tribe of Nebraska 1992) approximately 4,000 individuals are enrolled in the Omaha Tribe. The reservation is home to 2,941 tribal members, with the majority (2,000) residing in the town of Macy, the reservation headquarters. Walthill has Indian and non-Indian residents, while two other towns on the reservation are occupied predominantly by non-Indians.

Per capita income for the Omaha was reported at \$3,416, and the unemployment rate was listed at 64% (Omaha Tribe of Nebraska 1992). The family size averaged five children and the average education level was reported as that of high school graduate. These economic and logistic factors, as well as others, influence dietary patterns of the Omaha people residing on the reservation and impact the nutritional health of the individuals as well.

Type II diabetes has become an epidemic for many Native American populations in the recent past. This is especially true for the Omaha with some 265 (13%) of 2,000 Omaha adults over age 18 diagnosed with NIDDM (Smith 1993). Surprisingly, many school-aged children also have been diagnosed as having NIDDM. The screening process for Acanthosis Nigricans, a skin marker associated with type II diabetes, has been conducted in the schools and it has been found in one third of the children (155), especially those who are overweight or obese. The actual number of Omaha with the disease is likely to be higher due to the asymptomatic nature of the onset, which explains the lack of self-reporting of the illness. The Coordinator of the Diabetes Control Program at the United State Public Health Service/Indian Health Service (USPHS/IHS) Hospital that serves the Omaha and the Winnebago estimated

that another 15% of the population is affected by type II diabetes, but goes undiagnosed.

In a recent survey of diabetes among selected Great Plains tribes, prevalence and incidence rates for the Omaha and Winnebago tribes were determined through analysis of IHS Diabetes Control Program data for 1987 and 1988 (Stahn et al. 1993). The Winnebago and Omaha had the highest combined rates. The reported prevalence rate (1987) was 218.1 per 1,000, and the incidence rate (1988) was 20 per 1,000. These are 8.8 and 7.7 times the U.S. rates for prevalence and incidence of diabetes. Age adjusted prevalence rates for diabetes among the Omaha and Winnebago were also shown to be 3.2 times the overall rate for Native Americans. Though these statistics combine cases for the Winnebago and Omaha, as they are served by one facility, they are demonstrative of the effect of type II diabetes has on a population of Native Americans that includes the Omaha Tribe.

Preliminary Observations of the Modern Omaha Diet

The following observations by the author and C. Miewald are based on a period of two months spent mainly in Macy, Nebraska. Because of the limited time frame, the observations may not reflect differences in diet due to seasonality.

There are three small stores in Macy. One is larger than the others, with a candy counter, frozen novelties, a few dairy items, lunch meats, soft drinks, some dried and canned goods, and a selection of convenience foods and snack foods, such as chips, crackers, cookies, cakes, and microwaveable single serving items. This store also has a kitchen that serves pizza, fried chicken, fried potatoes, fried onions and usually a daily special, such as fry bread and a meat-based soup. This appeared to be quite a popular spot for lunch and otherwise. The other two stores sell convenience and snack foods, soft drinks, and candy. The only fresh produce observed in Macy was in the larger store, and the selection usually consisted of bananas, apples, oranges, and lemons.

Other stores were located outside of Macy in towns such as Decatur, Walthill, Winnebago, and South Sioux City, all in Nebraska. Some offered more variety, particularly in regards to fresh foods, but their utilization by the Omaha appeared to be constrained by limited access to transportation, or limited availability of cash to spend on gas or pay for a ride. These stores are from 9 to 30 miles from Macy (Fig. 1).

The special supplemental food program for Women, Infants, and Children (WIC) is a federally funded program of the Food and Nutrition Service

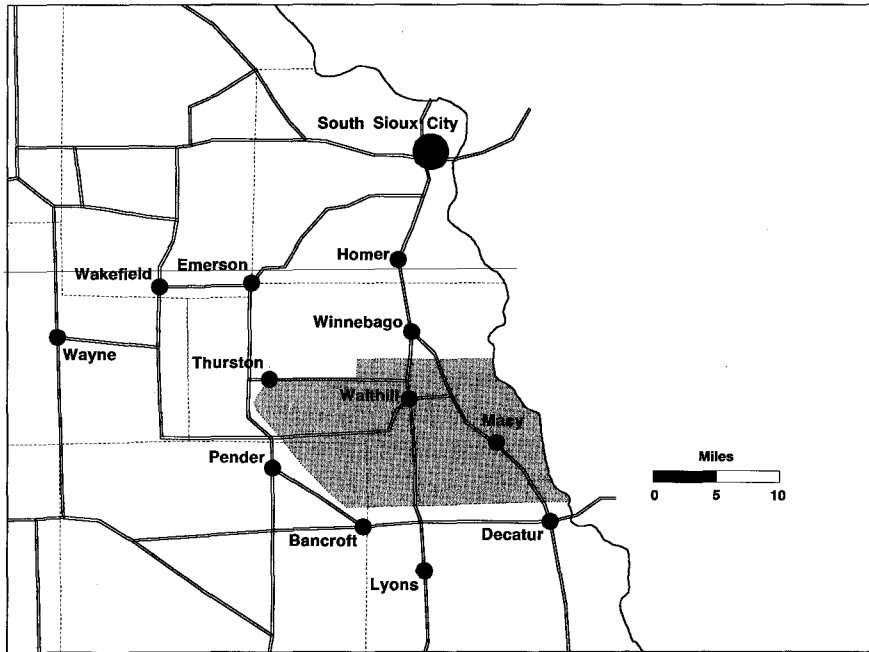


Figure 1. Omaha Reservation and Macy, Nebraska, in relation to regional urban areas with shopping or employment opportunities. Map by J. Clark Archer.

of the United State Department of Agriculture (USDA) and is designed to address calcium, iron, protein, and vitamins A and C deficiencies in pregnant and lactating women and their infants and children. It is operated by the Nebraska Indian Inter-Tribal Development Corporation (NIITDC). The program serves pregnant women and continues post partum up to 6 months. If breast feeding continues, the service will follow up to one year. Infants from 0 to 12 months benefit, as well as children between the ages of 1 and 5 years.

Women must apply for the program and they and their children must undergo a 24-hour dietary recall, and anthropometric measurements at the time of application. They are also asked some basic health and income questions. Eligibility is based on economic need and nutrient need as reflected by the recalls.

WIC works on a monthly voucher system; vouchers, made out to the store of the mother's choice, are good only for specified quantities of WIC-approved foods. Food items are prescribed in different packages, depending on the condition of the women and children. The foods in these packages must

meet specific criteria for the type of food. For example, infant formula must be iron fortified (10 mg/liter), must be complete, requiring water only, and must supply around 67 kcals/100 ml.

Types of foods in the program are the following:

1. Juices, frozen, canned or bottled; all must be full strength and meet brand requirements
2. Cereals, cold and hot
3. Peanut butter
4. Eggs
5. Milk, whole, low fat, or fortified skim, evaporated, non-fat dry, acidophilus, and buttermilk
6. Legumes, dry beans, lentils, black, navy, kidney, garbanzo, soy, pinto, mung beans, red, great northern, cow, crowder, split peas, and lima beans
7. Cheese, block or sliced; no deli, individually wrapped, cheese food, cheese spread, Velveeta, shredded, string, cottage or cream cheese
8. Infant Juice, all flavors, proper brands
9. Infant Cereal, iron fortified dry in boxes that require only water
10. Infant Formula, iron fortified

Due to a high incidence of lactose intolerance in this population, mothers may be prescribed a calcium supplement instead of milk. In June of 1993, this program served 53 Omaha women, 72 infants, and 207 children (Stavropoulos-Kuhn 1993).

The Summer Food Service Program, a federal program administered by the Food and Nutrition Service (FNS) of the USDA, supplies lunch during the week days of the summer break from school. It serves the children in Macy locally via the school cafeteria. The program operates here because it meets the eligibility requirement of being in an area in which one half or more of the children come from homes with incomes at or below 85% of the Federal poverty guideline (USDA, FNS 1993c). Children between the ages of 2 and 18 are eligible to participate, and the meals are required to include 2 ounces of protein, 3/4 cup fruit or vegetable, 1 serving of bread, and 1/2 pint of milk. The foods used include commodities and foods purchased with the federal funds. The typical and most popular lunch items were hot dogs, pizza, cheeseburgers, burritos, french fries, pickles, corn, potatoes, pork, corn soup, juices, and chocolate milk. The least favorite items, as reported by the cook,

were broccoli, green vegetables, and just about anything not on the list of favorites. "New" and "different" foods were not popular either.

The number of children this program serves varies from day to day and with the time of the month, with a high of 284 and a low of 49 in one day. The end of the month may see more participants because it is often a time of low funds.

The Macy Senior Center, a Title VI Program, a Nutrition Program for the Elderly in which the USDA contributes commodity foods and/or cash (USDA, FNS 1993b), provides a place for any senior that wishes to partake in one meal a day. Meals are also delivered to the homes of those seniors who wish and other adults may dine in the center for a minimal price. The meal is usually a lunch, but breakfast is served on funeral days. The Macy Senior Center not only provides meals, but also serves as a gathering place for activities and social gathering for the elders. The program began in 1966 on the Omaha Reservation, and in 1984 became tribally operated (Stavropoulos-Kuhn 1993).

Typical menu items at the time of observation included the following: meat-based soups with vegetables or dumplings; yeast breads, "cowboy" bread, "fry" bread, or commercial breads ("white man's bread"); canned and occasionally fresh fruits; mayonnaise based or lettuce salads; beef, chicken, and lunch meat dishes; some desserts; and coffee or iced tea. The foods used are a combination of commodities and foods purchased from local distributors. In September, 1992 an average of 808 monthly meals were served (Stavropoulos-Kuhn 1993).

The National School Lunch Program (NSLP), administered at the federal level by the FNS, operates during the school year at Macy Public School. The school receives cash subsidies as well as donated commodities for meals that are offered to all children at either reduced cost (no more than 40 cents), or at no cost, depending on the economic status of their household (USDA, FNS 1993a). To participate in the program, the school must meet a "meal pattern" set by the USDA that includes a minimum of 2 ounces of meat or meat alternate, 3/4 cup vegetable and/or fruit, 8 servings per week of bread or bread alternate, and 8 ounces of milk.

The Emergency Food Assistance Program (TEFAP) provides USDA-donated food for household use to the needy and underemployed. The foods available depend on market conditions, and eligibility criteria are set by the state agency and are passed on to local agencies that distribute the surplus commodities (USDA, FNS 1993d). TEFAP commodities are distributed to Omaha Tribal members who are in the Food Distribution Program on Indian

Reservations (FDPIR) at Winnebago, Nebraska; other members receive them through the Nebraska Department of Social Services (Stavropoulos-Kuhn 1993). The foods are the same as those distributed through the FDPIR, but the types and quantities are limited, as mentioned, by availability of surplus.

The Omaha consume some seasonal wild foods that have short gathering periods. Generally, they do not make up a large proportion of the subsistence. Some of the wild plant foods include milkweed, made into a soup with pork and dumplings; mushrooms, strawberries, black berries, mulberries, raspberries, gooseberries, choke cherries, and plums. Although some grow and dry corn for use in corn soup and other dishes, gardening is a rare source of food for the Omaha.

The Omaha consume some foods that are categorized as Indian or traditional which are served at social events such as celebrations and powwow. Indian foods include: fry bread, a bread made of flour or bakery mix that is fried in oil or shortening; Indian taco, fry bread topped with seasoned hamburger, lettuce, tomato, and cheese; Indian burger, fry bread with a hamburger inside; corn soup, soup of preferably dried Indian corn rather than canned or frozen, with meat stock; and dishes made with wild foods, such as milkweed soup and desserts or jams of wild berries.

Food is an important aspect of every social event. The serving of a complete meal is part of all gatherings and celebrations such as birthdays, handgames, dances, graduations and funerals. The whole community is often invited, which means there will be large amounts of food to prepare. Typical foods include soups, fry bread, mayonnaise-based salad, green salads, cake or pastry, corn, mashed potatoes, coffee and juices or fruit drinks.

During powwow, families or local groups provide stands that sell food including Indian tacos, Indian burgers, corn soup and fry bread. Soft drinks, candy, pickles and popcorn are also available at many stands and there is a public feeding line serving a free meal to all in attendance. The foods served in these lines are typical of those served at celebrations and other social events.

The Food Stamp Program (FSP) supplements food purchasing power of eligible low-income households, while benefiting the agricultural economy at the same time (USDA, FNS 1993a). Eligibility is based on meeting resource, work, and income requirements. Monthly allotments are adjusted for household size, and income. Those households with no income receive the maximum allotment for size while those with a countable income have benefits reduced by 30 cents per dollar of net income (USDA, FNS 1993e). Food stamps may be used to purchase food for human consumption, and seeds to

grow in home gardens but are not redeemable for alcohol, tobacco, ready-to-eat foods, vitamins, medicines, pet foods, and non-food items (USDA, FNS 1993e).

The Food Distribution Program on Indian Reservations (FDPIR) of the USDA is a supplemental food commodities distribution program administered by the Food and Nutrition Service (FNS) that is available to any person living within or near the boundaries of the reservation regardless of race, color, national origin, age, sex, handicap, political belief or religion. The rules for acceptance to the program are based on income and resources (USDA, FNS 1980). Those receiving food stamps are ineligible.

An individual wishing to receive food must fill out an application and return it to the food distributions program in Winnebago, Nebraska. The application is immediately reviewed, and if approved, a monthly distribution of food is set up based on the number of eligible individuals in the household. New participants may receive their first distribution at that time with the amounts of each type of food per individual predetermined by guide rates. Participants may pick up the food at the distribution center in Winnebago, or may have it delivered if no transportation is available. The food package received in 1992 was equivalent to \$36.64 per individual per month (USDA, FNS 1992).

The foods available through this program are listed on the guide rate and include:

1. Dairy: canned evaporated milk, boxed dried milk, and processed American cheese
2. Sugars: honey or corn syrup
3. Fats: shortening or vegetable oil or butter
4. Fruits and Vegetables: canned, canned juices, dry fruit, and dehydrated potatoes
5. Meats, Eggs and Beans: canned vegetarian beans, dry beans, canned meat, canned poultry, canned fish, peanut butter, roasted peanuts, and dehydrated egg mix
6. Grains and Cereals: wheat flour, bakery mix, rolled oats/wheat, farina, corn, meal, rice, dry breakfast cereals, macaroni, and spaghetti

Some of these items are plain-label versions of name brands with full nutritional information on the package, whereas other items list ingredients, but no nutritional information. Labels do not include expiration dates. In June

of 1992, this program reached some 200 Omaha families, totaling 873 individuals.

The USDA uses quarterly reports from the distribution site to estimate what is needed for the year (Wolfe 1993). Some of the foods are obtained either from agricultural surplus, or purchased from the lowest bidder with appropriated funds (USDA, FNS 1981). The state or, in the case of the Winnebago center, tribal agency orders are based on current caseload and the availability of the foods (USDA, FNS 1991).

Prior to 1977, the commodities program as described above did not exist on reservations. The distribution of commodities began many years earlier in order to relieve farmers of surplus crops in times of economic depression, and in doing so, supplemented the diets of the needy (USDA, FNS 1977). The Food Stamp Program replaced the distribution of commodity surplus foods in the late 1960s and early 1970s.

According to the director of the Winnebago Distribution Center, in 1977, a number of Native American tribes held a conference in Oklahoma, to discuss the usefulness of the Food Stamp program versus the Commodities program, and concluded that the commodities better served the people (Wolfe 1993). They lobbied for the right to tribal-administered commodities on the reservation. That same year the FDPIR was authorized by Congress in the Food Stamp Act (USDA, FNS 1991). In 1980, the Winnebago Distribution Center began providing the FDPIR program to the people of the Omaha, Winnebago, and Santee Sioux Reservations (Wolfe 1993).

Advantages of the FDPIR are often seen in light of the shortcomings of the Food Stamp program in the reservation setting. Access to food is one of the major problems for residents on reservations in rural, isolated places. The limited number of stores and semi-isolation create two problems:

1. competition: the absence which often results in higher prices, and thus, less food for the stamps.
2. logistics: the distance needed to travel to the store with selection is often longer than reasonably walkable, and the lack of transportation, cash for gas, or cash for a ride to the nearest competitively priced store also create difficulties for the Omaha.

There is another disadvantage to the food stamp program on the Omaha reservation. If an individual has children over the age of 18 she/he must register at the job service to prove she/he is seeking employment. Job opportunities are very limited in this isolated area and the nearest major

population center providing employment is approximately 20 minutes by car (see Fig. 1). Without transportation, a person will have great difficulty in seeking employment, and therefore, difficulty in meeting requirements for participation in the program (Wolfe 1993). If an individual is deemed eligible for food stamps, there is a lag time before the stamps are made available, and there is no emergency food stamp disbursement in Thurston County (Wolfe 1993). The commodities program, however, does not have the lag, and often those eligible for food stamps receive commodities to fill the gap while waiting for food stamps.

Income and resources are considerations in the eligibility requirements of both programs. The amount of food stamps an individual receives is graduated with income, but this is not so with commodities. As long as the commodities participant's income falls below a certain amount, whether it be by one or fifty dollars, the amount of food received is constant. After the income requirement then, the amount of food received is based on the number of mouths in the household. This is another factor considered to be an advantage of the FDPIR (Wolfe 1993).

USDA-donated Commodities in the Omaha Diet

The USDA considers commodity foods as a supplement. It can be argued that these foods are more than that for many on the Omaha Reservation. Usda-donated foods are a major portion of the Omaha diet and are found not only in the large number of households of FDPIR participants, but also in institutional and social settings.

According to 1992 Omaha tribal economic data, there are 2,941 members on the Omaha Reservation. Data collected for five months between June 1992 and February 1993 show that the FDPIR served on average 662 individuals per month during this time. This comprises approximately 23% of the Omaha population residing on the reservation. These numbers reflect commodities found only in the households of the reservation).

Commodity foods can also be found elsewhere in the Omaha diet. The school and health clinic rely partly on foods from the USDA's food distribution programs to feed the children in schools and elderly in the nursing home of Macy; and the Macy Senior Center includes some commodity foods in the daily meal as well. The Summer Food Service Program that feeds children also relies in part on USDA foods.

The Food Bank housed in the Food Distribution Center in Winnebago is in part stocked with Usda-donated foods (Wolfe 1993). Any food received

from the Temporary Emergency Food Assistance Program (TEFAP) through the state is Usda-donated. Social events and gatherings such as celebrations, funerals, and powwows often have a meal that usually includes some commodity foods. Even traditional "Indian" foods and culturally important foods are made with commodities. These Usda-donated foods are an important component of the modern Omaha diet.

Nutritional Considerations

Dietary change has been dramatic for the Great Plains tribes. Low fat animal protein sources such as wild game are no longer available, consequently the Omaha consume high fat domestic meat such as luncheon meats, hot dogs and hamburger (Stahn 1993). The "traditional" diet included more complex carbohydrates and fiber from fruits, roots, and berries. The carbohydrate sources of today's diet come from refined, more caloric foods containing little fiber, much simple sugars, and often added fats. Examples of such foods in the Omaha diet are candy, pastry, sodas, convenience snack foods, fried vegetables, and fry breads. This general dietary pattern is not unique to the Omaha, or to Native Americans in general. It can be seen elsewhere in American society, and is contributing to major health problems. What is unique appears to be the time frame for the change from "traditional" diet to modern for the Omaha, particular components of the contemporary Omaha diet, and this diet's affect on the health of the Omaha population.

Omaha diabetics who seek treatment are referred to the Diabetes Control Unit at the USPHS/IHS Winnebago Hospital in Winnebago, Nebraska. One of the main components of the Diabetes Control Program deals with dietary evaluation and nutrition counseling to help the patient make dietary and lifestyle changes that help control the disease. Because obesity is usually associated with NIDDM, and weight loss usually improves blood glucose control, weight loss and/or weight control are important first goals (Ratzlaff 1993). Increased activity is also encouraged as beneficial.

As the counseling progresses, the focus is on good nutrition principles that affect blood glucose control and lowering of cholesterol and triglycerides to acceptable levels. Encouraging the lowering of fat intake in the diet is used to help the patient achieve these goals. The registered dietitian also addresses any other problems pinpointed through the evaluation process and tailors the program for the patient's specific needs. Throughout this process, the specific nutritional recommendations for individuals with diabetes mellitus published

by the American Diabetes Association (ADA) guide the dietitian in counseling the patient.

The nutritional recommendations of ADA are as follows:

Calories. Caloric intake should be controlled to achieve and maintain a desirable body weight.

Carbohydrate intake. The amount of carbohydrates should be a large portion of caloric intake, ideally up to 55-60% of the total calories. Carbohydrate requirements are individualized to meet patient need, with amounts dependent on individual eating patterns, the impact on blood glucose, and lipid levels. Unrefined carbohydrate sources with fiber are encouraged as substitutes for highly refined carbohydrates, which are low in fiber. Small amounts of refined sugars, including sucrose, may be acceptable for some, depending on body weight and metabolic control.

Protein intake. The RDA for protein is .8g/kg of body weight for adults.

Total fat and cholesterol. Less than 30% of total calories should come from fat. Cholesterol intake should be less than 300 mg/day. When total fat is reduced, all components should make up 10% of the total. Unsaturated fat as opposed to saturated may help prevent atherosclerosis.

Alternative sweeteners. Nutritive and nonnutritive sweetener use is acceptable in managing diabetes.

Salt intake. Sodium intake may be harmful in hypertensive patients, and therefore should be reduced. This is individualized, as severe restriction could be harmful for individuals with poorly controlled diabetes.

Alcohol. Problems with hypoglycemia, glycemic control, neuropathy, obesity, and/or hyperlipidemia may be caused by alcohol. Its consumption is never encouraged.

Vitamins and Minerals. Vitamins and mineral recommendations are the same as for non-diabetics.

Omaha individuals newly diagnosed with diabetes are faced with challenges of dealing with a chronic disease. After nutrition counseling, they must then try to apply what they have learned to their present diet. USDA foods are prevalent in this contemporary diet for many. Further examination of the nutritional quality of these foods to determine the standards used in

deeming these foods eligible for distribution and what the diversity and allocation of USDA foods is based on would also be beneficial. More particularly, the impact of these foods on the incidence of type II diabetes and other nutrition-related diseases among the Omaha should be examined, because dietary change is often cited as an important factor in the epidemic of these problems in American Indian populations. A review of the recent literature regarding the adequacy of USDA foods and the FDPIR program has revealed an awareness of the need to investigate the quality of these foods and their health effects.

In 1988, congressional members requested that the General Accounting Office (GAO) investigate nutritional adequacy of food programs on the Fort Berthold, Pine Ridge, White Earth, and Navajo reservations. Congressional members also requested that the GAO uncover what special nutritional needs were not being met by the food assistance programs available to Native Americans living on federal reservations (USGAO 1989).

The report concluded that the FDPIR food package is a supplement rather than a 30 day supply of food and that participants are expected to purchase other foods. Tribal officials indicated that food shortages were occurring in some households participating in the FDPIR. The report concluded that the nutritional quality of the FDPIR foods could not be ascertained because of multiple factors affecting the value of an individual's food consumption. Tribal, Indian Health Service (IHS), and Health and Human Services officials interviewed throughout the study felt that fat and sodium levels in the FDPIR foods should be reduced (USGAO 1989). Omaha tribal members and IHS officials also expressed concern for the nutritional adequacy of the FDPIR foods with specific regard to sodium, cholesterol, and fat, and their relationship to widely known health problems such as diabetes, obesity, and hypertension.

GAO reporters concluded that the Food Stamp and FDPIR programs are not meant to meet particular dietary needs of Native American recipients. The report mentioned that other programs addressed specific needs such as the WIC program for women, infants and children, and that participants in the FDPIR program should take advantage of nutrition education and apply it in order to help meet special dietary needs. Existing special needs programs are not concerned specifically with the major diet-related diseases that plague Native Americans: diabetes, obesity, heart disease and hypertension. The need for adequate nutrition education and food preparation education can not be overstated, but to give it lip service only while supplying foods with allegedly "undeterminable" effects on the nutritional health of Native Ameri-

cans is objectionable. The prevalence of diseases related to diet at all four of the reservations and the impact of federal assistance programs (i.e. FDPIR) on those diseases is a major concern.

Similar concern was expressed at the Standing Rock Sioux Reservation in 1990 (Leonard 1991), the site for a field hearing of the House Select Committee on Hunger. Charles "Red" Gates, the Food Distribution Director for the reservation, brought the committee samples of canned meats from the FDPIR to illustrate the lard, vein, and bone content of these foods. Several representatives were quoted as being disgusted, and deemed these meats unfit for dogs (Minot Daily News 1990). Charles Gates also urged the committee to look into fat and sodium levels of these products, because reservation residents and tribal officials were concerned about the ill effects these foods may have on Indian health. As a result of this hearing, representatives requested a GAO investigation into the quality of canned meat products supplied by the USDA (USGAO 1991).

A recent evaluation of the FDPIR (Usher et al. 1990), prepared for the USDA's Food and Nutrition Service, included information from 30 programs across the nation. Objectives included a profile of participant characteristics, assessment of dietary needs and preferences of Native American participants, and an evaluation of how the FDPIR addresses them. There was no assessment, however, of the FDPIR's effect on nutritional health status of recipients.

Regulations that require local FDPIR programs to provide nutrition education services to participants are nonexistent (Usher et al. 1990). FDPIR encourages other organizations to establish programs and coordinate nutritional information to participant households. Of the 30 FDPIR programs studied, an average of 5% of administrative funds were allocated for the purpose of nutrition education. In those programs that did offer some nutrition education services (60%) and had staff expenditures allocated for this purpose, the personnel involved had little or no training in the areas of nutrition or health. The distribution of recipe books for cooking with commodities and demonstrations of preparation of certain food items were the most common activities involved in educating food recipients. These activities were held at the FDPIR center where the Omaha participants received their food. Cookbooks were distributed when available and cooking classes were held on a number of occasions, but these demonstrations were not consistently being offered throughout the history of the program due to the lack of a permanent demonstrator.

In investigating the dietary needs of FDPIR participants, it was found that about 1 in 8 (n=757) respondents reported that they often did not have enough food for the household. Of these, 80% experienced five or six days a month in which they were either out of food or without money to buy food (Usher et al. 1990). Although no documentation of such information for the Omaha was present, the presence of "lean times" and possible hunger at the end of the month for some Omaha residents was heard of on several occasions. Over 50% of the households included in this study reported that there was at least one person 16 or older that had one or more nutrition-related health problems. Twenty-five percent of the households had at least one individual who was supposed to be following a special diet. High blood pressure, diabetes, and obesity were the health problems reported by households (Usher et al. 1990).

Through the use of focus groups, researchers were able to ascertain that participants were concerned with the above-mentioned health problems and found them to be a significant problem to their reservation. Researchers also found that participants did not understand and had insufficient information regarding dietary health issues. Participants expressed the need for more education in areas of nutrition and health and described difficulties faced in making dietary changes in light of food preferences of the community and family environment (Usher et al. 1990). This need for nutrition education beyond cookbooks and cooking demonstrations, beyond what is now available through federal regulations, was also expressed by IHS and tribal officials in the community of the Omaha Tribe.

Several conclusions can be drawn from reviewing the literature on nutritional adequacy of USDA foods. First, the USDA considers the FDPIR to be a supplemental program. However, a gap exists in services provided to Native Americans, as evidenced by such phenomena as days without food or money to buy food for some reservation residents, and "lean times" at the end of the month when hunger may exist. Second, there is concern on many reservations, including the Omaha reservation, about the major diet-related diseases and the impact of government foods on the health of the community in relation to these diseases, while no study has yet to establish the impact as its main concern. Third, it is not the purpose of the FDPIR to address special dietary needs of Native Americans, as this program was created as the result of surplus commodities, not as a result of the need to employ a nutritionally and culturally appropriate domestic food relief intervention. The USDA places the responsibility of a nutritionally adequate diet for Native Americans who rely on USDA foods on the participants and their application of nutrition

education offered by the program. Unfortunately, the literature reveals that the amount and scope of nutrition education provided by the FDPIR or by existing federal regulations and funding policy cannot fill this need. This suggests that education should make up for the questionable quality or effect of the foods, yet the federal government fails to provide for education. Shanklin et al. (1992) reached a similar conclusion. This need is perceived not only by individuals represented in the sample population of the FDPIR evaluation, but also by health officials and tribal members of the Omaha community.

Conclusion

What can one conclude from this review of the literature and observations in the Omaha community? First, diabetes and other diet-related health problems are becoming increasingly problematic for many Omaha and other Native Americans. The complications of such diseases are real, traumatic, and life threatening. Second, it should be emphasized that the FDPIR and other Federal food programs are important sources of food for many Omaha. Their distribution methods, however, are flawed and should be carefully examined to determine their nutritional adequacy, and to ensure that measures are taken to avoid contributing to the nutritional health problems afflicting the Omaha Tribe. USDA programs are domestic food relief programs, and should be considered nutrition interventions, however, the impact of these interventions on the nutritional health status of those involved should be studied. Third, the impact of these foods on the incidence of type II diabetes and other diseases among the Omaha Tribe should be investigated to assess their nutritional adequacy. Such an investigation could determine whether or not the processes used by the USDA in allocating foods for distribution take into consideration the predisposition or high risk of many Native Americans to type II diabetes.

Fourth, there is a need for a nutrition education program. The local distribution sites are not currently given the federal support, financial means, or personnel to do much more than offer cookbooks and occasional demonstrations. Though these efforts are beneficial to participants, there still exists a need for a more thorough nutrition education program. This would require both federal and tribal efforts to develop programs to reach the entire community. This effort would need to be culturally relevant, incorporate local people, and have the interests of the community at heart. Information relevant to the relationship of diet and disease should be incorporated into these programs.

Fifth, for the Omaha, a nutrition and needs assessment component is needed to address nutritional problems. Identification of what obstacles the Omaha community sees to healthful eating or carrying out recommendations of the nutrition education is imperative. Since there is more to eating for health than the simple transmission of nutrition information, issues such as insufficient cash income, poor transportation, access to certain foods, and cultural or religious taboos or prescriptions need to be considered.

Larger issues of economic import also are involved—such as the freedom from dependence on government aid programs for food and nutrition. The economic ability to access other food sources and a wider range of choices is a long-term goal that can help ameliorate nutrition-related problems and hunger for many tribes. These issues should not be ignored.

Further investigations may show that the present programs are detrimental in that they promote or are a contributing factor in the onset of type II diabetes and other diseases of diet among the Omaha. These foods may be incurring not only personal loss of health and life to the individual, but also federal economic loss in terms of health care dollars through the Indian Health Service. Current federal government policy may be creating a need for future intervention.

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