2021

Traditional and Local Food Procurement Motivators, Barriers, and Desires from Foodservice Directors in South Dakota Schools with High Enrollments of Native American Students

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TRADITIONAL AND LOCAL FOOD PROCUREMENT MOTIVATORS, BARRIERS, AND DESIRES FROM FOODSERVICE DIRECTORS IN SOUTH DAKOTA SCHOOLS WITH HIGH ENROLLMENTS OF NATIVE AMERICAN STUDENTS

BY

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A thesis submitted in partial fulfillment of the requirements for the

Master of Science

Major in Nutrition and Exercise Sciences

Specialization in Nutritional Science

South Dakota State University

2021

THESIS ACCEPTANCE PAGE

Anna Barr

This thesis is approved as a creditable and independent investigation by a candidate for the master's degree and is acceptable for meeting the thesis requirements for this degree. Acceptance of this does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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ACKNOWLEDGEMENTS

I would like to thank my advisor, Dr. Suzanne Stluka for volunteering many hours to helping me learn and grow and for helping me reach successful completion of this project. Her experiences and insights into community and public health are examples I will forever carry into my career. Her abilities as a thoughtful and passionate leader leave me a model to which I hope to grow. Thank you, Dr. Stluka!

I would like to thank Dr. Kendra Kattelmann, whose oversight and direction are very valuable to me and highly remarkable in the field of community nutrition. Her attention to detail and focus on the 'bigger picture' within research have been guiding stars in this work. Thank you, Dr. Kattelmann!

I would like to thank Jessie Hendricks for her assistance and guidance in running statistical analyses and analyzing results. Thank you, Jessie!

Lastly, I would like to thank my family and friends who have been a huge support to me throughout graduate school. The encouragement you all gave me to persevere when I was struggling and to take a break when my cup was empty were always the appropriate encouragement I needed to persist. Your constant belief in me is noticed, uplifting, and appreciated. Thank you!

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ABBREVIATIONS

BIE	Bureau of Indian Education
CANS	Child and Adult Nutrition Services
CNP	Child Nutrition Program
FDPIR	Food Distribution Program on Indian Reservations
FFVP	Fresh Fruit and Vegetable Program
FSD	Foodservice Director
FTS	Farm to School
FV	Fruit and Vegetable
NA	Native American
NFSN	National Farm to School Network
NSLP	National School Lunch Program
SD	South Dakota
SDSU	South Dakota State University
SNAP	Supplemental Nutrition Assistance Program
DOE	Department of Education
U.S.	United States
USDA	United States Department of Agriculture

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ABSTRACT

TRADITIONAL AND LOCAL FOOD PROCUREMENT MOTIVATORS, BARRIERS, AND DESIRES FROM FOODSERVICE DIRECTORS IN SOUTH DAKOTA SCHOOLS WITH HIGH ENROLLMENTS OF NATIVE AMERICAN STUDENTS

ANNA BARR

2021

Purpose/Objectives: The objectives of the study were two-fold: 1) Determine the motivators and barriers to local food and local traditional food procurement among Food Service Directors (FSDs) of South Dakota (SD) schools serving Native American (NA) students, and 2) determine what traditional foods are desired for local procurement by the same population.

Methods: A cross-sectional survey design was used. An online survey was emailed to SD FSDs at 42 schools with high enrollments NA students. Eligibility was determined by 1) participation in National School Lunch Program (NSLP), and 2) >50% enrollment NA students. Motivators and barriers were determined by averaging Likert-scale responses and ranking by highest score. Desires were determined by averaging ranked interests in local procurement from each meal component. Specific traditional foods of interest from each component were then determined by summing frequencies of foods selected.

Results: Most FSDs were from Western SD in districts serving K-12. Twenty-seven FSDs started and 14 completed the survey. All motivators and barriers for both local and local traditional food procurement were more than 'somewhat' a motivator or barrier. The highest motivator was to improve overall health of students (3.50 and 3.55, respectfully). The highest barrier was lack of producers from whom to purchase (3.60 and

3.58, respectfully). Highest desire was given to local vegetables followed by fruits, then meats. Traditional foods most desired included traditional potato and carrot varieties, raspberries, wild plums, strawberries, bison, wild rice, and syrup.

Applications to Child Nutrition Professionals: This study revealed that FSDs desire nutritious local traditional foods for child nutrition programs (CNPs) that are not currently available in the market. Providing grant and funding opportunities for CNPs and local producers to increase FTS capacity could help initiate FTS programming and facilitate a change to a more sovereign food system. More research is needed to determine local producers' motivators and barriers to facilitate production for FTS. FTS programs are very personalized to school needs. More research is needed to determine the traditional foods of interest in other regions and for other cultures served by CNPs.

Key Words: Farm to School, Food Service Director, Child Nutrition, Traditional Foods, Local Foods, Rural Schools

CHAPTER 1: THESIS INTRODUCTION

The farm to school (FTS) movement has gained momentum in the last three decades, growing from only a handful of schools in the late 1990s to over 42,000 schools reporting FTS activities in 2014 (*National Farm to School Network (NFSN,)* 2021). The National Farm to School Network (NFSN) states FTS "enriches the connection communities have with fresh, healthy food and local food producers by changing food purchasing and education practices at schools and early care and education sites" *(NFSN, 2021).* FTS programs encompass a variety of implementation strategies focused on one of the three core elements: local food procurement, school gardens, and/or in-class education. Examples of the most common FTS activities include serving local food products in school meals, snacks, or educational lessons; conducting educational activities that expose students to various steps of food from farm to school; and creating and tending school gardens. (USDA, 2015)

In South Dakota (SD), 36 districts (31%) participate in FTS with another 7% planning to begin programs; that is nearly 60,000 SD students impacted by FTS, and $100,450 invested in local foods (South Dakota Districts, 2015). FTS activities are varied and continue to grow across the state. For example, the Wall School District has partnered with a local rancher and butcher to provide beef for school meals. Ranchers also invite Wall students to tour the cattle operation and provide FTS education via farm tours. On the other side of the state, Huron School District has partnered with Plain View Foods to source fresh produce snacks through the Fresh Fruit and Vegetable Program (FFVP). These two brief examples show how varied FTS activities and their impacts on students and other stakeholders can be.

As participation in FTS increases, scientific literature has become abundant in studies supporting its benefits. Among the benefits is improved attitudes and behaviors related to consuming fruits and vegetables (FV) (Greer, 2018; Ratcliffe, 2007). Garden-based learning improves nutrition knowledge (Hazzard, 2010). A 2014 study found that FTS programming improved FV consumption and decreased unfavorable FV behaviors among elementary students (Bontrager, 2014).

The primary activity of FTS is generally local food procurement (USDA, 2015). Local food procurement does not have one definition. Rather, it is defined by each FTS program based on resources and goals and can range in scale. For example, a definition could be: 'produced within a 50-mile radius'; 'produced within a day's drive'; or 'produced within the region' (USDA, 2015). A 2017 study by Kropp et al. found that FTS programs that participate in only local procurement (and not school gardens or in-class education) still show positive results. The study focused on local procurement of National School Lunch Program (NSLP) offerings at 22 elementary schools. The study determined decreases in plate waste of local FV with signage drawing attention to local FV, signifying that local procurement positively affected healthy eating (Kropp, 2017). In another study, students reported choosing FTS foods at lunch because of perceived quality, influence of school staff, and relationships with farmers (Izumi, 2010). Aboriginal youth in Canada agreed healthy foods should be served and even expressed preference for healthier food options (Gillies, 2018), showing student support and desire for new healthy food selections. For school food professionals, the choice to buy local comes from student enjoyment, price, and support for local farmers (Izumi, 2010).

Though the literature supporting FTS is plentiful, such is not the case for FTS programs involving Native American (NA) populations and traditional foods, especially when considering specific geographical areas such as SD tribal communities. However, there are a number of guidebooks developed by public groups for implementing and sustaining FTS programs tailored to NA populations and traditional foods. The USDA has released memos with details on allowances for incorporating traditional foods in child nutrition programs (CNPs) and has resources related to tribal health and traditional foods. Though there is an abundance of resource guides and government documents available to assist in starting FTS programs with traditional foods, the evidence of need and desire for these programs is only minimally documented. A 2011 report shows movement in NA communities to reclaim and rebuild the local food system (Vasquez, 2011). This could be in part due to integration of traditional foods enhancing NA food security, food sovereignty, and well-being. However, the current food system near tribal communities is often not conducive to traditional food consumption. A study of six high-obesity counties in SD, including NA reservations, found a limited availability of traditional foods in stores and a need for healthy foods that are affordable and available (Willard, 2018).

South Dakota is a rural state with a population under 900,000 and population density of 9.9 people per square mile (SD Census, n.d.), making it the fourth lowest population density in the United States. The state is home to nine NA reservations and an overall 12% NA population (Indian Country, 2020). Agriculture makes up the biggest industry in SD with agriculture products varying across the state. South Dakota is popularly divided by the Missouri River which passes through the center of the state. This river defines “East River” and “West River” which generally contain different

agricultural climates. East River is historically prairie with precipitation soil suitable for crop land, while West River is historically arid grassland more suitable as cattle range land. The most revenue generating agricultural products in the state are corn, cattle, soybeans, wheat, hogs, milk, and sunflower (South Dakota Agriculture, n.d.). South Dakota reservations are dispersed across the state with more located in arid regions than regions with more fertile soil and precipitation. NA students may attend one of five types of schools, "Bureau of Indian Education, Tribal, nonpublic, public school districts on tribal reservations, or public school districts with has the highest percentages of NA student population". (South Dakota Department of Education, n.d.)

Given the lack of literature supporting FTS programs in schools serving NA students, this project was designed as a baseline to study the interest, motivators, barriers, and desires of foodservice directors (FSDs) to procure traditional foods as part of FTS programs with NA students. The objectives of the study are two-fold: 1) Determine the motivators and barriers to local food and local traditional food procurement among FSDs of SD schools serving NA students, and 2) determine what traditional foods are desired for local procurement by the same population.

CHAPTER 2: LITERATURE REVIEW

TITLE: Traditional and Local Food Procurement Motivators, Barriers, and Desires from Foodservice Directors in South Dakota Schools with High Enrollments of Native American Students

PURPOSE: Determine the motivators and barriers to local food and local traditional food procurement among foodservice directors of SD schools serving Native American students. Determine what traditional foods are desired for local procurement by the same population.

Table 1. Farm to School Literature

Author, Year, and Title	Study Purpose	Sample Size and Description	Study Outcomes and Pertinent Findings
Spencer, 2019 Food in Focus: Youth Exploring Food in Schools Using Photovoice	Understand youth perspectives of school food using Photovoice – a qualitative visual methodology using photo-taking to enable reflection, facilitate change, and promote dialogue.	Seven youth including three from a rural area and four from an urban area.	Youth desire to be involved in school food decision-making and desire greater variety and quality in affordable school food options. Spaces and places were important for youth in the experience of food. Quality, variety, time, and price were identified as key components of food environments. Social influence plays a role in food selection.
Kropp, 2018 A Plate Waste Evaluation of the Farm to School Program	Investigate the impacts of FTS programs on selection and consumption of fruits and vegetables.	Three treatment and three control elementary (grades 1-5) schools in Florida participating in the national School Lunch Program; 11,262 plates were observed.	Local procurement positively affected fruit and vegetable (FV) consumption. FTS participants consumed more servings of fruits and vegetables on average.
Greer, 2017	Examine the relationship between high school	327 high school students from three Connecticut high schools,	Attitudes about consuming local fruits and vegetables, increased with prior ag

Agricultural Experiences Are Positively Associated with High School Students' Fruit and Vegetable Perceptions and Consumption	students' agricultural experiences and (1) attitudes about consuming local FV, (2) willingness to try new FV, and (3) FV consumption.	57% female, 53% with prior community garden or farm experience, 30% with a home garden.	experience and home garden. Willingness to try new fruits and vegetables, increased with prior ag experience and home garden. FV consumption, increased with home garden. Offering agricultural experiences to high schoolers could promote positive FV attitudes and behaviors.
Wansink, 2015 A Plant to Plate Pilot: A Cold-Climate High School Garden Increased Vegetable Selection but Also Waste	Determine if high school gardens in cold climates influence vegetable intake in the absence of nutrition education by evaluating plate waste before and after.	Three hundred seventy high school students that purchased cafeteria lunch from one high school in upstate New York.	School gardens increased selection and intake of school-raised produce. Though one-third of salad greens were wasted on the plate, more students were eating at least some salad greens.
Bontrager, 2014 Farm to Elementary School Programming Increases Access to Fruits and Vegetables and Increases Their Consumption Among Those with Low Intake	Assess success of FTS programs to increase student FV intake.	1,117 children in grades 3-5 at nine Wisconsin public schools (1 urban, 8 rural). Nineteen percent of participants were non-Caucasian, and 53% were male.	FTS programing positively affected FV consumption and decreased the proportion of students with unfavorable FV behaviors.
Wells, 2014 School Gardens and Physical Activity: A Randomized	Determine if school gardens effect children's overall physical activity (PA), and PA during the	Fourth and fifth grade students at 12 New York State schools (6 intervention, 6 control) with no school garden prior to the	Children's sedentary time decreased with school garden interventions both overall and while at school. Children move more and sit less during outdoor garden

Controlled Trial of Low-Income Elementary Schools	school day, to determine whether there is a difference in PA between indoor and outdoor garden lessons.	intervention and at least 50% students qualifying for free or reduced price meals.	education compared to classroom-based garden lessons.
Yoder, 2014 School Food Environment Factors Affecting Fruit and Vegetable School Lunch Waste in Wisconsin Elementary Schools	Assess factors affecting FV waste at school lunch with a multi-year cross-sectional study.	Third through fifth grade students at Wisconsin schools participating in various FTS programs.	Cooked fruits were wasted less than raw fruits. Cooked vegetables were wasted more than raw vegetables. Locally-sourced items were wasted more than conventionally sourced items when offered. Salad bar foods were wasted more than main menu foods. FV sides and toppings were wasted less than entrees. Length of time participating in FTS decreased waste.
Grommet, 2013 Effect of School Gardens on Food Behavior of Children	Determine the effect of school gardens on food behavior through systemic review of published literature.	Ten peer-reviewed articles reporting eight different school gardens were identified through multiple bibliographic databases within five years prior to the study.	School garden interventions ranged from 10 weeks to 1 year and included hands on gardening activities; food preparation; taste testing; and assessment of nutrition knowledge, FV preference, and FV intake. Increased FV preference was reported from 7 of the 8 school gardens assessing that parameter and 4 out of 5 studies assessing FV intake reported an increase.
Ruiz-Gaillaro, 2013 Garden-Based Learning: An	Assess changes in academic outcomes and personal behavior after	Sixty-three disruptive and low-performance secondary school stu dents in Southeastern Spain.	Garden-based learning resulted in reduced school failures and dropouts. Improvements were seen in student

Experience with "At Risk" Secondary Education Students	integration in a two-year garden-based learning program.		episode control, self-confidence, and self-esteem.
Taylor, 2013 Farm to School as a Strategy to Increase Children's Fruit and Vegetable Consumption in the United States: Research And Recommendations	Compile and discuss literature on the impact of FTS programs on children's actual FV intake to summarize findings and suggest future directions of the FTS program's impact in the United States.	Peer-reviewed and gray literature regarding FTS programs in the U.S., leading up to 2013.	Current (2013) literature shows increased FV consumption from FTS programs. However, the majority of studies used unreliable data sources, such as lunch participation rates and self-reported intake, rather than surveys validated for FV intake. Though results are promising, it is recommended to use validated dietary assessment methods to measure FV consumption, especially those that require observation of children's actual intake in order to eliminate errors from children's self-report.
Berlin, 2012 The Role of Social Cognitive Theory in Farm-to-School-Related Activities: Implications for Child Nutrition	Perform a literature review of dietary health impacts of FTS activities and determine their potential alignment with social cognitive theory, a best practice in nutrition.	The 3 categories of FTS activities were 1) classroom-based nutrition education activities, 2) school gardens, and 3) food interventions. Literature was reviewed from a 2009 review with addition of more recent articles.	FTS activities are highly varied but can be narrow in practice at individual locations. Some locations will not directly state that the activities are FTS. Intentional inclusion of diverse activities would be beneficial. FTS activities touch on theoretical constructs of social cognitive theory, but are typically not designed with educational theory in mind. More research is needed to

			determine best practices that are theoretically grounded.
Bareng-Antolin, 2011 High School Gardens Program Across the Nation: Current Practices, Perceived Benefits, Barriers, and Resources	Identify current practices, perceived benefits, barriers, and resources needed for beginning and continuing high school garden programs nation-wide.	Forty-two survey responses from teachers, administrators, and/or garden facilitators at high schools across the country.	When high schoolers take care of the school garden: 64.3% improved health and nutrition, 50% increased social skills/behaviors, and 50% increased leadership skills.
Swisher, 2011 Attitudes and Beliefs of Foodservice Staff and Educators Prior to Implementing a Farm to School Program	Determine the attitudes and beliefs of supportive stakeholders (foodservice staff and educators) before implementation of a FTS program.	Forty-two food service professionals and 136 educators from four schools in Nebraska.	A positive correlation was found between age of stakeholder and attitude/belief in the FTS program. The average attitude/belief score of foodservice professionals was 61.10 out of 90 and for educators was 66.79 out of 85.
Appleton, 2010 Promoting Health Literacy through the School Nutrition Environment	Improve student health literacy and food perceptions through social marketing nutrition messaging and improving the quality and composition of items offered in competitive food venues.	Three intervention schools in Iowa including 253 students.	Taste was identified as a potent motivator in student food selection, while nutrition was a low motivator. Gender plays important role in food selection. Foodservice directors should focus on marketing taste to promote healthy items and less on nutrition.
Hazzard, 2010 Utilization of Garden-Based Education to	Evaluate two garden-enhanced nutrition curricula for impact on	Seventy-seven 1st or 2nd grade children made up of 54.5% male, 39% white, and 35.1% Latino. All	The garden-based curricula improved nutrition knowledge but not positive nutrition behavior.

Positively Impact Children's Nutrition Knowledge and Behaviors	school-aged children's nutrition knowledge and behaviors.	students were English-speaking from English or Spanish-speaking parents.	
Izumi, 2010 Farm to School Programs: Perspectives of School Food Professionals	Explore the potential of farm-to-school programs to improve children's diets and provide farmers with viable market opportunities. Determine motivators and barriers to local school food procurement.	Seven school foodservice professionals, seven farmers, and four food distributors from seven FTS programs in the Upper Midwest and Northeastern United States.	School food professionals have motivators for buying local, including (1) "The students like it," (2) "The price is right," and (3) "We're helping our local farmer." Students choose FTS foods because of quality, influence from school staff, and relationships with farmers. Buying from farmers included lower prices, flexible specifications, and the "local feel."
Simonian, 2008 Farm Stands in Schools: Bringing Fresh Fruits to the Schools	Create farm stands on campus at two elementary schools to sell fresh fruit after school and determine 1) if fresh fruit consumption would increase, 2) if social marketing and nutrition education would impact sales, and 3) if sales would be strong enough to continue farm stand operations.	Two elementary schools in areas of lower socioeconomic status and similar demographics.	Students were aware of health benefits of fruit, whether they were promoted or not, and desired access to fruit at an affordable price. Enough fruit was sold at both farm stands to continue the operation. Implementing a farm stand could be an effective way to increase fresh fruit consumption in low socioeconomic areas where consumption is typically low.

Ratcliffe, 2007 Garden-Based Education in School Settings: The Effects on Children's Vegetable Consumption, Vegetable Preferences, and Ecoliteracy	Evaluate school garden programs to address important nutrition- and environment-related issues for childhood. Develop a comprehensive theoretical framework for garden-based education in school settings.	Students at two schools in San Francisco Unified School District with a school garden. A pre-post group of 236 sixth graders was assessed with a garden vegetable frequency questionnaire. Taste tests and group interviews were conducted with smaller student groups, and individual interviews were conducted with adult stakeholders.	Garden-based education resulted in improved recognition of, attitudes toward, preferences for, and willingness to taste vegetables. Garden-based education increased variety of vegetables consumed and consumed at school. Additionally, hands-on garden experiences improved ecological knowledge and behaviors. This project resulted in the development of the "Model for Garden Based Education in School Settings".

Table 2. Native & Traditional Foods Farm to School Literature

Author, Year, and Title	Study Purpose	Sample Size and Description	Study Outcomes and Pertinent Findings
Hillestad, 2019 Eat Smart, Play Hard the Oyate Way: Impact of a Culturally Tailored Nutrition and Physical Activity Curriculum on Elementary Youth	Assess changes in nutrition and physical activity knowledge and behavior in elementary-age participants after completion of a culturally tailored education curriculum.	A total of 248 participants (Kindergarten through 5th grade) from 13 elementary classrooms in tribal communities at school districts with high enrollments American Indian students.	The intervention (Eat Smart, Play Hard the Oyate Way) increased physical activity and cultural knowledge but not nutrition knowledge.
Fretts, 2018 Availability and Cost of Healthy Foods in a Large American-Indian Community in the North-Central United States	Assess the availability and price of healthy foods offered at all stores near a large American Indian reservation to understand local food environment.	Twenty-seven stores within a 90-mile radius of town center of a large American Indian community in North-Central United States.	Healthy foods were available at >97% grocery stores though prices and foods offered varied widely. Availability of traditional foods was not assessed.
Gillies, 2018 First Nations Students' Perceptions of School Nutrition Policy Implementation: A Mixed Methods Study	Explore First Nations students' perceptions of a school nutrition policy which can improve healthy food access for Indigenous First Nations children in Canada.	Ninety-four students in grades 4-12 completed a survey questionnaire. 20 students completed a qualitative interview.	Implementation of nutrition policy was facilitated by student support and taste preference. Eighty-seven percent of students agreed only healthy foods should be served at school and expressed preference for healthier food options in interviews. Students believed their diets could be improved by consuming fruits and vegetables at school. Communication between students and parents or teachers about what students eat and drink at school

			was low. The authors recommend involvement of First Nations children in implementation and evaluation of school nutrition policies.
Mucioki, 2018 Thinking Inside and Outside the Box: Local and National Considerations of the Food Distribution Program on Indian Reservations (FDPIR)	Investigate opportunities and challenges of FDPIR to achieve food security for its clientele, and the extent to which integration of traditional foods can enhance NA food security, food sovereignty, and wellbeing.	Data from three tribes in the Klamath River Basin (California/Oregon) and national institutions governing FDPIR.	The monthly box of USDA foods provided for low-income, rural Native Americans is a vital component of food security but has questionable quality, nutritional value, and cultural appropriateness. Traditional foods support a healthy weight, promote health, and prevent disease. FDPIR can support NA food sovereignty and security by granting tribes agency over sourcing traditional foods from tribally owned and operated businesses.
Willard, 2018 Food Availability, Including Traditional Foods, in Grocery and Convenience Stores in 6 High Obese Counties in South Dakota, Including Native American Reservations	Determine food availability, including traditional foods, in grocery and convenience stores.	One community per county was examined with observational study of 6 grocery stores and 9 convenience stores in six high obese counties in SD, including NA reservations.	A limited amount of traditional foods is available in these grocery and convenience stores. The availability of healthy food in these counties is staggeringly lower in comparison to other locations in SD and other areas of the U.S.
Sinley, 2016 Understanding Fruit and Vegetable Intake of Native American	Investigate FV consumption of NA children ages 2 through 5.	Forty-five caregivers of NA children and ten stakeholders in NA communities.	Caregiver role modeling, caregiver attitudes and social support, and caregiver knowledge of importance of FV intake were linked to FV intake of children. To

Children: A mixed methods study			increase the intake of FV among NA children, programs should address caregiver FV information, motivation, and behavioral skills.
Gates, 2014 The Diets of School-Aged Aboriginal Youths in Canada: A Systematic Review of the Literature	Review primary research studies that investigated the dietary intakes of Canadian school-aged Aboriginal youths. Summarize the tools and methodologies currently used to measure diet in this population. Identify knowledge gaps and suggest areas of future research.	Twenty-four cross-sectional design studies published between January 2004 and January 2014 related to diets of Canadian school-aged Aboriginal youths, including a literature review of Medline, Scopus, ERIC, Web of Science, and Google Scholar databases.	The diets of Aboriginal youths could be improved. Inadequate intake of vegetable, fruit, milk and alternatives, fiber, folate, Vit A, Vit C, calcium, Vit D was found concerning alongside an excess consumption of sugar sweetened beverages, snacks, and fast foods. Traditional foods identified as important but tend to be consumed infrequently.
Vasquez, 2011 The Role of Indigenous Knowledge and Innovation in Creating Food Sovereignty in the Oneida Nation of Wisconsin	Contribute to the promotion of food sovereignty and local food system revival by better understanding what knowledge and practices current farmers and gardeners in Oneida are using.	Observation of the Oneida Nation reservation of Wisconsin during a month-long visit by the principle investigator, interviews with local growers, 2 focus groups – one consisted of elders, the other of women.	There is a movement in Native communities to reclaim and rebuild local food systems. Food and agriculture provides a means for Oneida to express and define their sovereignty through healthy, interdependent relationships.

Table 3. Public Resources for Native & Traditional Farm to School

Title, Publishing Organization, Year	Purpose	Key Information
South Dakota Farm to School Resource Guide SDSU Extension, 2019	A 37-page resource for all FTS stakeholders and anyone interested in FTS, including chapters on "Getting to Know FTS", "Building Your FTS Team", "School Purchasing Guide & Menu Planning", "Producer Farm to School Guide", and Additional Resources. A new version including a Traditional FTS Programs section is expected to be published in 2021.	• FTS team members • Information for schools and producers • SD specific but with transferable information • Program highlights across the state
Native Farm to School Resource Guide First Nations Development Institute, 2018	A 52-page guide that provide tribes, schools, and community members with a resource to address the unique needs of Native farm-to-school programs.	• Ways to substitute traditional foods into recipes • Includes blue corn, squash, & buffalo • Using traditional foods makes foods more relevant to community, greater effect on tribal members • Greater than 50% students' daily calories come from school meals, especially in low-income tribal populations • Traditional foods improve the overall health of native people • Difficult to find traditional food suppliers • Determine whether schools are equipped to cook from scratch • Finding recipes with traditional foods may be difficult

Reclaiming Indigenous Food Relationships: Improving Health with Culture American Indian Cancer Foundation, 2018	A 12-page document for NA organizations, tribal communities, and individuals with purpose to support Indigenous people in achieving their best health, based on the traditional medicine wheel with food at the center, surrounded by the stages of life, the changing seasons and the various aspects of individual and community health.	• A framework to integrate cultural traditions into healthy eating initiatives for prevention of chronic disease
American Indian Traditional Foods in USDA School Meals Programs: A Wisconsin Farm to School Toolkit Wisconsin Department of Public Instruction, 2018	An 84-page toolkit for foodservice directors to identify, procure, and successfully incorporate traditional, healthy foods into breakfast and lunch programs and for anyone interested in traditional foods to learn about food culture in American Indian nations and tribal communities.	• Traditional foods include berries, bison, fish, maple syrup, potatoes, corn, beans, squash, wild rice, venison • Traditional diet promotes good health with lean meats, fruits, and vegetables • Traditional foods are a way for students to connect and learn about culture • Information for incorporating traditional foods in NSLP
Bringing Tribal Foods and Traditions into Cafeterias, Classrooms, and Gardens USDA, 2017	A 2-page fact sheet that explores how schools and tribes are integrating traditional foods into child nutrition programs, buying traditional foods locally, and incorporating multicultural nutrition education into classroom curriculum and hands-on lessons in school gardens.	• Includes bison, mesquite flour, wild rice, ancient squash/corn • Reference to USDA food buying guide • Example from Sisseton-Wahpeton tribe - bison meat for ground beef, salsa with green tomatillos, salad bar

Gardens in Tribal Communities USDA, 2017	A 2-page fact sheet focusing on tribal school gardens including examples, steps to plan a successful garden, procurement information, food safety, and links to more information.	• Examples from Arizona, New York, Colorado • Steps and Guide to starting
Child Nutrition Programs and Traditional Foods USDA, 2015	A 3-page memo to Special Nutrition Programs Regional Directors and Child Nutrition Programs State Directors to clarify that traditional foods may be served in CNPs and to provide examples of how several traditional foods may contribute towards a reimbursable meal.	• Uses CNP food buying guide • Examples of traditional foods for reimbursable school meals
Service of Traditional Foods in Public Facilities USDA, 2015	A 4-page USDA memo to Special Nutrition Program Regional Directors and Child Nutrition Program State Directors to provide guidance related to the donation and serving of traditional food at schools and institutions operating the USDA Child Nutrition Programs.	• Policies for donations of traditional foods • The Farm Bill defines traditional food as "food that has traditionally been prepared and consumed by an Indian tribe" and specifically includes in that definition: wild game meat, fish, seafood, marine mammals, plants, and berries. •
Growing Farm to School in Native Communities National Farm to School Network & Shining Waters Consulting, 2015	A 2-page resource including what FTS is, why it is beneficial, a focus on Native communities, four steps for getting started, and resources for technical assistance.	• New term for an ancient concept that embraces Indigenous knowledge and values in harmony with traditional Native lifestyles • FTS has proven positive results on health, education and hunger

Farm to School Profiles from Native Communities National Farm to School Network, 2015	A 2-page fact sheet that highlights four diverse Native FTS programs and the key values that make them successful.	• FTS can be a nexus of economic development, food sovereignty, health and nutrition, and cultural revitalization • Heritage gardens • Examples from Alaska, Oklahoma, North Dakota, New Mexico, Minnesota, Montana, Colorado, Washington, Hawaii
Indigenous Farm to School Programs: A Guide for Creating a Farm to School Program in an Indigenous Community First Nation's Development Institute (Kaisa Jackson), 2012	A 30-page guide including an overview of the 'State of Indigenous Food Crisis', evaluating community need, launching, and sustaining an indigenous FTS program with examples and tools.	• Lacking "actual food" in tribal communities • Free and reduced meal program, 50% of 8th graders are obese • Limited data for schools serving native foods • Addresses obesity among Native Americans • Nature deficit disorder • Re-traditionalization of heirloom plants and animals
Addressing Childhood Obesity in Indian Country: Report to Congress Mathematica Policy Research Gordon, Oddo, 2012	A 40-page report to congress on the level of food insecurity, obesity, and type II diabetes among NA children; the scope and reach of federal nutrition programs in Indian country; and how the Healthy Hunger Free Kids Act can improve food security, and reduce obesity and diabetes risk.	• NSLP has widest reach of all supplemental food/nutrition programs • Provides overview of current government programs in Indian country • Statistics on hunger, obesity, & type 2 diabetes

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CHAPTER 3: MANUSCRIPT

INTRODUCTION

The farm to school (FTS) movement has gained momentum in the last three decades, with over 42,000 schools reporting activities. FTS "enriches the connection communities have with fresh, healthy food and local food producers by changing food purchasing and education practices at schools and early care and education sites (NFSN, 2021)." It focuses on one of three core elements: local food procurement, school gardens, and/or in-class education. Scientific literature supports benefits, such as demonstrating that gardening and agricultural experiences improve attitudes and behaviors related to consuming fruits and vegetables (FV) (Bontrager, 2014; Gillies, 2018; Greer, 2018; Ratcliffe, 2007), and improving nutrition knowledge (Hazzard, 2010).

The primary activity of FTS is local food procurement (USDA, 2015). The definition of "local" varies, and is decided upon by individual schools, such as 'within a 50-mile radius' (*SD Farm to School Resource Guide*, 2019). Student's report choosing FTS foods because of perceived quality, influence of school staff, and relationships with farmers, while food service directors report buying local comes from student enjoyment, price, and support for local farmers (Izumi, 2010). Kropp et al. found that 22 elementary school FTS programs that participated only in local procurement still showed positive impacts; showing decreases in plate waste of local FV, signifying that local procurement positively affected healthy eating (2017).

Literature is lacking for FTS programs involving Native American (NA) populations and traditional foods, especially when considering specific geographical areas. A traditional food is a "food that has traditionally been consumed or prepared by

an Indian tribe" (*Service of Traditional Foods*, 2025). Though there is an abundance of resource guides and government documents available to assist in starting FTS programs with traditional foods, the evidence of need and desire for these programs is minimally documented. A 2011 report showed movement in NA communities to reclaim and rebuild the local food system using traditional foods to enhance food security, food sovereignty, and well-being (Vasquez). However, the current food system near native communities is often not conducive to traditional food consumption. A study of six high-obesity counties in SD, including NA reservations, found a limited availability of traditional foods in stores and a need for healthy foods that are affordable and available (Willard, 2018). Lower socioeconomic areas such as these tend to have low consumption of fresh FV (Bareng-Antolin, 2011).

South Dakota is a rural state with nine NA reservations, and a 12% NA population (Indian Country, 2020). According to the SD Department of Indian Education, NA students may attend one of five types of schools – "Bureau of Indian Education, Tribal, nonpublic, public school districts on tribal reservations, or public-school districts which have the highest percentages of NA students" (n.d.). The Missouri River divides the state down the center into "East" and "West" River; areas that contain different agricultural climates. East River is historically prairie with precipitation and soil suitable for crop land, while West River is historically arid grassland more suitable as cattle range land. More reservations are located in arid regions than those with more fertile soil and precipitation. Agriculture is the biggest industry, with the highest generating products being corn, cattle, soybeans, wheat, hogs, milk, and sunflowers (SD Agriculture, n.d.).

This is a baseline study to assess the motivators, barriers, and desires of foodservice directors (FSDs) to procure traditional foods as part of FTS programs at school's serving primarily NA students. The study objectives were two-fold: 1) Determine the motivators and barriers to local food and traditional food procurement among FSDs of SD schools serving primarily NA students, and 2) determine what traditional foods are desired for local procurement by the same population.

METHODS

A cross-sectional survey approach was used to study the motivators, barriers, and desires for local and traditional local foods among FSDs of SD schools with high enrollments of NA students. This study was approved by the South Dakota State University Institutional Review Board.

INSTRUMENT

This study utilized QuestionPro online survey software (n.d.). The survey instrument was adapted with permission from the "Survey of Michigan K-12 School Foodservice Providers" (Matts, 2012) and included questions about local food procurement and foodservice operations. A total of 34 questions were placed into five sections: background and demographics; defining local and traditional foods in school foodservice; traditional and local FTS background; motivators and barriers for procuring local and traditional foods; and desires for specific traditional foods. Prior to distribution, an experienced school FSD reviewed the survey for suitability among school FSDs; suggested changes were incorporated.

Four questions were used to assess motivators and barriers of procurement of local and traditional foods. Questions were formatted with a Likert scale in which 1 is not

a motivator, 2 is somewhat of a motivator, 3 is a moderate motivator, and 4 is an extreme motivator. A list of motivators or barriers was compiled for each question from the Michigan survey and literature review. Participants were given an opportunity to write in "other" motivators or barriers.

Desires were assessed by first asking participants to rank overall interest in procuring each meal component locally. Meal components were categorized according to the National School Lunch Program (NSLP), including vegetables, fruits, meat/meat alternatives, bread/grains, and other. Next, participants were asked to select all traditional foods of interest for local procurement from a list for each meal component, with the option to write-in foods not listed. The lists of traditional foods were developed through literature reviews and discussion with a SD tribal elder with vast knowledge of traditional foods.

SUBJECTS

Forty-two schools with high enrollments of NA students were identified (SDDOE, n.d.). The schools ranged in serving pre-K through 12th grade students, serving K-12, K-8, 9-12, or other (such as pre-12 or 1-8). Contact information for FSDs was provided by SDDOE Office of Child and Adult Nutrition Services (CANS). FSDs were defined as the person responsible for the majority of decisions made for the child nutrition program (CNP) at the school. Schools were screened for eligibility based on enrollment of NA students (>50%) and participation in NSLP. Participants were provided an opportunity to be entered into a drawing to receive a $25 Amazon gift card.

DATA COLLECTION

The survey invitation was provided via email once a week for three consecutive weeks in May 2020. In early June 2020, a survey invitation was included in the SDDOE CANS newsletter. Phone calls were made to each eligible FSD in June 2020 to invite them to take the survey which was re-emailed upon phone call completion. Many FSDs were not working in June as a result of summer vacation. Due to lack of success in reaching FSDs in May-June 2020, phone call invitations were made again in September-October 2020. Data collection closed in November 2020.

DATA ANALYSIS

Motivators and barriers were determined by averaging results from the Likert scale questions, and ranking motivators and barriers from highest to lowest average score. Ranked interest in meal components for local procurement were averaged to determine the overall rank of interest. Desires for specific traditional foods in FTS programs were ranked for each meal component by adding the number of FSDs who selected interest in each item to determine the most popular selections. Mann-Whitney tests were run to compare means for motivators and barriers of schools in East and West River. None of the tests were statistically significant at the 0.05 level of significance.

RESULTS

Of the 42 schools in the sample, 27 started, and 14 completed. Three were excluded due to not serving primarily NA students (<50%). Ten participants dropped out at various points. Beside qualifiers, no question was required, resulting in variable ‘n’ throughout the results.

DEMOGRAPHICS

Notable characteristics of the sample show FSDs are most commonly age 45-65 years and female with a variety of years of experience. The sample represented both White and American Indian or Alaska Native. Most FSDs were from Western SD in districts serving K-12. Only three districts had a history of procuring local foods and even fewer (n=1) had a history of procuring local traditional foods. See Table 1.

Customers were reported to rarely ask for local or local traditional foods. Of the three FSDs currently procuring local foods, they spent 0-2% on local and local traditional foods. When asked about interest in procuring local and local traditional foods, eight and 11 FSDs were interested, respectfully. Two FSDs were not interested in either. FSDs on average described themselves as slightly to somewhat familiar with traditional foods. When asked to write their definition of local foods, FSDs' responses were based on location purchased, location grown, or a list of perceived local foods. When asked to write their definition of local traditional foods, four FSDs responded with definitions similar to expected, seven FSDs provided examples as a definition, and three responded with 'do not use' or 'none available'. FSDs reported using semi-prepared cooking most often followed by scratch cooking and heat and serve.

MOTIVATORS

Fourteen FSDs provided a response asking the level to which factors were motivators in local food procurement, and 11 FSDs responded to the similar question asking motivators for local procurement of traditional foods. Motivators were averaged from one to four with higher numbers indicating a greater motivator (see Table 2). All motivators had an average score above 2.0 indicating they are all "somewhat a motivator". The top three motivators were determined. The highest motivator for both

local and local traditional foods was to improve overall health of students (3.50 and 3.55, respectfully). The second and third motivators for local foods was to increase purchasing from local food growers for community economic development (3.14) and greater customer acceptance of school meal pattern (3.00). The second highest motivator for local traditional foods was to increase cultural knowledge by strengthening connections to traditional foods (3.36) and the third was greater customer acceptance of school meal pattern (3.18).

An optional "other" blank was provided, and for local foods included "students appreciate" and "gets the students to eat fruit", with none noted for local traditional foods. No difference in mean was found between East and West River.

BARRIERS

Fifteen FSDs responded as to which factors were barriers in local food procurement, and 13 FSDs responded to the similar question in local procurement of traditional foods. Barriers were averaged from one to four with higher numbers indicating a greater barrier. All barriers had an average score above 2.0 indicating they are more than "somewhat a barrier". The top three barriers were determined. The highest barrier for procuring both local and local traditional foods was lack of producers from whom to purchase (3.60 and 3.58). The second highest barrier for both groups was lack of products available during school months (3.33 and 3.42). High cost of locally procured traditional products compared to current suppliers was also tied for local traditional foods (3.42). The third highest barrier for was a tie between state procurement regulations and lack of labor to prepare local products (3.07). Additional barriers found in Table 3.

An opportunity was given to FSDs to write in "other" barriers, but none were mentioned. No difference in mean was found between East and West River.

DESIRES

Participants were asked to rank their desire in procuring each of the NSLP meal components locally (Table 4). The results showed the highest preference for vegetables, followed by fruits, then meat and meat alternatives. Milk and grain components tied for fourth. Participants had the least interest in "other" local food products.

Fifteen FSDs selected as many local traditional foods that they would be interested to procure within each meal component. The top three results for vegetables included: traditional carrot varieties (10), traditional potato varieties (8), and prairie turnips, blue corn, and beans (5). When provided an opportunity to list "other" traditional vegetables of interest, two FSDs responded saying "none are available in our area", and "garden veggies such as carrots, corn, green bean, potatoes would all be great, but need to come in clean."

The most popular desired fruits were raspberries (11), wild plums (11), and strawberries (10). In the "other" option, one FSD responded and said "none available in our area".

Bison was largely preferred as a meat/meat alternative with 11 FSDs interested in procuring. Deer (4), antelope (3), and elk (3) were also selected in the top three food items of interest. When provided an opportunity to list "other" traditional meats/meat alternatives of interest, two FSDs responded. One said "none available in our area", and the other listed "home grown chicken, eggs, cheese".

There are no known traditional milk products. FSDs were given an opportunity to write-in traditional milk products, to which seven FSDs responded with “none”, one responded “cheese”, and another FSD said “protein drinks”.

Wild rice (10) was the most selected grain, followed by popcorn (7) and wild oats (2). These were the only three grain products on the survey list. No FSD listed an “other” traditional grain of interest.

The “other” meal component included interest in syrup (8), brown sugar (5), and tea (5). These were the only “other” products on the survey list. No FSD listed an “other” traditional food product on interest.

DISCUSSION

The majority of the FSDs were from West River (16:4 ratio), where more tribal reservations are located. West River has a more arid climate lending itself more towards rangeland than fruit, vegetable, and grain production. Thus, desires presented in this study may be more suited to the climate of West River than East River. Though most FSDs report interest in procuring local or traditional foods, the results show very little history among this sample. Customers rarely ask for local or traditional foods which may make this a low priority among FSDs. Three main themes (health, economy, and support) emerged within the motivators and barriers for procurement of local and local traditional foods.

HEALTH

The biggest motivator to procure local and traditional foods was to improve overall health of students. This response is in line with the literature, which shows FTS programs increase fruit and vegetable (FV) consumption among youth (Taylor, 2013).

FSDs saw greater customer acceptance of school meal patterns as a moderate motivator and accommodating student taste preferences as somewhat of a barrier to using local and traditional foods. Contrary to this, research by Gates found that First Nation's students believed only healthy foods should be served in school lunch programs and expressed preference for healthier food options (2014). Similarly, Gilles found that traditional foods are important to students but tend to be consumed infrequently (2018). This supports the idea that students are receptive to healthy local and traditional foods in FTS programs, but this study shows that FSDs may not perceive this receptivity in students. FSDs reported that customers (including students) rarely ask for local or traditional foods.

While FSDs are motivated by student health, they see a common barrier of lack of labor to prepare local and traditional products. To a lesser extent, FSDs run into limited access to kitchen equipment to prepare and process fresh whole foods.

ECONOMY

According to three FSDs with history of procuring local foods, 0-2% of the foodservice budget was spent on local foods, indicating little to no economic stimulation and relatively small local purchases. For local traditional foods, one FSD responded that 0% of the budget was spent, which could be because the foods were donated from a local producer, or were so small in quantity that they were approximately 0% of the budget. FSDs showed high motivation for procuring local and traditional foods based on increasing purchasing among local food and local traditional food growers for community economic development.

FSDs reported the biggest barrier was lack of local producers from whom to purchase. Willard (2018) indirectly supported this by finding that there is a limited amount of traditional foods available in grocery stores near SD NA reservations. Second to this was the barrier of a lack of products available during school months, further complicated by the barrier of limited storage for bulk purchases. Additionally, FSDs report high cost of locally procured traditional foods as a barrier.

SUPPORT

Two motivators for local and traditional food procurement were greater community support for school meals, and to increase cultural knowledge by strengthening connections to traditional foods. Additionally, FSDs were motivated to procure locally based on greater customer acceptance of the school meal pattern. Customers include students but also school staff and visitors who purchase school meals at a higher cost than student meals, potentially creating more revenue. These motivators may be an indication that FSDs desire to have a good reputation in the community for providing satisfying, culturally-appropriate meals.

Though FSDs are seeking support for school meals from community members including customers, they do not always feel there is support at the local, state, or federal levels to provide these satisfying and culturally-appropriate meals. FSDs reported state and federal procurement regulations as moderate-extreme barriers. Additionally, lack of compliance with their institution's purchasing regulation policies was seen as somewhat-moderate barrier.

CONCLUSION AND APPLICATIONS

DEFINING LOCAL AND TRADITIONAL FOR FTS

FSDs provided definitions for local and traditional foods, and both varied. Since "local" is defined by each FTS program, it appears the definitions are different from school to school. It also seems the FSDs in this study were not specific with their definitions, never providing geographic area or radius from which they consider purchases to be local. Definitions by FSDs for traditional local foods were similar to the definition from the U.S. Farm Bill – "foods that have traditionally been prepared and consumed by an Indian tribe". Depending on tribal traditions and geographic location, the inclusions to the traditional food definition would vary.

There is an opportunity for technical assistance providers to work with FSDs on how best to define local to meet their FTS program goals. The FSDs in this study had an average somewhat-moderate familiarity with traditional foods and 38% belonged to a tribe. This shows an opportunity for FSDs to become more familiar with traditional foods as a first step. This study did not evaluate how students or other potential FTS team members define local and traditional foods. Since students are an integral part of FTS programs, their input is valuable in defining parameters. There would also likely be differences to these responses based on geographical region, urban or rural district, and culture served which could add value to this area of research in the future.

TRADITIONAL FOODS DESIRED & PREPARATION METHODS

FSDs reported improving student health as the biggest motivator for local and traditional food procurement and their desires for nutrient rich traditional foods support this and align with local growing conditions (climate) and NA foods. Looking at the desires for specific traditional foods of interest, FSDs are most interested in 1) vegetable, 2) fruit, and then 3) meat/meat alternative components in that order. Results would be

expected to vary depending on geographical location and traditional foods of other NA tribes or other cultures.

Likely the foods identified as desired would require additional labor and equipment to prepare from their whole form. However, FSDs reported lack of labor to prepare local and traditional foods as a moderate-extreme barrier, and limited access to kitchen equipment to prepare whole foods was somewhat-moderate barrier, creating a gap between what FSDs would like to procure and what they have the capacity to process. Some of these foods, such as fruits, would not require significant labor and equipment since they are usually eaten in the whole form. Vegetables may take more labor and equipment to clean and process. FSDs responses about desired traditional foods ask for long shelf-stability, more items sold in the winter months, and non-produce items like wild rice, popcorn, syrup, brown sugar, and tea.

GETTING STARTED WITH STATE NETWORKS & LOCAL TEAMS

The NFSN reports SD as a state without a FTS network, no enacted FTS legislation, and positions related to FTS only through one organization (*State of the States*, 2019). Though this study examined barriers to local procurements, it did not specifically examine 'why' FSDs had not procured local foods or local traditional foods in the past. Little history of local procurements could in-part be due to the lack of a developed state-wide farm to school network in SD and similar states, which are also home to NA tribal communities. Having dedicated support for FTS procurement may help remove some of the burden. A developed FTS network with state-wide full-time staffing would support school districts in creating FTS programs and building their own FTS team. Furthermore, making existing resources and materials available and easily

accessible by FSDs could help eliminate barriers. For example, the SD Farm to School Guidebook includes a section on "Use of Traditional Foods in Farm to School" (2019). Resources for FTS programs including those with traditional foods are available and shared throughout different state networks (First Nations Development Institute, 2018; American Indian Traditional Foods in USDA School Meal Programs, 2019; Bringing Tribal Foods and Traditions into Cafeterias, Classrooms, and Gardens, 2017; Child Nutrition Programs and Traditional Foods, 2015).

Through this and previous studies, a gap in communication is perceived between FSDs and students. Involving students may help bridge the gap between the perceptions FSDs hold about students and students' true attitudes and beliefs. This could be an opportunity to open dialogue about the desires and preferences of local and traditional foods in school meals among students at schools serving high proportion NA students. Results would vary based on NA tribal foods and are likely to vary school to school with similar geography and culture.

FTS programs are very personalized to school needs. One valuable area of future research would be to compare motivators, barriers, and desires for local and traditional foods in FTS programs across the country to determine if the main themes are the same regardless of different demographics.

BUILDING SCHOOL AND COMMUNITY CAPACITY FOR FTS

FSDs are interested in purchasing from local producers to contribute to community economic development. However, FSDs note that there are not producers from whom to buy nor products available at opportune times of the year for school meals. This study reveals that there exists a desire for these products (local traditional foods) that

are not currently available in the market. This provides an opportunity to produce foods, especially foods which are listed in Table 4 and those that could be stored or processed by the producer and delivered closer to date of use, limiting the FSD barriers of lack of storage and lack of products available during school months.

Farm Bill and other governmental funding continues to increase for local food procurement and local farming. (Johnson & Cowan, 2019) Connecting local producers and community members interested in starting a local food operation with grant opportunities may help local producers to meet the FTS market demand. Grant dollars could be offered to schools to increase storage for FTS products which would help FSDs and encourage greater procurement from local suppliers. FTS programs could also get creative with storage and preservation methods by involving other community members in the FTS team beyond producer and FSD. Local meat lockers, grocery stores, convenience stores, churches, or food pantries may also have unused extra storage space. Furthermore, local producers may need additional grant dollars to help them to start-up their local business and purchase equipment such as season extenders, or increasing shelf-life by drying and pickling items to sell when harvest is low.

NA tribes have a history of food sovereignty and thorough use of resources. Programs like FTS help reclaim this traditional food system and improve present-time food sovereignty by increasing production, distribution, and consumption of foods within tribal communities. Every tribe is different and will have different goals for food sovereignty and how they desire the food system to work for their community. Providing grant and funding opportunities to increase FTS capacity can help facilitate a change to a more sovereign food system. For example, a program could be developed similar to the

"Double Up Dakota Bucks" program. This program doubles Supplemental Nutrition Assistance Program (SNAP) dollars spent on fresh fruits and vegetables, increasing healthy foods purchased by low-income families, sales by farmers, and business at local retailers. Mimicking this model, a potential program could contribute funds to match traditional food purchases by FSDs from local vendors, doubling the buying power of FSDs and increasing sales for local producers. This would be an incentive program for schools while facilitating more sales to help producers get started.

STATE AND FEDERAL SUPPORT FOR FTS

This study did not determine the exact reasons why state and federal regulations are perceived by FSDs as moderate-extreme barriers to local and traditional procurement difficult. There are allowances in the NSLP which make procuring traditional foods easier to accomplish than FSDs may be aware of. The USDA released a memo in July of 2015 titled "Child Nutrition Programs and Traditional Foods". This memo includes different examples for crediting traditional foods in the food buying guide used by FSDs and includes some of the same foods desired by the FSDs in this sample, and it also clarifies that traditional foods that do not credit toward a reimbursable meal may be served and contribute to the weekly nutrient analysis.

Game meats such as bison and venison are allowed as long as they are slaughtered and inspected in a federally inspected facility. This may contribute to what SD FSDs perceive as a barrier, because finding an inspected meat establishment may be difficult in rural communities or limited in the animals they will process. Though the allowance by the USDA is a step in the right direction, it is possible that tribal communities desire to slaughter and process their own meat since this is a long-standing tradition of many

tribes. It is possible that FSDs may be unaware of the allowances that exist and therefore perceive barriers. It is also possible that FSDs perceive them as not enough to overcome the barrier of state and federal procurement regulations. An area of future direction is to look into FSD awareness of traditional food policy at the state and national levels.

CONCLUSION

The results in this study offer a baseline of motivators and barriers for local and local traditional food procurement among FSDs as well as desires for specific traditional foods in FTS programs. More research is needed to determine the traditional foods of interest in other regions and for other cultures served by CNPs. It would also be valuable to determine how these specific procurement desires of FSDs compare to the desires of student customers. Since producers are necessary in order for local foods procurement to be possible, studying the motivators and barriers of local producers would help identify needs to facilitate local production of the foods desired by FSDs in order to bring FTS procurement to fruition. It will remain important to recognize the many differences between tribes and between different cultural groups and regions across the U.S. and the many different ways culture and geography can change motivators, barriers, and desires for local and traditional foods.

TABLES

Table 1. *Characteristics of Food Service Directors, Schools, and Child Nutrition Programs*

Characteristic	n
Participants (FSDs)	
Age (n=21)	
31-45	2
46-55	9
56-65	9
66+	1
Race (n=21)	
White	12
American Indian or Alaska Native	8
Prefer not to say	1
Gender (n=21)	
Female	18
Male	3
Years as FSD of school (n=21)	
1-3	7
4-9	5
10-14	3
15+	6
School	
East or West River (n=20)	
East	4
West	16
Type of School (n=20)	
Bureau of Indian Education	4
Tribal	3
Public not on tribal reservation	7
Public on tribal reservation	6
Grade Levels (n=21)	
K-12	17
Other	4
CNPs	
History of procuring local foods (n=19)	
Yes	3
No	16
History of procuring local traditional foods (n=19)	
Yes	1
No	18

Table 2. *Motivators to Procuring Local Foods and Local Traditional Foods*

Local Foods	Average (Stdev) **All** (n=14)	**East River** (n=3)	**West River** (n=10)
Improve overall health of students	3.50 (0.85)	3.33 (0.50)	3.80 (0.42)
Increase purchasing among local food growers for community economic development	3.14 (0.86)	2.67 (0.58)	3.50 (0.53)
Greater customer acceptance of school meal pattern	3.00 (1.00)	2.50 (0.71)	3.30 (0.82)
Greater community support for school meals	2.85 (1.07)	2.50 (0.71)	3.10 (0.99)
Local Traditional Foods	Average (Stdev) **All** (n=11)	**East River** (n=3)	**West River** (n=8)
Improve overall health of students	3.55 (0.52)	3.33 (0.58)	3.63 (0.52)
Increase cultural knowledge by strengthening connections to traditional food	3.36 (0.50)	3.00 (0.00)	3.50 (0.53)
Greater customer acceptance of school meal pattern	3.18 (0.60)	2.67 (0.58)	3.38 (0.52)
Greater community support for school meals	3.09 (0.54)	2.67 (0.58)	3.38 (0.52)
Increase purchasing among traditional food growers for community economic development	3.09 (0.70)	2.33 (0.58)	3.25 (0.46)

Responses were average scores 1-4 (1=not a motivator, 2=somewhat a motivator, 3=moderate motivator, 4= extreme motivator)
Significance p=0.05, no significant differences between East and West River.

Table 3. *Barriers to Procuring Local Foods and Local Traditional Foods*

Local Foods	Average (Stdev)		
	All (n=15)	**East River** (n=4)	**West River** (n=11)
Lack of local producers from whom to purchase	3.60 (0.63)	3.75 (0.50)	3.50 (0.71)
Lack of products available during school months	3.33 (0.98)	3.50 (1.00)	3.27 (1.01)
State procurement regulations	3.07 (0.92)	3.00 (1.15)	3.10 (0.88)
Lack of labor to prepare local products	3.07 (1.00)	3.00 (1.15)	3.10 (0.99)
Federal procurement regulations	3.00 (0.88)	3.00 (1.15)	3.00 (0.82)
Limited storage for bulk purchases	2.87 (0.92)	2.25 (0.96)	3.09 (0.83)
High cost of locally procured products compared to current suppliers	2.86 (0.95)	3.67 (0.58)	2.64 (0.92)
Accommodating student taste preferences	2.85 (0.90)	2.67 (0.58)	2.90 (0.99)
Lack of compliance with your institution's purchasing regulation policies	2.77 (1.24)	3.33 (1.15)	2.60 (1.26)
Creating/finding recipes to incorporate local foods that meet nutritional standards	2.46 (1.13)	3.00 (1.00)	2.30 (1.16)
Limited access to kitchen equipment to prepare/process fresh whole foods	2.36 (0.93)	2.50 (0.58)	2.30 (1.06)
Local foods with Traditional Significance	Average (Stdev)		
	All (n=13)	**East River** (n=4)	**West River** (n=9)
Lack of local producers from whom to purchase	3.58 (0.67)	3.25 (0.96)	3.75 (0.46)
Lack of products available during school months	3.42 (0.67)	3.00 (0.82)	3.63 (0.52)
High cost of locally procured traditional products compared to current suppliers	3.42 (0.90)	4.00 (0.00)	3.13 (0.93)
Lack of labor to prepare traditional products	3.25 (0.75)	3.00 (1.15)	3.38 (0.52)
Limited storage for bulk purchases	3.08 (0.67)	2.50 (0.58)	3.38 (0.52)
Lack of compliance with your institution's purchasing regulation policies	3.08 (0.90)	3.25 (0.96)	3.00 (0.93)
Accommodating student taste preferences	3.00 (0.63)	2.67 (0.58)	3.13 (0.64)
Federal procurement regulations	3.00 (0.91)	3.00 (0.82)	3.00 (1.00)
State procurement regulations	3.00 (0.91)	3.00 (0.82)	3.00 (1.00)
Limited access to kitchen equipment to prepare/process fresh whole foods	2.83 (0.83)	2.50 (0.58)	3.00 (0.93)
Creating/finding recipes to incorporate traditional foods that meet nutritional standards	2.75 (1.06)	2.67 (0.58)	2.78 (1.20)

Responses were average scores 1-4 (1=not a barrier, 2=somewhat a barrier, 3=moderate barrier, 4= extreme barrier).
Significance p=0.05, no significant differences between East and West River.

Table 4. *Top Three Food Products of Traditional Significance Desired from Each Meal Component for Local Procurement*

	All (n=15) Frequency (rank)	**East River** (n=4) Frequency (rank)	**West River** (n=11) Frequency (rank)
Vegetables			
Traditional carrot varieties	10 (1st)	2 (1st)	7 (1st)
Traditional potato varieties	*8 (2nd)	2 (1st)	5 (2nd)
Prairie turnips	5 (3rd)	1 (2nd)	4 (3rd)
Blue corn	*5 (3rd)	1 (2nd)	--
Beans	5 (3rd)	1 (2nd)	4 (3rd)
Prairie onion	--	1 (2nd)	--
Fruits			
Raspberries	11 (1st)	3 (1st)	8 (1st)
Wild plums	*11 (2nd)	3 (1st)	7 (2nd)
Strawberries	*10 (3rd)	3 (1st)	6 (3rd)
Blackberries	--	3 (1st)	--
Meat and Meat Alternatives			
Bison	*11 (1st)	4 (1st)	6 (1st)
Deer	4 (2nd)	--	4 (2nd)
Antelope	3 (3rd)	--	3 (3rd)
Elk	3 (3rd)	--	3 (3rd)
Fish	--	1 (2nd)	--
Grains			
Wild Rice	10 (1st)	4 (1st)	6 (1st)
Popcorn	*7 (2nd)	1 (2nd)	5 (2nd)
Wild oats	2 (3rd)	--	1 (3rd)
Wild rice	--	1 (2nd)	--
Other			
Syrup	8 (1st)	2 (1st)	6 (1st)
Brown sugar	5 (2nd)	2 (1st)	3 (2nd)
Tea	*5 (3rd)	1 (2nd)	3 (2nd)

Survey questions were "select all that apply". All ties are included for first through third rank, sometimes resulting in more than three foods per component.
**Sum adds up to one less than total because one participant did not identify East or West River.*

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