Preventing Type 2 Diabetes in Native Americans through Nutrition

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Abstract

Diabetes is a chronic condition that disproportionately affects the Native American population. A means of improving the outcomes was through an education program aimed at a younger target population. The purpose of this project was to determine if nutritional knowledge can reduce the risk of Type 2 diabetes in the Native American population. Changes in dietary habits can reduce the risks of Type 2 diabetes for high risk populations like Native Americans. Having knowledge of nutrition can assist people in making educated choices in deciding what foods to consume. Determining nutritional knowledge by implementing a test followed by a dietician led education session was measured against a posttest to determine if there were improvements in test results. A statistically significant change in test scores ($p = 0.023$) indicated that offering an educational course to high school students can offer an opportunity for them to become aware how nutritional choices can influence outcomes for Type 2 diabetes. Implementation of an education program promoting proper nutrition to the Native American community can increase nutritional knowledge and may reduce the incidence of Type 2 diabetes.

*Keywords*: Native Americans, diabetes prevention, nutritional education
Preventing Type 2 Diabetes in Native Americans through Nutrition

Native Americans are an ethnic group that are disproportionately affected by Type 2 diabetes. The level of disparity and risk factors greatly influence their individual health care outcomes. Living in a rural community affects access to medical care, healthy food choices, and overall fitness. Assisting a target population by bringing attention the need to modify nutrition knowledge, may reduce the incidence of Type 2 diabetes.

Overview

Background

Diabetes is one of the many chronic health conditions facing our health care system in the United States. Approximately 1.5 million people age 18 and older were diagnosed with diabetes in 2015 (Centers for Disease Control and Prevention, 2017). Diabetes is the seventh leading cause of death in the United States, costing 327 billion dollars in 2017 (American Diabetes Association, 2018). Native Americans are 15.1% of this diagnosed population in the United States (American Diabetes Association, 2018). Native Americans who live on reservations experience low income, high unemployment, lower education levels, and poor living conditions (Towne et al., 2017). These circumstances promote chronic health conditions, poor nutrition, and unhealthy habits (Towne et al., 2017).

Annual medical spending for individuals with diabetes was $13,966 (in 2012 dollars) which amounted to twice that for individuals without diabetes (Zhou et al, 2014). The American Diabetes Association (2015) released data on the cost of diabetes and found that diagnosed diabetes cost $245 billion (in 2012 dollars). The Institute for Alternative Futures estimates that diabetes will increase by 54% from 2015 to 2030 to
over 54 million people and the cost (in 2015 dollars) will increase to $622.3 billion (Rowley, Bezold, Arikan, Byrne, & Krohe, 2017). A sobering reminder is that Native Americans are 2.4 times more likely to be diagnosed with diabetes than non-Hispanic whites (U.S. Department of Health and Human Services Office of Minority Health, 2016). Literature has shown community-engaged research benefits underserved communities that need medical care, have pronounced health disparities, and are underrepresented in research studies (Davis et al, 2014).

Preventing diabetes in the Native American community requires multiple modes of treatment. Promoting proper nutrition and educating Native Americans about the importance of nutritional knowledge could provide a powerful tool to prevent diabetes. Educating people about the importance of proper nutrition has shown positive results in areas that are prone to inadequate medical care, lower education opportunities, and limited access to clean water and fresh foods (Shen, Hu, Sun, 2015).

For Native Americans, diabetes is the fourth leading cause of death (Espey et al., 2014). Many Native Americans living on reservations have limited resources available to them. Diets that lack healthy foods, such as processed meats, refined grains, and sugar sweetened beverages can contribute to diabetes (Barnard, 2014). Because Native American communities are in non-agricultural rural areas, food choices are limited and contain many unhealthy choices. In some communities there are no fitness centers, and small grocery stores only carry processed packaged food.

The Native American community of concern is the rural area of Thurston county in Nebraska. This county includes the Omaha and Winnebago Indian reservations. The poverty rate for Thurston county in 2014 was 30.6%, which was the highest in Nebraska.
In Thurston county, the poverty rate for children under 18 years of age was 40.3%, children ages 0-5 was 43.9%, and school age children (ages 6-17) was 38.5%. The poverty rate for the elderly (65 and older) in Thurston county was 16.4% compared to 7.8% for the state of Nebraska (Daily et al, 2017). The population in Walthill, Nebraska was around 769 in 2014 with 617 (79.1%) of individuals being American Indian (City-Data.com, 2018). The estimated number of youths in Walthill, is approximately 273 people under the age of 18 (U.S. Census Bureau, 2017). The estimated median household income in 2016 was $38,338. The Nebraska estimated median household income in 2016 was $56,927. The estimated per capita income for 2016 was $12,231. In Walthill the estimated median house value in 2016 was $30,418 as compared to $148,100 for the state of Nebraska. The mean prices for most housing units in 2016 was $41,881; attached houses was $44,651; mobile homes were $21,886; and the median gross rent was $567 (City-Data.com, 2018). The ethnic composition of the population is composed of 602 Native American residents (81%), 89 white residents (12%), 33 Hispanic residents (4.5%), and 6 black residents (.81%). The most common language spoken is English along with Native North American (Data USA, 2016). Thurston county ranked in the top five for every poverty subgroup in Nebraska (Daily et al., 2017). The town of Walthill is in the center of the Omaha Indian Reservation that includes more than half of Thurston county (City-Data.com, 2018).

Stakeholders from various community sectors, organizations, and the individuals within the community have a direct or indirect involvement within a rural community. Individuals impacted within the community include American Indians, health care providers (physicians, nurses, social workers, psychologist, nutritionist and pharmacists),
Indian Health Services, tribal representatives, local businesses (grocery/convenience stores), parks and recreation departments, churches, governmental housing authorities, local school and preschool/head start programs, village board members, local fire and rescue department, and library committee.

Community residents along with tribal and community organizations provide a connection and deeper understanding of the health and cultural issues the community faces. They could help identify ways to implement a plan into action that the individuals within this population would respond to culturally and socially without reluctance. They could assist in finding resources for funding within and outside the community. The stakeholders were involved at various levels in the evaluation process, were advocates for change, and critics in identifying issues in the project. Engaging stakeholders throughout the research process improved patient care and the quality of care individuals received (Schmittdiel et al, 2015).

Stakeholders have a vested interest in the community and support and critique ideas for change. They influence the community socially, financially, and physically with efforts made to create housing, recreational facilities, clinics and hospitals. Often stakeholders are the driving force for change within a community. Stakeholders create a positive change, identify and implement future programs and identify facilities or social changes needed to improve the health disparities within the community. They help support and identify funding for future programs that impact the community. Helping integrate ways for a healthy lifestyle and providing education to the members of the community are significant ways stakeholders influence community health. With chronic disease on the rise in the American Indian population, stakeholders are the means to
change for the diverse population creating jobs, increasing social networks, and identifying reliable funding for creating healthy lifestyles, and exercise.

Medical stakeholders played an intricate part in data collection, implementation, providing health care, communicating ideas of new programs, and disseminating research findings. The medical stakeholders helped to guide questionnaires, ideas for research collaboration, and interventions used in the past. Schools, preschools and libraries helped provide meals at school, identified knowledge levels of the population, and provided educational materials that are accessible at the library. Implementing open communication amongst community members assisted in identifying community needs.

Opportunities are endless for stakeholders to provide cost effective, healthy alternatives to Native Americans to reduce the number of people being diagnosed with diabetes and help manage the disease for those who have diabetes. Providing a rural community, the benefits of good nutrition helps reduce the number of people affected by diabetes. Evaluating what Native Americans of various ages in this community know about healthy food choices guided education sessions to prevent this devastating disease. Research has shown that a proper diet has many benefits (ADA, 2018). In many instances individuals with diabetes have been able to better control their diabetes through various diet regimens (ADA, 2018).

Since Native Americans are the most susceptible ethnic group being diagnosed with diabetes, providing health-promotion strategies to reach underserved communities help reduce the number of incidences of diabetes and provide a higher quality of life through diet. Reducing the incidence of Type 2 diabetes in the Native American population in an economical way would have a tremendous impact on the community.
Problem Statement

Native Americans are at a greater risk of developing Type 2 diabetes than other ethnic groups. The educational level varies within the population with the majority of the population having received a high school diploma (City-Data.com, 2018). There is a lack of nutritional knowledge; government food provisions are high in fat and carbohydrates, and a traditional Indian diet is no longer followed (Park, Hongu, & Daily III, 2016). Implementation of programs to educate Native Americans on the importance of diet and nutrition are lacking (Simonds, Omidpanah, & Buchwald, 2017). Therefore, the PICOT question is “In Native American adolescents, does education of a traditional diet improve knowledge of nutrition and reduce the risk of Type 2 diabetes?”

Purpose Statement

Within the Native American population, one could determine there is an imbalance between nutrition and diabetes. In this community, there is a deficiency in the diets of Native Americans that needs to be addressed, particularly in knowing what would be considered a healthy diet to prevent Type 2 diabetes. The purpose of this project was to determine nutritional knowledge and reduce the risk for Type 2 diabetes in Native American population in Walthill, Nebraska through increased awareness and education.

Outcomes

The desired outcome for providing education was to aid in prevention and reduce the risk for Type 2 diabetes in the American Indian population. A diabetes risk assessment tool was initially used to assess the risk of diabetes. Measuring the outcome involved assessing height in inches and weight in pounds, measuring a change in body mass index (BMI) to reduce risk of Type 2 diabetes (ADA, 2018). Nutritional knowledge
was measured by providing a test that asked basic questions concerning nutrition. A dietician then offered an educational session that provided information about nutrition and healthy choices for an at risk population for diabetes. A posttest followed this educational session that asked the same questions. Comparing the differences in the answers indicated what nutritional knowledge was obtained.

The approximate length of the educational session was approximately 20 minutes. A diabetes risk assessment and a pretest was given to participants prior to the education session. Following the education session, the post test was given. Improvements were assessed to determine nutritional knowledge. The participant’s BMI was assessed prior to the education training and two months following. This project enabled the participants to continue their nutritional knowledge and monitoring of BMI changes with their own health care providers to identify ways to reduce the incidence of Type 2 diabetes.

**Review of the Literature**

A literature review was performed using CINAHL Complete, PubMed, and Cochrane database of systematic reviews (Appendix A). Population, Problem, and Intervention were the main categories used to retrieve articles from CINAHL Complete and PubMed. Criteria included Native Americans (Population), Adolescents (Population), Type 2 diabetes (Problem), and Traditional Native American Diet and American Diet (Interventions). COCHRANE Database of Systematic Reviews included Native American Indians and Type 2 diabetes. Articles included in the research were dated from 2014 to 2018, with one exception (2013). Key words were combined to narrow down the search. For Population and Problem, the two categories were combined using “AND”.
Interventions were combined using “OR”. This was further reduced by taking Native American Indians “AND” Adolescents “AND” Type 2 diabetes “AND” Traditional Native American Diet along with Native American Indians “AND” Adolescents “AND” Type 2 diabetes “AND” American Diet. These articles and the articles from the COCHRANE Database of Systematic Reviews narrowed the number of articles down to forty-one. Exclusion criteria were: did not address PICOT question, focus on specific intervention or symptom, “Indian” diet (India), and wrong patient population. Inclusion criteria included: highest levels of incidence, Native American and adolescents population, key focus on reducing Type 2 diabetes and improving nutrition, removed duplicates, and accepted full articles. Practical screens used were: dated from 2014-2018 [with one exception (2013)], research article, English language, and human research.

Twelve articles met all the criteria and were kept for the literature search.

The twelve articles selected for this Capstone project provided different aspects that pertain to the research itself (Appendix B). Understanding the population, their needs, and circumstances is necessary to make this project successful. Besides the genetic aspect of Type 2 diabetes affecting the Native Americans, social determinants compound the problem further.

**Socioeconomic Status**

A prevailing part of Native American life includes poor socioeconomic conditions. **Individuals who experience a lower social economic status face challenges in meeting goals of controlling weight** (Jiang et al., 2015). The Special Diabetes Program for Indians Diabetes Prevention Demonstration Project determined that neighborhood characteristics can impact outcomes for ethnic groups, meaning that communities lacking
in resources (lack of transportation) had higher incidences of Type 2 diabetes (Jiang, Chang, Beals, Bullock, Manson, & The Special Diabetes Program for Indians Diabetes Prevention Demonstration Project, 2018). Additionally, income and education level play an important role in determining healthy food choices which affect chronic diseases, such as Type 2 diabetes (Teufel-Shone et al., 2014).

Diet

It had been shown that a diet including more traditional foods, rather than processed foods, had a positive effect on a tribe of Natives from Mexico. These natives had a similar genetic relationship to Pima Indians in America, who have the highest incidence of diabetes among Native Americans (Chaudhan, Begay, & Schulz, 2013). Traditional food examples would include meat and poultry, eggs, whole grains, fish, beans and legumes, vegetables, fruit, nuts and seeds, dairy, and fats. Diet and exercise significantly affect physiological and biological markers related to diabetes (Dong, Collado, & Branscum, 2016). Healthy food can be difficult because of finances, cravings, flavor, and accessibility in these communities (Keith, Stastny, Brunt, & Agnew, 2018).

Behavior Modification

Developing strategies to inspire participants to achieve diet and an optimal BMI remains a behavior modification challenge (Fretts et al., 2014). However, when successful, behavior modification can improve outcomes for type 2 diabetes (Urquidez-Romero et al., 2014). Psychosocial issues and other disparities need to be addressed in order to incorporate a program that modifies behavioral changes (Rosas et al., 2016). Trust needs to attained in order for there to be buy-in for any type of education and change (Anderson, Adeney, Shinn, Safranek, Buckner-Brown, & Krause, 2015).
Education

Providing education to Native Americans was a pivotal part of this project. Education needs to cover the psychological stressors and socioeconomic stressors that affect Native Americans (Teufel-Shone et al., 2018). Technology can be used to test markers that could predict Type 2 diabetes and education plans can be put into place that help people who are at higher risk (Zhao et al., 2015).

Native American children have higher rates of obesity than the rest of the nation (Dennison, Sisson, Lora, Stephens, Copeland, & Caudillo, 2015). Changes that occurred in the Native American diet have been influenced by the introduction of European and Asian diets (Park, Hongu, & Daily III, 2016). Foods Consumed by ancient Native Americans have been adopted by other cultures, however the current Native American diet uses less nutrient-dense food (Park, Hongu, & Daily III, 2016). A systematic review on American Indians posed that physical activity and food choices were two factors that could be modified and make an impact on diabetes (Dong, Collado, & Branscum, 2016). Emphasizing healthy food choices that were originally consumed by Native Americans should be adopted to increase the health outcomes.

This Capstone project focused on nutritional education to encourage changes in diet to reduce the incidence of diabetes in Native Americans in the community of Walthill, Nebraska. Identifying awareness of socioeconomic status helped coordinate a program that enabled behavior modification in diet. Understanding issues that affect how people eat and make food choices also enabled a successful project. While education levels vary among people, the nutritional knowledge of many can be simple and
improper. By educating the Native American community, an improved outcome was attained by those prone to Type 2 diabetes.

**Theoretical Framework**

The IOWA Model of Evidence–Based Practice to Promote Quality Care provides the methodology and framework for this project (Appendix C). The IOWA Model highlights the importance of considering the entire healthcare system from the provider to the patient and the organization, using evidenced-based research to guide practice decisions. The IOWA model helps nurse practitioners to identify important and clinically significant practice questions to be addressed and develop solutions by incorporating evidence-based research into practice (Melnyk & Fineout-Overholt, 2015). This model is a step by step process involving a problem-solving method in which the identification of a problem or a knowledge-focused trigger creates the need for change. If the problem is a priority for the organization, a team is formed. The team is composed of key stakeholders such as physicians, nurse practitioners, the target population, and other significant community members. The next step is to synthesize and critique research for use in practice. A pilot of practice change occurs if there is significant evidence. Evaluation and dissemination of results/findings would follow (Melnyk & Fineout-Overholt, 2015).

The trigger for this project began with the internal and external data of poverty, lack access to proper nutrition, food insecurity, low educational rate, and lack of access to medical care. A clinical question was effectively framed to create the PICO question “In Native American adolescents, does education of a traditional diet improve knowledge of nutrition and reduce the risk of Type 2 diabetes?” This question allowed for an enhanced
literature review by using pertinent key words within the PICO Question. Key words used within the PICO question were: Population-Native Americans, Adolescents Intervention: Traditional Native American diet, Comparison: American diet, and Outcome: Improve nutrition and reduce Type 2 diabetes.

The next step was determining if the problem was a priority and a problem for the organization and in this case the community. Deemed a priority, the next step was to organize a team of stakeholders who had a vested interest in the community. Stakeholders consisted of physicians, nurse practitioners, dietician(s), tribal leaders, Indian health services, local churches, community organizations and most importantly the Native American Indians living within the rural community who suffer from diabetes and experience significant health disparities. Stakeholders are vital resources for financial support and social services.

After a thorough literature search of CINAHL, PUBMED, and Cochrane systematic reviews, 12 articles were identified with significant findings. With research findings suggesting a healthy diet plays a vital role in controlling and preventing Type 2 diabetes (Dong, Collado, & Branscum, 2016), the community would have to agree that the trigger indicates a need for change. Other significant findings indicated the need for further nutritional education on healthy food choices (Teufel-Shone et al., 2014). The organization (community) agreed that research and evidence would impact change for the population they serve. Education was provided to the Native American Indians by a dietitian to address healthier food choices within the traditional Native American diet. The next step involved implementing the change into practice while monitoring, modifying, analyzing, and evaluating the process and outcome. American Indians have a
complex social system that is difficult to enter for those who are considered an “outsider”. Gaining the trust through people familiar with the community such as tribal council members and clinical staff was critical in order for this project to be successful.

Results then were disseminated to the stakeholders with the plan of maintaining sustainable strategies to be adopted by others in practice and future health care settings of the individuals involved. Utilizing the Iowa model allowed for evidence-based research to be used as a problem-solving approach to improve healthcare outcomes. The new revised version of the Iowa model reassures the consideration of patient and family preferences as important practice inference (Iowa Model Collaborative, 2017). In the Native American population, cultural choices and family are of vital importance to their overall compliance and adherence to health care recommendations. The Iowa model was a useful tool as it allows future nurse practitioners to openly apply evidenced-based research in the practice setting.

Organizational Assessment

The community was prepared and willing for change. Projects have been initiated recently that have a positive impact on the community. In 2017, the town received an Owner Occupied Rehabilitation Grant which provided funding to rehabilitate nine homes in town (Village of Walthill, NE, 2018). The U.S. Department of Agriculture has awarded over $350,000 to construct a building for four local small businesses of which three must be Native American owners (Village of Walthill, NE, 2018). Also, there is Project Washkon, an after-school program consisting of two classes: one that requires one hour of tutoring, and the second which offers enrichment classes on various subjects. There are field trips available for participants who meet the requirements set forth by the
program. Project Washkon also provides snacks to participating students (Walthill web, n.d.).

Despite the hopeful new changes, there are cultural barriers that need to be overcome for research and policy in this Native Americans community. Understanding the belief system and the history of the Native Americans was important in being able to provide support and aide to them. Addressing cultural barriers were vital to the project and would impact the outcome of the project if not recognized. The possibility existed that some individuals within the community would not want to participate which would impact the ongoing sustainable strategy of the project.

Education needed to be addressed as there were variations in the education levels of Native Americans. The individuals involved in the study needed to be aware of the terminology used and have a basic understanding of how these terms are used.

**Methodology**

Implementing a change in the ideas and misconceptions Native Americans they have about nutrition was the basis of this project. The purpose of this project was to determine if there is an imbalance between nutrition and diabetes by assessing nutritional knowledge of Native American adolescents. The project was evidence-based, determining the need for nutritional education to help adolescents make healthy choices to reduce the occurrence of type 2 diabetes.

**Setting**

The midwestern public school for the project was located in the rural Omaha American Indian reservation in a poverty-stricken area of Thurston county, Nebraska. This rural northeast Nebraska community and Omaha Indian reservation is the home to
many of the Native American Indian population (Nebraska Department of Education, n.d.) The population is approximately 739 people within the town, in which 207 households consist of children under the age of 18 (City-Data.com, 2018). The local school has approximately 389 children in pre-kindergarten to high school. There are currently 180 students in ninth through twelfth grade. The secondary staff teaching the high school consists of eighteen teachers, a superintendent, a principal, and a nurse (Walthill web, n.d.).

**Sampling**

A school provided a structured learning environment where providing nutritional knowledge was applicable to the project and the specific Native American Indian population. The population of interest was the native American Indians in the rural area of Thurston county, Nebraska. Inclusion criteria for the evidenced-based project include Native American Indians, high school students, male and female, and students participating in a physical education/health class. Established exclusion criteria included individuals in special education classes and those who were absent or expelled. The project site was a midwestern public high school located on the Indian reservation in Thurston county, Nebraska. Evidence-based studies suggest educating the young on nutritional knowledge and awareness with diet within a cultural context will impact the overall health and future of the American Indian population (Dong, Collado, & Branscum, 2016). The nutritional education provided was part of a health lesson in the already established nutritional curriculum (Appendix D).
Implementation Procedures

After receiving approval from the Internal Review Board (IRB) from Nebraska Methodist College of Nursing and written permission from the superintendent of the high school under study, the project began. The DNP candidate was the project coordinator.

Confidentiality was maintained throughout the project for the individuals involved. There were no recording devices used by the project coordinator during the learning session. The questions presented in the pre-test and post-test were not intrusive in nature and did not ask for personal information. There were no personal identifiers used during the collection of data (Hicks, 2014). Each participant was assigned a number, one up to seven, determined by the number of participants in the class. Numbers matched the participant's pre and post intervention responses.

The participants were recruited by the superintendent, who selected participants who attended a health science class. The individuals involved in the project include six students, randomly designated by the superintendent. The project coordinator assigned a number to each participant for the diabetes risk assessment and height and weight measurements. These numbers were correlated with the participants’ pre-test and post-test (Appendix E).

The intervention was held in a classroom. The project coordinator was present during the training session; however, the registered dietician provided the education/intervention. The initial height and weight measurements used were recorded by the high school nurse at the beginning of the project. The height and weight measurements were sealed in an envelope and given to the project coordinator who filed them away in a separate folder labeled “heights and weights” and place them in a locked
briefcase/box. The BMI measurement and the diabetes risk assessment (Appendix F) determined if these individuals were at an increased risk for Type 2 diabetes. To determine if there is a difference in scores on tests between males and females, identification of male or female was marked on the pre and post diabetes risk assessment by the participant. No other demographic information was obtained.

A dietician was retained from a local hospital. Questions that were used in the project (pre and post-tests) were provided for the dietician to establish the educational content. Coordinating the lesson with the school involved following the preexisting schedule of the class that was selected by the superintendent. The class periods for this school usually last fifty minutes. Due to time constraints and curriculum conflicts, this lesson was only offered one time. The project included a diabetes risk assessment (Appendix F) and a ten-minute pre-test (Appendix E) that included multiple choice and true/false questions to individuals in a health class at the community’s high school. The classroom teacher distributed and collected the pre-test given to the participants. Upon completion of the pre-test the participants returned the diabetes risk assessment and questionnaire to the teacher. After all the diabetes risk assessments and pre-tests were completed and turned in, the teacher handed the questionnaires over to the project coordinator who filed them away in a separate folder labeled “pre-test” and placed them in a locked briefcase/box. After the test, a twenty-minute lecture was provided by a dietician on nutrition. The lecture provided the information needed to answer the questions on the pretest and posttest. Following the educational session, the exact test previously taken was distributed as a post-test to determine there were improvements over the pre-test. The teacher distributed and collected all completed posttest, who then
gave them to the project coordinator. Two months after the educational session, another height and weight measurement was assessed on each participant by the school nurse.

**Intervention**

In order to determine if diabetes will be prevented or delayed by following a more traditional diet, an assessment of nutritional knowledge was established. The intervention was the education session provided by a registered dietician to establish nutritional knowledge. The nutritional information included: discussion of foods contained in a healthy diet, recommended serving sizes, nutritional labels, and cup equivalents/serving size. Nutritional knowledge can lead to improved dietary habits (Alaunyte, Perry, & Aubrey, 2015). Therefore, providing education to the at-risk population during adolescence was a strategy to encourage healthy eating.

The IOWA Model of Evidence–Based Practice to Promote Quality Care was applied in this setting as a way to identify the problem of insufficient nutritional knowledge for the target population. The use of a test of nutrition knowledge was a way to determine the amount of information needed on nutrition for the students. The high prevalence of Type 2 diabetes in the Native American population is a problem that needs interventions that can be applied to adolescents so behaviors can be modified. The literature review was able to identify research that was related to the project. Involving stakeholders in the community was a way to offer families the necessary tools to provide proper nutrition. This Capstone project was one step in solving an issue that touches a community struggling with this chronic disease.
Measurement Instrument(s)

A questionnaire was developed by the project coordinator to evaluate whether a.) nutrition education significantly improves knowledge of basic traditional native American foods and b.) significantly affects BMI. The questionnaire was developed by the DNP candidate that was evaluated by the candidate’s mentor, pertinent faculty members, and the NMC statistician. The Nutrition Assessment Tool (Appendix E), provided questions that were directed towards the group participating in the education session. The questions were selected to catch the participants’ attention and inspire them to want to know the answers. Information from the American Diabetes Association (ADA), American Heart Association (AHA) the Centers for Disease Control and Prevention (CDC), and HelpTeaching.com (2018) were used to compile the questionnaire. A diabetes risk assessment tool, provided by the American Diabetes Association, was used to identify risk for Type 2 diabetes.

Data Collection Procedures

Pre-Intervention

The project required a diabetes risk assessment and a nutritional knowledge test, consisting of multiple-choice and true/false questions. Additionally, height and weight measurements of the participants were taken by the school nurse. This data was collected to calculate the BMI of the participants.

Intervention

The dietician provided an education session of approximately twenty minutes (Appendix D). The curriculum for this educational session provided answers to the questions provided on the pre and post-test.

Post-Intervention
After the educational session, a test was given to assess nutritional knowledge. Post-tests were compared to the pre-tests for statistical significance of the education session. Two months after the educational session (intervention), another measurement of heights and weights were taken of the participants. The heights and weights of the individuals taken prior to the intervention were used to measure BMI and compared to the height and weight measurements taken two months later. A secondary diabetes risk assessment was taken at two months.

**Ethical Considerations/Protection of Human Subjects**

The Nebraska Methodist College Internal Review Board (IRB) approval was obtained prior to initiating the DNP project. The official IRB Determination Form was submitted as soon as the proposal was approved. In order to keep information related to the individuals confidential, a numbering system was implemented. Assigning a number to each student was recorded by the project coordinator. The project coordinator only identified the participants by the number assigned to them. The pre-test and post-test were used for data analysis. In order to keep these records accurate and intact, the tests were collected by the class teacher and placed in a folder identifying them as either pre-test or post-test and placed in a lockable briefcase/box which only the project coordinator had access.

Conflicts of interest can influence the outcomes of experiments. In this situation a potential conflict of interest would be that the project coordinator was born within the county of Thurston and resided there for 18 years after birth. However, having left the county over thirty years ago, there were not very many faculty or staff there that could recognize or remember the project coordinator. The project coordinator had no prior
contact with any of the students and was unable to identify the students other than being in the classroom during the one-time presentation. There was no monetary incentive for this research project to either the participants or the project coordinator. No physical examinations were performed by the project coordinator on any of the participants. After careful review there were no financial or non-financial interests of the researcher or college to create potential bias in how the project was developed or conducted. There were no known risks or unintended consequences identified with this project.

Formal training on ethical conduct and a certification process was completed. A copy of the Collaborative Institutional Training Initiative (CITI) Program certification form was submitted for both the project coordinator and the mentor.

The determined level of review by the IRB was an exempt review as the project involves less than minimal risk where the probability or magnitude of harm is not greater than those encountered in everyday life to vulnerable participants. The criteria identified includes: research is conducted in an established educational setting (public school) that involves normal educational practices (pre and post-test) on nutrition in a health class (Nebraska Methodist College, 2018). The only other intervention was height and weights of participants by the school nurse prior to the pretest and two months following post-test. There were no behavioral interventions or biospecimens obtained, in which exemption was applied.

Informed consent for this project was waived under Subpart D of the federal regulations, “Additional Protections for Children Involved as Subjects in Research” (Hicks, 2014). There was no funding from governmental authorities for this project. The research done used a test (questionnaire). The questionnaire was a defined set of printed
written questions with a choice of answers devised for the purpose of providing educational knowledge. Heights and weights of participants prior to the pre-test and two months following post-test were taken. A diabetes risk assessment was completed by the participants prior to the pretest. This project conducted nutritional education which is part of the normal curriculum for the health class.

Data Analysis

The compilation of data was acquired from the pre and post-tests taken by the participants during the project and through the heights and weights measured prior to the project and two months after the project. Each test was scored and answers were graded as either correct or incorrect. Comparing the scores after an education course on nutrition was used to determine if there were significant differences after the intervention. Heights and weights were collected to determine BMI. Comparing the BMIs that were calculated pre-intervention and two months post-intervention were used to indicate the intervention had any pervading impact on the participants. Compiled data was statistically analyzed using IBM’s Statistical Package for the Social Sciences (SPSS) statistical analysis software. Results were compared using a paired t-test to determine statistical significance. Collaboration with Nebraska Methodist College (NMC) statistician for the Capstone project was conducted to verify the proper statistical analysis was used to interpret the results and determine there were statistically significant results from the intervention.

Results

Data analysis was completed using IBM SPSS Statistics Version 26 (IBM Corp., 2019). A descriptive analysis comparing the participant’s pre and post testing of the
nutritional tool was carried out using SPSS for analyzing the data. There were six participants (n = 6) consisting of two males and four females. The intervention consisted of a pretest (Appendix E) followed by educational session presented by dietician. A posttest (Appendix E), which was the exact same test as the pretest, was given. In analysis of the pretest and posttest results, a paired t test was utilized to compare results between the pretest and posttest (Figure 1). The pretest average score was (m = 51.3333) percent. The posttest average score was (m = 62.6667) percent. The paired t test revealed that there was a significant difference between the two tests (p = 0.023). A bar graph (Figure 2) illustrates the scores obtained on the pretest and posttest indicating significant difference in scores following educational session. A Histogram (Figure 3) shows the increase significance of the average test scores of the participants from pretest to posttest following an education session. The pretest and posttest findings suggest that the implementation of an educational session provided by a dietician may have a positive influence on nutritional knowledge.

The diabetes risk assessment provided remarkable information regarding the participants. Of the six participants, five of them indicated they had at least one relative (mother, father, sister or brother) with diabetes. One participant indicated they have been diagnosed with high blood pressure (Table 2). A descriptive analysis of comparing BMI of the participants (n = 6) with measurements of height and weight provided prior to the pretest was not significantly different from that of the participants (n = 6) measured two months following the posttest (figure 4). Repeated variables of height and weight measured at two time points had no significance (Table 3).
BMI scores of a higher body weight increases risk for Type 2 diabetes. Therefore, providing education and awareness of risk factors for Type 2 diabetes to adolescents in an American Indian population may prevent and reduce their risk of type 2 diabetes.

**Discussion**

Research suggests that implementing a well-designed program is effective in changing dietary behavior and can provide young people with the knowledge and skills to make healthy food choices (Dong, Collado, & Branscum, 2016). The Omaha American Indian reservation is a rural poverty-stricken area of Thurston county, Nebraska. It is the home to many of the Native American Indian population. In the Native American community, the food environment with regard to food availability and food related behaviors has transitioned from the traditional diet of seeds, nuts, and berries to a diet of processed meats, high sugar and carbohydrates. Hunting and gardens growing foods for families has passed and now the local retail of a small grocery store readily provides the means of an American diet of processed foods, processed meats, candy and chips and a small section of fruits and vegetables. This change in dietary habits alongside the barriers of access, household income, lack of nutritional knowledge, convenience, poor food choices, lack of fitness centers and behavioral choices potentially play a significant part in the increase of Type 2 diabetes in this Native American population.

The capstone project of educating adolescents in a high school setting created awareness and provided nutritional information that potentially can impact a lifestyle change to decrease the risk for type 2 diabetes. The significance in the pre and post test results after a nutritional education session provides insights to developing programs to educate this risk populations at a younger age. Identifying simple facts in nutritional
knowledge can aid in the prevention of type 2 diabetes. The educational session, provided by a dietician from a local community hospital, initiates the opportunity for individuals to connect and communicate with another health care provider in a non-invasive way. Outreach programs would then provide services to this vulnerable population who might not otherwise have access to additional resources living in the rural community.

The increase in incidence of obesity and diabetes in the younger populations is continually rising. According to the ADA, the prevalence of type 2 diabetes in those under 20 years of age will quadruple in 40 years (Diabetes Care, 2019). With these devastating facts, prevention, education and awareness of risk factors are keys to the success in the outcome of health disparities.

The Type 2 diabetes risk assessment tools utilized in this project provided awareness to the participants of health conditions that increase the risk for Type 2 diabetes. Results of the risk assessment tool significantly identified that five of the six participants having a known factor of a relative having diabetes. Heights and weights were assessed as research indicates that the risk of diabetes development in American Indians occurred in those with higher levels of BMI (Zhao et al., 2015). Change in the BMI over a two month period was nonsignificant. Elevated BMI calculated from heights and weight identified risk, despite the small number in the group. An elevated BMI is an increased risk factor for Type 2 diabetes (Diabetes Care, 2019). These risk factors indicate the need for a nutritional educational program to be implemented and consideration of implementing changes to existing health education curriculums to reduce the risk of type 2 diabetes to the Native American’s in this rural community.
Limitations

As the results portrayed important findings, there are limitations to the study. The sample size was limited due to the small number of the participants. The population of this community is relatively small; however, to suggest the participants as being representative of the population could be misguided. Improving knowledge of dietary education does not equate to reduction in habits that can reduce the risks for type 2 diabetes. Socioeconomic factors play an important role in what food items are purchased for the household. Also, since the study focused on adolescents, it is uncertain what influence they have on what the family purchases for food. Do the children actively participate in grocery shopping? Does their knowledge of nutrition have a significant impact on what family members will eat? These are a couple of questions that limit the study. Another limitation is the time given to provide this educational program. Instituting a long-term nutritional education program could possibly have a greater impact on results. Obtaining a student’s BMI can be a starting point to make students aware of the importance weight can have on chronic diseases. However, this study did not give enough time to see any changes. There were no exercise interventions provided in the study.

Plan for Sustainability

This Capstone project’s purpose was to provide a viable program (intervention) that could help an underserved population (Native Americans) influence the outcomes of Type 2 diabetes. Initiating an educational program that will impact the health of a younger population can instill a sense of ownership in the prevention of Type 2 diabetes. Developing this ownership will allow other stakeholders such as educators, health care
providers, parents, and community officials the incentive to sustain the program. Sustainability requires certain criteria. Cost effectiveness is an important aspect of sustainability that needs to be addressed. This project can provide a cost-effective program that will show results in a short amount of time and can save an immeasurable amount in health costs and lives. Grants from various organizations could be acquired to provide funding for educational tools required to maintain the program. Having community members and health care professionals involved can bring a sense of ownership that can sustain the program. Involving local health care professionals can promote trust among the members of the community. This type of trust can cause increased preventative medical reviews among the people in the area who would otherwise not schedule appointments or avoid preventative care.

**Implications for Practice**

Serving the Native American community by providing a program that can reduce the harmful effects that Type 2 diabetes has on this population is crucial in creating awareness on the role of diet in Type 2 diabetes prevention. Promoting a knowledge of nutrition to promote healthy dietary habits is a great start for adolescents. Instituting healthy behaviors can impact the community by modifying dietary habits, promoting exercise, bringing a positive outlook for a target population susceptible to Type 2 diabetes, and saving thousands of dollars in medical costs related to Type 2 diabetes. By showing adolescents the importance of nutritional knowledge, some of the misconceptions about Type 2 diabetes can be resolved. Investing time and effort into their nutritional education can help answer concerns about Type 2 diabetes, reasons for unhealthy lifestyle decisions, ways to maintain healthy food choices, and other healthy
decisions that can contribute to a better quality of life. These types of changes in behavior can produce a more invested group of individuals that will be able to ask more informed questions to health care providers. This group can also influence the food choices that community grocery stores make when adjusting inventories.

**Conclusion**

This study has implications for the potential positive impact of a diabetes educational program for the Native American adolescents. The diabetes educational program efficacy is a semblance of a method to reduce Type 2 diabetes for a population of at-risk individuals. The information can help to guide these participants to be more cognizant of factors that can attribute to Type 2 diabetes. Providing education to adolescents can potentially modify behaviors, especially to the Native American population. The Native American population faces a disproportionate rate of Type 2 diabetes compared to other populations. By reducing factors that attribute to this disease, the numbers of Type 2 diabetes cases can be impacted. Working with a younger population can empower students to take control of their lives through education. If adolescents can obtain information that positively influences lifestyle changes, the possibilities of benefitting their health outcomes can be immeasurable.
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T., & Howard, B. V. (2015, February). Novel Metabolic Markers for the Risk of
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doi:10.2337/dc13-2484
Appendix A

“In Native American adolescents, does education of a traditional diet improve knowledge of nutrition and reduce the risk of Type 2 diabetes?”

Search conducted in CINAHL complete with full text database (C) and PubMed database (P) retrieving articles from 2014-2018

Search completed in COCHRANE Database of Systematic Reviews from 2014-2018

**POPULATION/PROBLEM**

Native American Indians (2014-2018)
- 2121 (C)
- 2218 (P)

Adolescents
- 177,448 (C)
- 347,938 (P)

**PROBLEM**

Type 2 Diabetes (2014-2018)
- 21,754 (C)
- 55,972 (P)

**INTERVENTION**

Traditional Native American Diet
- 4 (C)
- 23 (P)

American Diet
- 1568 (C)
- 2758 (P)

All Combined Using “AND”
- 85 (C)
- 38 (P)

All Combined Using “OR”
- 1569 (C)
- 2758 (P)

**INCLUSION CRITERIA**

- Highest levels of evidence
- Native American population
- Key focus on reducing Type 2 diabetes and improving nutrition
- Remove duplicates
- Full article

**EXCLUSION CRITERIA**

- Did not address PICOT question
- Focus on specific intervention or symptom
- “Indian” diet (India)
- Wrong patient population

**TOTAL ARTICLE**

22

**FINAL KEEPERS**

12
Appendix B

Review of Literature Matrix

PICO

“In Native American adolescents, does education of a traditional diet improve knowledge of nutrition and reduce the risk of Type 2 diabetes?”
### PICO

"In Native American adolescents, does education of a traditional diet improve knowledge of nutrition and reduce the risk of Type 2 diabetes?"

<table>
<thead>
<tr>
<th>Citation/ Level of Evidence</th>
<th>Participants/Setting/ Sample size</th>
<th>Purpose/Background</th>
<th>Methods/Design &amp; Limitations</th>
<th>Findings/Summary Strengths/Weaknesses</th>
<th>Applicability to Own Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson, L. M., Adeney, K. L., Shinn, C., Safranek, S., Buckner-Brown, J., &amp; Krause, L. K. (2015). Community coalition-driven interventions to reduce health disparities among racial and ethnic minority populations (Review) [Electronic version]. Cochrane Library, 1-188. doi: 10.1002/14651858.CD009905.pub2</td>
<td>Fifty-eight community coalition-driven intervention studies were included. Racial and ethnic minorities—children and adults. Mostly urban settings in high-income countries.</td>
<td>Systematic review of coalition-led interventions to provide informed decision making about the use of community coalition models. There are racial and ethnic disparities in health status. Coalitions attempt to bridge this gap by implementing community level interventions.</td>
<td>Cluster-randomized controlled trials, randomized controlled trials, quasi-experimental designs (e.g. propensity score matching, regression discontinuity designs), controlled before-after studies, interrupted time series studies (with at least three data points before and three after the intervention),</td>
<td>Broad-scale community level interventions resulted in little or no differences in measures of health behavior or health status. Broad health and social care systems led to small changes in health behavior or health status (large samples). Lay community health outreach worker community interventions led to beneficial changes in health behavior measures of moderate</td>
<td>The target population (Native Americans) would benefit from community coalitions to connect health care professionals to this project. Gaining trust and buy-in from the community will require help from stakeholders. Offering professional education can</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Data from households (N=71) in Maycoba, Mexico 7 store owners &amp; 10 key informants. A 15-year study.</th>
<th>Examine the food environment in Maycoba, Mexico to determine changes affecting obesity and diabetes.</th>
<th>Interviews and focus groups had certain defined criteria in order to participate. Lack of information on children.</th>
<th>Food environment looks to play a role in the effects of type 2 diabetes. There have been noticeable changes in retail food environment over the 15-year study.</th>
</tr>
</thead>
</table>

This study noted the protective effects of the traditional lifestyle of the indigenous population.
<table>
<thead>
<tr>
<th>Level V. Qualitative study with descriptive statistics</th>
<th>Associated error due to interviewee inaccuracies.</th>
<th>Strength was time frame of study. Weaknesses were lack of reliable/valid data, lack of pointed questions to look at food insecurity, and not looking at children.</th>
<th>people even though they had a genetic predisposition towards type 2 diabetes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dong, Y., Collado, M., &amp; Branscum, P. (2016, January). Native American Diabetes Prevention Intervention Programs: A Systematic Review [Electronic version]. California Journal of Health Promotion, 10(3), 26-36. Level I. Systematic review</td>
<td>Nine intervention and prevention studies that included at least one physiological or biological indicator of diabetes. All articles used physical activity and/or dietary change as modifiable factors. Studies ran anywhere from 6 months to 3 years.</td>
<td>The systematic review wanted to determine research design, recruitment, significant research findings, and use of theory.</td>
<td>Defined inclusion and exclusion criteria falling into a randomized control trial, quasi-experiment or pre and posttest. 103 articles narrowed down to 9 articles. Systematic review used the following physiological and biological markers: blood pressure, fasting serum glucose, BMI, weight, and hemoglobin A1c. Almost all of the studies showed significant effects of diet and exercise on physiological and biological markers. Different learning theories were used to conduct the researches. Strength includes statistically significant results for studies that used theory. Weaknesses include small participation rate for RCT studies, high attrition rates, and undetermined attendance rates.</td>
</tr>
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</table>

**Level II. Randomized control trial**

| Strong Heart Family Study participants (N=1639) | Examine the association of Life’s Simple 7 goals with incidence of diabetes among AI. Using cardiovascular modifiable risk factor goals: physically active lifestyle; healthy diet; healthy BMI; avoid smoking; and lower blood pressure; fasting glucose, and total cholesterol. | Inclusion/exclusion criteria well defined and category metrics determined. Participants followed the guidelines for the Life’s Simple 7 and were graded on their results. | Participants who achieved more goals had lower risk of type 2 diabetes. Dietary goal was least likely to be achieved Strengths include long-term study, large sample size, proven program (for cardiovascular disease), recordable data that was valid and measurable. Weaknesses include lack of valid data in some areas-answers from the participants. | Dietary modifications can be the hardest to achieve. Chronic conditions affect multiple diseases. Reducing multiple risk factors can benefit more than just one disease. If diet can be adjusted, possibly other risk factors can be modified and improve outcomes for type 2 diabetes and other chronic diseases. |
### Preventing Type 2 Diabetes in Native Americans

**Jiang, L., Chang, J., Beals, J., Bullock, A., Manson, S. M., & the Special Diabetes Program for Indians Diabetes Prevention Demonstration Project (2018, March 10).** Neighborhood characteristics and lifestyle intervention outcomes: Results from the Special Diabetes Program for Indians [Electronic version]. *Preventive Medicine, 111*, 216-224. doi: 10.1016/j.ypmed.2018.03.009

#### Level II: Randomized control trial

<table>
<thead>
<tr>
<th>Number of Participants</th>
<th>Study Description</th>
<th>Inclusion Criteria</th>
<th>Neighborhood Characteristics</th>
<th>Research Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>3394 participants from 80 different tribes in 18 states.</td>
<td>Study the impact of neighborhood characteristics on diabetes incidence and behavioral outcome on American Indian and Alaska Native (AI/AN) communities.</td>
<td>Inclusion criteria: American Indian or Alaska Native, at least 18 years of age, and prediabetic. Gender, age, employment status, annual household income, baseline BMI, RAPA, and healthy diet regression models.</td>
<td>Neighborhood characteristics impacted the effectiveness of lifestyle intervention in a diverse set of AI/AN communities, independent of socioeconomic characteristics. Lower household income = higher incidence of diabetes. AI/AN population less BMI reduction and less physical activity. Greater neighborhood concentrations of racial minorities may impact the management of the disease. Not having a private vehicle reduced their chances of improving food choices and reducing weight.</td>
<td>My research will take place in a poverty-stricken area with a minority group that has higher incidence of type 2 diabetes. Knowing how poverty affects the way people respond to treatments can help determine ways to treat participants in this community.</td>
</tr>
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</table>

Strengths include evidence-based research and large sample size. Weaknesses include relied on information from participants (confidentiality conflict).
<table>
<thead>
<tr>
<th>Authors</th>
<th>Methodology</th>
<th>Main Findings</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jiang, L., Huang, H., Johnson, A., Dill, E. J., Beals, J., Manson, S. M., &amp; Roubideaux, Y. (2015, November). Socioeconomic Disparities in Weight and Behavioral Outcomes Among American Indian and Alaska Native Participants of a Translational Lifestyle Intervention Project [Electronic version]. <em>Diabetes Care</em>, 38(11), 2090-2099. doi:10.2337/dc15-0394</td>
<td>Level III. Controlled cohort study 2553 participants from 36 AI/AN grantees. 16 session Lifestyle Balance Curriculum. Study socioeconomic disparities in weight and behavioral outcomes for AI/AN in a diabetes prevention project. Criteria for inclusion and exclusion defined. BMI measured. RAPA questionnaire. Statistical analysis done. Participants with lower SES have more challenges meeting intervention goals. Less professionally educated staff members also have an effect on participants’ success. Strengths include large sample size. Weaknesses include relying on participants information, missing data.</td>
<td>This study helps to understand the importance SES has on behavior modifications. Using the right personnel to educate the individuals is important in improving outcomes.</td>
<td></td>
</tr>
<tr>
<td>Keith, J. F., Stastny, S., Brunt, A., &amp; Agnew, W. (2018, June). Barriers and Strategies for Healthy Food Choices among American Indian Tribal College Students: A Qualitative Analysis [Electronic version]. <em>Journal of the Academy of Nutrition and Dietetics</em>, 18(6), 1017-1026. doi: 10.1016/j.jand.2017.08.003</td>
<td>Level V. Qualitative analysis Data collected from AI/AN college students (N=20) in a tribal college taking a life skills course. Qualitative analysis on dietary patterns of college students. No studies on AI/AN dietary pattern transitioning into adulthood. Nonexperimental cohort design for qualitative descriptive analysis. Interview questions on dietary intake, influencing factors of food choices, self-efficacy for healthy food choices, Food choices based on taste and cravings are a significant factor in food choices. Access to healthy foods, time to prepare meals, finances, and transportation to grocery store were all challenges. Strengths include close monitoring of participants, questions designed by the authors.</td>
<td>Having an uncertainty about healthy food choices is part of what the project is about. Improving their nutritional knowledge can help them to make</td>
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<tr>
<td><strong>Teufel-Shone, N. I., Jiang, L., Beals, J., Henderson, W. G., Zhang, L., Acton, K. J., Roubideaux, Y., &amp; Manson, S. M. (2014, April). Demographic</strong></td>
<td><strong>SDPI-DP AI/AN participants (N=3135)</strong> 80 tribes in 18 states 27-item food frequency questionnaire. AI/AN who were retired, living in urban areas and had higher income and Need to be aware that young adults and</td>
<td><strong>Identify food choices of AI/AN who are at risk of type 2 diabetes and develop a</strong></td>
<td></td>
</tr>
<tr>
<td>Study Title</td>
<td>Setting</td>
<td>Inclusion Criteria</td>
<td>Methodology</td>
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<tr>
<td>Characteristics and food choices of participants in the Special Diabetes Program for American Indians Diabetes Prevention Demonstration Project [Electronic version]. <em>Ethnicity &amp; Health</em>, 20(4), 327-340. doi:10.1080/13557858.2014.921890</td>
<td>Rural AI/AN setting with type 2 diabetes (N=2484). Used FFQ and Kessler-6 Distress Scale.</td>
<td>Study how psychological distress can affect food choices for AI/AN with type 2 diabetes.</td>
<td>Inclusion criteria included having type 2 diabetes.</td>
</tr>
<tr>
<td>Teufel-Shone, N. I., Jiang, L., Rockell, J., Chang, J., Beals, J., Bullock, A., &amp; Manson, S. M. (2018, April 23). Food choices and distress in reservation-based American Indians and Alaska Natives with type 2 diabetes [Electronic version]. <em>Public Health Nutrition</em>, 1-9. doi:10.1017/S1368980018000897</td>
<td>Rural AI/AN setting with type 2 diabetes (N=2484). Used FFQ and Kessler-6 Distress Scale.</td>
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<tr>
<td>Study</td>
<td>Design &amp; Methods</td>
<td>Prevalence &amp; Comparison</td>
<td>Findings</td>
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<tr>
<td>Urquidez-Romero, R., Esparza-Romero, J., Chaudhari, L. S., Begay, R. C., Giraldo, M., Ravussin, E., Knowler, W. C., Hanson, R. L., Bennett, P. H., Schulz, L. O., &amp; Valencia, M. E. (2014, May). Study Design of the Maycoba Project: Obesity and Diabetes in Mexican Pimas [Electronic version]. <em>American Journal of Health Behavior, 38</em>(3), 370-378. doi:10.5993/AJHB.38.3.6</td>
<td>Level II. Randomized control trial</td>
<td>Compared Mexican Pima to “Blancos” in the community (N=604) 354= Pimas, 250= Blancos.</td>
<td>Cross-sectional epidemiological study to identify the effects of traditional and western environments on the prevalence of type 2 diabetes and obesity in Mexican Pimas and Blancos from Maycoba, Mexico.</td>
</tr>
<tr>
<td>Zhao, J., Zhu, Y., Hyun, N., Zeng, D., Uppal, K., Tran, V. T., Jones, D., He, J., Lee, E. T., &amp; Howard, B. V. (2015, February). Novel Metabolic Markers for the Risk of Diabetes Development in American Indians [Electronic version]. <em>Diabetes Care, 38</em>(2), 220-227. doi:10.2337/dc14-2033</td>
<td>Level III. Controlled Cohort Study</td>
<td>Normoglycemic AI (N=2117) who developed diabetes (N=133) and a control group of (N=298) 5.5-year study-Strong Heart Family Study AI from Arizona, North and South</td>
<td>Develop novel metabolic markers for diabetes development in AI Assessed diabetes risk factors.</td>
</tr>
<tr>
<td>Dakota, and Oklahoma.</td>
<td>A developed metabolic score significantly increased diabetes risk prediction. Strengths include using metabolic markers to predict type 2 diabetes, applied to AI population. Weaknesses include small sample size, too many compounds that were not in the metabolomics database, unknown if applies to other ethnic groups.</td>
<td>set forth to improve their outcome.</td>
<td></td>
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</table>
Appendix C

Iowa Model of Evidence-Based Practice

1. Risk Management Data
2. Process improvement Data
3. Internal/External Benchmarking Data
4. Financial Data
5. Identification of Clinical Problem

Is this Topic a Priority For the Organization?

Form a Team

Assemble Relevant Research & Related Literature

Critique & Synthesize Research for Use in Practice

Pilot the Change in Practice
1. Select Outcomes to be Achieved
2. Collect Baseline Data
3. Design Evidence-Based Practice (EBP) Guideline(s)
4. Implement EBP on Pilot Units
5. Evaluate Process & Outcomes
6. Modify the Practice Guidelines

Is There a Sufficient Research Base?

Yes

No

Base Practice on Other Types of Evidence:
1. Case Reports
2. Expert Opinion
3. Scientific Principles
4. Theory

Conduct Research

Is Change Appropriate for Adoption in Practice?

Institute the Change in Practice

Monitor and Analyze Structure, Process, and Outcome Data
- Environment
- Staff
- Cost
- Patient and Family

Continue to Evaluate Quality of Care and New Knowledge

Disseminate Results

Worldviews on Evidence-Based Nursing, 2017; 14(3), 175–182.
Appendix D

Teaching Plan

Objectives:

1. Teaching: Discuss the impact they might have on control of preventing Type 2 diabetes. Dispel myths that surround the reasons for contracting diabetes: “I did something bad”, or they ate too much sugar. Discuss what life style changes are most difficult to incorporate into their lives.

2. Teaching: Define Type 2 diabetes. Explain that most foods contain sugar (glucose) and that the body needs this sugar or glucose for energy. Explain that the brain, muscles and internal organs all use sugar (glucose) for fuel. Emphasize that eating too much sugar does not cause diabetes. Genetics, weight, family history and ethnicity all contribute to diabetes.

3. Teaching: Diet is crucial to prevention of Type 2 diabetes and diabetes management. Maintaining a healthy body weight is one of the keys to preventing Type 2 diabetes. Being overweight makes insulin less able to do its job (keeping glucose levels normal in the blood). Losing even a small amount of weight helps lower the blood glucose levels. Physical activity helps to decrease blood glucose levels and other aspects of health. Exercise 150 minutes per week.

4. Teaching: Good and healthy nutrition is the first step in managing or preventing Type 2 diabetes. This helps to better control blood glucose levels, decreases your risk of complications and helps us to achieve or maintain a healthy body weight. Stress the positives of good nutrition and help participants realize that favorite foods do not have to be omitted from their intake, just eaten in moderation. There are no good foods or bad
foods; rather there are “sometimes” foods. Discuss how the food may be included or try to offer a similar healthier alternative for a favorite food.

5. Teaching: Define the major sources of carbohydrate, protein and fat. Stress the importance of including each of these nutrients at a meal. Emphasize that variety is key to enjoying food, and that meals each day should include vegetables, fruits, whole grains, dairy and lean sources of protein. Discuss portion size and emphasize that healthy blood glucose is achieved by moderate portion sizes.

6. Teaching: USDA protein vegetarian choices. The diabetic menu is the way everyone should eat. Discuss three to four different choices of a carbohydrate at a meal, or more of just one choice. Explain the concept that a portion of protein must be included at lunch and dinner. Discuss impact of carbohydrates, protein and fat in Fast Foods.

7. Teaching: Review sources of carbohydrate. Carbohydrates are necessary for important body functions. Don’t avoid carbohydrates; rather they should moderate their intake. Carbohydrate foods have the greatest effect and quickest effect on blood glucose levels. Carbohydrate foods raise blood glucose regardless of the source. Discuss that milk, fruit and bread raise blood glucose just as a cookie does.

8. Teaching: Encourage foods without extra sauces and to omit cheeses. Discourage the practice of “supersizing” selections. Illustrate the difference in calories, fats and carbohydrates between a regular portion and a “supersized” portion. Encourage participants to choose items that are grilled, baked or roasted rather than fried. Discuss principles of good meal planning.

9. Teaching: Proteins affect blood glucose levels but to a much lesser extent that carbohydrates. A source of protein should be included at each meal. Try to choose very
lean and lean protein choices if possible. Examples include: white meat chicken or turkey (no skin), fish such as cod, salmon or trout, shellfish like lobster, crabs, clams and low fat cottage cheese. Some red meats are also lean. These include flank steak, roasts such as a pot roast, pork tenderloin.

10. Teaching: When using fat, choose healthy alternatives such as olive and canola oils. Nuts in small amounts may also be included. Use margarines that are trans-fat free. Try to use high fat foods less frequently or substitute lower fat alternatives. Examples: low fat milk or skim milk for whole milk, reduced fat cheeses. USDA recommends skim milk for adults.

11. Teaching: Discuss food labels and nutritional information located on food labels. Nutritional labels provide information about a foods nutrient content. Discuss portion and serving sizes per container.

12. Teaching: Review questions, answer questions and concerns. Discuss resources available (USDA, ADA, AHA, and CDC).

(Diabetes Initiative, 2009)
Appendix E

Nutrition Assessment Tool

1. According to the American Diabetes Association a healthy diet consists of which of the following?
   a. Drinking lots of water and cutting back on fats, sugar, and salt
   b. Nutrient-dense food including vegetables, fruits, whole grains, fat-free or low-fat dairy, a variety of protein foods and oils
   c. Avoiding oversized portions and exercise
   d. All of the above

2. According to the American Heart Association, how much exercise should you complete each week?
   a. 20 minutes every day
   b. 90 minutes a day once you are in shape
   c. 150 minutes per week
   d. It depends on the size of your heart

3. If you are overweight or obese, the health benefits of losing weight through diet and exercise include:
   a. Lowered risk of developing heart disease, like heart attacks and stroke
   b. Improved sensitivity to the action of insulin and improved blood sugar levels
   c. Prevention or delaying of serious health conditions, like breathing problems, joint and bone disorders
   d. All the above

4. It would be better to eat a whole piece of fruit, than to drink a glass of 100% juice.
   a. True
   b. False

5. According to the USDA, what type of milk is recommended for adults?
   a. Reduced fat (2%)
   b. Fat-free (skim)
   c. Whole milk
   d. Buttermilk (full fat)

6. How many servings of vegetables are suggested to eat each day?
   a. 0-2
   b. 3-5
   c. 6 or more
   d. It doesn’t matter how many servings of vegetables you eat daily
7. According to the USDA, which food is a vegetarian choice in the protein food group?
   a. Hummus (made with chick peas)
   b. Peanut butter
   c. Black bean veggie burgers
   d. All of the above

8. On a nutritional label what does a serving size describe?
   a. The amount of food in a container
   b. Recommended amount of food you should consume according to your age
   c. A portion of or all of the food in a container
   d. A portion of food in a container

9. What is the most important fact you should consider on a food label to determine nutritional value?
   a. Vitamins
   b. Sodium
   c. Ingredients
   d. Calories per serving

10. If you have Type 2 diabetes, you may or may not experience one of its signs or symptoms.
    a. True
    b. False

11. You should check the ingredient list for terms like “whole grain”, “whole cornmeal” or “whole wheat” to help you choose food products made from whole grains.
    a. True
    b. False

12. According to the USDA how many cup equivalents from foods in the dairy group are recommended for adults each day?
    a. 1 cup
    b. 4 cups
    c. 3 cups
    d. 6-8 cups
Appendix E

Nutritional Assessment Tool Answers

1. d- All of the above
2. c- 150 minutes per week
3. d- All of the above
4. a- True
5. b- Fat-free (skim)
6. b- 3-5
7. d- All of the above
8. d- A portion of food in a container
9. c- Ingredients
10. a- True
11. a -True
12. c- 3 cups
Appendix F

Are you at risk for type 2 diabetes?

1. How old are you?
   - Less than 40 years (0 points)
   - 40–49 years (1 point)
   - 50–59 years (2 points)
   - 60 years or older (3 points)

2. Are you a man or a woman?
   - Man (1 point)
   - Woman (0 points)

3. If you are a woman, have you ever been diagnosed with gestational diabetes?
   - Yes (1 point)
   - No (0 points)

4. Do you have a mother, father, sister or brother with diabetes?
   - Yes (1 point)
   - No (0 points)

5. Have you ever been diagnosed with high blood pressure?
   - Yes (1 point)
   - No (0 points)

6. Are you physically active?
   - Yes (0 points)
   - No (1 point)

7. What is your weight category?
   - See chart at right.

If you scored 5 or higher:
You are at increased risk for having type 2 diabetes. However, only your doctor can tell for sure if you do have type 2 diabetes or prediabetes, a condition in which blood glucose levels are higher than normal but not yet high enough to be diagnosed as diabetes. Talk to your doctor to see if additional testing is needed.

Type 2 diabetes is more common in African Americans, Hispanics/Latinos, Native Americans, Asian Americans, and Native Hawaiians and Pacific Islanders.

Higher body weight increases diabetes risk for everyone. Asian Americans are at increased diabetes risk at lower body weight than the rest of the general public (about 15 pounds lower).

American Diabetes Association
### Table 1

**Simplified Project Timeline**

<table>
<thead>
<tr>
<th>Task</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recruitment of eligible participants by superintendent</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Intervention; Nutritional Tool/Diabetes Risk Assessment Tool</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
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<td></td>
</tr>
<tr>
<td>Pre/Post-test and Analysis of outcomes</td>
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<td></td>
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<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>Results presented to local providers</td>
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<td></td>
<td>X</td>
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</tbody>
</table>

- X indicates the task is completed in that month.
# Tables

## Table 2

*Diabetes Risk Assessment Results*

<table>
<thead>
<tr>
<th>Type 2 Diabetes Risk Assessment Questions</th>
<th>Participant #1</th>
<th>Participant #2</th>
<th>Participant #3</th>
<th>Participant #4</th>
<th>Participant #5</th>
<th>Participant #6</th>
</tr>
</thead>
<tbody>
<tr>
<td>How old are you?</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Are you a man or woman?</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>If you are a woman, have you ever been diagnosed with gestational diabetes?</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Do you have a mother, father, sister or brother with diabetes?</td>
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<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Have you ever been diagnosed with high blood pressure?</td>
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<td>0</td>
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<tr>
<td>Are you Physically active?</td>
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<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<td>What is your weight category?</td>
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<td>0</td>
<td>2</td>
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<td>Total Score</td>
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<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
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### Tables

**Table 3**

*Body Mass Index (BMI)*

<table>
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<tr>
<th>Participants</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
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<tbody>
<tr>
<td>gender</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
| Pre-Height   | 5'6"| 6'3"| 6'2"| 5'7"| 5'3"| 5'1"
| Pre-Weight (lbs) | 155| 191| 162| 232| 215| 140|
| Post-Height  | 5'6"| 6'3"| 6'3"| 5'7"| 5'3"| 5'1"
| Post-Weight (lbs) | 152| 190| 159| 227| 218| 134|
| Pre BMI      | 25 | 23.9| 20.8| 36.3| 38.1| 26.5|
| Post BMI     | 24.5| 23.7| 20.4| 35.6| 38.6| 25.3|
Figure 1

**T-Test**

**Paired Samples Statistics**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
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<tr>
<td>Pair 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>6</td>
<td>11.23684</td>
<td>4.58742</td>
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<tr>
<td>test score percentage</td>
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**Paired Samples Correlations**

<table>
<thead>
<tr>
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<th>N</th>
<th>Correlation</th>
<th>Sig.</th>
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<tbody>
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<td>Pair 1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>test score percentage &amp; test score percentage</td>
<td>6</td>
<td>.778</td>
<td>.069</td>
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**Paired Samples Test**

<table>
<thead>
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<th>95% Confidence Interval of the Difference</th>
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<th>df</th>
<th>Sig. (2-tailed)</th>
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<tr>
<td></td>
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<td>Std. Deviation</td>
<td>Std. Error Mean</td>
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<td>Upper</td>
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<td>33</td>
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Figure 2

Bar Chart

Pretest

test score percentage

Frequency

3.0
2.0
1.0
0.0

33.00
50.00
58.00
67.00

test score percentage

Posttest

test score percentage

Frequency

2.0
1.5
1.0
0.5
0.0

42.00
50.00
67.00
75.00

test score percentage
Figure 3

Histogram

Pretest

Histogram

Posttest
### Paired Samples Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
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### Paired Samples Correlations

<table>
<thead>
<tr>
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<th>N</th>
<th>Correlation</th>
<th>Sig.</th>
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<tbody>
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### Paired Samples Test

<table>
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<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>Sig. (2-tailed)</th>
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<td>BMI_Post</td>
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