Manager and consumer perspectives on fruit and vegetable availability and purchasing at Navajo Nation small stores

Emily Piltch, MPH
PhD Dissertation
Agriculture, Food and Environment Program
October, 2017

Committee Members
Dr. Timothy Griffin (Chair)
Dr. Sonya S. Shin
Dr. Robert F. Houser

Acknowledgments

Support from many important individuals and institutions made completion of this dissertation possible. As a Friedman Fellow for my early years at Tufts and then as a USDA NIFA pre-doctoral fellow for the past (almost) two years, the generous support from the Gerald J. and Dorothy R. Friedman Foundation and from the AFRI ELI program enabled me to dedicate myself full-time to the PhD process. If it were not for these funding mechanisms, I would almost surely still be working on the dissertation.

While funding was essential to get to where I am today, it is the guidance and mentorship provided by numerous people that has made it possible for me to stay dedicated to issues of public health nutrition and food justice. I recall the fall of 2010 when I was working at the University of New Mexico Prevention Research Center. I had a yearning to continue my education and was fairly certain that the Friedman School was where I wanted to do that. Following guidance from Friedman alum, I cold emailed the Agriculture, Food and Environment Program Director and requested a phone call. I remember nervously sitting outside of the UNM Health Sciences library hoping to find a bit of quiet for the call. We discussed inter and transdisciplinary work and of course of my interests in the health benefits of community gardening. Our conversation firmed up my interest in both the Friedman School and working/learning under Dr. Tim Griffin. While Tim is an agronomist, I was fortunate that he has such dedication to interdisciplinary work and supporting the interests and skills development of students in ancillary disciplines. I have commented to friends and colleagues, on many occasions, how truly privileged I am to have such a supportive and kind advisor/committee chair.

A huge thank you also goes to my two additional committee members. Gratitude to Dr. Sonya Shin, Executive Director of Community Outreach and Patient Empowerment (COPE) who first welcomed me to the COPE family in the summer of 2012 and has since provided me entrée to and mentorship in working on the Navajo Nation, an honor that not many people are afforded. Much appreciation goes to Dr. Bob Houser who has had immense patience as I've worked through data analysis. Three public health professionals who have mentored and inspired me, and given generously of their time include: Susan DeFrancesco, JD, MPH, Ginny Chomitz, PhD, MS and Sheila Fleischhacker, PhD, JD. Thank you! And, while the theme of this dissertation built on work of the COPE organization, credit must be provided to the many professors and mentors across the Northeast Region who provided me guidance and insight as this project took shape, in many ways, paralleling components of the USDA-funded AFRI Enhancing Food Security in the Northeast that I worked on as a research assistant.

It goes without saying that my mom and dad, Susan and Martin Piltch, PhD, deserve enormous appreciation as they've supported and believed in me no matter what the endeavor. My sister Sarah, JD and her husband, David, and beautiful son have provided love and encouragement throughout this arduous process. My boyfriend Dr. Evan Carson- who has been through his own dissertation- always knew the right things to say, provided calmness, understanding, patience, research assistance and manuscript editing, I can't thank him enough for it all. And a huge thank you to the support of family, friends and classmates throughout the country. Specifically: Dr. Erica Bigio, my childhood best friend, who also has her PhD, was extremely understanding when I needed a shoulder to lean on over the years. Her parents who now live in Boston even attended my defense!

Abstract

The Navajo Nation (NN) is the largest federally recognized tribe in the U.S. More than half of Navajo residents live below the poverty line, 42% are unemployed, and one-third lack plumbing and electricity. In addition, the Navajo people have some of the highest rates of childhood obesity and food insecurity reported for a U.S. population. To reverse these public health challenges, the food environment must provide opportunities for healthy eating at affordable prices. The food environment challenges identified in urban, non-Native communities are structurally different from those faced in NN, so there is a specific need to develop approaches appropriate to local conditions. Convenience stores are the food outlets closest to 70% of Navajo communities, yet these small stores vary in their availability of healthy options. Little is known about the challenges and possible facilitators to supplying fruits and vegetables (F&V) to the most remote regions in NN. The research objectives addressed were to 1) determine F&V availability at all small stores in communities without grocery stores in NN, 2) document customer perspectives on barriers to and facilitators of purchasing F&V at these stores and, 3) understand store owner and manager views on stocking F&V. In Aim 1, we used a modified Nutrition Environment Measures Survey (NEMS) in stores to document all fresh, frozen and canned F&V at the 71 small stores in Navajo Nation communities without grocery stores. We also compared the fresh F&V offerings available at independently operated stores and regional and national chains. We found that nine stores had no fresh fruits and twelve stores had no fresh vegetables available. The overall median number of canned, fresh, and frozen F&V types offered across all stores were nine, eight and three, respectively. There were more fresh fruit and vegetable offerings at independently owned stores compared to regional or national chain stores ($p < 0.05$). Aim 2 explored perspectives on food availability and shopping preferences of 72 customers outside of 9 small stores in remote NN. Four individuals (5.6%) purchased some F&V at the small store the day s/he was interviewed and 32% had purchased some in the previous week. Most participants (64%) shopped primarily at super center stores outside of their communities, yet about half shopped at the small store at least twice per week. This suggests that the small stores are important spaces to encourage healthful food purchasing. Shoppers would be more inclined to purchase F&V if a greater variety were available at affordable prices. For Aim 3, interviews with six owners and 16 managers of 22 small stores in NN revealed that management would like to offer more fresh F&V. However, barriers exist, such as perceived low demand, limited F&V offerings from distributors and for some managers, minimal authority over product selection. Participants were interested in purchasing products from local farmers however few relationships exist and there was concern with food safety requirements. These findings document that increasing availability and purchasing of F&V in remote NN is complex and must address both supply and demand challenges. There are opportunities for increased dialogue among customers and management to encourage augmentation of product offerings. There is also need to explore creative sourcing, such as pooled purchasing among multiple locations, which could help stores increase variety while decreasing cost to customers. Given current product selection and varying levels of decision making autonomy, it will be necessary to pursue different strategies when looking to partner with independently owned stores compared to those that are part of regional or national chains. Study results will inform local programmatic and advocacy efforts to increase healthy food access in remote NN.

Table of Contents

List of Tables

List of Figures

Introduction

Socioeconomic factors (1) and place of residence (2) have profound impact on diet quality, food security and prevalence of diet related diseases. Individuals living in rural areas are at greater risk for obesity (2) as are nonwhite populations (3). While data are limited, Native American communities experience staggering health disparities (4) and this dissertation focuses on the Navajo Nation, the largest Native American tribe in both population and land-base. Over half of Navajo residents live below the poverty line, 42% are unemployed and one-third lack plumbing and electricity (5). The Navajo Nation faces a stark double-burden of high food insecurity and high rates of overweight, obesity and diet related diseases (6). The community food environment influences both food availability and the likelihood of consuming a healthy diet (7,8) yet little is known about the retail challenges and possible facilitators to supplying healthy food to the most remote regions in Navajo Nation.

Using the metrics from the United States Department of Agriculture (USDA), the Navajo Nation is considered a food desert (21). That is, this region's census tracts are low-income where a significant number of residents are more than 20 miles from the nearest supermarket (9). Local studies illustrate a more dire situation, where traveling 45-60 miles or more, each way, for groceries is a normal occurrence (6,10,11). Consequently, families shop for groceries only once or twice per month, as was reported by 50% of nearly 400 individuals interviewed on the Eastern side of Navajo Nation (11). There are thirteen full-scale grocery stores across the 27,000 square mile Navajo Nation. Those families living far from grocery stores have small stores in closer proximity. However, it has been well established that healthy food options at smaller stores are

limited and those that are available are more expensive than those at larger stores and are often of lower quality (12)(13). The long-term goal of this work is to improve access to healthy, affordable foods within small retail food outlets operating in Navajo Nation.

The focus of this dissertation was to better understand the constraints and facilitators facing shoppers and businesses that make purchasing F&V at small stores in Navajo Nation challenging. These challenges were examined in three independent articles.

Food insecurity and health background and significance

Food insecurity impacts 17.4 million people across the US (14). That is, about 14.0 percent of US households were unable to obtain enough food to meet the needs of all their members because they had insufficient financial or other resources for food (14). Within the US population, low-income, ethnic minorities are at the greatest risk for food insecurity (15): much commentary exists on the association between social class and diet quality (12,16,17). Geography also plays a critical role in food availability: according to a nationally-representative survey conducted by the USDA, food insecurity rates were highest in rural areas compared to all others (14). Rural regions lack conveniently located, full-service grocery stores with healthy food options (18). Small convenience stores stocking foods that are energy-dense and nutrient poor with limited availability of healthy foods like fresh F&V, are more prevalent in these rural areas lacking population density necessary for attracting larger stores (13,19–21).

The community food environment influences both food availability and the likelihood of consuming a healthy diet (7,8). In the US, the consumption of F&V are dramatically lower than is recommended, putting the population at risk for being overweight or obese and developing diet related chronic diseases such as heart disease,

stroke and certain types of cancers (22,23). Over one-third of adults are obese, and nearly 70% are either overweight or obese (24) with American Indian/Alaska Natives having the highest adult obesity rate (54%) of any racial or ethnic group (24). Much work has been done attempting to address the food insecurity, obesity paradox (12,25,26) yet ethnic and class disparities persist.

The Navajo Nation government, local organizations and the Navajo people are engaged in intensive efforts to address food insecurity and chronic disease prevalence including passage of two bills. These include a 2% tax on junk foods, the first of its kind within a Native American community (27) and a subsequent bill that eliminates the 5% sales tax on fresh F&V, water and a limited number of additional healthy food items (28). The Dine' Food Sovereignty Alliance (DFSA) is building capacity for local food production and also assisting a variety of food access efforts to indigenize their processes, that is, providing guidance on working collaboratively with local people and following a framework that ensures projects in Navajo Nation are guided by indigenous-ways-of-knowing and not simply by Western perspectives.

Food acquisition habits have been explored in specific regions of Navajo Nation. For example, approximately 250 clients of community health representatives (CHR) in one of the eight Navajo service units (Indian Health Service designation) were surveyed (6). Community food assessments were conducted in one service unit of Arizona and also in three chapters on the eastern side of the Nation (10,11). However, no work has been done assessing shopping habits at small stores or understanding the impact of the healthy food offerings that do exist on shopper decision making.

Access to healthy food in Navajo Nation is a social and environmental justice

issue (28) that has been exacerbated by forced relocation of the Navajo people, colonialism and loss of culture and traditions (6,10). These dimensions all contribute to the food system challenges faced in Navajo Nation, they must be acknowledged, but are not explicitly studied in this dissertation. The research described here was built on the strengths and resources that currently exist in the community. We collaborated with community leaders already invested in healthy food advocacy and promoted co-learning among all partners with hopes to not perpetuate historic injustices (30).

Food purchasing and consumption patterns are informed by a complex interplay of individual, family, community and policy determinants. This dissertation examined the individual, community and built environment levels of food access in order to determine retail and consumer perspectives on availability and purchasing of F&V in Navajo Nation. The dissertation was informed by constructs of two public health theories: the political economy of health and the social cognitive theory as well as the social determinants of health framework. The political economy of health is a broad framework that places health outcomes in political, social-cultural, economic and historic contexts. This theory highlights the complex web of forces exerted on individuals as they interact in society (31,32). Similarly, the social cognitive theory "addresses the reciprocal interplay between self-regulatory and environmental determinants of health behavior" (p. 623)(33). Complementing these theories, a social determinants of health model frames the global perspective of this work by acknowledging and highlighting the "social and environmental inequalities that contribute to health disparities" (p. 455).(34).

Dissertation goal and aims

The goal of this dissertation was to characterize the food retail environment in remote Navajo Nation through triangulating three distinct data sets. Completed in

collaboration with the Gallup, New Mexico based Community Outreach and Patient Empowerment (COPE), we documented all available fruit and vegetable (F&V) types at the small stores; interviewed store owners or managers at small stores in the NM region of Navajo Nation, and also conducted brief surveys with customers at a sample of the small stores where management interviews took place.

Aim 1: Availability and healthfulness of fruits and vegetables offered for sale at independently owned, regional and national chain small stores in remote Navajo Nation

In order to contextualize store management and shopper perspectives on F&V availability and purchasing, it was necessary to objectively document what was offered at the stores. Thus, this portion of the study assessed all fresh, frozen and canned F&V availability, quality and price at the 71 small stores in chapters without grocery stores on Navajo Nation. We also evaluated the role that store ownership structure plays in the amount of fresh F&V offered by the small stores. Small stores are either independently owned and operated or are regional or national chain stores. Based on preliminary knowledge about the Navajo food environment, we hypothesized that there is a significant difference in fresh F&V availability across the three types of stores. Understanding this possible differential in F&V availability can assist in the approaches pursued for collaborating with stores interested in offering a greater number of options.

Aim 2: The complexities of selling fruits, vegetables and traditional Navajo foods in remote Navajo Nation retail outlets: perspectives from owners and managers of small stores

Aims 2 and 3 were geographically bounded to the NM region of Navajo Nation. The primary objective of the second study component was to investigate the barriers and

facilitators store owners and managers face in offering F&V at small stores in remote Navajo Nation. A secondary objective was to investigate the role that small stores play in offering Navajo traditional foods and in collaborating with local food producers.

Aim 3: Fruit and vegetable purchasing at small stores in remote Navajo Nation

Having objectively documented F&V availability at the small stores and learned the perspectives of store management regarding their product offerings, the third component of this study sought input directly from customers. Thus, the objective of article 3 was to document the factors influencing F&V purchasing at the small stores in remote Navajo Nation.

References

1. Choudhary T. Navajo Nation Data US Census 2000. (2010). http://www.nec.navajo-nsn.gov/Portals/0/Reports/NN2010PopulationProfile.pdf. Accessed October 3, 2017.
2. Tarasi D, Alexander C, Nania J. 18,000 Americans without Electricity: Illuminating and Solving the Navajo Energy Crisis. (2011). *Colorado Journal of International Law and Policy*. 22(2):263–82.
3. Eldridge D, Jackson R, Rajashekara S, Piltch E, Begay M-G, VanWassenhove-Paetzold J, et al. Understanding Food Insecurity in Navajo Nation through the Community Lens. In: Ivers A, editor. Food Insecurity and Public Health. CDC Press; 2014.
4. D'Angelo H, Suratkar S, Song H-J, Stauffer E, Gittelsohn J. (2011). Access to food source and food source use are associated with healthy and unhealthy food-purchasing behaviours among low-income African-American adults in Baltimore City. *Public Health Nutrition.* 14(9):1632–1639.
5. Lutfiyya MN, Chang LF, Lipsky MS. (2012). A cross-sectional study of US rural adults' consumption of fruits and vegetables: do they consume at least five servings daily? *BMC Public Health*.12:280. https://doi.org/10.1186/1471-2458-12-280 Accessed October, 2013.
6. Economic Research Service. Food Environment Atlas. https://www.ers.usda.gov/data-products/food-environment-atlas/. Accessed October 3, 2017.
7. Eldridge D, McKenzie J, Jackson R. DINÉ FOOD SOVEREIGNTY A Report on the Navajo Nation Food System and the Case to Rebuild a Self-Sufficient Food System for the Dine People. 2014.

http://www.dinecollege.edu/institutes/DPI/Docs/dpi-food-sovereignty-report.pdf. Accessed October 3, 2017.

8. Rio Puerco Alliance, Hasbidito. Tri-Chapter Food and Energy Economic Survey Results. 2013.
9. Larson NI, Story MT, Nelson MC. Neighborhood Environments. (2009). Disparities in Access to Healthy Foods in the U.S. *American Journal of Preventive Medicine.* 36(1):74–81.e10.
10. Kumar G, Jim-Martin S, Piltch E, Onufrak S, McNeil C, Adams L, et al. (2016). Healthful Nutrition of Foods in Navajo Nation Stores: Availability and Pricing. *American Journal of Health Promotion.* 30(7):501-510.
11. Coleman-Jensen A, Rabbittt M, Gregory C, Singh A. (2015). Household Food Security in the United States in 2014. Vol. 194, USDA Economic Research Report. https://www.ers.usda.gov/webdocs/publications/45425/53739_err194_summary.pdf?v=42515. Accessed October 3, 2017.
12. Franklin B, Jones A, Love D, Puckett S, Macklin J, White-Means S. (2012). Exploring mediators of food insecurity and obesity: A review of recent literature. *Journal of Community Health.* 37(1):253–264.
13. Darmon N, Drewnowski A. (2008). Does social class predict diet quality? *American Journal of Clinical Nutritio*n. 87(5):1107–1117.
14. Drewnowski A, Darmon N. (2005). Symposium: Modifying the Food Environment: Energy Density, Food Costs, and Portion Size Portion Sizes and the Obesity Epidemic. *Journal of Nutrition.*135:900-904.
15. Powell LM, Slater S, Mirtcheva D, Bao Y, Chaloupka FJ. (2007). Food store availability and neighborhood characteristics in the United States. *Preventive Medicine.* 44(3):189–195.
16. Bustillos B, Sharkey JR, Anding J, McIntosh A. Availability of More Healthful Food Alternatives in Traditional, Convenience, and Nontraditional Types of Food Stores in Two Rural Texas Counties. (2009). *Journal of the American Dietetic Association.*109(5):883–9.
17. O'Connell M, Buchwald DS, Duncan GE. (2011). Food access and cost in American Indian communities in Washington State. *Journal of the American Dietetic Association.*111(9):1375–1379.
18. Bell J, Mora G, Hagan E, Rubin V, Karpyn A. Access to Healthy Food and Why It Matters: A Review of the Research. 2013. http://thefoodtrust.org/uploads/media_items/access-to-healthy-food.original.pdf. Accessed October 3, 2017.
19. Centers for Disease Control and Prevention. State Indicator Report on Fruits and Vegetables, 2013. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services; 2013.
20. DHHS. Dietary Guidelines for Americans. 2010.
21. Trust for America's Health, Robert Wood Johnson Foundation. The State of Obesity: Better Policies for a Healthier America. 2015.
22. Centers for Disease Control and Prevention. Strategies to Prevent Obesity and Other Chronic Diseases: The CDC Guide to Strategies to Support Breastfeeding

Mothers and Babies. 2013. https://www.cdc.gov/nutrition/downloads/state-indicator-report-fruits-vegetables-2013.pdf. Accessed October 3, 2017.

23. Keener, D., Goodman K., Lowry A., Zaro S., & Kettel Khan, L.(2009). Recommend Community Strategies and Measurements to Prevent Obesity in the United States: Implementation and Measurement Guide. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. https://www.cdc.gov/obesity/downloads/community_strategies_guide.pdf. Accessed October 3, 2017.
24. Navajo Nation Council Office of the Speaker. (2014). Navajo Nation Council enacts the Healthy Dine' Nation Act of 2013. 22nd http://www.navajo-nsn.gov/News%20Releases/NNCouncil/2014/jan/NNC%20enacts%20the%20Healthy%20Dine%20Nation%20Act%20of%202013.pdf. Accessed October 3, 2017.
25. Office of the Navajo Nation Tax Commission. Public Ruling Administration of the "Elimination of the Sales Tax on Fresh Fruits, Fresh Vegetables, Water, Nuts, Seeds and Nut Butters" under the Navajo Nation Sales Tax. http://www.navajotax.org. Accessed October 3, 2017.
26. Anderson MD. Beyond food security to realizing food rights in the US. (2013). *Journal of Rural Studies.* 29:113–122.
27. Laveaux D, Christopher S. (2009). Contextualizing CBPR: Key Principles of CBPR meet the Indigenous research context. *Pimatisiwin: a Journal of Indigenous and Aboriginal Community Health.*7(1):1.
28. Fine B. The Political Economy of Diet, Health and Food Policy. New York: Routledge; 1998.
29. Minkler M, Wallace S, McDonald M. (1994). The Political Economy of Health: A Useful Theoretical Tool for Health Education Practice. (1994). *International Quarterly of Community Health Education.* 15(2):111–126.
30. Bandura A. Health promotion from the perspective of social cognitive theory. (1998). *Psychology & Health*. 13:623–649.
31. Schulz A., Northridge ME. (2004). Social Determinants of Health: Implications for Environmental Health Promotion. *Health Education & Behavior.* 31(4):455–471.

Availability and healthfulness of fruits and vegetables offered for sale at independently owned, regional and national chain small stores in remote Navajo Nation

Abstract

Introduction

Rural and remote populations like Navajo Nation have few food outlets close to home and the small stores that do exist have limited offerings. The availability and healthfulness of the fruits and vegetables (F&V) offered has not been systematically documented nor has the impact of store ownership on F&V availability been assessed.

Methods

Using a modified Nutrition Environment Measures Survey in stores (NEMS-S), this study summarizes the availability of all fresh, frozen and canned F&V at the 71 small stores in Navajo Nation communities without grocery stores and compares the fresh F&V offerings available at independently operated stores and regional and national chains. This study also documents the percent of these stores meeting guidelines for minimum stocking levels of F&V at small stores.

Results

One or more fresh, frozen or canned vegetables were available at over 75% of stores in this study. Fresh and canned fruits were available at 87% of stores while frozen options were offered at only 34%. The median numbers of canned, fresh, and frozen F&V types offered were nine, eight and three, respectively. There were more fresh F&V offerings at independently owned stores compared to regional or national chain stores ($p < 0.05$). Forty-nine percent of stores met the "basic" designation for F&V minimum stocking levels and 21% met the "preferred" level based on the Robert Wood Johnson Foundation expert panel guidelines.

Conclusion

There was considerable range in the amount of F&V types offered at small stores in remote Navajo Nation. These inventory data should be viewed within the broader context of the varied dimensions impacting healthy food access in the food desert regions studied.

Introduction

Unhealthy dietary patterns, obesity and diet-related diseases have been correlated with neighborhood deprivation, high concentration of minority populations and rural settings (1). While a network of complex factors influences dietary patterns, it has been

hypothesized that the food environment is a larger contributor to the obesity epidemic compared to individual factors such as knowledge and skills (2).

Of the 110 chapters (geopolitical units) in Navajo Nation, 99 of them do not have a grocery store (3). The grocery stores are located in chapters with the largest populations: between 2,000 to 9,000 residents per chapter, according to the 2010 Census (3). Most, but not all, of the 99 chapters without grocery stores have a small store with varying levels of fruits and vegetables (F&V). The majority of Navajo Nation residents live in the remote areas with 70% of Navajo residents living in a chapter without a grocery store. With small stores providing the most convenient food shopping opportunities for a large proportion of Navajo Nation, it is important that these stores provide a variety of quality and affordable F&V options.

Over the past 15 years, two studies have been conducted documenting food availability in Navajo Nation. In 2000, a collaboration between University of New Mexico (UNM) and Dine College assessed the Navajo Nation food environment (4). They documented the availability and price of selected healthful foods in 46 small stores (4). The sample included small grocery stores, convenience stores and trading posts that were more than 15 miles from a large grocery store in New Mexico, Arizona and Utah. Popular fresh F&V as well as a variety of canned and frozen F&V without added salt or sugar were included. Stores had an average of nine types of fresh F&V. More than half of the stores had the following fresh F&V: celery, carrots, lettuce, potatoes, tomatoes, oranges, bananas and apples, while five stores had no fresh F&V. Analysis of variance showed no differences in availability of healthful foods by type of store or by distance

from a major grocery store. It was reported that quality and price varied among store types but those analyses were not provided (4).

During the summer of 2013, the Centers for Disease Control and Prevention (CDC) and the Navajo Nation Division of Health assessed a sample of grocery and convenience stores both on and near the Navajo Nation using an augmented Nutrition Environment Measures Survey in Stores (NEMS-S) (5). The NEMS-S is a standardized observational survey to document the availability of healthy food options, prices and quality in the retail environment (6). The survey provides structure for documenting food and beverage availability from all food groups and also compares availability of healthful items to their less healthful alternatives (eg. whole wheat bread vs. white). A total of 63 stores were included in the 2013 study, including all 13 supermarkets and 50 convenience stores on the Navajo Nation and nine border town supermarkets. The study revealed similar findings to those conducted elsewhere in the country and reported in a systematic review on measures of the consumer food store environment (7). Healthy options were more commonly found at supermarkets compared to convenience stores (5) and while focus of the study was not on F&V specifically, it was documented that all grocery stores offered four or more types of fresh fruits and five or more types of fresh vegetables, while only about 30% of the convenience stores offered this variety. Quality was not reported nor were frozen F&V types assessed. Over half (62%) of Navajo convenience stores offered canned fruits in water or 100% juice and 88% offered low sodium (<200 mg/serving) canned vegetables in water and without sauce. However this study did not document the number of types of healthy canned F&V, simply their presence (5).

There are three distinct ownership structures of small stores in Navajo Nation: independently owned stores (such as trading posts); Navajo Nation chain stores (such as Navajo Petroleum and the Red Mesa Express chain) and national/international chain stores (such as Chevron or Shell). The UNM/Dine College study found no difference in F&V offerings among store management types (4) but their sample size was smaller and they did not divide stores by independent versus regional or national chains, which we hypothesize will prove important. From informal conversations with managers at these three types of stores, we learned that the level of autonomous decision-making among the different store owners (or managers) has strong impacts on the type of foods offered.

A systematic baseline assessment of F&V availability across all small stores in Navajo Nation has not been done. Our study fills that research gap using NEMS-S modified for a focus on F&V. The purpose of our study was to document the availability, quality and price of F&V at the 71 small stores in chapters without grocery stores in Navajo Nation. We also evaluated the role that store ownership structure plays in the amount of fresh F&V offered by small stores in Navajo Nation. We hypothesized that there is a significant difference in fresh F&V availability across the three types of stores. Interviews with a sub-sample of store owners and managers of the small stores in this study provided qualitative context to support this hypothesis (8). Not only do owners (of the independent stores) have autonomous decision making power compared to the hierarchical decision making structure that occurs at regional or national chain stores, but the owners also consider their stores community spaces that provide essential services to the local residents. Even though healthy food, like F&V, is not the most popular type of food sold at the stores, owners are committed to offering them as a convenience to

shoppers who have few other shopping choices within a large radius. Understanding if a relationship exists between store ownership type and amount of fresh F&V offered will inform future store intervention work and will also provide avenues through which alternative supply chain development might be possible.

Methods

Design

Our study documented all fresh, frozen and canned F&V at the 71 small stores in Navajo Nation chapters without grocery stores. An augmented NEMS-S (6) tool was used to assess availability and price of all F&V available. We also documented the quality of the fresh F&V and the availability of frozen and canned with no or low sodium for vegetables (≤ 140 mg/serving) and no additives (e.g. added sugars or high fructose corn syrup) for fruit.

The NEMS-S is an established survey utilized across the country (7) to assess food availability in food retail settings. It is one of a suite of survey instruments used to assess the food environment. The suite includes surveys specific to restaurants and worksite vending machines. Our study is part of a larger Healthy Stores initiative of the non-profit organization Community Outreach and Patient Empowerment (COPE) located in Gallup, New Mexico, and funded through the Centers for Disease Control and Prevention (CDC) Racial and Ethnic Approaches to Community Health (REACH) grant. We utilized a sub-set of the data collected for the Healthy Stores initiative that assessed a broader array of food availability at all small stores across Navajo Nation.

The data analyzed for our study were collected by COPE staff, volunteers (including the first author) and community partners. The survey was piloted and

surveyors were provided extensive training to ensure reliability of data. Each section of the survey had specific instructions to remind the data collector as s/he embarked on that portion of data collection. For example, in the fresh fruits section, the data collector was told to always look for the fruits sold individually to ensure eventual analysis could compare quality and price for the same type of item sold across stores. If that F&V type was only sold in a bag or other packaging, the data collector was to document how it was sold, the price and quality of available items. For fresh fruit, apple, banana, orange, pear, strawberries, and grapes were provided on the survey and the data collector was told to select *Yes* if that item was available at the store and *No* if it was not available. The data collector was guided to document all other fruits that were available and to select quality and record price (either per item, pound or whatever packaging it came in). Fresh F&V quality was assessed on a scale of 1 (low quality) to 3 (high quality). For the decision-making process, the data collectors were told that if half or more of the F&V type (say, apples) was acceptable enough for him/her to eat, then it would be a 3. Documenting a 2 would indicate medium quality. While F&V quality is a subjective variable, sufficient training was provided to ensure reliable data collection. To view the entire survey tool, see appendix: Navajo Nation Healthy Stores Initiative-food environment assessment.

Sample

Our study utilized a subset of data collected for the COPE Healthy Stores initiative. The COPE database included all small stores across Navajo Nation. Multiple strategies were used to ensure a complete list: Kumar et. al (2015) provided a compilation of Navajo stores from the InfoUSA 2011 dataset, Yellow Pages, Google Maps and contributions from Navajo Division of Health staff (5). Calls were made to each of the

110 chapters to gain local knowledge of the current retail environment. All stores fell under one of three management types. Independent stores included all trading posts and convenience stores that are owned and operated autonomously. Regional chain stores were those owned and operated by a company on or near the Navajo Nation that owns multiple stores and national chain stores were those owned and operated by national or international companies. The intent of our study was to understand F&V availability in only the most stark food deserts of the Navajo Nation; thus, the parameters for inclusion in the study were that the store must be in a chapter that does not have a grocery store. To the best of our knowledge, this is a complete list of small stores located in chapters of the Navajo Nation that do not have a grocery store.

Data collection occurred at the convenience of data collectors; thus, there was no systematic bias introduced regarding day or time of collection. The inventories were conducted using electronic tablets that had a Commcare (Dimagi, Inc.) platform for data entry.

Analysis

Store environment data were analyzed using Stata statistical software package version 12.1 (StataCorps, College Station, TX). Data are presented as percent of stores on Navajo Nation, in chapters without grocery stores, that offer any fresh, frozen or canned F&V across all stores and divided by ownership type. Frequencies of available fresh, frozen and canned F&V are provided. Availability of no/low sodium (defined as <140 mg/serving) frozen and canned vegetables as well as frozen fruits with no added sugar or other additives and canned fruits in water or their own juices are also reported. For the most commonly available fresh items, median quality and price are also presented.

It is customary that in social science research a representative sample is used to draw conclusions about the population of interest. As long as appropriate sampling procedures are used (for example, random or stratified random sampling), and a sufficient sample size is chosen based on *a prior* criteria, conclusions based on the sample can be attributed to the population. For the current study, however, we utilized data collected on the entire population of small stores within our defined constraints: stores in chapters without grocery stores, thus, statistical tests typically run on a sample are not necessarily needed to infer information about the whole. Although it could be argued that it is not necessary, we performed statistical analyses to test our hypothesis that there is a statistically significant difference among the total amount of fresh F&V types offered at the three types of stores.

Due to non-normality of our dependent variables, we used non-parametric statistical tests. First, we used the Kruskal-Wallis test to compare median amounts of F&V across the three store types. Since this was found to be significant at the $p<.05$ level, we could reject the null hypothesis that there is no difference among the fresh F&V types across the three store categories. We then ran the two-sample Wilcoxon rank-sum (Mann-Whitney) test to compare independently owned stores to regional chains; independent to national chains, and regional to national chains. Due to comparing across three store types, we corrected the p-value (0.05/3) and statistical significance would be determined at a level of $p<0.016$.

Stores that met the minimum stocking levels defined by the Robert Wood Johnson Foundation for small retail food outlets specific to the F&V category at the Basic and Preferred levels were also determined (9). To meet the *basic level*, stores had to offer four

varieties of qualifying fruits and six varieties of qualifying vegetables; up to two (in each category) could be canned or frozen. At least one vegetable variety had to be dark green or red/orange per USDA guidelines (10). For the *preferred level*, stores had to provide six varieties of qualifying fruits (three could be canned or frozen) and eight varieties of qualifying vegetables (four could be canned or frozen). At least two vegetable varieties had to be dark green or red/orange. Canned or frozen fruits must be in water, 100% juice or extra light or light syrup. Canned or frozen vegetables could not have any additional ingredients besides water or a small amount of sugar for processing and they must also have no or low sodium. In addition to the above stipulations, the following were also not allowed to be included in the metric for determining if stores met minimum F&V stocking levels: fruits or vegetable juice, garlic, herbs, condiments, ginger root, lemons and limes.

Results

Fruit and Vegetable Availability

Tables 1-3 summarize the availability of fresh, frozen and canned F&V at the 71 small stores in Navajo Nation communities that do not have grocery stores.

Table 1 Percent of stores on Navajo Nation, in chapters without grocery stores, that offer any fresh, frozen or canned fruits and vegetables; all stores and divided by ownership* type

	All stores		**Independently owned**		**Regional chain**		**National chain**	
	Number (n=71)	%	Number (n=27)	%	Number (n=28)	%	Number (n=16)	%
Vegetables								
Fresh	59	83	25	93	22	79	12	75
Frozen	54	76	23	85	19	68	12	75
Canned	62	87	24	89	24	86	14	88
Fruit								
Fresh	62	87	25	93	24	86	13	81
Frozen	24	34	12	44	11	39	1	6
Canned	62	87	23	85	24	86	15	94

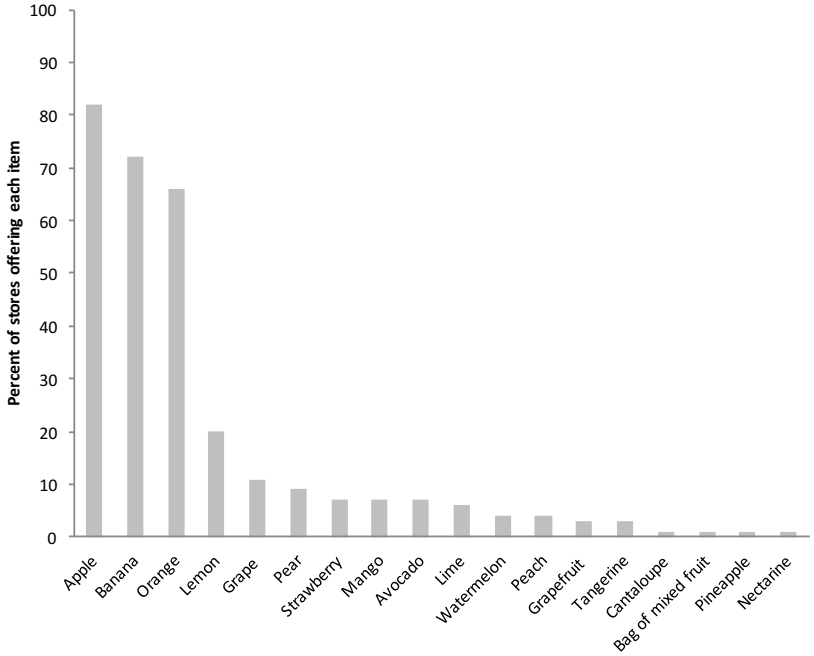
* There are three distinct ownership structures of small stores in Navajo Nation: independently owned stores (such as trading posts); Navajo Nation regional chain stores (such as Navajo Petroleum and the Red Mesa Express chain) and national/international chain stores (such as Chevron or Shell).

Table 2 Percent of stores on Navajo Nation, in chapters without grocery stores, that do not offer fresh, frozen or canned fruits and vegetables

	Number (n=71)	**%**
Vegetables		
Fresh	12	17
Frozen	17	24
Low or no sodium	37	52
Canned	9	13
Low or no sodium	37	52
Fruit		
Fresh	9	13
Frozen	48	68
No additives	60	85
Canned	9	13
No added sweetener	27	38

The percent of stores offering each type of fresh F&V is shown in Graphs 1 and 2, respectively. Fresh fruits and fresh vegetables were available at 87% (n=62) and 83% (n=59) of stores, respectively. Nine stores had no fresh fruits and twelve stores had no fresh vegetables available. The median types of fresh fruits offered was three and for vegetables, five. Stores had a greater variety of fresh vegetables compared to fresh fruit. Most of the stores offered potatoes (75%), lettuce (72%), onion (72%), carrots (68%), tomatoes (62%) and celery (52%). There were three fresh fruit types available at half or more of the stores. Those included apples (82%), bananas (72%) and oranges (66%).

Graph 1 Availability of fresh fruits among 71 small stores in Navajo Nation chapters without a grocery store



Graph 2 Availability of fresh vegetables in small stores in Navajo Nation chapters without a grocery store (n=71 stores)

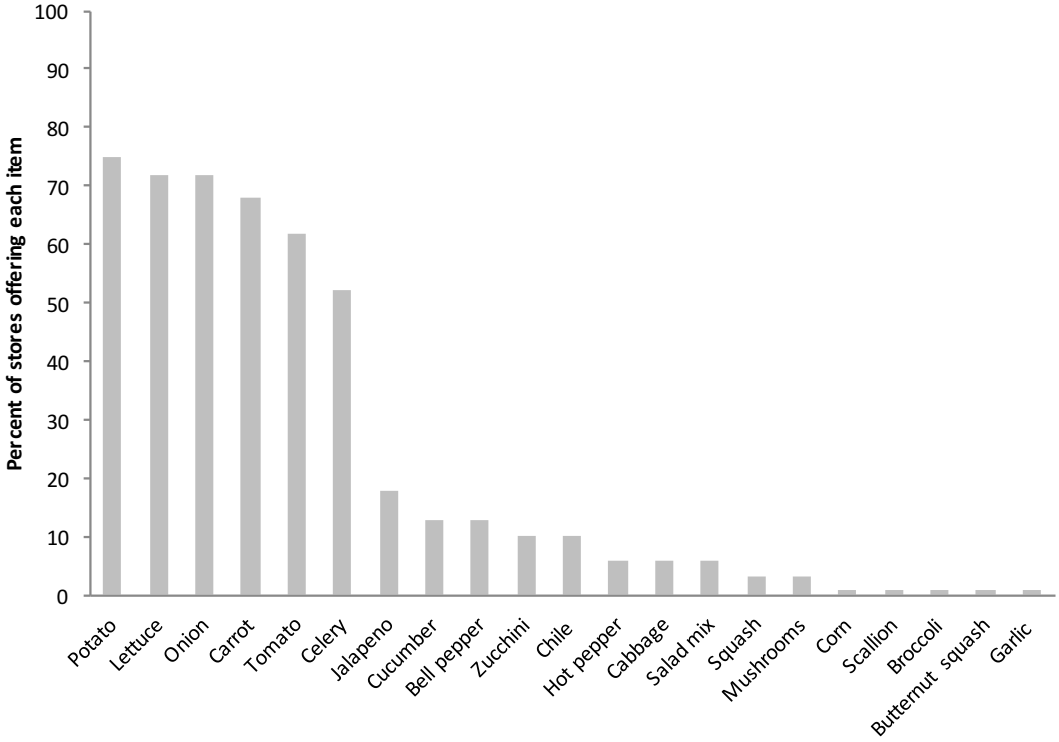


Table 3 provides a summary of median availability broken down by store type. Summaries of F&V availability were divided by store ownership type to examine if stores under different management styles offered, on average, quantitatively different amounts of F&V variety. There was a statistically significant difference in the number of types of fresh F&V available at the three store types (p-value = 0.0034). Independently owned stores had a median of eleven fresh F&V varieties, regionally operated chain stores had a median of eight and nationally operated chain stores had a median of six-and-a-half.

Table 3 Median and Interquartile Range (IQR); availability* for each fruit and vegetable category by store-ownership of small stores on Navajo Nation in chapters without grocery stores

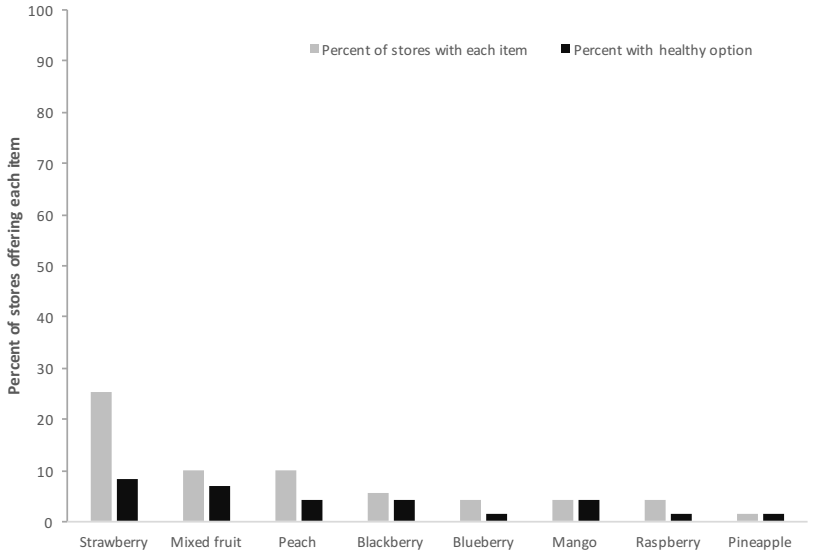
	Min, Max	Overall Median (IQR)	Independently owned Median (IQR)	Regionally owned chains Median (IQR)	Nationally owned chains Median (IQR)
Vegetables					
Fresh	0, 12	5 (5)	7 (3)	5.0 (4.5)	4.0 (5.0)
Frozen	0, 8	2 (2)	3 (2)	2.5 (3.0)	1.0 (1.5)
Canned	0, 12	5 (4)	5 (4)	5.5 (3.0)	3.0(1.5)
Fruit					
Fresh	0, 9	3 (2)	4 (4)	3.0 (1.0)	3.0 (2.0)
Frozen	0, 5	0 (1)	0 (2)	0 (1.5)	0 (0)
Canned	0, 8	4 (3)	4 (2)	4.5 (3.0)	3.5 (2.0)
Total fresh	0, 20	8 (6)	11(7)	8.0 (6.0)	6.5 (7.0)
Total frozen	0, 9	3 (3)	3 (5)	3.0 (4.5)	1.0 (2.0)
Total canned	0, 18	9 (5)	9 (6)	10 (5.0)	6.0 (3.5)

*Availability refers to the number of different types of fruits and vegetables available at a store. For example, apples, bananas, and oranges represent three types available; multiple varieties of one type (e.g., apples) do not count as multiple types. Juice (fruit and vegetable) is not included.

Frozen fruits and vegetables

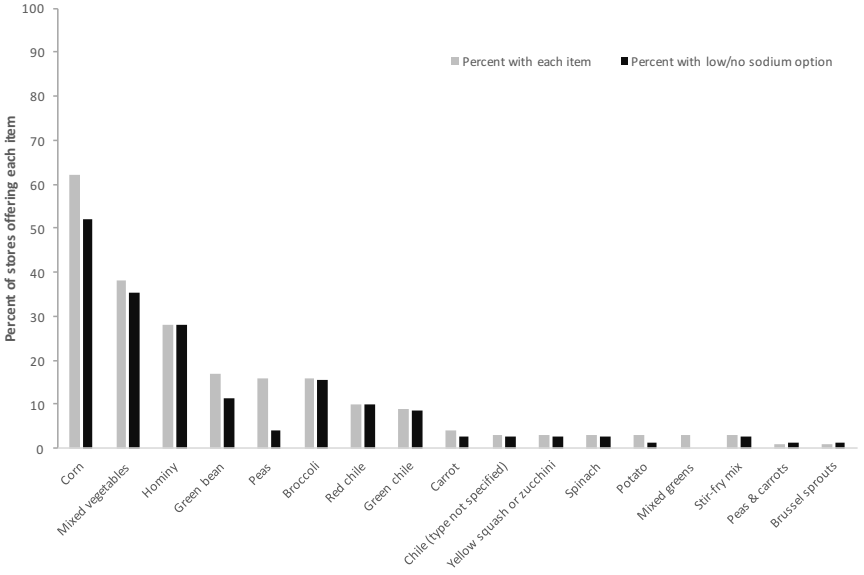
See Graphs 3 and 4 for complete summaries of frozen F&V offerings at the stores. Frozen fruits were available at 34% (n=24) of stores and frozen vegetables at 76% (n=54). The median number of frozen fruits and vegetable types were zero and two, respectively. Among those stores that offered any frozen fruit, the most commonly found items were strawberries (18 stores), mixed fruit (7 stores) and peaches (7 stores). Few stores offered options with no additives: six stores offered strawberries with no additives and five offered mixed fruit with no additives. Only one type of frozen vegetable was found at more than 50% of stores (corn, at 62% of stores). After corn, mixed vegetables and hominy were the two frozen vegetable types available at the most number of stores, 39% and 28% of stores, respectively. Among those stores that offered frozen vegetables, a large proportion of those stores had a low or no sodium option. Among the 44 stores offering frozen corn, 84% (n=37) had a no or low salt option; 93% that had frozen mixed vegetables had a low or no sodium option (25 of the 27 stores); and all stores with hominy had a low or no sodium type available.

Graph 3 Availability of frozen fruit types and healthy options+ in small stores in Navajo Nation chapters without a grocery store (n=71 stores)



+ healthy options are those frozen fruit types without added sugar or other sweeteners or preservatives
*Note: if a store offered the frozen fruit and the healthy option, it would be reflected in both the lighter and darker bar. Alternatively, if a store only offered the healthier option, it would just be reflected in the darker bar.

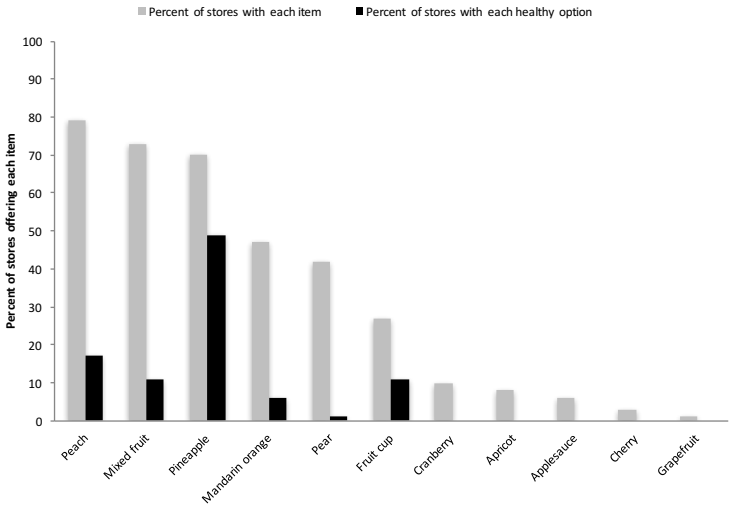
Graph 4 Availability of frozen vegetables and low or no sodium options in small stores in Navajo Nation chapters without a grocery store (n=71 stores)



Canned fruits and vegetables

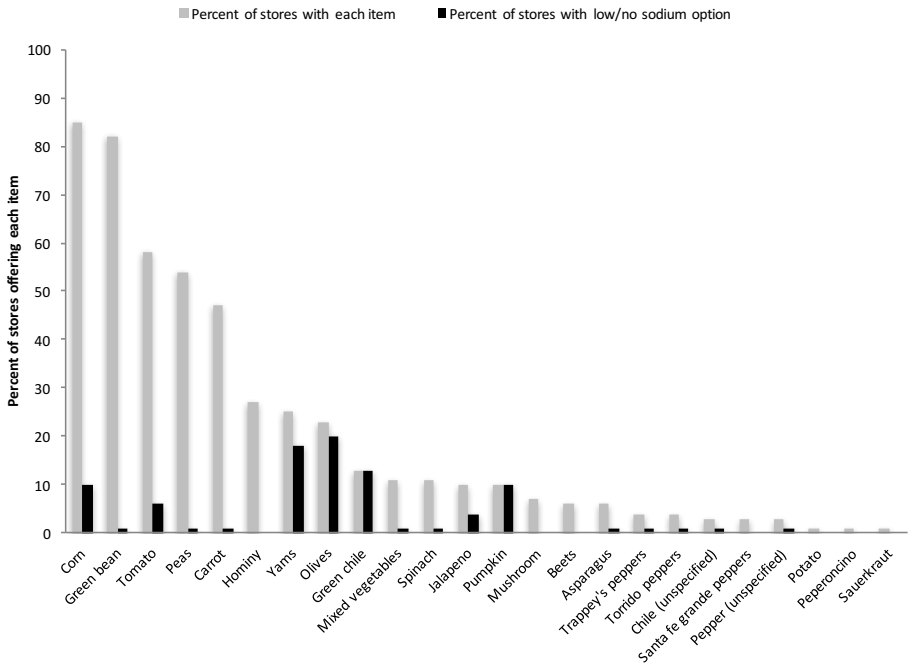
See Graphs 5 and 6 for a summary of all canned F&V offered and percent of stores carrying each type. Canned F&V were available at most stores, with 87% (n=62) offering some type of F&V. Eight percent of stores (n=6) did not offer any varieties of canned fruits or canned vegetables; 38% (n=27) of stores did not have any healthy canned fruit options; and 52% (n=37) did not have any healthy canned vegetable options.

Graph 5 Availability of canned fruit and healthy options* in small stores in Navajo Nation chapters without a grocery store (n=71 stores)



*For canned fruit to be considered a healthy option, it must be in its own juice with no added sugars or high-fructose corn-syrup.

Graph 6 Availability of canned vegetables and healthy options^ in small stores in Navajo Nation chapters without a grocery store (n=71 stores)



^ For canned vegetables to be considered healthy options they must have ≤140 mg of sodium per serving.

Canned peaches (79%), mixed fruit (73%) and pineapple (70%) were the most commonly available canned fruit options. Forty-nine percent of stores offered pineapple in its own juice with no added sugars or high-fructose corn-syrup, but there were few other healthy canned fruit options (17% of stores offered healthy canned peach and 11% of stores had healthy mixed fruit in a can).

More than half of the stores offered canned corn (85%), canned green beans (82%), canned tomato (58%) and canned peas (54%). Healthier alternatives of olives and yams were available at the most number of stores: 20% and 18% respectively. For canned vegetables to be considered healthy options they must have ≤140 mg of sodium per serving. It is possible that yams were incorrectly documented as *healthy* because they do not customarily have any sodium, though they often have a sweetener like high

fructose corn syrup (in *heavy syrup*). Sweetener was not assessed for canned vegetables which might explain why they appear to be documented as a healthy vegetable option.

Fresh Fruit and Vegetable Pricing and Quality

Tables 4 and 5 summarize the median, minimum and maximum prices as well as quality of the fresh F&V in the units that were most commonly available at the small stores. For any given F&V type, there was a large range between the least and most expensive offerings. For example, depending on the store, a 1 lb bag of carrots was between $0.69 and $2.49. Similarly, a single onion was between $0.30 and $2.09 depending on the store. There was also a large range in pricing for fruits with an orange, apple or banana costing anywhere from $0.30 to $0.99 (for bananas), $1.49 (for apples) and $1.89 (for oranges).

Table 4 Fresh vegetable median price and quality based on sales unit most commonly found among the small stores in remote Navajo Nation

Vegetable	Unit	# of stores w/ unit	Total #stores w/ veg type	% of stores w/ unit~	Median price ($) (IQR)	Min, Max price ($)	Median quality (IQR)
Potato	5 lb bag	15	53	28	2.29 (0.25)	1.99, 3.23	3.00^(1.00)
	10 lb bag	33	53	62	3.99 (2.00)	2.39, 7.25	3.00 (0)
Carrot	1 lb bag	33	48	69	1.29 (0.36)	0.69, 2.49	3.00 (0)
Onion	Individual	42	51	82	0.79 (0.30)	0.30, 2.09	3.00 (1.00)
Tomato	Individual	16	44	36	0.69 (0.51)	0.39, 1.99	3.00 (1.00)
Celery	Bundle	25	37	68	2.15 (0.60)	0.79, 2.99	3.00 (1.00)
Lettuce	Head	49	51	96	2.05 (0.70)	0.79, 2.99	3.00 (1.00)

~Of the stores that offer any of the vegetable type
^5 lb bag of potato quality based on 14 stores because one store sold by the unit did not have quality recorded

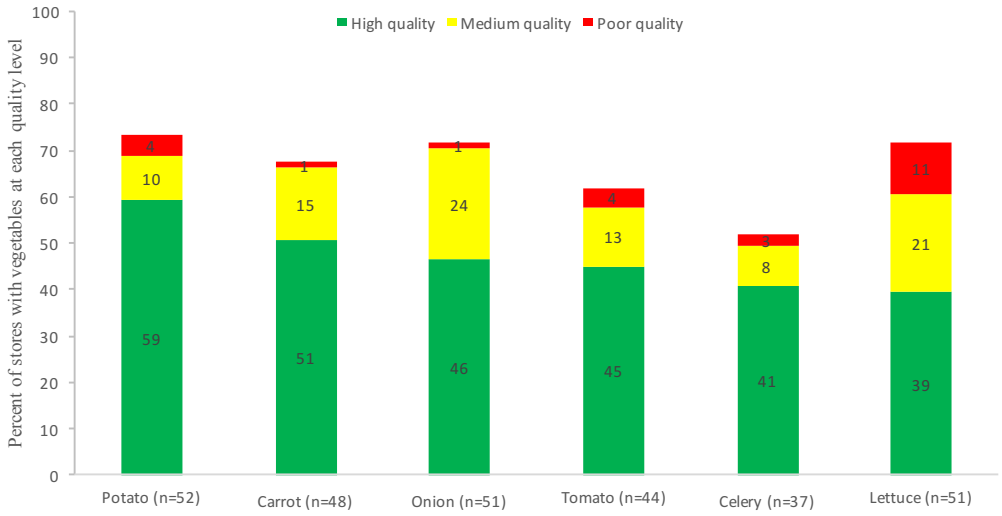
Table 5 Fresh fruit median price and quality based on sales unit most commonly found among the small stores in remote Navajo Nation

Fruit	Unit	# of stores w/ unit	Total #stores w/ fruit type	% of stores w/ unit~	Median price ($) (IQR)	Min, Max price ($)	Median quality (IQR)
Orange	Individual	37	47	79	0.89 (0.20)	0.35, 1.89	2.50` (1.00)
Apple	Individual	43	58	74	0.99 (0.38)	0.30, 1.49	2.00 (1.00)
Banana	Individual	34	51	67	0.69 (0.31)	0.30, 0.99	2.00* (0)

~Of the stores that offer any of the fruit type
`Orange quality based on 36 stores because one store that sold by the unit did not have quality recorded.
*Banana quality based on 33 stores because one store that sold by the unit did not have quality recorded.

To assess the quality of fresh F&V across all stores offering each type, Graph 9 shows the percent of stores with each vegetable by whether it was of high, medium or poor quality. The fruit or vegetable is in order from the greatest to fewest stores with high quality of each product. For example, while 73% of all stores sold fresh potatoes, 59% of all stores had high quality potatoes on the day of data collection. A similar number of stores had iceberg lettuce for sale but it was the vegetable type with the lowest percent of stores with high quality product. It is notable that most stores providing fresh F&V had high or medium quality on the day of data collection.

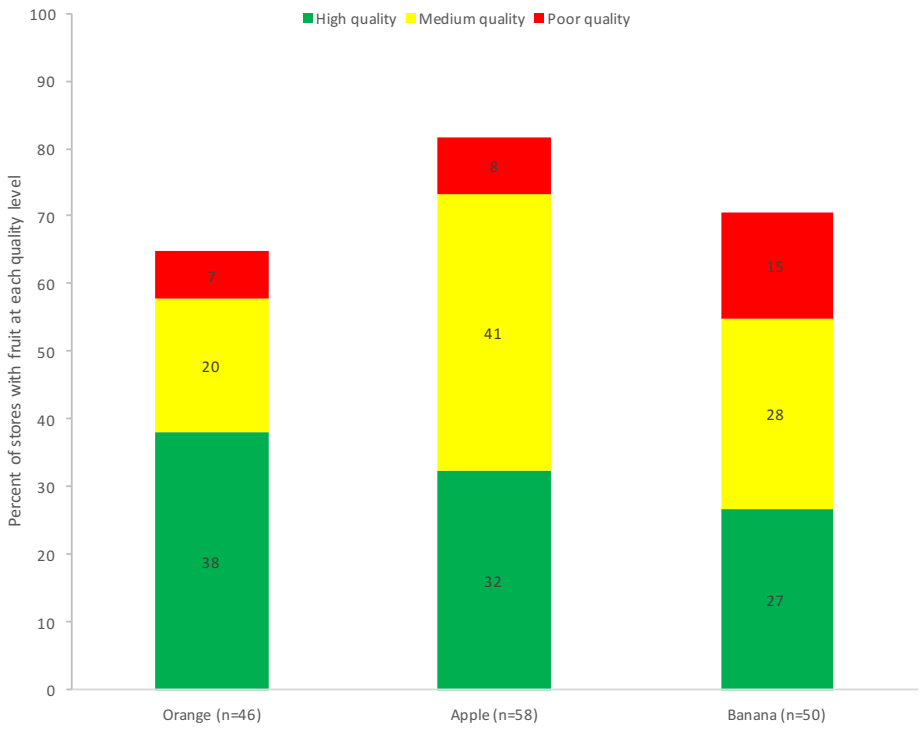
Graph 9 Percent of Navajo Nation small stores offering each fresh vegetable type and quality* level assessment of each (n=71 stores)



*Percentages may vary slightly from Graph 2 because items could have been available at a given store but quality was not recorded and/or percentage rounding for the purposes of dividing by high/medium/low quality.

Graph 10 shows the percent of all stores that had high, medium and poor quality oranges, apples and bananas. Close to 40% of all stores had high quality oranges while about one-third had high quality apples or bananas.

Graph 10 Percent of Navajo Nation small stores offering each fresh fruit type and quality level assessment of each (n=71 stores)



Stores Meeting Minimum Stocking Levels of Produce

Based on the Robert Wood Johnson Foundation (RWJF) Healthy Eating Research guidance for minimum levels of fruits and vegetable stocking at small retail food stores, 35 stores assessed in our study met those guidelines at the basic level. The dark green or red/orange options found at these stores included: fresh carrots, tomatoes and butternut squash; low or no-sodium, frozen broccoli, carrots, spinach and mixed greens; and

canned tomato, carrot, spinach and pumpkin. Fifteen stores (21%) met the preferred stocking level guidance that required six varieties of qualifying fruits (three of which could be canned or frozen) and eight varieties of qualifying vegetables (four could be canned or frozen). Table 6 summarizes these findings.

Table 6. Stores meeting fruit and vegetable minimum stocking levels for small retail food stores based on Robert Wood Johnson Foundation Healthy Eating Research guidance

F&V stocking level	Study stores meeting req (%)	No. qualifying* fruit	No. canned/frozen allowable	No. qualifying* vegetables	No. canned/frozen allowable
Basic	35 (49%)	4	2	6	2
Preferred	15 (21%)	6	3	8	4

*To qualify, frozen and canned fruit had to be in water or 100% juice with no other added ingredients; frozen or canned vegetables had to be low or no sodium; garlic, lemons and limes could not be included.

Discussion

Substantial work has been done to elucidate the most impactful determinants that encourage the consumption of healthier foods and the reduction of overweight, obesity and concomitant chronic diseases. Still, targeted effort is imperative for change to occur in communities such as Navajo Nation that have some of the highest rates of diet-related chronic disease across all US populations. There is need for programmatic and policy level change at multiple levels of the social ecological model while partnering with stakeholders across levels.

This study provided a landscape look at the fresh, frozen and canned F&V available for purchase at all of the small stores on Navajo Nation in communities without grocery stores. Many families take monthly trips to the Navajo Nation border towns where they do the bulk of their food shopping. Brief interviews with 72 shoppers outside of nine small stores in Navajo Nation provided evidence that residents in these regions purchase a variety of products at the stores (11). One-third (n=23) of the shoppers interviewed had purchased any F&V at the small store in the week prior to the interview and one-quarter (n=19) stated that staple food items were their among their most commonly purchased items at the small stores (11). Given the diversity of foods purchased by shoppers at these small stores, it is necessary to understand which foods are available, and their quality and cost, to contextualize dietary decisions that are made in these food desert communities.

Small stores on Navajo Nation are either independently owned or are members of regionally-based or national chains. We hypothesized that there would be a significant difference in fresh F&V availability across the three different types of stores and our data support this hypothesis. Based on these data, independently owned stores offer a greater

number of fresh F&V items than regional or national chain stores. Interviews with store owners (of independent stores) and managers (of regional and national chains) on Navajo Nation provide context for this finding. Store owners are aware that the stores they operate are the only retail option within 20-60 miles or more. While their stores are businesses, store owners feel that they provide a community service and thus try to offer a broad range of items including fresh, frozen and canned F&V varieties (8).

Store managers of the chain stores expressed interest in providing a variety of healthy options and specifically F&V but they do not make purchasing decisions at their stores and do not appear to have the power to recommend these items to upper management (8). Coupling the objectively assessed quantitative store inventory data with qualitative perspectives shared by store owners and managers provide rationale for approaching store owners and managers in different ways, if healthy store initiatives were to be pursued across all three types of small stores in Navajo Nation. Specifically, store owners might be more willing to consider strategies for providing greater variety of F&V or sharing the F&V delivery dates with customers (possible approaches for increasing interest and desire in purchasing the F&V). To influence which foods are available on the shelves of regional and national chain stores, it will be necessary to build relations with management beyond the store level. This is already occurring between COPE and some regional chains. National chain stores had the fewest fresh F&V types despite the economies of scale that inherently benefits such stores. If interested, community residents who shop at both regional and national chains could submit requests to the stores that they incorporate more diversity of fresh F&V types, at affordable prices. While this could

take some investigation, it is possible to learn who the appropriate individual at the headquarters is for requesting such food options.

While it has been documented that greater variety of F&V offerings encourages more F&V to be purchased (12), it is important to understand the healthfulness of the suite of options available as well. Using the RWJF Healthy Eating Research expert panel guidelines for minimum stocking at small stores, it was determined that just fifteen stores (21%) in Navajo food deserts met the preferred stocking level guidance that required six varieties of qualifying fruits (three of which could be canned or frozen) and eight varieties of qualifying vegetables (four could be canned or frozen). Among the 72 shoppers interviewed (11), 47% reported shopping at the small store at least two or more times per week. Consequently, these small stores are important spaces to offer a variety of healthy options and we recommend that stores work towards meeting the RWJF minimum stocking recommendations, if feasible.

While having minimum stocking recommendations from experts in the field is critical for moving towards the goal of providing healthy food, and specifically F&V options at small remote stores, we recommend incorporating a F&V quality dimension into subsequent iterations of recommendations. Fresh F&V must be both available and acceptable, from a quality standpoint, for purchasing to occur (11,13). To qualify under the RWJF recommendations, F&V must be 'non-expired and non-spoiled'(9, p. 5) however, gradations of fresh F&V quality is not discussed and would be beneficial for communities utilizing the recommendations moving forward.

Store owners utilize a variety of different distribution methods for sourcing their F&V (8) which could help explain the sizable range in pricing of fresh F&V from one

store to another. However, given the large magnitude of price differential across stores, there is need to understand the range of factors that are considered in pricing F&V. Future work to make healthy food most accessible to remote communities on Navajo Nation should identify stores with the least expensive F&V and work to understand what supply chain dimensions and/or other factors enable such price differentials.

While our study provides a landscape look at all F&V offerings at the known small stores in Navajo Nation communities without grocery stores, there are some inherent limitations to the work. First, each store was visited just one time and thus it is unknown how representative the documented inventory was to a typical day at the store. Further research could assess a small sample of the stores on a more regular basis to obtain better representation of what shoppers have available. Secondly, while our study included all known small stores in remote regions of Navajo Nation, there was no data collected at stores where shoppers might more typically make large food purchasing trips and this is needed for understanding price differentials. It is well established that products at small stores are, on average, more expensive than at larger grocery stores (7). Still, it is important to contextualize F&V pricing collected at small stores in Navajo Nation with pricing at the closest larger grocery stores if future policy or programmatic change efforts will focus on making healthy food affordable in Navajo food deserts. Third, shoppers cite poor F&V quality as a reason for not purchasing F&V at small stores in Navajo Nation (11), yet the median quality of F&V assessed in our study appeared to be good. The quality dimension in this study was based only on a 1-3 rating and thus there was little room for documenting gradation of quality. Future research could utilize a broader scale,

such as the 1-5 used in a food inventory study conducted in the Lower Mississippi Delta (14).

This study built upon the limited food environment literature on Navajo Nation (4,5) through documenting all F&V offerings at small stores in remote Navajo Nation and highlighting the differential F&V types across independently owned, regional and national chain stores. Healthy food access is simply one piece of a complex network of determinants influencing food purchasing and consumption patterns. To most productively impact community-level and regional change, it is necessary to consider this inventory piece in tandem with other individual, inter-personal, community and policy level influences.

Acknowledgements

This manuscript was supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Agriculture and Food Research Initiative - Food, Agriculture, Natural Resources and Human Sciences Education and Literacy Initiative under award number 2016-67011-24675 and by the Centers for Disease Control and Prevention grant number 6 NU58DP005874-03. Any opinions, findings, conclusions, or recommendations expressed in this manuscript are those of the author(s) and do not necessarily reflect the official views of the U.S. Department of Agriculture or the Centers for Disease Control and Prevention or the Department of Health and Human Services.

References

1. Larson NI, Story MT, Nelson MC. Neighborhood Environments. *American Journal of Preventive Medicine* 2009; **36**(1): 74–81.e10.
2. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating Healthy Food and Eating Environments: Policy and Environmental Approaches. *Annual Review of Public Health* 2008; **29**(1): 253–72.
3. Arizona Rural Policy Institute. Demographic Analysis of the Navajo Nation Using 2010 Census and 2010 American Community Survey Estimates. http://www.nec.navajo-nsn.gov/Portals/0/Reports/NN2010PopulationProfile.pdf. Accessed October 3, 2017.
4. Pareo-Tubbeh, Shirley L, Shorty M, Bauer M, Agbolosoo E. The Variety, Affordability, and Availability of Healthful Foods at Convenience Stores and Trading Posts on the Navajo Reservation. Unpublished. 2000.
5. Kumar G, Jim-Martin S, Piltch E, Onufrak S, McNeil C, Adams L, et al. Healthful Nutrition of Foods in Navajo Nation Stores: Availability and Pricing. *American Journal of Health Promotion* 2016; **30**(7): 501-510.
6. Glanz K, Sallis JF, Saelens BE, Frank LD. Nutrition Environment Measures Survey in Stores (NEMS-S) Development and Evaluation. *American Journal of Preventive Medicine* 2007; **32**(4): 282–9.
7. Gustafson A, Hankins S, Jilcott S. Measures of the Consumer Food Store Environment: A Systematic Review of the Evidence 2000–2011. *Journal of Community Health* 2012; **37**(4): 897–911.
8. Piltch, E, Shin, S, Houser, RF., Griffin, T. The complexities of selling produce and traditional Navajo foods in remote Navajo Nation retail outlets: perspectives from owners and managers of small stores. Unpublished, Agriculture Food & Environment Program, Tufts University; 2017.
9. Laska, MN, Pelletier, JE. Minimum Stocking Levels and Marketing Strategies of Healthful Foods for Small Retail Food Stores [Internet]. Durham, NC: Healthy Eating Research; 2016. http://healthyeatingresearch.org/wp-content/uploads/2016/02/her_minimum_stocking_final.pdf. Accessed October 3, 2017.
10. U.S. Department of Health and Human Services, U.S. Department of Agriculture. Dietary Guidelines for Americans 2015-2020 Eighth Edition. http://health.gov/dietaryguidelines/2015/guidelines/. Accessed October 3, 2017.
11. Piltch, E, Shin, S, Houser, RF, Griffin, T. Fruit and vegetable purchasing at small stores in remote Navajo Nation. Unpublished, Agriculture Food & Environment Program, Tufts University; 2017.
12. Martin KS, Havens E, Boyle KE, Matthews G, Schilling EA, Harel O, et al. If you stock it, will they buy it? Healthy food availability and customer purchasing behaviour within corner stores in Hartford, CT, USA. *Public Health Nutrition* 2012; **15**(10):1973–8.
13. Gittelsohn J, Sharma S. Physical, Consumer, and Social Aspects of Measuring the Food Environment Among Diverse Low-Income Populations. *American Journal of Preventive Medicine* 2009; **36**(4): S161–5.

14. Connell CL, Yadrick MK, Simpson P, Gossett J, McGee BB, Bogle ML. Food Supply Adequacy in the Lower Mississippi Delta. *Journal of Nutrition Education and Behavior* 2007; **39**(2):77–83.

The complexities of selling fruits, vegetables, and traditional Navajo foods in remote Navajo Nation retail outlets: perspectives from owners and managers of small stores

Abstract

Navajo Nation residents experience extreme rates of poverty, food insecurity and diet related diseases. While many residents travel far to shop at grocery stores, there are small stores closer to home that could provide more healthy options, like fruits and vegetables (F&V). Little is known from the perspective of store owners and managers regarding the barriers and facilitators to offering F&V. Between April and July 2016, six owners and sixteen managers of twenty-two small stores in Navajo Nation were interviewed. While all stores are located in USDA designated food deserts, each faces unique challenges to offering F&V. The average number of years participants were in their position was twelve years with one manager having just started and one owner having operated his store for 39 years. Close to 80% (n=17) of participants stated that they were residents of the community. Almost all (87%) of store managers were Navajo and all storeowners were not. About half (n=12) of participants were the primary decision makers regarding the products offered; some managers had more autonomy than others; owners were uniformly decision makers. When asked about the types of foods that were most commonly purchased, most said snacks and drinks, 82% and 68% respectively. Many participants said they would like to offer more fresh F&V. However, barriers included varying demand, limited F&V choices from distributors and for some managers, limited authority over product selection. Findings contribute to the discussion on engaging store owners and managers in providing quality, healthy food close to home in low-income, rural regions.

Keywords

Rural, small stores, fruits and vegetables, food supply

Introduction

About 70% of Navajo Nation residents live in a community or chapter without a grocery store (1). With only thirteen grocery stores in the Navajo Nation, small stores such as convenience stores and trading posts are the food retail outlets closest to home for the majority of residents. Small stores have less healthy food and more calorie-dense,

nutrient-poor food, compared to full scale grocery stores (2–5). This is particularly concerning in Navajo Nation where residents experience some of the highest levels of both food insecurity and diet-related chronic diseases in America (6,7). While choosing to consume a healthy diet is a decision influenced by many factors both internal and external to the individual, a health promoting food environment is one necessary component.

Public health initiatives focused on increasing the healthfulness of small store offerings are widely implemented (8). Two studies documented efforts in rural (9) or native/aboriginal (10) communities with a significant component involving store managers. Formative research with eleven food store owners or managers in Pitt County, North Carolina found that convenient, inexpensive snacks were most popular with shoppers and that store management was willing to stock more healthful foods but there was low perceived customer demand (9). A study looking at the effects of store manager practices on the diets of local communities in two remote Aboriginal areas of Australia found that store managers had significant power over the food supply (10). The study identified that dedication of store management to community wellness was a critical component to offering healthy food (10). Additionally, it was found that healthier foods were offered in stores where managers exercised advocacy skills to ensure that high quality fruits and vegetables (F&V) were delivered and stored properly (10). Unpublished data collected through 22 interviews with a sample of small store owners and managers from across all of Navajo Nation (as a component of Kumar et al.'s 2013 Navajo Nation food environment work (5)) identified similar themes to challenges in supplying healthy

food found elsewhere: lack of customer requests, limited space availability and profitability of products sold (9,11).

The current study builds on existing work by documenting the perspectives that owners and managers of small stores in one specific geographic region of Navajo Nation have regarding offering F&V. The results will inform local programmatic and advocacy efforts. Additionally, findings will add to the limited literature base regarding the supply challenges of offering fresh F&V in remote and tribal communities. Thus, the primary objective of this study was to investigate the barriers and facilitators store owners and managers face in offering F&V at small stores in remote Navajo Nation. A secondary objective was to investigate the role that small stores play in offering Navajo traditional foods and in collaborating with local food producers.

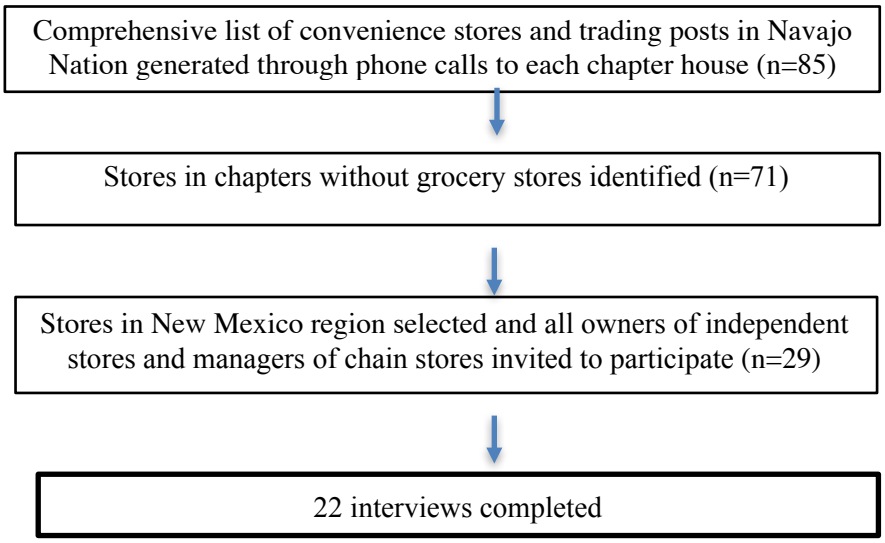
Materials and Methods

Sampling frame and selection of stores

Interviews were conducted with store owners and managers of small retail outlets in chapters without grocery stores in the New Mexico region of the Navajo Nation. In collaboration with Community Outreach and Patient Empowerment (COPE), a non-profit organization working on increasing access to healthy food in Navajo Nation, a list of all small stores across Navajo Nation was compiled by calling each of the 110 chapter houses. As chapters are the most local form of government on Navajo Nation, and the chapter house is the central organizing hub for each chapter, it was presumed that the chapter manager or coordinator would be able to provide information on local retail establishments. This local knowledge was combined with a list generated through Kumar

et. al's (2014) study that utilized an InfoUSA 2011 dataset, the Yellow Pages, Google Maps and Navajo Division of Health staff input. In total, 85 small stores on Navajo Nation were identified, 71 of which are in chapters without grocery stores. Twenty-nine of the stores are in the New Mexico region of Navajo Nation. See Figure 1 for an outline of the store selection process for this study. Phone calls were made to store owners, of independently owned stores, and store managers, of regional or national chain stores to introduce the project and schedule a time for an in-person interview. A recruitment script was used to guide the calls. One store was removed from the list of possible participants because during an initial visit, it was determined that the store was participating in an existing healthy stores initiative. Four additional stores were removed because upon initial introduction, the store owner or manager was not interested in participating.

Figure 1 Determination of store owner and manager interview participants



Survey development and measures

An interview guide was developed based on existing studies (12,13). Input from

COPE staff and partners was incorporated to ensure that information gleaned would be useful for programmatic and policy work. Table 1 provides a summary of the dimensions included in the interviews.

Table 1 Navajo Convenience Store and Trading Post Owner/Manager Interview Topics

Background questions	Resident of chapter/community; Miles live from the store
	Navajo (y/n)
	Title at store, duration in role
	Number of employees
	Type of store (Trading Post, Convenience store, other)
	Number of registers
Store characteristics	Time of month store is busiest and why
	Use of Point of Sale (POS) system
	Product selection decision maker; Decision making process
Foods available	Top 3 selling food items
	Whether or not store offers fresh/frozen produce; interest in offering additional varieties; best selling produce varieties
	Number of produce refrigerators; Availability of back refrigerated storage
	Whether or not store offers Traditional Navajo foods; interest in offering more types
	Customers look for fresh or frozen fruits and vegetables in the store
	Customers look for traditional Navajo foods in the store
Perspectives on customers; the community*	Store plays an important role increasing f/v in community
	Store plays an important role increasing traditional foods in community
	Customers often suggest new items they would like stocked
	Top three reasons fresh or frozen food is offered at store
	If any challenges are faced in carrying fresh or frozen produce and top 3
Supports and barriers to stocking healthy food	Name, delivery frequency, supplier requirements
	Comfort level in asking questions and providing feedback to supplier
Produce supplier	Interest in purchasing fresh produce from Navajo farmers and steps for doing so
	Interest in hosting a pop-up farmers market

* Possible response of strongly disagree, disagree, somewhat disagree, somewhat agree, agree, strongly agree

Most questions asked for brief responses and participants often provided additional context or explanation. The interview guide was pilot tested with store owners in the Arizona region of Navajo Nation prior to the document being finalized. Interview questions were organized under the following sections: background (including title; if owner or manager was a resident of the community where the store was located; type of

store and number of employees); store characteristics (such as number of cash registers and busiest shopping periods during the month) and foods sold in the store (including most popular items and decision making process of products offered). Participants were also asked from where they obtain their fresh F&V; at what frequency and if they would be interested in collaborating with Navajo farmers as F&V suppliers. A section asked about the benefits and barriers to participating in the Supplemental Nutrition Assistance Program (SNAP) and Women, Infants and Children (WIC) Program. Another component of the interview included five statements about the store owner or manager's perspectives on store shoppers and the role of small stores in the community. Those questions had six possible responses: strongly disagree, disagree, somewhat disagree, somewhat agree, agree and strongly agree. The participants were shown the response options on a sheet of paper. An example of this type of question was: "My store plays an important role in increasing the fruits and vegetables in this community."

Data collection

Between April and July 2016, 23 interviews were conducted by one of the authors (EP) and took place at each of the store locations. Each interview began with a brief introduction of COPE's Navajo Healthy Stores Initiative: that it helps stores interested in increasing F&V and promoting the products in their stores. Participants were then told that the information they provide will help with planning COPE's projects and providing assistance to stores. The store owners and managers were told that their involvement in the interview was voluntary and that they could skip a question or end the interview at any time. Verbal consent was obtained before the interview commenced and a copy of the consent form was provided. Interviews took between 20 and 90 minutes.

Interview questions were read out loud to the owner or manager and responses were written into a paper-based interview form. In appreciation of their time, each participant received a basket with fresh F&V (valued <$15). All data were entered into an excel spreadsheet and Stata statistical software package version 12.1 (StataCorps, College Station, TX) was used to analyze quantitative data. Qualitative data were summarized into themes.

Navajo Nation Human Research Review Board and Tufts University Institutional Review Board approvals were granted prior to interviews occurring.

Results

Interview participant and store characteristics

Responses from 22 completed interviews are summarized below. Of the 16 store managers and 6 store owners who completed interviews, the average number of years in his/her respective role was 12.0 years (s.d.=11.6) with one manager having just started and one owner having operated his store for 39 years. Three-quarters of participants reported that they live in the chapter or community where the store is located. See Table 2 for characteristics of the store owners and managers.

Table 2 Characteristics of 22 store owner or manager interview participants in Navajo Nation

	n (total)	% (total)	Navajo (n=13)	% Navajo (59)
Store owner	6	27	0	0
Store manager	16	73	13	81
Resident of community or chapter*	17	77	9	53
Distance from home to store				
Individual lives on site	7	32		
Individual lives off-site and up to 10 miles away	11	50		
Individual lives >10 miles away	4	18		

*where store is located

Most stores were convenience stores (68.2%, n=15) with trading posts and other independent stores also represented. A breakdown of all store types is presented in table 3.

Table 3 Store types represented in this study

	n	%
Store type		
Trading Post	5	23
Convenience Store	15	68
Independently owned	2	9
Navajo Nation chain	10	45
National chain	3	14
Other (eg. independent small grocery; trade center with laundry, post-office, gas)	2	9

The majority of stores (63.6%, n=14) had two cash registers, seven stores had one and one store had three. Almost half (45.5%, n=10) of the stores use a Point of Sale (POS) system for electronically managing inventory. Stores had a medium of five employees with a range of 1-14. Close to 60% of those owners and managers interviewed reported that it is busiest in his/her store early in the month (n=13) because that is either when community members are paid or when their federal assistance becomes available.

The remaining nine participants had a variety of responses with regards to the busiest time of month. The responses included: that business is the same throughout the month; both early and end of the month are the busiest and that the first and third weeks are busiest when community members are not making trips into the larger municipalities that have grocery stores. Others stated that it depends on when community members are paid. Still others discussed that certain times of day like lunch and evening are busier and that it also depends on when there are community events like graduation. All stores accept SNAP benefits however one store was not currently redeeming SNAP because the store was in the process of recertification. About three-quarters (77.3%, n=17) of the stores accept WIC vouchers.

Processes for decision making and store product offerings

Individuals interviewed were asked who decides what products are offered in their stores. About half (54.5%, n=12) of participants said s/he is the person who makes the decision about product offerings. Approximately one-quarter (27.3%, n=6) said that someone else makes the decision and four participants said that it is some combination. The participants who do not make product selection decisions stated that either the chain's corporate office or the owner of the regional chain was the entity in that leadership role. When asked what the process is for deciding on the products to offer, the primary response was that it depends on what the customers want and will buy. While many stores source their products through a food distributor that delivers once or twice per week, some store owners are their own suppliers, specifically for fresh F&V. These owners look to supercenters or grocery stores for the best quality and prices of fresh F&V to provide to their shoppers. Due to the small volume of perishable items that are sold in

the rural areas, store owners find it most cost effective to serve as their own suppliers.

In response to a question about the top three selling food categories in the store, the most commonly reported types were snacks (81.8%, n=18), drinks (68.2%, n=15), and hot prepared foods (31.8, n=7). When asked about the top three types of fresh fruit purchased in the store, the most common responses were bananas (86.4%, n=19), apples (77.3%, n=17), and oranges (72.7%, n=16). Tomatoes (59.1%, n=13), lettuce (54.5%, n=12), and carrots (36.4%, n=8) were the most commonly sold fresh vegetables. See tables 4-5 for a complete list of best-selling food types.

Table 4 Best-selling food categories at the 22 small stores participating in this study+

Best-selling food categories	n	%
Snacks	18	82
Drinks	15	68
Hot/prepared foods	7	32
Sandwiches	6	27
Staples	5	23
Produce	4	18

+store owner/manager provided the three most popular types

Table 5 Fruit, vegetable and Navajo traditional foods at 22 small stores in Navajo Nation*

	n	%
Carries fresh fruit	21	96
Best selling fresh fruit		
Bananas	19	86
Apples	17	77
Oranges	16	73
Owner/manager interest in offering more fruit types	18	82
Carries fresh vegetables	19	86
Best selling fresh vegetables+		
Tomatoes	13	59
Lettuce	12	55
Carrots	8	36
Celery	5	23
Onions	5	23
Potatoes	5	23
Owner/manager interest in offering more vegetable types	14	67
Carries frozen fruit or vegetables	18	82
Best selling frozen fruit or vegetable+		
Strawberries	8	36
Mixed vegetables (n=21)	8	38
Corn (n=21)	9	43
Owner/manager interest in offering more frozen produce (n=17)	10	59
Experiences challenges in carrying fresh or frozen produce (n=20)	16	80
Carries any traditional Navajo foods	13	59
Best selling traditional Navajo foods+		
Blue corn meal	9	69
Meat, primarily mutton	6	46

*All 22 participants responded to each question unless n is otherwise noted

+store owner/manager provided the three most popular types

Perspectives on accepting SNAP and WIC

While all stores accept SNAP benefits, it was difficult for many store owners or managers to estimate the percentage of their sales that are made with SNAP. Among the 14 participants that provided a numeric value, those ranged from 5-80% with a median of 40% (IQR=20%). Five of the 14 stated that they were simply estimating the amount and two said that a large portion of their sales are through SNAP. In response to a question about the major benefits to participating in SNAP, store owners and managers said that

taking SNAP benefits both the customer in terms of convenience to the low-income shoppers living near-by and to the store as it brings in more sales. When asked if there are any disadvantages to participating in the SNAP program, half of the store owners or managers said that there are no disadvantages. The other half commented on the unhealthy foods that are purchased with SNAP ("seeing people buy junk food") and the SNAP rules regulating what can be purchased using the benefits. One owner mentioned that she wished the customers could purchase hot and/or prepared foods like lamb and rotisserie chicken with SNAP. One owner said that about 40% of his sales used to be on SNAP but that has now become 5% because shoppers can use the same card at super centers, likely implying that the benefits will go further there.

The majority of stores (77.3%, n=17) accept WIC benefits and the interview participants also had a difficult time estimating WIC sales. Ten of the participants (45.5%) provided a percentage but they also used qualifiers like "about," "maybe" or "an educated guess." The median percentage of WIC sales reported by a store owner or manager was 20% (IQR=18.8%) with the lowest being 2% and the highest being 30%. Three participants stated that the percentage was "low" and one of them said that the store used to see a higher amount of WIC but much less now. Another participant stated that she only sees WIC used at the end of the month. When asked about the major benefits of participating in the WIC program, responses fell into three categories: providing a general convenience to the local community (41.2%, n=7); bringing in more sales (41.2%, n=7); and helping with sales of fresh F&V and other healthy foods (17.6%, n=3). Five participants mentioned milk in some capacity with regards to WIC usage. It was stated that milk is one of the most commonly purchased items among WIC

participants and that some stores would not offer milk if it was not required by the WIC program. Another comment was that it is a benefit to the community that the milk man delivers to the store once per week.

We also asked if there were any disadvantages to participating in the WIC program. Six participants stated that there were no disadvantages and the other 11 spoke of challenges meeting WIC rules and requirements such as needing to carry certain foods and quantities of items, even if they never sell. Another challenge was following pricing guidelines, such as only being able to markup WIC items a certain amount that is less than the stores usually would. Being cognizant of dates was also a theme. One comment was that the store loses out financially when products expire. This was mentioned specifically about outdated baby formula that the store purchases by the case. Another participant stated that the cashiers must be very attentive to expiration dates on the WIC vouchers themselves.

Among the stores not taking WIC, the reasons included: that the store does not offer groceries; they would participate in WIC if they were asked to; that the "product requirements are ungodly" and similarly, not enough people in the community use WIC. An additional comment was that if there were enough residents who participated in the WIC program, then he would take them.

Fresh fruit and vegetable offerings and perspectives on stocking additional types

While almost all stores carried some fresh F&V, there were many nuanced explanations for why offerings could be limited. Eighty-two percent (n=18) of participants stated that they would like to offer more types of fresh fruit and 67.0%

(n=14) would like to offer more fresh vegetables but the store owners and managers face a variety of impediments to doing so.

A theme that underlies much of the decision-making process about F&V options is that minimal demand drives the level of supply and that fresh options spoil quickly. However, those are not necessarily the only determinants. Store managers face a variety of challenges including the fact that they rely on what is available in suppliers' order books that do not tend to have many options. Additionally, managers indicated that they would offer more options if it was their decision to make. One manager stated that shoppers ask for a variety of fresh items like celery, tomatoes and carrots but that her own manager says that the store does not serve the role of a grocery store and thus, F&V are not appropriate to offer. The store owners interviewed stated that they would provide more options if there were an explicit need in the community. Four participants mentioned that the challenges exist in both supply and in the level of sales and that it is often hard to predict how much of certain perishable items to order or offer at one time. One participant stated that "the ordering and the amount just varies…pros and cons…losing out if have too much and not enough purchased" while another stated "sometimes we don't carry enough and need more."

When store owners and managers offer new types of F&V and those items do not sell well, then there is limited motivation to continue offering the items or trying other new ones. Two participants stated that WIC recipients are the main purchasers of fruit. Single-serving ready-to-eat fresh fruit (prepared on site) sells well at the two stores where they are offered. One store owner in a very remote region stated that fresh F&V cannot sit for long and thus, he brings it in about two times per week. Another store owner who

is also in an extremely remote region and operates an historic trading post stated that he stopped selling fresh fruit ten years ago. He explained that the older generation would buy healthy food and F&V at his store but that his current shoppers come in more for soda and snacks.

Still, some store owners were willing to take steps to offer more F&V varieties: one stated "whatever people would want to try," another stated that her own family grows pumpkins and sells them at hay stacks outside of the store, and another suggested specific types of F&V that he would be willing to offer that last longer, such as romaine lettuce and chili peppers. He went on to share that he "has a soft spot for unusual produce types like jicama" and likes to offer different types of produce to teach his shoppers about new options.

Perspectives on offering frozen fruits and vegetables

The majority of store owners or managers (81.8%, n=18) stated that they offer at least some frozen F&V. However, many participants had additional information to share about offering these products. Six participants stated that frozen F&V do not sell well and some store managers stated that the selection of items they offer is limited by the few options of their distributor. Other comments made included: not having a freezer or space within the freezer for F&V, that he would supply more frozen F&V if shoppers bought them and that items like frozen mixed fruit are desirable to offer but too expensive. One store owner stated that she had not tried offering frozen F&V but liked the idea and would consider it in the future as it keeps longer than fresh and can be healthier than canned. One store manager stated that her superior would not allow the store to carry F&V because "it's not a grocery store," a similar response to when the participant was

asked about offering fresh F&V. A manager at another store stated that she tries to have the frozen F&V placed next to more popular frozen items, but even this nudge does not influence purchasing patterns.

Reasons for offering fresh or frozen fruits and vegetables

Participants were asked to share the top three reasons that they offer fresh or frozen F&V: some provided only one response and others shared three. While many different answers were provided, those responses heard most frequently included: that there is demand for the products (50.0%, n=11) with one store owner stating "there's still a market for it although it's not what it used to be;" that WIC or the Navajo Nation junk food tax requires the items (40.9%, n=9); to increase healthy habits and decrease health issues in the community (36.4%, n=8); and that the store provides a convenience to shoppers (22.7%, n=5). Other responses focused on specific populations like youth (n=2) "because the schools are around and there are kids to provide it to." Others spoke of more value-driven explanations (n=2) like "it's the right thing to do." Two others said that it is determined through the corporation's main office and not a decision made by the manager interviewed: "they've always had them here."

Challenges with vendors and transportation

There are many limitations and challenges with the vendors utilized by the stores. For example, one participant stated that there are two mark-ups because of how the distribution works. The F&V go through a larger distributor first and then a smaller one and that there are extreme fees to pay for utilizing certain distributors. Some distributors require a minimal amount spent by the store in order for delivery to be feasible. Another stated that 10-15 years ago, he had more options of suppliers that had routes near his

store. A manager expressed a similar sentiment: that the corporate office does not have many places from which stores can order. One store owner lamented that F&V suppliers are different from suppliers of other products: "for milk, bread and potato chip supplies, if they (the distributer) sees expired items on the shelf, they'll give credit on the next order. If this was done for F&V, that would be amazing." Another store owner stated that his distributor has a certain strategy for how fresh F&V are transported on the truck and that this strategy does not seem to work: by the time F&V have gotten to the store, they have already become bruised.

Traditional Navajo Foods

Just over half (59.0%, n=13) of the participants interviewed stated that their stores carry at least one type of traditional Navajo food. While the most commonly cited traditional foods offered were blue corn meal (69.2%, n=9) and meat such as mutton (from adult sheep) (46.2%, n=6), there were many other products mentioned including: white and yellow corn meal, "Blue Bird"[1] flour, Navajo tea, steamed corn and posole. Some of the stores have prepared foods or deli sections and carry foods like blue corn mush, lamb stew meat, sheep liver or *'ach'íí'*[2] (intestines). Multiple store owners were perplexed with a question about whether or not they carry traditional Navajo foods because they felt like the definition of such foods has changed over time and would likely be different depending on who was discussing the topic. Some store owners were willing to troubleshoot and brainstorm ideas for augmenting their offerings. One owner stated:

---

[1] Blue Bird corn is milled in Cortez, Colorado and is considered, by many, to be a traditional Navajo food. This is likely due to it being the preferred type of flour used in making fry bread. http://navajotimes.com/business/2010/0910/093010bluebird.php

[2] A border-town deli has been offering *'ach'íí'* and other traditional meats for 50 years. http://navajotimes.com/news/2007/090607achii

"both managers are Navajo, they could help decide" and another said "I don't know what types (to offer), if someone wanted it, we would provide it." Two owners stated that they would carry more types or some types more consistently if they had reliable suppliers with one owner stating that she was "not sure where to get it." While pinon (or pine) nuts are harvested in abundance on Navajo Nation, two owners discussed that they do not purchase these from local community members because of either how much they charge or because owners are skeptical of the quality. One stated that "it's a huge risk, disease potential, because insurance won't cover it."

The nine stores (40.9%) that do not carry any traditional foods are convenience stores that are operated by a regional or National chain. Consequently, the most common explanation for why they do not offer any traditional foods is that their distributor or warehouse does not offer the products. One store manager stated that he "has not had the opportunity, hasn't been discussed and not in order books—would have to work with NAPI (Navajo Agricultural Products Industry) or local farms." Another stated that she would be willing to sell traditional foods and that people do ask for them but she could not find options in the distributor's ordering book. One manager stated that she used to carry NAPI potatoes and bleached flour, the small three-pound bags that were used as gifts for Bingo.

Perspectives on partnering with Navajo farmers

Fourteen store owners and managers (64.0%) said that they are interested in purchasing fresh F&V from Navajo farmers. One participant mentioned that she currently offers F&V brought in by local growers; one was not interested in pursuing such a partnership and six said that it is not his/her decision to make.

Among the nine trading post owners or primary decision makers who participated in an interview, all but one expressed interest in purchasing F&V from Navajo farmers. One stated that "it would be awesome" and that the local growers would simply need to let management know what they have. For example, this owner mentioned that one employee has chickens and sells their eggs at the store. Community members also bring in pinion nuts and Navajo tea that the store is willing to sell. Another trading post owner said he had no problem buying products from local growers if the quality is good and if the producer can offer them at a reasonable price. Another owner mentioned if it was feasible, he would be glad to partner with Navajo farmers, but also that the growing seasons is short and could be a limiting factor. He went on to say that he would need to get to know folks who grow food in the community for this to occur. Another owner stated that the "Navajo aren't farming around here…would purchase from them in a heart-beat…(but) mostly Bilagáana (Caucasian) farmers."

Among the 10 study participants who are managers at regional chain stores, half stated that they would like to purchase F&V from Navajo farmers and the other half said that they do not make the decision about where the products are purchased for their stores. Among those who said they were interested, further discussion revealed similar sentiments to the others: that despite their interests, decisions about product sourcing must go through their main office. Managers communicated varying degrees of self-efficacy regarding the steps to take in partnering with local food producers. One manager stated: "we're not allowed to, (the) owner and district manager decide and it's all about cost, how much he'll pay and receive, profit." Another manager from the same chain said: "I would love to, hoping to push for it but not sure how to organize it yet." That

manager went on to say that there are a couple of growers in the community and that they would have to go through the company headquarters to pursue selling products. Still another manager was interested in the concept of connecting with Navajo farmers but said that there were not any in the area.

The one participant who expressed disinterest in partnering with Navajo farmers said that his insurance requires USDA approval of the foods he sells. Two owners stated that they would purchase from NAPI with one stating that it was the only local agriculture he knew of. Two of the participants who are willing to sell locally produced products also mentioned the need for agricultural inspections and perceived requirements of certain size and weight labels from the farms. Despite interest, one owner commented that it is "hard to imagine that happening…the farms are likely not around here, more in Farmington." Another said that while it is rare, some local growers offer to sell their F&V and he has considered it. That owner went on to say that "they're mostly ranchers who produce food for their animals. It's dry farming, very little irrigation. They use the food personally and don't produce to sell." Previous research conducted with farmers on Navajo Nation (14) reported similar findings: a theme behind motivation for farming reported through in-depth interviews with 20 Navajo farmers was that they use and save the food they produce to feed their families and that hay, oats and alfalfa are grown for their livestock.

Store owner and manager perceptions of customers and the community

Interview participants were asked if their customers look for fresh or frozen F&V and traditional Navajo foods in their stores. Participants were also asked what they feel like their store's role is in providing those products. About three-quarters (76.2%, n=16)

somewhat agreed or agreed that customers look for fresh or frozen F&V and about half (47.6%, n=10) felt similarly about traditional Navajo foods. Additionally, three-quarters (72.7%, n=16) somewhat agreed or agreed that his/her store plays an important role in increasing F&V access in the community. About half of participants (45.0%, n=9) agreed, to any extent, that their store plays an important role in increasing traditional foods available in the community and about three-quarters (77.3%, n=17) of individuals interviewed agreed to some degree that their customers suggest new items they would like stocked in the stores. See figures 2-6 showing a summary of responses to each statement.

Figure 2:
My customers look for fruits and vegetables (fresh or frozen) in the store. (n=21)

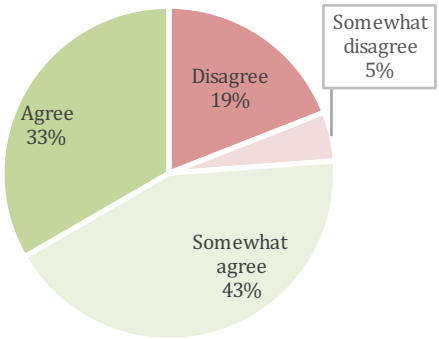


Figure 3:
My customers look for traditional Navajo foods in the store. (n=21)

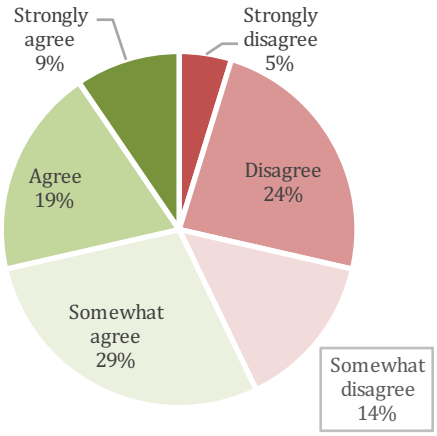


Figure 4:
My store plays an important role in increasing the fruit and vegetables in this community. (n=22)

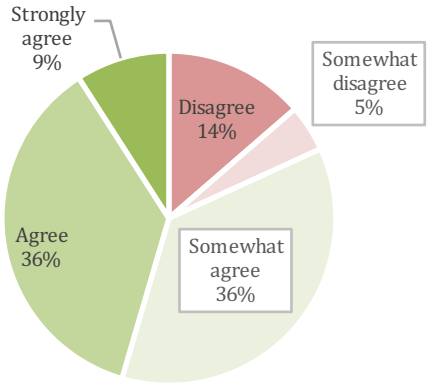


Figure 5:
My store plays an important role in increasing the traditional foods available in this community. (n=20)

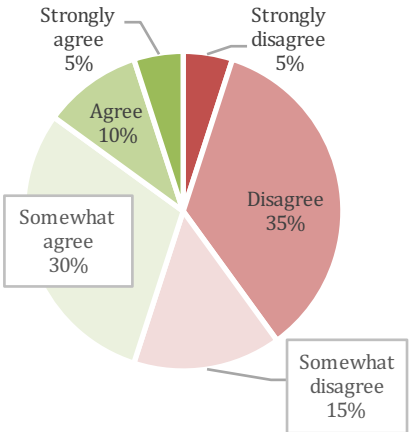
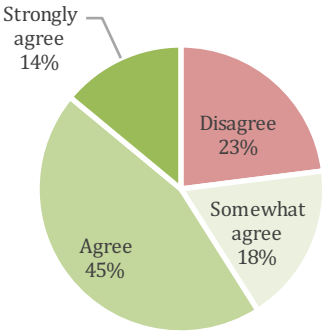


Figure 6:
My customers often suggest new items they would like me to stock. (n=22)



Discussion

This study focused in remote Navajo Nation and documented small store owners' and managers' perspectives on offering F&V and traditional Navajo foods at their stores. The findings highlight that store owners and managers perceive that F&V are not in high demand at the small stores. Navajo Nation residents largely confirm these sentiments in that the primary retail outlets where they shop for food are grocery stores and supercenters (6,15). Still, most owners and managers felt that their stores play an important role in increasing F&V in the community, that they would like to offer more F&V and, that their customers do look for these items in the stores. However, for stores to increase the variety of F&V they offer, demand would need to be higher and suppliers would need to offer more options, two dimensions also identified in rural areas in a review article by Pinard et. al (2016) (16). It is important to consider that the perceived low demand for F&V at small stores on Navajo Nation does not actually align with true demand. Studies in the discipline of behavioral economics evaluated the potential impact of price augmentations or increased nutrition education on shopping behavior and have found positive results (17,18). In the context of Navajo Nation, if F&V quality and price were within acceptable range of what can be found at larger stores, would demand and purchasing actually be higher? Small scale behavioral economic studies could be pursued in the Navajo context to better understand the underpinnings of low perceived demand by store owners and managers.

Another important theme identified in this study was the willingness of store owners and managers to respond to shoppers' requests. This topic has been highlighted in corner store initiatives throughout the country and summarized by Gittelsohn et al (2014).

Lessons learned from healthy store initiatives in Baltimore, Maryland; Minneapolis, Minnesota; Burlington, North Carolina; and Philadelphia, Pennsylvania included acknowledging the potentially complex relationships that exist among store owners, managers and their customers. It was found that "relationship quality was moderated by whether there was a shared language and heritage" (p.310) (8). The store owner participants in our study were Caucasian with mangers and shoppers primarily Navajo. Some store owners suggested that their managers could help identify local Navajo farmers and/or other strategies for offering traditional foods in their stores. There may be need for assistance in facilitating opportunities for store personnel and shoppers to meaningfully collaborate on increasing supply and purchasing of F&V at the small stores. Successful healthy corner store initiatives that could be modeled have engaged youth in advocacy efforts (19) and have partnered with local community residents on culturally appropriate marketing campaigns and linking store initiatives with other community revitalization efforts (20). Providing locally meaningful ways for shoppers and store owners and managers to partner could increase the likelihood that shoppers request new items, store owners provide those items and that shoppers close the loop by making the purchases.

While study participants expressed willingness to augment offerings, challenges with food suppliers and distributors persist. There are few food suppliers that carry F&V and have routes to these remote areas. As this study took place, one of the main food distributors, primarily utilized by regional chain stores, closed and thus, perspectives presented should be interpreted knowing that it was a particularly unique time to be discussing the topic. Managers operating these chain stores shared that the new supplier

had limited offerings but that the participants were optimistic that more options might become available as additional stores signed on. It is well established that how and from where stores source their F&V directly impacts the price and quality of the items (21). If small stores in Navajo Nation are interested in exploring new strategies for sourcing F&V, they could consider recommendations identified through key informant interviews with experts in the small store and food distribution spaces (21). One recommendation that could align well with technical assistance COPE is already providing to stores is to research and share the distributor options that exist including any minimal ordering size and product availability (21). While it is likely that stores are already familiar with all of their options, there could potentially be opportunities that have not yet been identified. It is also important to consider how best to reduce the financial risk to store owners, especially if they are encouraged to try stocking new items. One recommended strategy is offering stores "take-back" funds that would compensate the store for new products that do not sell, at least in early stages of implementation (21). Another potential strategy is for multiple small stores in Navajo Nation to purchase F&V collaboratively and request partnering with the nearest grocery store to obtain the whole sale pricing of a larger distributor (21).

Whether stores are independently owned or subsidiaries of regional or national chains, each store has unique assets and challenges that would make offering more F&V types potentially difficult. When working with store owners and managers on healthy store initiatives, a critical step is understanding who all the players are and how they engage with one-another. For example, owners of trading posts might have managers who are closely connected to the local community. Similarly, regional or national chain

stores commonly have store managers that live in the local chapter and are well acquainted with frequent shoppers. We learned that store managers may view their roles and levels of influence differently, even within the same regional or national chain. Thus, an important next step in providing technical assistance to regional chain stores is collaborating with the owners, understanding the current roles and expectations of the local managers and identifying leadership and advocacy skills that could be built among managers. In advocating for more F&V at national chain stores, it is necessary to identify who, within the corporate management structure, would be receptive to discussions about product augmentation. Some informal discussions have occurred through COPE outreach where it has become clear that at least one national chain is interested in offering more healthy products.

Discussion of increasing F/V options at small rural stores would not be complete without highlighting the need for technical assistance connecting stores with local food producers. Setala et al (2011) interviewed Navajo farmers in Arizona and identified three primary barriers they had with selling to local small stores. Those included: having a limited harvest, lack of crop transportation and the price that local stores were willing to pay (22). From the store owner and manager perspectives, our study identified that store owners were not aware that local growers existed in the community. There were also concerns about need for USDA certifications. New Mexico State University (NMSU) is currently supporting small scale efforts in food production along a north-south corridor convenient to many small stores that participated in this study. A next step that COPE or other interested stake holders could take would be to collaborate with NMSU in providing training to both store personnel and local growers on Food Safety requirements

and the potential for producer group Good Agricultural Practice (GAP) certification.[3] It is also possible that additional food producers near the small stores on Navajo Nation could be identified through discussing possible collaborations at chapter meetings and Agency Council meetings. As relationships are built between store owners and food producers, discussions about pricing and transportation logistics could be collaboratively pursued.

A considerable amount of pertinent and actionable information was gleaned through this study. However, a limitation was that participants knew that they were helping to inform future work increasing healthy food in Navajo Nation. Thus, it is possible that responses were influenced towards supporting the work. Still, participants provided candid responses about the challenges they face with supply, perishability and the lack of demand. Moreover, we documented perspective from an owner or manager at the majority of stores in chapters in NM without grocery stores. This is the first study of its kind documenting perspectives from such a large proportion of possible retailers in the region and can be the basis for further study on supply chain dynamics and investigating the supply/demand balance in remote Navajo Nation.

Acknowledgements

This manuscript was supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Agriculture and Food Research Initiative - Food, Agriculture, Natural Resources and Human Sciences Education and Literacy Initiative under award number 2016-67011-24675. Any opinions, findings, conclusions, or recommendations expressed in this manuscript are those of the author(s) and do not necessarily reflect the official views of the U.S. Department of Agriculture.

---

[3] GroupGAP Food Safety Program https://www.ams.usda.gov/services/auditing/groupgap

References

1. The Navajo Nation. Navajo Nation Data & Statistics Division of Economic Development. http://navajobusiness.com/pdf/Ads/CensusRep.html. Accessed October 3, 2017.
2. D'Angelo H, Suratkar S, Song H-J, Stauffer E, Gittelsohn J. (2011). Access to food source and food source use are associated with healthy and unhealthy food-purchasing behaviours among low-income African-American adults in Baltimore City. *Public Health Nutrition, 14*(9), 1632–1639.
3. Treuhaft, S. & Karpyn A. The Grocery Gap: Who Has Access to Healthy Food and Why It Matters. Policy Link Food Trust. 2010. http://thefoodtrust.org/uploads/media_items/grocerygap.original.pdf. Accessed October 3, 2017.
4. Black C, Ntani G, Inskip H, Cooper C, Cummins S, Moon G, et al. (2014). Measuring the healthfulness of food retail stores: variations by store type and neighbourhood deprivation. *International Journal of Behavioral Nutrition and Physical Activity, 11*(1), 69.
5. Kumar G, Jim-Martin S, Piltch E, Onufrak S, McNeil C, Adams L, et al. (2016). Healthful Nutrition of Foods in Navajo Nation Stores. *American Journal of Health Promotion, 30*(7), 501–510.
6. Eldridge, D, Jackson, R, Rajashekara, S, Piltch, E, Begay, M, VanWassenhove, J, et al. (2015). Understanding Food Insecurity in Navajo Nation through the Community Lens. In: Ivers, L, editor. Food Insecurity and Public Health. Boca Raton, FL: CRC Press, 155–173.
7. Gittelsohn J, Kim EM, He S, Pardilla M. (2013). A Food Store-Based Environmental Intervention Is Associated with Reduced BMI and Improved Psychosocial Factors and Food-Related Behaviors on the Navajo Nation. *Journal of Nutrition*, 143, 1494–1500.
8. Gittelsohn J, Laska MN, Karpyn A, Klingler K, Ayala GX. (2014). Lessons Learned From Small Store Programs to Increase Healthy Food Access. *American Journal of Health Behavior, 38*(2), 307–15.
9. Pitts SBJ, Bringolf KR, Lloyd CL, McGuirt JT, Lawton KK, Morgan J. (2013). Formative evaluation for a healthy corner store initiative in Pitt County, North Carolina: engaging stakeholders for a healthy corner store initiative, part 2. *Preventing Chronic Disease,*10 DOI: http://dx.doi.org/10.5888/pcd10.120319.
10. Lee AJ, Bonson AP V, Powers JR. (1996). The effect of retail store managers on Aboriginal diet in remote communities. *Australian and New Zealand Journal of Public Health*, *20*(2), 212–214.
11. O'Malley K, Gustat J, Rice J, Johnson CC. (2013). Feasibility of increasing access to healthy foods in neighborhood corner stores. *Journal of Community Health*, *38*(4), 741–749.
12. Andreyeva T, Middleton AE, Long MW, Luedicke J, Schwartz MB. Food retailer practices, attitudes and beliefs about the supply of healthy foods. (2011). *Public Health Nutrition*, *14*(6), 1024–1031.
13. Carty, K., Post, W. A, Ray, B. Stock Healthy Shop Healthy Toolkit. University of Missouri Extension. http://extension.missouri.edu/stockhealthy/home.aspx. Accessed October 3, 2017.

14. Setala A, Bleich SN, Speakman K, Oski J, Martin T, Moore R, et al. (2011). The Potential of Local Farming on the Navajo Nation to Improve Fruit and Vegetable Intake: Barriers and Opportunities. *Ecology of Food and Nutrition*, *50*(5), 393–409.
15. Piltch, E, Shin, S, Houser, RF, Griffin, T. Fruit and vegetable purchasing at small stores in remote Navajo Nation. Unpublished, Agriculture Food & Environment Program, Tufts University; 2017.
16. Pinard CA, Byker Shanks C, Harden SM, Yaroch AL. (2016). An integrative literature review of small food store research across urban and rural communities in the U.S. *Preventive Medicine Reports, 3*, 324–332.
17. Ball K, McNaughton SA, Le HN, Gold L, Ni Mhurchu C, Abbott G, et al. (2015). Influence of price discounts and skill-building strategies on purchase and consumption of healthy food and beverages: outcomes of the Supermarket Healthy Eating for Life randomized controlled trial. *American Journal of Clinical Nutrition, 101*(5), 1055–64.
18. Price J, Riis J. (2012). Behavioral Economics and the Psychology of Fruit and Vegetable Consumption. *Journal of Food Studies. 1*(1). ISSN 2166-1073.
19. Ortega AN, Albert SL, Sharif MZ, Langellier BA, Garcia RE, Glik DC, et al. (2015). Proyecto MercadoFRESCO: A Multi-level, Community-Engaged Corner Store Intervention in East Los Angeles and Boyle Heights. *Journal of Community Health*, *40*(2), 347–56.
20. Healthy Corner Stores The State of the Movement. Public Health Law and Policy; 2009. http://www.changelabsolutions.org/sites/default/files/documents/HCSReport.pdf. Accessed October 3, 2017.
21. Hadwin, A. Providing Fresh Produce in Small Food Stores: Distribution Challenges & Solutions for Healthy Food Retail. The National Policy & Legal Analysis Network to Prevent Childhood Obesity (NPLAN); 2014. https://www.changelabsolutions.org/sites/default/files/Fresh-Produce-Distribution-Small-Food-Stores_FINAL_20140131.pdf. Accessed October 3, 2017.
22. Setala A, Gittelsohn J, Speakman K, Oski J, Martin T, Moore R, et al. (2011). Linking farmers to community stores to increase consumption of local produce: a case study of the Navajo Nation. *Public Health Nutrition, 14*(9), 1658–1662.

Fruit and Vegetable Purchasing at Small Stores in Remote Navajo Nation

Abstract

Objective: Food insecurity and obesity co-occur across low-income communities and are seen starkly in Native American population food-deserts. Few grocery stores exist to serve the Navajo Nation, the largest federally recognized Native American community in the US. Little work has been done to understand factors that influence fruit and vegetable (F&V) purchasing at the small stores closest to home and this research contributes to that need.
Design: Cross-sectional consumer intercept surveys outside of small stores.
Setting: Low-income, rural, and remote Navajo Nation.
Subjects: 72 individuals outside of nine small stores provided their perspectives on food availability at the small store and shopping patterns and preferences.
Results: Four individuals (5.6%) purchased F&V at the small store the day s/he was interviewed and 32% had purchased any in the previous week. Convenience to home or work was the most commonly cited reason that participants purchase F&V at the small store. Other responses included price and health considerations. More variety of F&V and greater stocking of healthy foods were reported as dimensions that would be needed for participants to buy more or any F&V at the small store.
Conclusions: While shoppers at small stores on Navajo Nation do not commonly purchase F&V at these convenient retail spaces, they are still some of the few places to buy food within large radii. Increased opportunity for store owners, managers and shoppers to dialogue is necessary for such retail outlets to improve the local food environment.

Keywords

Small stores; customers; fruits and vegetables, rural

Introduction

Food insecurity impacts 17.4 million people across the United States (US) (1). In 2014, 14.0 percent of US households were unable to obtain enough food to meet the needs of all their members because they had insufficient financial or other resources for food (1). Within the US population, low-income, ethnic minorities are at the greatest risk for food insecurity (2) and evidence exists that there is association between social class

and food access (3–5). Geography also plays a critical role in food availability: according to a nationally-representative survey conducted by the United States Department of Agriculture (USDA), food insecurity rates were highest in rural areas (1). Rural regions lack conveniently located, full-service grocery stores with healthy food options (6). Small convenience stores stocking energy-dense, nutrient poor options with limited availability of healthy foods like fresh fruits and vegetables (F&V) are more prevalent in these rural areas, as they lack the population density necessary for attracting larger stores (7–10).

The community food environment influences both food availability and the likelihood of consuming a healthy diet (11,12). In the US, an estimated 7-18% of state populations met federal guidance for fruit intake and between 5-12% met vegetable recommendations (New Mexico average was 15% meeting fruit and 9% meeting vegetable recommendations) (13) putting the population at risk for being overweight or obese and developing diet related chronic diseases such as heart disease, stroke and certain types of cancers (14,15). Over one-third of adults are obese, and nearly 70% are either overweight or obese(16) with American Indian or Alaska Natives, nationally, having the highest adult obesity rate (54%) of any racial or ethnic group (16). Much work has been done attempting to address the food insecurity, obesity paradox (3,17,18) yet ethnic and class disparities persist.

This study takes place in Navajo Nation. Located in the Southwest US, it is the largest Native American tribe in both population and land-base. See figure 1 for the geographic location of Navajo Nation.

Figure 1 Map highlighting Navajo Nation location in the Southwest US

Source: Navajo Nation Economic Development
http://navajobusiness.com/fastFacts/LocationMap.htm

Over half of Navajo residents live below the poverty line, (19) 42% are unemployed (20) and one-third lack plumbing and electricity (20). The Navajo Nation faces a stark double-burden of high food insecurity and rates of overweight, obesity and diet-related chronic diseases (21). Minimal current diet-related disease data exists that are specific to Navajo Nation. However, a New Mexico Department of Health report on racial and ethnic health disparities (2014) (22) documents that American Indian or Alaska Natives in New Mexico, of which Navajo are a large portion, have the highest rate of adult obesity at 38.2 per 100 (compared to Caucasians at 22.0 per 100) and high school youth obesity (19.8 per 100 compared to 11.3 per 100 Caucasians). Moreover, American Indian or Alaska Native populations have an alarming age-adjusted diabetes mortality rate (also highest of all ethnic or racial groups) at 76.5 attributed deaths per 100,000 compared to Caucasians at 17.2 per 100,000 (22).

The USDA Economic Research Service Food Access Research Atlas designates the Navajo Nation region a “food desert” (23). That is, low-income census tracts where a significant number of residents are more than 20 miles from the nearest supermarket (23). However local studies illustrate a more dire situation with Navajo residents traveling 45-60 miles, or more, one way, for groceries being a normal occurrence (21,24,25). Due to the long travel distances and expense for such travel, families shop for groceries only once or twice per month, as was reported by 50% of nearly 400 individuals interviewed on the Eastern side of Navajo Nation.(25) There are thirteen grocery stores across the 27,000 square mile Navajo Nation. Those families living far from grocery stores have small stores in closer proximity. However, it has been well established that healthy food options at smaller stores are limited and those that are available are more expensive than those at larger stores and are often of lower quality (3) (9).

Food acquisition habits have been explored in specific regions of Navajo Nation. For example, approximately 250 clients of community health representatives (CHR) in one of the eight Navajo service units (Indian Health Service designation) were surveyed (21). Community food assessments were conducted in one service unit of Arizona and also in three chapters in New Mexico, on the eastern side of the Nation (24,25). However, no work has been done assessing shoppers habits at small stores or understanding the impact of the healthy food offerings that do exist on shopper decision making. Food purchasing strategies and perceptions have been evaluated in many settings (26–34) but have not been done by talking directly to shoppers within a Native American community. Anecdotally, owners of small stores in Navajo Nation have varying opinions about stocking fresh F&V and some report that shoppers are not interested in buying such foods

at their stores. Conversely, Navajo community members have stated that they would like to buy healthy food close to home but feel that those foods are not available (21,24,25). None of these projects have engaged with customers while they are at the small stores.

Fruits and vegetables must be available, affordable, and acceptable to shoppers for purchasing of such items to occur. Given the short shelf life of many types of fresh F&V, store-owners and managers need to be confident that their shoppers will purchase those F&V, if stocked (9,26,35). In order to understand the constraints of Navajo Nation food shoppers and inform future interventions to increase access to healthy food close to home, customer intercept surveys were conducted outside of small food retailers in the New Mexico region of Navajo Nation. The primary purpose of this study was to document the factors influencing F&V purchasing at small stores in Navajo Nation.

Methods

Survey structure

A survey was developed based on published literature (36,37) and a tool that was developed for a USDA funded food security project in the Northeast US (38). Development of the survey for this study also included input from Navajo stakeholders to ensure cultural appropriateness and that sufficient questions were asked for utility by local advocacy efforts.

Three screening questions were posed if the potential respondent was male, and four if female. Those questions were: if s/he is 18 years of age or older; one of the primary food shoppers in the household and if s/he lives on the Navajo Nation. If the individual responded no to any of the questions, the survey was terminated. Women were also asked if they were currently pregnant or breastfeeding. If they responded

affirmatively, we also declined interviewing them as the assumption was made that their shopping behaviors were different than women who were not pregnant or breastfeeding. Survey topics are outlined in Table 1.

Table 1 Topics Included in Consumer Intercept Survey

Shopping behavior	Store where majority of food shopping is done Frequency of shopping at small store Usual purchases at small store Primary reason for shopping at small store Travel time from home to store Knowledge of if small store sells fresh fruits and vegetables If shopper purchased any fresh, frozen, canned or dried fruits or vegetables that day or in the previous week at the small store. If yes, specific produce items purchased Why shopper buys produce at the small store Foods would like to buy but cannot find at the small store Dimensions that would make purchasing produce at the small store easier
Locally produced food	If shopper ever purchases produce at farmers markets or roadside stands; if grows own food or if a family member does
Demographics	Age Household size Number of people typically shopping for Usual mode of transportation to the small store Gender Employment status Household participation in federal assistance programs Food insecurity Formal education
Home utilities	If home has reliable electricity; a working refrigerator; kitchen sink with running water

Customers

Between July and September 2016 a convenience sample of shoppers participated in brief interviews outside of nine small stores in the New Mexico region of Navajo Nation. A total of 72 individuals provided their perspectives on food availability at the small store and their shopping patterns and preferences. All shoppers exiting the store were invited to participate in the survey. For those who agreed, or who were interested in

hearing more information, we told them briefly that the purpose of the survey was to learn more about food needs in the region and that it was being conducted by Community Outreach and Patient Empowerment (COPE) based in Gallup and working throughout the Navajo Nation on public health initiatives. We stated that the information collected would be used for a project looking at increasing the availability of healthy food across Navajo Nation. Additionally, we shared that people will have a wide range of responses and that all are acceptable. We also told them that they may refuse to answer any question.

Interviews took between five and ten minutes, with each interview conducted by one of two data collectors. Individuals who completed the survey were provided a "Grow Navajo Buy Local" fruit fusion water infuser bottle (value < $4). The theme coincides with the Healthy Navajo Stores Initiative conducted by COPE, whose executive director is a co-author. Eleven stores were visited. Interviews were conducted Monday through Friday between 10 AM and 7 PM.

Convenience Stores and Trading Posts

While residents of Navajo Nation rely heavily on the thirteen grocery stores on the Reservation and supercenter stores in border towns (such as Gallup, Grants and Farmington), the only outlets to purchase food throughout most of Navajo Nation are at small convenience stores and trading posts. Trading posts are privately-owned general stores historically operated as centers for Navajo ranchers and artists to access outside markets. These stores now serve roles similar to that of convenience stores and gas stations. A complete list of all convenience stores and trading posts was generated through calling each Navajo Nation chapter (geopolitical unit) and by asking the name of

any small stores that exist in the community. The stores identified through chapter calls were cross-referenced with a list developed in the summer of 2013 for a Navajo Division of Health and Centers for Disease Control and Prevention (CDC) study that documented food inventories of a sample of grocery and convenience stores in Navajo Nation and border towns (9). Convenience stores and trading posts in the New Mexico region of Navajo Nation and in chapters without grocery stores were considered for participation in this study if they met specified criteria. The store owner or manager must have participated in an interview[4] (n=22) (39), gave permission for shopper interviews to be conducted and also if they offered at least five types of fresh, frozen or canned fruits and vegetables, as determined by store inventories completed during baseline data collection for the Navajo Healthy Stores Initiative[5] (n=19). Of these, a convenience sample of 11 stores were visited for shopper interviews.

The store owner/manager on site was informed of the data collection just prior to shopper interviews being conducted. Additionally, all fresh, frozen, canned and dried F&V available on the shelves were documented as a frame of reference for understanding shoppers perspectives on food availability and shopping preferences.

Prior to any data collection, this study was approved by the Navajo Nation Human Research Review Board and the Tufts University Institutional Review Board. Data were collected on paper surveys and entered into an excel spreadsheet. Statistical analyses were conducted using Stata statistical software package version 12.1 (StataCorps, College Station, TX).

---

[4] As described in Aim 2 of the dissertation.
[5] As described in Aim 1 of the dissertation.

Results

Store participation and characteristics

The following results are based on consumer intercept surveys conducted at nine of the eleven stores visited. Two stores were excluded from this study because there were either no shoppers during the time period of data collection or those individuals who were shopping were not interested in participating.

All nine stores accept Supplemental Nutrition Assistance Program (SNAP) and eight accept Women Infants and Children (WIC). See table 2 for complete summary of F&V available on the day surveys were conducted. The median amount of fresh, frozen, canned and dried types of F&V available the day surveys were conducted was 24 (IQR=5). One store did not offer any fresh F&V. The median amount of fresh F&V offered was eight (IQR=3.5) with a minimum of six and a maximum of 21. The median number of canned F&V types was nine (IQR=6; minimum of 6 and maximum of 19). Six stores did not offer any frozen fruit (the other three offered one or two types) while all stores offered at least three types of frozen vegetables with a median of six types and a maximum of eight. None of the stores offered dried vegetable types and five stores did not offer any dried fruit.

Presence and types of dark green, red, and orange vegetables was delineated because The Dietary Guidelines for Americans (15) specifically recommends these as part of a healthy eating pattern. Only one store offered a dark green vegetable (frozen broccoli) while eight stores offered red or orange vegetables (fresh carrots and tomatoes and canned tomatoes, carrot, pumpkin, and yams)

Table 2 Availability of fruit and vegetable types across nine small stores in the New Mexico region of Navajo Nation

Fruit or vegetable type	% Stores with any	Stores with any	Min	Max	Mean	SD	Median	Q1	Q3	IQR
Canned	100	9	6	19	11.4	4.5	9.0	9.0	15.0	6.0
Vegetable	100	9	3	12	6.4	3.4	5.0	4.0	9.0	5.0
Dark green*	0	0	0	0						
Red/orange	89	8	0	4	1.9	1.4	1.0	1.0	3.0	2.0
Fruit	100	9	2	7	5.0	1.6	5.0	4.0	6.0	2.0
Fresh	89	8	0	21	8.4	5.9	8.0	6.0	11.0	5.0
Vegetable	89	8	0	12	5.2	3.5	5.0	4.0	7.0	3.0
Dark green	0	0								
Red/orange	89	8	0	2	1.3	0.71	1	1.0	2.0	1.0
Fruit	89	8	0	9	3.2	2.6	2.0	2.0	4.0	2.0
Frozen	100	9	3	8	5.4	1.8	6.0	4.0	7.0	3.0
Vegetable	100	9	3	8	5.0	1.8	6.0	3.0	6.0	3.0
Dark green	11	1	0	1						
Red/orange	0	0								
Fruit	33	3	0	2	0.44	0.73	0	0	1.0	1.0
Dried	100	9	0	3	0.67	1.1	0	0	1.0	1.0
Vegetable	0	0								
Fruit	44	4	0	3	0.67	1.1	0	0	1.0	1.0
All F&V types	100	9	12	48	26	10.1	24	22	30	8

*The dark green or red/orange options found at these stores included: fresh carrots and tomatoes; frozen broccoli, and canned tomato, carrot, pumpkins, and yams.

Demographic characteristics of shoppers

Below is a brief demographic summary of the individuals who participated in this study followed by information about usual shopping patterns. This background provides a framework for presenting the factors influencing F&V purchasing at small stores in remote Navajo Nation, the primary objective of this study. For complete demographic information including availability of electricity and running water at home, food security and participation in federal food assistance programs see tables 3, 4, and 5.

The mean age of participants was 58 years with a range of 23 to 88 years. Sixty-three percent of participants were female and fifty-six percent were employed, 17% were retired. Education level varied with 24% having no more than a high school education, 36% having graduated from high school or equivalent and 25% having completed at least some college or technical school; 15% had completed college or more advanced schooling.

Table 3 Characteristics of a convenience sample of shoppers at nine small stores in the New Mexico region of Navajo Nation (n=72)

Characteristic	n	%
Female	45	63
Employment		
Employed	41	56
Unemployed	9	13
Homemaker	7	10
Retired	12	17
Unable to work	2	3
Student	1	1
Usual transportation to store~		
Drive self	62	86
Get a ride	7	10
Other	3	4
People in household		
1	12	17
2-4	43	60
≥5	17	24
People usually shopping for		
1	9	13
2-4	46	63
≥5	17	24
Highest level of education		
Less than high school degree	17	24
High school graduate or equivalent	26	36
Some college or technical/trade school	18	25
Bachelors degree or higher	11	15

~ Average travel time from home to the small store (n=69): 17 minutes; least amount of time was one minute and greatest was 60 minutes.

Table 4 Home utilities of sampled shoppers at nine small stores in the New Mexico region of Navajo Nation

	n	%
Home has electricity (n=71)	61	85
No electricity	8	11
Only has solar	3	4
Reliable enough to operate appliances (n=61)	59	97
Home has working refrigerator	64	90
Home has kitchen sink with running water (n=72)	62	86

Table 5 Food insecurity and participation in federal assistance programs of sampled shoppers at nine small stores in the New Mexico region of Navajo Nation

	n	%
Worried at any time in past month wouldn't have enough food to feed family (n=71)	31	44
A little worried	9	29
Somewhat worried	14	45
Very worried	7	23
Anyone in household participates in a federal assistance program (n=72)	35	49
Food stamps	23	32
Food Distribution Program on Indian Reservations (FDPIR or "Commodities")	7	10
School breakfast/lunch	15	21
Women Infant and Children (WIC)	4	6
Supplemental Security Income (SSI)	5	7
Head Start	4	6

Purchasing Behavior

While 64% of participants stated that they do most of their food shopping at supercenters, 47% of individuals shop at the small store at least two or more times per week. The most commonly reported reasons for shopping at the small store were: convenience to home or work (n=34), for gas (n=15) and for a snack or drink (n=9). Snacks (n=30), staples (n=19) and soda (n=18) were the self-reported most commonly purchased items when participants shop at the small stores.

In developing the survey for this study, a COPE staff person who is Navajo recommended asking if participants know if the store sells fresh F&V. This was suggested because some products are less obviously placed in the store than others and knowing that F&V are sold is one predisposing dimension to purchasing those F&V. Three-quarters of participants reported that the small store sells fresh F&V while an

inventory conducted just prior to starting the consumer surveys showed that all but one store offered any fresh F&V.

Only four individuals had purchased any F&V the day of the interview and 32% (n=23) had purchased any F&V at that store in the previous week. Among those individuals who had purchased any F&V at that store in the prior week, the mean number of types was 2.5 with a minimum of one and maximum of five. Lettuce and oranges were most commonly purchased with six individuals reporting each of these types. Fewer people bought any canned F&V and only one person purchased a frozen F&V type. We did not find any association between the amount of F&V types offered (all or fresh) and the amounts that were purchased.

Two-thirds of participants stated that they have purchased fruits or vegetables at farmers' markets or roadside stands, in the past, and close to one-quarter said they grow some of their own food. Of those individuals who do not grow any of their own food, one-third of them stated that a family member does produce some of his/her own food.

While small stores in remote Navajo Nation are some of the only places for food purchasing within many miles, there is a strong perception that these stores are not spaces where people should or would buy F&V. Seventeen percent of the shoppers in this study were not aware if the store sold fresh F&V.

Factors influencing healthy purchasing behavior

Half of those individuals who purchased F&V in the past week stated that the primary reason they did was because the store is convenient or closer to home. Multiple additional responses were provided ranging from forgetting to purchase an item in town to comments about maintaining a healthy diet including: "trying to get kids more healthy and promoting health."

Facilitators to stimulate more fruit and vegetable purchasing at local stores

Survey participants were asked what would be needed for them to buy more F&V at the small store. The most common responses were: if there were more variety of F&V offered (24% or 17 individuals) and more stocking of healthy foods (19% or 14 individuals).

Four participants stated that the placement of F&V in the store would help encourage purchasing. That is, if F&V were closer to the front of the store, displayed in a large and prominent way and not in the back.

One participant stated that offering complementing foods like lunchmeats could motivate shoppers to buy F&V, for example, to use on sandwiches. Another person stated that options that are convenient (like prepared salads) would encourage purchasing of F&V at the small store. Two individuals stated they do not purchase F&V there; another said that "nothing really" would encourage buying more F&V at the small store because he buys it in bulk at a supercenter and another said that local people do not eat much (F&V) and that the store does enough to provide it. Four individuals did not understand the question and skipped it and three people said that they did not know what would make it easier for them to purchase more F&V at the small store.

We did not have the statistical power to detect any differences in demographic characteristics between those who purchased F&V in the past week and those who did not.

Factors that could promote healthier purchasing among those who did not buy fruits or vegetables

Among the two-thirds of participants who did not buy any F&V at the small store in the last week, the primary factors that would make it easier for them to purchase it at the small store in the future included: if there were more variety of F&V available there (stated by eleven participants); better pricing (stated by nine participants); greater stocking of healthy food, better marketing and promotion of the food and better F&V quality (each stated by six participants); and having a bigger store available to them closer to home that had more healthy options (stated by three participants).

Discussion

A key finding in this study was that about half of participants visited the small store two or more times per week. This suggests that the stores could be an effective location for promoting the purchasing, cooking and consumption of healthy foods. Food selection, purchasing and consumption decisions are the result of a complex interplay among many factors and there is need to understand the strongest dimensions and feedback loops (40) necessary to be most impactful in the Navajo Nation. Future research and program development in these communities should identify the most relevant, actionable augmentations that could be made, across dimensions of the ecological framework, to make healthy eating an accessible and desirable option.

Health behavior theory (41) provides frameworks for understanding the impact of multiple and interacting dimensions on individuals' decision making. Specifically, Social Cognitive Theory (42) considers individuals' knowledge, skills and beliefs within the context of complex social systems. In this study, close to 20% of participants did not

know that the stores sold F&V. This was an interesting finding as we consider all dimensions that factor in to decision making. While simply knowing that the stores sell F&V will not guarantee that shoppers will purchase it, promoting the F&V that stores already offer could be a meaningful step in increasing the opportunities for shoppers to purchase healthy food close to home.

Results from this study reveal the need for interventions that make locating and purchasing F&V easy and appealing choices for customers. Currently, shoppers at small stores in remote Navajo Nation do not view small retail outlets as places for regularly purchasing fresh F&V. And, while the challenge is one of both supply and demand, encouraging purchasing of the healthy foods that do exist at the stores is critical for communicating to store owners and managers that healthy foods are desired. Given the variety of reasons that individuals choose to buy F&V at the small store close to home, promoting the F&V that are available and the usual delivery dates through various media outlets could be useful in encouraging utilization of the small store as a place to obtain F&V.

A large segment of this rural population visits grocery stores or super centers only once or twice per month. Choosing to purchase perishable F&V at the small stores during these intervening times will necessitate multi-pronged interventions. One such strategy is engaging with store owners willing to arrange the store whereby all F&V, whole grain products, low sodium, low sugar snacks and other healthy food options are co-located in a visible and well-advertised location. This environmental change coupled with recipes and easy to implement tips for using healthy items purchased in the store for preparing snacks and meals could help increase demand (and thus supply) of healthy offerings at

these stores. Gummer Wholesale, a distribution company in Ohio that specializes in providing healthy offerings in small quantity to convenience stores also provides free technical assistance to interested stores (43). Business-minded students or entrepreneurs on the Navajo Nation or in border towns could look to Grummer Wholesale for guidance on filling this need locally.

Small stores that see few customers per day cannot compete with grocery stores in outlying communities that have greater volumes of shoppers. Economies of scale experienced by grocery stores enable offering of F&V for relatively low prices. If small stores are to provide affordable, high quality products, there is need for creative sourcing and partnership building. While many small Navajo communities have few services, there are transportation and distribution networks that connect to institutions such as hospitals and schools that already have food distribution channels. Exploring the potential to partner with such institutions could be promising and would necessitate store willingness as well as dedicated community advocacy and leadership. Acknowledging the intractable-seeming challenges of perpetual poverty and unemployment, there is real need to work within the existing infrastructure and systems of the communities most impacted.

Encouraging small scale food production at the home or community garden levels is a recommended strategy for increasing availability and consumption of F&V (17). Multiple entities are partnering with Navajo communities to support traditional agriculture and gardening programs (44) (personal communication). Perceptions of and interest in linking locally grown food to small stores on Navajo Nation has also been explored (45). With two-thirds of participants in this study having purchased F&V at

farmers markets or road-side stands and half of participants having some connection to small scale food production (either growing it themselves or having a family member who does), a segment of the community is predisposed to incorporating F&V into their diets. While there are many challenges to farming on the Navajo Nation, far reaching health benefits could be realized through engaging in food production (46).

Conclusion and Implication for Practice

Consuming a healthy diet is widely appreciated as essential for good health. However, the opportunity is dependent on multiple and complex determinants. To date, no studies have investigated purchasing habits of Navajo shoppers in regions without grocery stores. The primary objective of this work was to document the factors considered in purchasing F&V at small stores in remote Navajo Nation. Among the shoppers taking part in this study, the main reason for shopping at the small store was convenience to home. It was reported that food shopping is primarily done at supercenters far from where participants live. Still, about half of individuals shop at the small store two or more times per week, but not typically for F&V. Knowing that the small store is a place where community members buy items frequently, this setting could be important for implementing strategies to increase interest in and purchasing of F&V.

While the majority of stores in this study offered some F&V, purchase of F&V was not the primary driver bringing shoppers into the store. This study highlights opinions of Navajo shoppers that there are multiple reasons that they do not purchase F&V at the small stores with an overarching theme that small stores are for "convenience" foods and that availability, quality and price dictate that only out of necessity, would F&V be purchased at the small store. Shoppers at small stores in rural North Carolina (26), Minnesota and Iowa (47) have expressed similar sentiments. The

shoppers we inter viewed had actionable suggestions for making F&V more appealing to customers including better visibility and promotion of the F&V that are available.

While this research offers insight into shopper purchasing, there are some limitations to the study. For purchasing to occur, F&V must be available for sale. We documented F&V availability on the day of the interviews and on one additional day in a separate season. A visual comparison of the two data points suggests similar availability across seasons but a more rigorous approach with sufficient power would be needed to show if there is a difference in offerings over time. Additionally, while this study was small, it provides some indication that having greater variety of F&V on the shelves might not impact food purchasing decisions. A larger study with sufficient statistical power would need to be conducted in order to better understand this relationship. Research conducted in an urban setting found a small increase in F&V purchasing with increase in availability (48) and while increased variety would be desirable in most settings, further research is needed to identify the strongest indicators that would impact F&V purchasing and consumption in this rural setting of Navajo Nation. Another consideration for further study is the challenge of F&V quality. We did not record quality of the fresh F&V available the day that interviews were conducted. Fruits and vegetables must be both available and acceptable to the shopper for purchasing to occur and thus it is necessary to have a rigorous and systematic understanding of the quality of F&V offered at these small stores. Additionally, the study was conducted in a convenience sample of small stores in the New Mexico region of Navajo Nation, thus, results cannot be generalized to all Navajo Nation small stores. Individuals self-selected to participate and so it is not known if their perspectives are representative of those shoppers who chose not

to be interviewed, nor of Navajo Nation residents more broadly. Small stores in extremely rural areas have difficulty selling F&V, especially fresh fruits and vegetables that are very perishable, at a rate that is necessary for business profitability. In order for stores to offer F&V at prices competitive to larger outlets, they would need to engage in creative solutions that necessitates open communication among all impacted entities.

Policy and financial incentives have been explored and implemented throughout the country as strategies for making healthy food more accessible and affordable in low-income communities. The Navajo Nation government, local organizations and the Navajo people are engaged in intensive efforts to address the food desert-obesity paradox including passage of two bills. These include a 2% tax on unhealthy foods, the first of its kind within a Native American community (49) and a subsequent bill that eliminates the 5% sales tax on fresh F&V, water and a limited number of additional healthy food items (50). The Dine' Food Sovereignty Alliance (DFSA) is building capacity for local food production and also assisting a variety of food access efforts to indigenize their processes, providing guidance on working collaboratively with local people and following a framework that ensures projects in Navajo Nation are guided by indigenous-ways-of-knowing and not simply by Western perspectives. While DFSA is a newly formed non-profit, its sentiments have been percolating, over time, across Navajo Nation, where local people and groups are taking ownership of their food system by bringing back traditional agriculture.

This study documents shopper perceptions and food purchasing practices at small stores in Navajo Nation food deserts. The results can be used to build upon as Navajo communities pursue further work to increase healthy food options close to home. The

data collection process and study findings may also be useful to other rural populations working to improve their food environments.

Acknowledgements

This manuscript was supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Agriculture and Food Research Initiative - Food, Agriculture, Natural Resources and Human Sciences Education and Literacy Initiative under award number 2016-67011-24675. Any opinions, findings, conclusions, or recommendations expressed in this manuscript are those of the author(s) and do not necessarily reflect the official views of the U.S. Department of Agriculture.

References

1. Coleman-Jensen A, Rabbittt M, Gregory C *et al*. (2015) Household Food Security in the United States in 2014. Vol. 194, USDA Economic Research Report. https://www.ers.usda.gov/webdocs/publications/45425/53739_err194_summary.pdf?v=42515 (accessed October, 2017).
2. Franklin B, Jones A, Love D *et al*. (2012) Exploring mediators of food insecurity and obesity: A review of recent literature. *J of Community Health* **37**, 253–264.
3. Larson NI, Story MT, Nelson MC (2009) Neighborhood Environments. Disparities in Access to Healthy Foods in the U.S. *Am J Prev Med* **36**, 74–81.e10.
4. Darmon N, Drewnowski A (2008) Does social class predict diet quality? *Am J Clin Nutr*. **87**, 1107–1117.
5. Drewnowski A, Darmon N (2005) Symposium: Modifying the Food Environment: Energy Density, Food Costs, and Portion Size Portion Sizes and the Obesity Epidemic. *J Nutr*. Suppl. 900–904.
6. Powell LM, Slater S, Mirtcheva D *et al*. (2007) Food store availability and neighborhood characteristics in the United States. *Prev Med* **44**, 189–195.
7. Bustillos B, Sharkey JR, Anding J *et al*. (2009) Availability of More Healthful Food Alternatives in Traditional, Convenience, and Nontraditional Types of Food Stores in Two Rural Texas Counties. *J Am Diet Assoc* **109**, 883–9.
8. O'Connell M, Buchwald DS, Duncan GE (2011) Food access and cost in American Indian communities in Washington State. *J Am Diet Assoc* **111**, 1375–9.
9. Kumar G, Jim-Martin S, Piltch E *et al*. (2016) Healthful Nutrition of Foods in Navajo Nation Stores. *Am J of Health Promot* **30**, 501–510.
10. Bell J, Mora G, Hagan E *et al*. (2013) Access to Healthy Food and Why It Matters: A Review of the Research. http://thefoodtrust.org/uploads/media_items/access-to-healthy-food.original.pdf (accessed October, 2017).
11. D'Angelo H, Suratkar S, Song H-J *et al*. (2011) Access to food source and food source use are associated with healthy and unhealthy food-purchasing behaviours among low-income African-American adults in Baltimore City. *Public Health Nutr* **14**, 1632–1639.
12. Lutfiyya MN, Chang LF, Lipsky MS. (2012) A cross-sectional study of US rural adults' consumption of fruits and vegetables: do they consume at least five servings daily? *BMC Public Health* **12**, 280.
13. Moore L, Dodd K, Thompson F *et al*. (2015) Using Behavioral Risk Factor Surveillance System data to estimate the percent of the population meeting USDA Food Patterns fruit and vegetable intake recommendations. *Am J Epidemiol* **181**, 979–88.
14. Centers for Diseases Control and Prevention. State Indicator Report Fruits and Vegetables 2013. (2013) https://www.cdc.gov/nutrition/downloads/state-indicator-report-fruits-vegetables-2013.pdf (accessed October 2017).
15. U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans* (2010). 7th Edition, Washington, DC: U.S Government Printing Office, December 2010

https://health.gov/dietaryguidelines/dga2010/dietaryguidelines2010.pdf (accessed October, 2017).

16. Trust for America's Health & Robert Wood Johnson Foundation. *The State of Obesity: Better Policies for a Healthier America 2014*. http://healthyamericans.org/assets/files/TFAH-2014-ObesityReport-Fnl10.9.pdf (accessed October, 2017).
17. Centers for Disease Control and Prevention. Strategies to Prevent Obesity and Other Chronic Diseases: The CDC Guide to Strategies to Support Breastfeeding Mothers and Babies (2013) https://www.cdc.gov/breastfeeding/resources/guide.htm (accessed October, 2017).
18. Goodman K, Lowry A, Zaro S, *et al*. (2009) *Recommend Community Strategies and Measurements to Prevent Obesity in the United States: Implementation and Measurement Guide*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. https://www.cdc.gov/obesity/downloads/community_strategies_guide.pdf (accessed October, 2017).
19. Choudhary T. Navajo Nation Data US Census 2000. The Navajo Nation Division of Economic Development http://www.navajobusiness.com/pdf/NNCensus/Census2000.pdf (accessed October, 2017).
20. Tarasi D, Alexander C, Nania J 18,000 Americans without Electricity: Illuminating and Solving the Navajo Energy Crisis (2011) *Colo J Int Environ Law Policy* **22**, 263–282.
21. Eldridge D, Jackson R, Rajashekara S, *et al*. (2014) Understanding Food Insecurity in Navajo Nation through the Community Lens. In *Food Insecurity and Public Health [*Ivers A, editor]. CDC Press.
22. New Mexico Department of Health. (2014) *Health Equity in New Mexico: A Report on Racial and Ethnic Health Disparities,* 9th Edition. https://nmhealth.org/publication/view/report/1346 (accessed October, 2017).
23. United States Department of Agriculture. Economic Research Service. Food Environment Atlas. https://www.ers.usda.gov/data-products/food-environment-atlas/ (accessed October, 2017).
24. Eldridge D, McKenzie J, Jackson R. (2014) DINÉ FOOD SOVEREIGNTY A Report on the Navajo Nation Food System and the Case to Rebuild a Self-Sufficient Food System for the Dine People http://www.dinecollege.edu/institutes/DPI/Docs/dpi-food-sovereignty-report.pdf (accessed October, 2017).
25. Rio Puerco Alliance, Hasbidito. (2013). Tri-Chapter Food and Energy Economic Survey Results.
26. Pitts SBJ, Bringolf KR, Lloyd CL, *et al*. Formative evaluation for a healthy corner store initiative in Pitt County, North Carolina: engaging stakeholders for a healthy corner store initiative, part 2. *Prev Chronic Dis* **10**:E120.
27. Gittelsohn J, Rowan M, Gadhoke P. (2010) Interventions in Small Food Stores to Change the Food Environment, Improve Diet, and Reduce Risk of Chronic Disease. *Prev Chronic Dis* **9**, 1–15.

28. Langellier B, Garza J, Prelip M, *et al*. (2013) Corner Store Inventories, Purchases, and Strategies for Intervention : A Review of the Literature. *Calif J Health Promot* **11**,1–13.
29. Gittelsohn J, Kim EM, He S, *et al*. (2013). A food store-based environmental intervention is associated with reduced BMI and improved psychosocial factors and food-related behaviors on the Navajo nation. *J Nutr* **143**, 1494–1500.
30. Jilcott SB, Laraia B a, Evenson KR, *et al*. (2009) Perceptions of the community food environment and related influences on food choice among midlife women residing in rural and urban areas: a qualitative analysis. *Women Health* **49**, 164–80.
31. Burns C, Cook K, Mavoa H. (2013) Role of expendable income and price in food choice by low income families. *Appetite* **71**, 209–17.
32. Webber CB, Sobal J, Dollahite JS. (2010) Shopping for fruits and vegetables. Food and retail qualities of importance to low-income households at the grocery store. *Appetite* **54**, 297–303.
33. Ghosh-Dastidar B, Cohen D, Hunter G, *et al*. (2014) Distance to Store, Food Prices, and Obesity in Urban Food Deserts. *Am J Prev Med* **47**, 587–595.
34. Bodor JN, Rose D, Farley T *et al*. (2008). Neighbourhood fruit and vegetable availability and consumption: the role of small food stores in an urban environment. *Public Health Nutr* **11**, 413–20.
35. Andreyeva T, Middleton AE, Long MW, *et al*. (2011). Food retailer practices, attitudes and beliefs about the supply of healthy foods. *Public Health Nutr* **14**, 1024–1031.
36. Pitts SBJ, Bringolf KR, Lloyd CL, McGuirt JT, Lawton KK, Morgan J. Formative evaluation for a healthy corner store initiative in Pitt County, North Carolina: engaging stakeholders for a healthy corner store initiative, part 2. (2013) *Prev Chronic Dis*. **10:**E120.
37. Carty K, Post WA, Ray B, *et al*. Stock Healthy Shop Healthy Toolkit. University of Missouri Extension http://extension.missouri.edu/stockhealthy/ (accessed October, 2017)
38. Bonanno A, Berlin L, Chenarides-Hall K, *et al*. (2014) Shopper Intercept Survey Instrument. Unpublished research instrument of the Enhancing Food Security in the Northeast (EFSNE) project.
39. Piltch, E, Shin, S, Houser, RF., Griffin, T. The complexities of selling produce and traditional Navajo foods in remote Navajo Nation retail outlets: perspectives from owners and managers of small stores. Unpublished, Agriculture Food & Environment Program, Tufts University; 2017.
40. Hummel E, Hoffmann I. (2016) Complexity of nutritional behavior: Capturing and depicting its interrelated factors in a cause-effect model. *Ecol Food Nutr* **55**, 241–57.
41. Glanz K, Rimer BK, Viswanath K, editors. (2008) Health behavior and health education: theory, research, and practice. 4th ed. San Francisco, CA: Jossey-Bass.
42. Bandura A. (1998) Health promotion from the perspective of social cognitive theory. *Psychol Health* **13**, 623–649.
43. Bentzel, D, Weiss, S, Bucknum, *et al*. (2015) Healthy Food and Small Stores: Strategies to Close the Distribution Gap. The Food Trust.

44. Lombard KA, Beresford SAA, Ornelas IJ, *et al*. (2014) Healthy Gardens/Healthy Lives: Navajo Perceptions of Growing Food Locally to Prevent Diabetes and Cancer. *Health Promot Pract*. **15**, 223–231.
45. Setala A, Gittelsohn J, Speakman K, *et al*. (2011) Linking farmers to community stores to increase consumption of local produce: a case study of the Navajo Nation. *Public Health Nutr* **14**, 1658–1662.
46. Soga M, Gaston KJ, Yamaura Y. (2017) Gardening is beneficial for health: A meta-analysis. *Prev Med Rep* **5**, 92–99.
47. Smith C., Morton L. (2009) Rural Food Deserts: Low-income Perspectives on Food Access in Minnesota and Iowa. *J Nutr Educ Behav* **41**, 176-187.
48. Martin KS, Havens E, Boyle KE, *et al*. (2012) If you stock it, will they buy it? Healthy food availability and customer purchasing behaviour within corner stores in Hartford, CT, USA. *Public Health Nutr* **15**, 1973–1978.
49. Navajo Nation Council Office of the Speaker. (2014) Navajo Nation Council enacts the Healthy Dine' Nation Act of 2013. 22nd http://www.navajo-nsn.gov/News%20Releases/NNCouncil/2014/jan/NNC%20enacts%20the%20Healthy%20Dine%20Nation%20Act%20of%202013.pdf (accessed October, 2017).
50. Office of the Navajo Nation Tax Commission. (2014) Public Ruling Administration of the "Elimination of the Sales Tax on Fresh Fruits, Fresh Vegetables, Water, Nuts, Seeds and Nut Butters" under the Navajo Nation Sales Tax http://www.navajotax.org/Navajo%20Taxes/Public%20Rulings/Healthy%20Foods%20Act%20Public%20Ruling.pdf (accessed October, 2017).

Conclusion

Summary of results

This dissertation investigated three perspectives on the small store food environment in Navajo Nation. In the first study, titled *Availability and healthfulness of fruits and vegetables offered for sale at independently owned, regional and national chain small stores in remote Navajo Nation,* it was documented that of the 71 stores, 87% sold fresh fruit and 83% sold fresh vegetables. The median types of fresh fruits and vegetables offered was three and five, respectively. Nine of the stores had no fresh fruit options and twelve stores had no fresh vegetables available. Knowing that the small food stores in remote Navajo Nation fall within three distinct ownership types, and based on our collective knowledge of the region, we deduced that store type would be a meaningful dimension when characterizing the availability of fresh F&V. This information could help contextualize the approach used for engaging with management at the various stores. Indeed, we found a statistically significant difference in the number of types of F&V available at the three store types (p-value = 0.0034). Independently owned stores had a median of 11 fresh F&V types, regionally operated chain stores had a median of 8 and nationally operated chain stores had a median of 6.5.

While the amount of fresh F&V differed statistically, qualitatively, it is not known how, and to what extent, a 4.5 fresh F&V type difference might make on customer shopping patterns at the small stores nor what that might mean for shopper dietary diversity. When customers were asked, in the third study, what would encourage them to purchase more F&V, one commonly heard response was that they would like to see more types of F&V offered. Studies that investigated the relationship between F&V availability

at small stores and actual customer purchases documented modest positive associations yet they were all in urban settings (1–3). Research on the association between the amount of F&V available and the amount purchase is needed in the rural and Native settings to elucidate if increased availability is, indeed, a determinant for increased purchasing. While a wide variety of F&V availability at small stores is desirable, other determinants that customers consider include price and quality. These dimensions greatly rely on a multitude of additional variables including reliability on F&V suppliers that deliver high quality items. Store management must also consider if they are moving enough fresh items in a timeframe that enables prices to be low and quality to remain high.

In the second study, titled *The complexities of selling fruits, vegetables, and traditional Navajo foods in remote Navajo Nation retail outlets: perspectives from owners and managers of small stores,* we documented that store management would like to offer more fresh F&V, however, barriers included varying perceived demand, limited F&V choices from distributors and for some managers, limited authority over product selection. While the Navajo Nation context is unique in many ways, the perspectives of small store owners and managers are similar to themes identified across the country (4). Discussion in the third paper highlights recommended next steps for working with store owners and managers on Navajo Nation including aiding in identifying reliable, high quality and affordable sources of fresh F&V as well as providing assistance in building networks between store management and local food producers. Study one identified that stores differed considerably in their fresh F&V pricing. This heterogeneity should be further investigated to understand how some store owners are able to offer fresh F&V at far more affordable prices than other stores. While there are many variables that

determine product pricing, a community development technique such as *positive deviance* (5) could be used to understand the unique perspectives and actions taken by store owners who offer products at the lowest prices. The dimensions highlighted through understanding pricing decision making could potentially benefit other store owners interested in offering more affordable options but not necessarily considering it a feasible business option.

In the third study, *Fruit and Vegetable Purchasing at Small Stores in Remote Navajo Nation*, it was striking that 47% of the 72 customers interviewed shopped at the small store in their community at least two or more times per week. Still, only four individuals had purchased any F&V at the small store the day of the interview and 32% had purchased any in the previous week. While small stores in remote Navajo Nation are some of the only places for food purchasing within many miles, there is a strong perception that these stores are not spaces where people should or would buy F&V. In fact, 17% of the shoppers in this study were not aware if the store sold fresh fruits or vegetables. To increase awareness of store products, management in conjunction with cooperative extension or other local groups could provide F&V advertisement including shelf-labels as well as promotional activities like taste-tests and cooking demonstrations. These were included in the Navajo Healthy Stores intervention study by Gittelsohn et al. (2013) which had mixed results but found the most beneficial impact on participants who had greatest exposure to intervention components (6). These findings provide rationale that even small, low-cost interventions could potentially be impactful with regards to shopper education and purchasing habits.

An overarching take-away from this dissertation work is that public health interventions aiming to address the limited high quality and diverse F&V must equally engage store personnel and customers. Conclusions from small store work in Baltimore, MD provide applicable summary to our efforts: "future research and intervention work should develop strategies to distinguish and lessen perceptual gaps between small-store owners and customers regarding the request for healthy foods and expected availability in corner stores" (7) (p.26).

Recommended next steps

While this dissertation focused on the potential for increasing access to high quality, fresh F&V specifically in the small store setting, an investigation into food availability would not be complete without attention to other, non-retail food sources. Two-thirds of customers interviewed for study three stated that they have ever purchased F&V at farmers' markets or roadside stands yet no comprehensive documentation exists regarding direct-to-consumer marketing in Navajo Nation nor community-wide use of these resources. Large chapters, that also have grocery stores, operate seasonal farmers' markets. However, few, if any, of the smaller communities, that are the focus of this dissertation, have regular farmers' markets. Fresh F&V outlets that are largely uncharacterized in Navajo Nation are flea markets that operate weekly, with some that are active year-round. While flea markets also tend to be in the larger chapters, they are components of the regional food system that do not operate within the retail/market confines of the small stores. Based on the work conducted for this dissertation, I recommend that, in addition to concerted efforts collaborating with store owners and managers, attention also be directed to additional opportunities that residents have for obtaining fresh F&V in Navajo Nation. The use of "alternative food sources" (8)(p.705)

including flea markets and neighbors or friends has been investigated in South Texas *colonias*. *Colonias* are Mexican-origin unincorporated settlements where residents have rates of poverty, diet-related diseases, and food insecurity (9) similar to Navajo Nation. Residents of *colonias* also parallel Navajo Nation communities as they have limited availability to a wide-range of resources including retail outlets for high quality, affordable and healthy food (8–10). Studies have documented the availability of food, including fresh F&V, at *colonias* flea market vendors (10) as well as use of these flea markets and other alternative food sources by *colonias* residents (8). Broadening the landscape of food environment investigation in Navajo Nation could utilize this work in the *colonias* for guidance.

I also recommend that future work seeking to increase access to F&V in Navajo Nation consider contextual factors beyond the built environment. There is a need to investigate to what extent the social environment impacts dimensions of F&V access in these remote communities. The social environment is relevant to this discussion because it has consistently been shown that social connections (defined in many ways) are positively associated with health promoting behaviors (11). The concept of social capital incorporates many dimensions of the social fabric of a community including concepts of trust, social norms and networks (12). While much commentary exists on its etiology, (13) social capital can be described as three broad categories of relationships that are relevant to contextualizing the relationships that exist between Navajo Nation residents and the owners and managers of the small remote stores. The categories include: bonding social capital, or relationships among members of a network with some dimensions of similarity, bridging social capital, that describes relationships among individuals who

differ on certain meaningful dimensions, and linking social capital, or the relationship building across power differentials (14). In study two of the dissertation, we asked store owners and managers if they live in the community or chapter where the store is located. One-third (n=7) of store owners or managers lived adjacent to the store and 50% (n=11) lived off-site but within 10 miles of the store. Moreover, three quarters (77%, n=17) of store owners or managers stated that they were residents of the community or chapter where the store was located. Next steps in this work should look critically into both the social and psychological dimensions of community as well as social capital. Such understanding could provide insight into facilitating relations between store management and customers.

A final contextual factor that cannot go unmentioned is that of race relations between community residents and non-Navajo owners of the small stores. Racial tension on Navajo Nation dates back to the 1800s when "the United States carried out aggressive and violent Western expansion under the premise of Manifest Destiny, a belief that White Americans had a divinely sanctioned right to claim lands not only claimed by Mexico but also inhabited by Native peoples (15) (p. 160-161). From my own experience living in a Navajo Nation border town and attending community meetings in the region, I have observed that some Navajo residents view the operation of small stores in Navajo Nation by non-Native people as a continuation of colonization and oppression. Future work seeking to address contextual factors limiting the availability and accessibility of healthy, affordable food in Navajo Nation should incorporate culturally sensitive and appropriate discussions on race relations. One framework to consider as race relations is incorporated into research on healthy food access is that of Critical Race Theory (16). "Critical Race

Theory integrates transdisciplinary methodologies that draw on theory, experiential knowledge, and critical consciousness to illuminate and combat root causes of structural racism (16) (p.S31). Ford and Airhihenbuwa (2010) (16) detail the constructs underlying Critical Race Theory and provide a concrete example of how its tenants were utilized in development and implementation of public health research (16). In his paper "Toward a Tribal Critical Race Theory," Brayboy (2006) (17) provides an extension of Critical Race Theory in specifying how the framework could more adequately address challenges faced by indigenous communities in America.

This dissertation provides some context for understanding the complex nature underlying residents' abilities to obtain healthy food in remote Navajo Nation. Both indigenous organizations and outside non-profits such as Community Outreach and Patient Empowerment work tirelessly to address the intractable-seeming public health challenges of food insecurity and chronic disease. It is my humble hope that this dissertation can contribute, even to a small extent, to efforts combating the food injustices that exist on Navajo Nation.

References

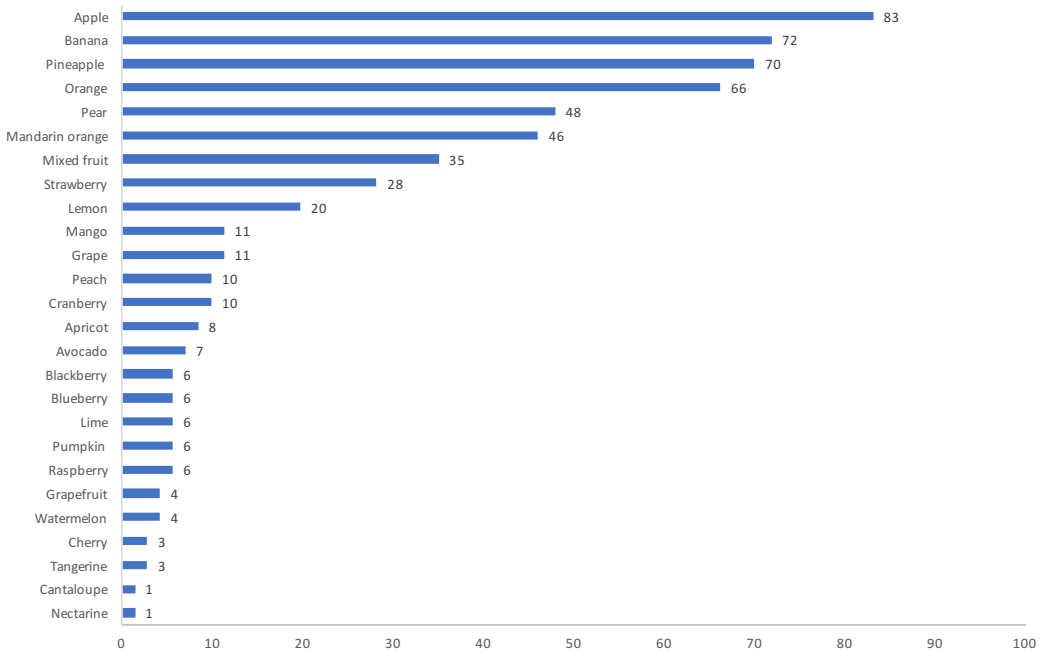
1. Caspi CE, Lenk K, Pelletier JE, Barnes TL, Harnack L, Erickson DJ, et al. (2017). Association between store food environment and customer purchases in small grocery stores, gas-marts, pharmacies and dollar stores. *International Journal of Behavioral Nutrition and Physical Activity.* 14:76. DOI 10.1186/s12966-017-0531-x
2. Ruff RR, Akhund A, Adjoian T. (2016). Small Convenience Stores and the Local Food Environment: An Analysis of Resident Shopping Behavior Using Multilevel Modeling. *American Journal of Health Promotion.* 30(3):172–80.
3. Martin KS, Havens E, Boyle KE, Matthews G, Schilling EA, Harel O, et al. (2012). If you stock it, will they buy it? Healthy food availability and customer purchasing behaviour within corner stores in Hartford, CT, USA. *Public Health Nutrition.*15(10):1973–1978.
4. Gittelsohn J, Laska MN, Karpyn A, Klingler K, Ayala GX. (2014). Lessons Learned From Small Store Programs to Increase Healthy Food Access. *American Journal of Health Behavior.*38(2):307–15.
5. Marsh DR, Schroeder DG, Dearden KA, Sternin J, Sternin M. (2004). The power of positive deviance. *British Medical Journal.* 329:1177-1179.
6. Gittelsohn J, Kim EM, He S, Pardilla M. (2013). A Food Store-Based Environmental Intervention Is Associated with Reduced BMI and Improved Psychosocial Factors and Food-Related Behaviors on the Navajo Nation. *Journal of Nutrition.*143(9):1494–1500.
7. Kim M, Budd N, Batorsky B, Krubiner C, Manchikanti S, Waldrop G, et al. (2017). Barriers to and Facilitators of Stocking Healthy Food Options: Viewpoints of Baltimore City Small Storeowners. *Ecology of Food and Nutrition.* 56(1):17–30.
8. Sharkey JR, Dean WR, Johnson CM. (2012). Use of Vendedores (Mobile Food Vendors), Pulgas (Flea Markets), and Vecinos o Amigos (Neighbors or Friends) as Alternative Sources of Food for Purchase among Mexican-Origin Households in Texas Border Colonias. Journal of the Academy of Nutrition and Dietetics. 112(5):705–710.
9. Valdez Z, Dean WR, Sharkey JR. (2012). Mobile and home-based vendors' contributions to the retail food environment in rural South Texas Mexican-origin settlements. *Appetite.* 59(2):212–7.
10. Dean WR, Sharkey JR, St. John J. Pulga (Flea Market) Contributions to the Retail Food Environment of Colonias in the South Texas Border Region. (2011). *Journal of the American Dietetic Association.*111(5):705–710.
11. Murayama H, Fujiwara Y, Kawachi I. (2012). Social Capital and Health: A Review of Prospective Multilevel Studies. *Journal of Epidemiology.* 22(3):179–187.
12. Ferlander S. (2007). The importance of different forms of social capital for health. *Acta Sociologica.* 50(2):115–128.
13. Szreter S. (2004). Health by association? Social capital, social theory, and the political economy of public health. *International Journal of Epidemiology.* 33(4):650–667.

14. Hawkins RL, Maurer K. (2010). Bonding, Bridging and Linking: How Social Capital Operated in New Orleans following Hurricane Katrina. *British Journal of Social Work.* 40(6):1777–1793.
15. Eldridge, D, Jackson, R, Rajashekara, S, Piltch, E, Begay, M, VanWassenhove, J, et al. Understanding Food Insecurity in Navajo Nation through the Community Lens. In: Ivers, Louise, editor. Food Insecurity and Public Health. Boca Raton, FL: CRC Press; 2015. p. 155–73.
16. Ford CL, Airhihenbuwa CO. (2010). Critical race theory, race equity, and public health: toward antiracism praxis. *American Journal of Public Health.*100(S1):S30–S35.
17. Brayboy BMJ. (2005). Toward a Tribal Critical Race Theory in Education. *The Urban Review.* 37(5):425–446.

Appendices

Additional analyses of store inventory data

Percent of the 71 stores in Navajo Nation chapters without grocery stores that offer any of each type of fruit



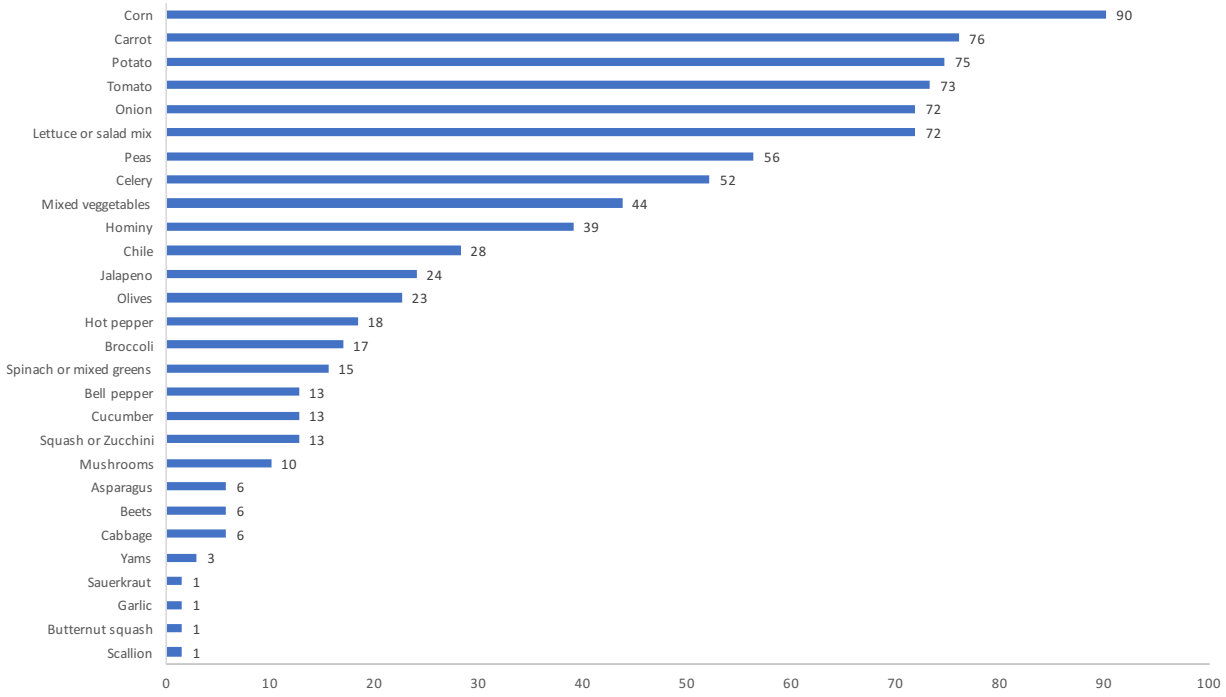
This graph and accompanying below tables document availability across fresh, frozen and canned fruit. For example, 48% of stores offerred pears of any type. 42% of all stores offerred canned pears and 8% offered fresh pears.

Percent of stores offering each type of fruit and divided by fresh, frozen or canned

Fruit type	Percent of stores offering
Apple	83
Fresh	82
Applesauce	6
Banana	72
Pineapple	70
Canned	70
Frozen	1
Fresh	1
Orange	66
Pear	48
Canned	42
Fresh	8
Mandarin orange (can	46
Mixed fruit	35
Plastic fruit cup	27
Frozen mixed fruit	10
Fresh mixed fruit	1
Strawberry	28
Frozen	21
Fresh	7
Lemon	20
Grape	11
Mango	11
Fresh	7
Frozen	4

Fruit type	Percent of stores offering
Peach	10
Frozen	10
Fresh	4
Cranberry (Canned)	10
Apricot (Canned)	8
Avocado	7
Blackberry (Frozen)	6
Blueberry (Frozen)	6
Lime	6
Pumpkin (Canned)	6
Raspberry (Frozen)	6
Grapefruit	4
Fresh	3
Canned	1
Watermelon	4
Cherry (Canned)	3
Tangerine	3
Cantaloupe	1
Nectarine	1

Percent of the 71 stores in Navajo Nation chapters without grocery stores that offer any of each type of vegetable*



Vegetable types broken down by canned, frozen and fresh when available
Shaded row provides percent of stores offering any of the given type of vegetable while the unshaded beneath show percents of stores offering fresh, frozen or canned. Those with no sub-types document percent of stores offering fresh.

Vegetable type	Percent of stores offering
Corn	90
Canned	85
Frozen	62
Fresh	1
Carrot	76
Fresh	68
Canned	46
Frozen	4
Potato	75
Fresh	75
Frozen	3
Canned	1
Tomato	73
Fresh	62
Canned	58
Lettuce or salad mix	72
Lettuce	72
Salad mix	6
Fresh onion	72
Peas	56
Canned	54
Frozen	15
Fresh celery	52
Mixed vegetables	44
Frozen	38
Canned	11
Frozen stirfry mix	3
Frozen peas & carrots	1

Vegetable type	Percent of stores offering
Chile	28
Canned green chile	13
Fresh (unspecified)	10
Frozen red chile	10
Frozen green chile	8
Frozen chile (unspecified)	3
Canned chile (unspecified)	3
Hominy	28
Frozen	28
Canned	27
Jalapeno	24
Fresh	18
Canned	10
Canned olives	23
Hot peppers	18
Canned	14
Fresh	6
Broccoli	17
Frozen	15
Fresh	1
Spinach or mixed greens	15
Canned spinach	11
Frozen spinach	3
Frozen mixed greens	3
Squash or Zucchini	13
Fresh	13
Frozen	3
Fresh cucumber	13
Fresh bell pepper	13
Mushrooms	7
Canned	7
Fresh	3
Fresh cabbage	6
Canned beets	6
Canned asparagus	6
Canned yams	3
Fresh scallion	1
Fresh butternut squash	1
Fresh garlic	1
Canned sauerkraut	1

Data collection instruments

Navajo Nation Healthy Stores Initiative-food environment assessment

Store ID: ___-___ Rater ID: ___

A. STORE VISIT DATA:

Fill in questions 1-5 before leaving office (you might need to googlemap for zip code). Please be sure to fill out entire survey before leaving the store. Keep in mind foods that appear like they should be found together may be available in different parts of the store. If something isn't labeled that you need (like pricing), make a note of your questions and ask all of them at the end of your store visit. We want to minimize interruptions to store staff.

1. Date of Site Visit: ____ /____ /____
MM DD YY

2. Store Name: _____

3. Is this store a chain? ☐1 Yes, regional chain ☐2 Yes, national chain
☐0 No ☐777 Other (write) 3a _____
☐888 Don't know

4. Store Location: 4a. Chapter: _____ 4b. Zip Code: _____

4c. City/town if not on Navajo_____

5. Store Type: ☐ 1 Convenience store ☐ 2 Trading Post
☐ 777 Other (write in) 5a_____

6. GPS coordinates 6a (latitude)_____ , 6b (longitude)_____

7. Before entering store, record potential for "pop up" farmer stand in parking lot (eg. is there possible safe space) and take photo of parking area

_____

B, MARKETING AND LAY-OUT:

1. Photo-documentation (Please check all the pictures taken):
- ☐ 1a Store front / outside marketing
- ☐ 1b Store entry
- ☐ 1c Produce display(s)
- ☐ 1d Positive promotion + marketing strategies
- ☐ 1e Cash register area
- ☐ 1f Other: 1g _____
- ☐ 1h Other: 1i_____
- ☐ 1j Other: 1k _____

2. Please rate the store on the following characteristics:

2a Overall store condition	☐ 1 poor ☐ 2 average ☐ 3 good
2b Cleanliness	☐ 1 poor ☐ 2 average ☐ 3 good
2c Condition of windows	☐ 1 poor ☐ 2 average ☐ 3 good
2d Condition of walls	☐ 1 poor ☐ 2 average ☐ 3 good

Comments_____

3. Promotion + Marketing

3.1 Is there indication (eg. signs) that the store takes SNAP (food stamps)?

□0 No □1 Yes → 3.1.a: where (mark all): □ 1 On windows seen from outside of store
□ 1 inside store

3.2 Is there indication (eg. signs) that the store takes WIC (Women Infants and Children coupons)?

□0 No □1 Yes → 3.2.a: where (mark all): □ 1 On windows seen from outside of store
□ 1 inside store

3.3. Look throughout the store, mark all places where fresh fruit is available for purchase.

□ 1 Front of store
□ 1 Checkout counter (if different from front of store)
□1 In refrigerated section (not front of store)
□ 1 In non- refrigerated section (not front of store)
□ 0 Fresh fruit is not available

3.4. Look throughout the store, mark all places where fresh vegetables are available for purchase.

□ 1 Front of store
□ 1 Checkout counter (if different from front of store)
□ 1 In refrigerated section (not front of store)
□ 1 In non- refrigerated section (not front of
□ 0 Fresh vegetables are not available

3.5. Upon first entering the store (within 5 feet of entrance), are there OTHER HEALTHY ITEMS available for purchase? (Eg: dried fruit, whole grain snacks (≥ 2 g fiber/ serving), nuts and seeds (without sugar or honey roasted), nut butters. Healthy snacks have: ≤200 calories per portion as packaged; <10% of total calories from saturated fat; 0 g trans fat; ≤35% of calories from total sugars; ≤230 mg sodium (Na)/serving minimal or no added fat, sugars, sweeteners).

□0 No □1 Yes → 3.5.a: where (mark all): □ 1 Front of store
□ 1 Checkout counter (if different from front of store)
□ 1 End of aisle in the store

3.6. Upon first entering the store (within 5 feet of entrance), are there LESS HEALTHY ITEMS available for purchase? (Eg. alcoholic beverages, soft drinks and other sugar sweetened beverage (SSB), sweet desserts/candy, sugared cereals, chips (>3g fat/oz) and other salty snacks, fried foods, foods high in sugar and fat)

□0 No □1 Yes → 3.6.a: where (mark all): □ 1 Front of store
□ 1 Checkout counter (if different from front of store)
□ 1 End of aisle in the store

3.7. Does the store take SNAP? *(note: this is different from question 3.1 asking if there are signs indicating SNAP is taken; if you don't see signs, please ask).* □0 No □1 Yes

3.8. Does the store take WIC? *(note: this is different from question 3.2 asking if there are signs indicating WIC is taken; if you don't see signs, please ask).* □0 No □1 Yes

3.7. Mark the largest produce refrigerator that could be placed in the store:

☐0 No space for any of these fridges

☐1 5 cubic foot (1.5 x 3 ft)

☐2 Small open display (2.3 x 4 feet)

☐3 10 cubic foot (2 x 4.4 feet)

Questions 3.8-3.14 ask if the store promotes various types of food items. By promote we mean signs are visible that indicate these items are sold in the store.

3.8. Do signs/displays *promote* regional grown/produced items? ☐ 1 Yes, # signs _____ ☐ 0 No
By regional we mean grown on Navajo Nation, NM, AZ, Utah or CO

3.9. Do signs/displays *promote* Diné grown/produced items? ☐ 1 Yes, # signs _____ ☐ 0 No

3.10. Do signs/displays *promote* traditional Native Foods? ☐ 1 Yes, # signs _____ ☐ 0 No

3.11. Do signs/displays *promote* organic items? ☐ 1 Yes, # signs _____ ☐ 0 No

3.12. Do signs/displays *promote* tax-exempt healthy items? ☐ 1 Yes, # signs _____ ☐ 0 No

3.13. Do signs/displays *promote* GMO items? ☐ 1 Yes, # signs _____ ☐ 0 No

3.14. Is there a recycling bin or container available? ☐ 1 Yes ☐ 0 No
LOOK FOR: "cans only."
Ask person working at store if you don't see one.

Store ID: ___-___ Rater ID: ___

C. FRESH FRUIT

Look for each type of fruit. If it is available, check the yes box and record the number of varieties (eg. gala and red delicious). Always look for the fruit sold individually (not in an x lb bag), this is the one we are most interested in for quality and price. If there are multiple varieties of one fruit sold individually, choose the least expensive one and record quality and price. If half or more of that variety is acceptable enough for you to eat, circle 3. If half or more is unacceptable for consumption, circle 1. If it is somewhere in the middle, circle 2. Look for indication of where the product is from and record if it is Diné, regional or if you can't tell. If that fruit is only sold in a bag or in other packaging, record quality of that item, if it's regional and price of the bag/package and its size. Add all other fresh fruit that are available in the blank spaces after grapes. Use additional sheet if needed. Fill out the number of varieties, quality, if regional and price.

1. Does the store offer fresh fruit? ☐1 Yes ☐0 No (skip to section D, fresh vegetables)

Type of Fruit	Available?	# different varieties	Quality circle 1, 2 or 3	Regional = NM, AZ, CO, UT Labeled as...	Price
1. Apple	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ 1 $_____ / per ___ item(s) ☐ 2 $ _____ / per_____ lb
2 Banana	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ 1 $_____ / per ___ item(s) ☐ 2 $ _____ / per_____ lb
3.Orange	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ 1 $_____ / per ___ item(s) ☐ 2 $ _____ / per_____ lb
4 Pear	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ___ item(s) ☐ $ _____/ per_____ lb
5 Strawberries	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ___ item(s) ☐ $ _____/ per_____lb
6 Grapes	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ___items ☐ $ _____/ per _____lb
7 _____	1 Yes	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ___ items ☐ $ _____/ per ____ lb
8 _____	1 Yes	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ___ item(s) ☐ $ _____/ per _____ lb
9 _____	1 Yes	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ___ item(s ☐ $ _____/ per ___ lb

2. Are there reduced price/"quick sale" fresh fruit? ☐1 Yes ☐0 No

3. Are fresh fruit snacks (e.g. cut fruit, grapes, fresh fruit with or without juice) for sale? ☐1 Yes ☐0 No

Price $_____ per _____oz

3. Comments:

Store ID: ___-____ Rater ID: ___

D. FRESH VEGETABLES

Look for each type of vegetable. If it is available, check the yes box and record the number of varieties. Always look for the vegetable sold individually (not in an x lb bag), this is the one we are most interested in for quality and price. If there are multiple varieties of the vegetable, sold individually, choose the least expensive one and record quality and price. If half or more of that variety is acceptable for you to eat, circle 3. If half or more is unacceptable for consumption circle 1. If it is somewhere in the middle, circle 2. Look for indication of where the product is from and record if it is Diné, regional or if you can't tell. If the vegetable is only sold in a bag or package (eg. 4 tomatoes on Styrofoam), record the price and the quantity or poundage for that product. Add any additional fresh vegetables that are available and fill out the number of varieties, quality, if regional and price.

1. Does the store offer fresh vegetables? ☐1 Yes ☐0 No (skip to Section E, Frozen Fruit)

Type of vegetable	Available?	# different varieties	Quality circle 1, 2 or 3	Regional? Labeled as...	Price
1 Tomato	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ___ item(s) ☐ $_____/per ____lb
2 Celery	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ___ item(s) ☐ $_____/per ____lb
3 Summer Squash / Zucchini	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ___ item(s) ☐ $_____/per ____lb
4 Lettuce	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per____ item(s) ☐ $_____/per ____lb
5 Corn	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per____ ear(s) ☐ $_____/per ____lb
6 Carrot	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ____item(s) ☐ $_____/per ____lb bag
7 Onion	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ____item(s) ☐ $_____/per ____lb bag
8 Cucumber	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per ____item(s) ☐ $_____/per ____lb
9 Winter (hard) squash	☐ 1 Yes ☐ 0 No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1 Diné ☐ 2 Regional not Diné ☐ 3 Not Regional ☐ 888 Can 't tell	☐ $_____ / per____ item(s) ☐ $_____/per ____lb

Store ID: | | - | | | | Rater ID: | |

Type of vegetable	Available?	# different varieties	Quality circle 1, 2 or 3	Regional? Labeled as...	Price
10 Potatoes	☐ 1Yes ☐ 0No	_____	Poor 1 quality Ok 2 High 3 quality	☐ 1Diné ☐ 2Regional not Diné ☐ 3Not Regional ☐ 888Can 't tell	☐ $_____ / per ____item(s) ☐ $ _____/ per ____ lb bag

2. Are there reduced price/"quick sale" fresh vegetables? ☐1Yes ☐0No

3. Are fresh veggie snacks (e.g. baby carrots, mixed veggies in a cup) for sale? ☐1Yes ☐0No

Price $_____ per _____oz

4. Comments:

_____

_____

E. FROZEN FRUIT

Look for each type of fruit. If it is available, check the yes box and record the number of brands or types of that frozen fruit. If there are multiple brands/types of one fruit, look at ingredients and record price of the one with fewest ingredients (should just be the fruit, no sugar or other additives). If multiple types have no additives, choose the least expensive one and record its price. If the only option(s) has additives, choose the least expensive one, record if it has added sugar, other additives, none or if you can't tell. Record its price. If there are 2 brands of strawberries, one has added sugar and one does not, check "added sugar" and "no" and record price of the item with no sugar.

1. Does the store offer frozen fruit? ☐1Yes ☐0No (skip to section F, frozen vegetables)

Type of Fruit	Available?	# different brands/types?	Any additives? (mark all)	Price (of item with fewest ingredients)
1. Strawberries	☐ 1Yes ☐ 0No	_____	☐ 0No ☐ 1Added sugar ☐ 777Other ☐ 888Can't tell	$ _____for a _____ oz package
2. Blueberries	☐ 1Yes ☐ 0No	_____	☐ 0No ☐ 1Added sugar ☐ 777Other ☐ 888Can't tell	$ _____for a _____ oz package
3. Pineapple	☐ 1Yes ☐ 0No	_____	☐ 0No ☐ 1Added sugar ☐ 777Other ☐ 888Can't tell	$ _____for a _____ oz package
4. Mixed fruit	☐ 1Yes ☐ 0No	_____	☐ 0No ☐ 1Added sugar ☐ 777Other ☐ 888Can't tell	$ _____for a _____ oz package
5._____	1Yes	_____	☐ 0No ☐ 1Added sugar ☐ 777Other ☐ 888Can't tell	$ _____for a _____ oz package

2. Comments: _____

Store ID: | | - | | | | Rater ID: | |

F. FROZEN VEGETABLES

Look for each type of vegetable. If it is available, check the yes box and record the number of brands or types of that froze vegetable. If there are multiple brands/types of one vegetable, look at ingredient list and record price of the one with fewe ingredients (should just be the vegetable, no salt or other additives). If multiple types have no additives, choose the least expensive one. If the only option(s) has additives, choose the least expensive one, record if it has salt or other additive and record price. If multiple types of vegetables are in one bag ("mixed veggies"), write that in at bottom of table.

1. Does the store offer frozen vegetables? ☐1 Yes ☐0 No (skip to section G, packaged fruit)

Type of vegetable	Available?	# different brands/types?	Sodium or other additives?	Price (1. fewest ingredients 2. Least expensive)
1. Corn (record hominy/ posole as separate)	☐ 1 Yes ☐ No	_____	☐ 0 Sodium free (<5 mg/serving) ☐ 1 Low sodium (≤140 mg) ☐ 2 >140 mg sodium ☐ 777 Other ☐ 888 Can't tell	$ _____ for a _____ oz package
2.Peas	☐ 1 Yes ☐ No	_____	☐ 0 Sodium free (<5 mg/serving) ☐ 1 Low sodium (≤140 mg) ☐ 2 >140 mg sodium ☐ 777 Other ☐ 888 Can't tell	$ _____ for a _____ oz package
3.Carrots	☐ 1 Yes ☐ 0 No	_____	☐ 0 Sodium free (<5 mg/serving) ☐ 1 Low sodium (≤140 mg) ☐ 2 >140 mg sodium ☐ 777 Other ☐ 888 Can't tell	$ _____ for a _____ oz package
4.Green beans	☐ 1 Yes ☐ 0 No	_____	☐ 0 Sodium free (<5 mg/serving) ☐ 1 Low sodium (≤140 mg) ☐ 2 >140 mg sodium ☐ 777 Other ☐ 888 Can't tell	$ _____ for a _____ oz package
5. Broccoli	☐ 1 Yes ☐ 0 No	_____	☐ 0 Sodium free (<5 mg/serving) ☐ 1 Low sodium (≤140 mg) ☐ 2 >140 mg sodium ☐ 777 Other ☐ 888 Can't tell	$ _____ for a _____ oz package
6._____	1 Yes	_____	☐ 0 Sodium free (<5 mg/serving) ☐ 1 Low sodium (≤140 mg) ☐ 2 >140 mg sodium ☐ 777 Other ☐ 888 Can't tell	$ _____ for a _____ oz package
7._____	1 Yes	_____	☐ 0 Sodium free (<5 mg/serving) ☐ 1 Low sodium (≤140 mg) ☐ 2 >140 mg sodium ☐ 777 Other ☐ 888 Can't tell	$ _____ for a _____ oz package

2. Comments: _____

G. PACKAGED FRUIT

Look for each type of fruit. Look at ingredient labels for an option with no additives (includes sugar, high fructose corn syrup (HFSC), and preservatives other than ascorbic acid (eg. vitamin C)). If an option with no additives is available, check yes under "Option with no added sugar..." If such an option is not available, check no. If there is an option of that fruit with additives, check yes under "Option with additives." Record price of the option with no additives (preferably a can approximate 15 oz; if that size is not available, provide price and size that is available).
If multiple types have no additives, choose the least expensive one and record its price. If all options have additives, record pric of the least expensive option of approximately 15 oz.

1. Does the store offer fruit in a can or cup? ☐1 Yes ☐0 No
(skip to Section H, packaged vegetables)

Type of Fruit	Option with no added sugar, HFCS, other additives?	Option with additives (sugar, HFCS, etc)?	ONLY record Price of option with NO additives record size
1. Peaches	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for _____ oz can (only record for 14-16 oz can)
2. Pineapple	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for _____ oz can (only record for 14-16 oz can)
3. Mandarin oranges	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for _____ oz can (only record for 14-16 oz can)
4. Mixed fruit	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for _____ oz can (only record for 14-16 oz can)
5. Fruit in plastic cup	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for a _____ oz

2. Comments: _____

H PACKAGED VEGETABLES

Look for each vegetable in a can between 14-16 oz.. Look for the vegetable in water, without sauce or added sugar/fat/oil. For example, include corn in water but not creamed corn. Although we want record of all options, we are most interested in the option with the least amount of sodium. Look at ingredient label and nutrition facts panel to see the amount of sodium in the can. Is there a sodium free option (says "<5 mg/serving" on label)? If yes, check the yes box. If no, check the no box. Are there low sodium (≤140 mg/serving) or high sodium (> 140 mg) options? Check yes or no under those categories. Record the price of the option with least amount of salt regardless of size. If the only option available has salt, record price of the least expensive brand that's between 14-16 oz.

1. Does the store offer vegetables in a can or jar? Yes No (skip to Section I, traditional foods)

Type of vegetable	Sodium Free (< 5 mg/serving)?	Low Sodium (≤140 mg/serving)?	High sodium (> 140 mg)?	Price (with least amount of salt AND preferably 14-16 oz option)
1. Corn	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for a _____ oz

2. Peas	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for a _____ oz
3. Carrots	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for a _____ oz
4. Cut green beans	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for a _____ oz
5._Diced, crushed or whole, tomatoes	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for a _____ oz
6._____	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	☐ 1 Yes ☐ 0 No	$ _____ for a _____ oz

2. Comments: _____

_____

I. TRADITIONAL / NATIVE FOODS

Be sure to look throughout the entire store for these items, they may be in different sections. If any item is not available, be sure to check no under available.

1. Does the store offer traditional or native foods? ☐1 Yes ☐0 No (skip to Section J, healthy snacks)

Traditional Item	Available?	# different varieties?	Price of least expensive option
1. Yellow corn meal*	☐ 1 Yes ☐ 0 No	_____	$_____/_____lb bag
*Only include yellow corn from the four-corners area or other native producers, brands like "Aunt Jemima" do not count			
2. Blue corn meal	☐ 1 Yes ☐ 0 No	_____	$_____/_____lb bag
3. Blue corn pancake mix	☐ 1 Yes ☐ 0 No	_____	$_____/_____lb bag
4. White corn meal	☐ 1 Yes ☐ 0 No	_____	$_____/_____lb bag
5. Dried steamed corn	☐ 1 Yes ☐ 0 No	_____	Price _____/_____size

6. Heirloom beans*	☐ 1 Yes ☐ 0 No	_____	Price _____/_____size
*Look at the bean package label, it should say "heirloom" if it is. If dried beans are available and are from the 4-corners area but with no indication of heirloom, check no under available and then add a note (under price) describing the bean and document price per size of bag.			
7. Pinon nuts	☐ 1 Yes ☐ 0 No	_____	Price _____/_____size
8. Navajo tea	☐ 1 Yes ☐ 0 No	_____	Price _____/_____size
9. Mutton	☐ 1 Yes ☐ 0 No	_____	Price _____/_____lb (or part)
10. Lamb	☐ 1 Yes ☐ 0 No	_____	Price _____/_____lb

11. Record any other traditional or native foods that are available:
You might find: *traditionally harvested wild foods like hashk'aan (yucca fruit), chiilchin (sumac berries), wild celery, wild onions, wild spinach wild oats, acorns, herbs, berries. Record name of product and price (per oz or lb if applicable)*

_____

_____

_____

12. Is there a "hot prepared foods" section in the store ☐1 Yes ☐0 No (skip to section J, protein sources)

12a. Is prepared mush available? ☐1 Yes ☐0 No Price $_____ per _____oz serving

12b. Mutton stew? ☐1 Yes ☐0 No Price $_____ per _____oz serving

12c. Steam corn stew? ☐1 Yes ☐0 No Price $_____ per _____oz serving

Other traditional prepared foods? (record name and price per serving size below)

12d._____ Price $_____ per _____oz serving

12e._____ Price $_____ per _____oz serving

12f._____ Price $_____ per _____oz serving

13. Comments: _____

_____

J Protein sources

Food type	Available?	# different varieties?
1. Dried beans Look for pinto, dark/light red kidney, black, garbanzo/chick peas, lima, black eyed peas, lentils).	☐ 1 Yes ☐ 0 No	_____
2. Low sodium canned beans (<200 mg/serving)	☐ 1 Yes ☐ 0 No	_____
3. Tuna (white, or light in water) Do NOT include: tuna in oil, be flavored or seasoned, or with added ingredients	☐ 1 Yes (skip next question) ☐ 0 No	_____
4. If tuna is not available, are there other healthy canned meats? Look for: salmon, chicken (white meat only), sardines, mackerel. Only Include: items served in water. Do not include items with added ingredients, seasoned or flavored, or oil.	☐ 1 Yes ☐ 0 No	_____
5. Ground beef * ≥ 90% lean, ≤ 10% fat)	☐ 1 Yes, lean* ☐ 2 Yes, but not lean ☐ 0 No	_____
6. Other lean meats (only document if there is no lean ground beef) Only include: turkey, chicken, pork	☐ 1 Yes ☐ 0 No ☐ NA	_____

Review the survey, did you leave any questions blank?

Navajo Nation Healthy Stores Initiative-food environment assessment

Store ID: ___-___ **Rater ID:** ___

Be sure all questions are complete before leaving the store!
Check that all answers are clear and easy to read. Thanks!

L Parting Activities:

- ☐ Explain program (if not already done)
- ☐ Leave staff with cover letter, brochure
- ☐ Point out contact information on brochure
- ☐ If manager or owner, ask:

"Would you be open to a follow-up visit from the COPE team to discuss a possible partnership in the Healthy Navajo Stores Initiative?"

□ Yes □ No □ Not sure

If yes or not sure: Store's preferred contact information:

Contact person: _____ Role: □ Manager □ Owner □ Other

Phone number: _____- _____- _____

Best days/times for a follow-up visit: _____

- ☐ Provide survey reimbursement and obtain receipt form for gift card
- ☐ Thank the store for their hospitality

Navajo Convenience Store/Trading Post Owner/Manager Survey

Store ID: | | - | | | | **Interviewer ID:** | |

Notes to interviewer:
Don't forget card sort for Section C.
A 1-10 scale for p.14 and HSI pamphlet

Date _____

Store name_____start time_____ end time_____

Thank you for taking the time to meet with me. This interview should take about 45 minutes. We really value your insight and appreciate your willingness to share with us. The information you provide will help us as we plan the Navajo Healthy Stores Initiative providing assistance to stores that are interested in increasing produce and promoting that produce at the store. Your name and store name will not be associated with any of your responses. If there are any questions you would prefer to not answer, just let me know.

BENEFITS: *There are no direct benefits to you from participating in this interview, however, you may enjoy talking about these issues and sharing your perspectives.*

RISKS: *There are no forseen risks to participating in this interview. Your name and name of your business will be stored separately from your interview responses. Information gleaned through all interivews conducted will be summarized without identifying information. Thus, your perspectives will never be associated with your name or business.*

APPROVALS FOR THIS STUDY: *This study has been reviewed and approved by the Navajo Nation and Tufts University Institutional Review Boards (IRB).*

VOLUNTARY PARTICIPATION: *You do not have to agree to be in this study, and you may change your mind at any time.*

CONTACT INFORMATION: *For any questions about your rights as a study participant, this survey or the larger project, you are welcome to call the main contact for this study, Sonya Shin at 617-872-0310 or Emily Piltch at 505-280-3029. You may also contact Lara Sloboda, manager of Tufts Institutional Review Board, at (617) 627-3417.*

PERMISSION TO PROCEED:
Is it okay to proceed with the interview? [**Verbal Yes/No**] *Completion of the interview implies your consent to participate in this research. If you would like a copy of the consent section, I have one for you.*

Navajo Convenience Store/Trading Post Owner/Manager Survey

Store ID: | | - | | | | **Interviewer ID:** | |

Background questions:
We'll start with a few background questions.

1. Are you a resident of this Chapter/Community? Yes No

2. About how many miles do you live from the store? _____

3. Are you Navajo Yes No

4. What is your title here at the store (eg. store owner, manager)? _____

5. How long have you served in this role? ____years _____months

6. How many employees do you have, not including yourself? _____

7. Would you call your store a: *circle one* Trading Post

Convenience store (indicate 6a-6c)

Other_____

(*if c-store, ask if independently owned, or part of a regional, national chain or other)*

6a. independent
6b. regional chain
6c. national chain
6d. Other (write in)_____

We'll move on to a few questions about the size, hours and shoppers at your store.

A. Store Characteristics

7. How many cash registers does your store have?_____

13. When is it busiest in your store? (read options-choose one)

Early in the month

Middle of the month

End of the month

Same throughout the month (skip next question)

14. Why do you think it is busiest at this time of the month?

B. Foods sold in your store-

Now let's move on to questions about the food offered in your store.

15a. Who decides what products are offered at your store? *Circle response*

I do Someone else *Write in the position that person holds*

_____

Notes_____

15b. How do you/the decision maker decide what food to sell at your store?

16a. Do you use a POS System (Point of Sale?) Yes No (skip to Question 17)

16b. What is the name and where did you buy it?

16c. What do you use it for?

16d. How familiar are you with its functionality?
Not at all A little Somewhat Very much

17. What are the top 3 selling food items in your store?
prompt—we're curious of food categories not specific brands.

1._____2._____3._____

18. Do you sell fresh produce? Yes (Skip to Question 19a) No

18b. Why do you not sell fresh produce?

18c. What would encourage you to offer fresh produce to your customers?
(when done, skip to Question 34)

19a. What type of produce refrigerators do you use?
Remote
Self-contained
other (please write in)_____

19b. How many produce refrigerators do you have?

19c. How long is each, what are their dimensions? (*I can measure if that would be easier)*_____

19d. In your opinion, what condition are they in?

19e. Do you have back refrigerated storage? Yes No (Skip to next question)

20. Do you sell fresh fruit? Yes No
(skip to question 23)

21. What are the top three types of fresh fruit sold in your store? We're curious about the types of fresh fruit that sell best at your store. Please be specific for example cut melons in a cup versus whole melons.

1._____2._____3._____

21a. What % of the store's revenue would you estimate is from selling fresh fruit?
_____% *(might not know because of how receipts are generated)*

22. Would you be interested in offering more types of fresh fruit?

Yes (What types?) skip to Q 26 No

23. Have you tried to sell fresh fruit in the past?

Yes No (skip to Q 25)

24. Why do you no longer sell fresh fruit?

25. Why have you not sold fresh fruit in the past?

26. Do you sell fresh vegetables? Yes No (skip to question 30)

27. What are the top three types of fresh vegetables sold in your store? We're curious about the types of fresh vegetables that sell best at your store. Please be specific, for example: the 1 lb bag of baby carrots.

1._____2._____3._____

28. What % of the store's revenue would you estimate is from selling fresh vegetables?
_____% *(might not know because of how receipts are generated)*

_____Don't know

29. Would you be interested in offering more types of fresh vegetables?

Yes (What types?) skip to Q 33 No (why not?)->then skip to Q 33

30. Have you tried to sell fresh vegetables in the past?

Yes No skip to Q 32

Store ID: | | - | | | | **Interviewer ID:** | |

31. Why do you no longer sell fresh vegetables? *Skip to Q 33*

32. Why have you not sold fresh vegetables in the past?

33. Do you sell frozen fruit or vegetables?

Yes *No (skip to Q 38)*

34. What are the top three types of frozen fruit or vegetables sold in your store? We're curious about the types that sell best. Please be specific such as 16 oz bag of frozen strawberries

1._____2._____3._____

35. Would you be interested in offering more types of frozen fruit or vegetables?

Yes (What types?) *skip to Q 39* No (skip to Q 39)

36. Have you tried to sell frozen fruit or vegetables in the past?

Yes No *(skip to Q 38)*

37. Why do you no longer sell frozen fruit or vegetables?

38. Why have you not sold frozen fruit or vegetables?

39. Do you sell Traditional Navajo foods (like blue corn meal, dried steamed corn, pinon nuts, wild locally harvested vegetables like onion or celery)?

Yes No (skip to Q 43)

40. What are the top three types of Traditional Navajo foods sold in your store?

1._____2._____3._____

42. Would you be interested in offering more types of Traditional Navajo foods?

Yes (What types?) *skip to Next section* No

43. Have you tried to sell Traditional Navajo foods in the past?

Yes No skip to Q 45

44. Why do you no longer sell Traditional Navajo foods? Skip to section c

45. Why have you not sold Traditional Navajo foods in the past?

I am now going to read some statements and would like to know your thoughts on each. The possible answers are: strongly disagree, disagree, somewhat disagree, somewhat agree, agree or strongly agree? [PROVIDE RESPONSE CARD]

C. Store owner perspectives customers and the community

1. My customers look for fruits and vegetables (fresh or frozen) in the store.

a. Strongly disagree
b. Disagree
c. Somewhat disagree
d. Somewhat agree
e. Agree
f. Strongly agree

2. My customers look for traditional Navajo foods in the store.
   a. Strongly disagree
   b. Disagree
   c. Somewhat disagree
   d. Somewhat agree
   e. Agree
   f. Strongly agree

3. My store plays an important role in increasing the fruits and vegetables in this community.
   a. Strongly disagree
   b. Disagree
   c. Somewhat disagree
   d. Somewhat agree
   e. Agree
   f. Strongly agree

4. My store plays an important role in increasing the traditional foods available in this community.

   a. Strongly disagree
   b. Disagree
   c. Somewhat disagree
   d. Somewhat agree
   e. Agree
   f. Strongly agree

5. My customers often suggest new items they would like me to stock.

   a. Strongly disagree
   b. Disagree
   c. Somewhat disagree
   d. Somewhat agree
   e. Agree
   f. Strongly agree

Supports and Barriers to Stocking Healthy Foods

D. We're also interested in the supports and barriers you have to stocking produce in your store.

1. What are the top three reasons that you offer fresh or frozen produce at your store? I don't offer produce

   a.

   b.

   c.

2. Do you experience any challenges in carrying fresh or frozen produce?

   Y N (skip to Q 4)

3. Of the challenges you face in carrying fresh or frozen produce, what are the top three?

   I'm not interested in carrying produce

   a.

   b.

   c.

4. From where does your store get fresh fruits and vegetables (e.g., which suppliers, adjacent stores, farms, community gardens, family gardens, other sources of local agriculture, etc.)?

Please provide names of distributors, farmers, and other suppliers. We're also interested in how frequently they deliver and on which days, typical products you order from this supplier, and any supplier requirements (such as minimums).

Name of supplier	Type (e.g. farmer, distributor, etc)	How long you've utilized supplier	Delivery Frequency (number of times per week)	All produce? If not, specify	Delivery Days	Supplier requirements / restrictions

13. How well do you know the delivery person(s)?

14. Is it the same person from each distributor with each drop?

15. How comfortable are you in asking questions or providing feedback to your suppliers? (eg. if the produce you receive is of poor quality, do you feel like you could call send it back?).

16. Would you be interested in purchasing fresh produce from Navajo farmers?
    Y (skip to Q 18) N

17. Why not? (skip to Q 19)

18. What steps could you take to start partnering with farmers?

19. Would you be interested in hosting a pop-up farmers market in your parking lot once a month to provide the community with more produce?

20. Do you know or have any personal relationship with any farmers?

21. Do you belong to any trade organizations or retailer groups (if yes, which ones?)?

Store ID: | | - | | | | **Interviewer ID:** | |

D. Benefits and Barriers to Participating in the SNAP & WIC Program

We're also interested in EBT (electronic benefits transfer, food stamps, SNAP) *and WIC at your store*.

1a. Do you accept EBT/SNAP? Yes No (skip to 5)

1b. About what percent of your monthly sales are from SNAP? _____

2. What are the major benefits of participating in SNAP? (the top 3)

_____

_____

3. Are there any disadvantages to participating in the program? Please explain (Skip to Q 8)

_____

_____

4. What are the main reasons why you do not participate in SNAP?

_____

_____

5. Are you interested in taking SNAP in the near future?

a. Yes
b. No (skip to Q 8)
c. Don't know
d. I can't make this decision (then who does?)

6. If interested, do you anticipate any challenges to your operations from participating in EBT/SNAP?

a. Yes

b. No (Skip to Q 8)

7. What types of challenges?

_____

_____

8. Do you accept WIC Yes No (Skip to Q 11)

8b. About what percent of your monthly sales are from WIC?

9. What are the major benefits of participating in the WIC program?

_____

_____

10. Are there any disadvantages to participating in the WIC program?

_____

11. What are the main reasons why you do not participate in WIC?

_____

_____

12. Are you interested in joining the program in the near future?
a. Yes b. No (skip next question)

13. If interested, do you anticipate any challenges to your operations from participating in the WIC program?
a.Yes b. No (skip to section E)

What types of challenges do you anticipate? (e.g., staff time, additional resources, increased expense, etc.)?

_____

Store ID: | | - | | | | **Interviewer ID:** | |

This next section will ask about your store's engagement with the community.

E. Community Engagement/Communications/marketing

1. On a scale of 1-10, how would you rate your store's efforts in promoting health in the community?
1 would be very little effort and 10 the highest level of involvement_____

2. On a scale of 1-10, how would you rate your store's efforts to work with the community you serve? 1 would be very little effort and 10 the highest level of working with the community_____

3. Do you advertise in the community? Yes No (skip to final question)

3b.What methods do you use? _____

3c. What works?_____

3d. What hasn't worked?_____

5. Do you have any additional comments?

_____

_____

Thank you for your time, we really appreciate it!

Before leaving store, document hours of operation (typically posted on the door and if not, then ask) and record dimensions and quality of produce refrigerators if need-be.

The contents of this survey were adapted from the "Healthful Nutrition of Foods in Stores on Navajo Nation: Availability, Pricing, and Promotion" conducted by Navajo Division of Health & CDC (2013) and the University of Missouri Extension, Stock Healthy Shop Healthy.

Store ID_____ Survey ID_____ Date_____ Time_____

REACH HEALTHY STORES INITITATIVE

CUSTOMER INTERCEPT SURVEY

We are surveying food shoppers in the area to get your thoughts on the food available and purchasing habits. Your responses are confidential. We do not ask for your name, so no information associated with your name will ever be shared.

First, we need to ask few questions to see if you fit the profile of people we would like to talk to. [If no to questions 1,3,4, terminate survey]

1. *ARE YOU 18 YEARS OF AGE OR OLDER?* **Y N**
2. *(If female): are you currently pregnant or breastfeeding?* **Y N**
   Terminate if response is yes

3. *ARE YOU ONE OF THE PRIMARY FOOD SHOPPERS IN YOUR HOUSEHOLD?* **Y N**
4. *DO YOU LIVE ON THE NAVAJO NATION?* **Y N**

PURPOSE:
This survey aims to learn more about food needs in this region. It is being conducted by the COPE Team (Community Outreach and Patient Empowerment) based in Gallup, NM and working throughout the Navajo Nation on public health initiatives. We are using the information collected for a project that is looking at increasing the availability of healthy food across Navajo.

PROCEDURES:
The survey should last about 5-7 minutes, and it mainly asks about your opinions and shopping. People will have a wide range of answers to these questions, and all are okay. You may refuse to answer any question you wish. You will receive a small thank you gift for your participation.

BENEFITS:
There are no direct benefits to you from being in this survey, however, you may enjoy talking about these issues.

VOLUNTARY PARTICIPATION:
You do not have to agree to be in this study, and you may change your mind at any time.

PERMISSION TO PROCEED:
*Is it okay to proceed with the survey? [***Verbal Yes/No****] Completion of the interview implies your consent to participate. If you would like a copy of the consent section, I have one for you.*

QUESTIONS

1. Where (what store) do you do the majority of your food shopping?

2. How often do you shop at [*store name where survey is occurring*]?

□ 2 or more times a week □ Weekly □ Every 2 weeks □ Monthly □ A few times a year □ Other:

3. What do you tend to buy when you shop here? Please list_____
_____

4. What is your main reason for shopping here?_____

5. How long does it take you to travel to this store from home?

_____hr _____minutes

6. Do you know if the store sells fresh fruits or vegetables?

□Yes, it does sell fresh fruits or vegetables
□No, it does not sell fresh fruits or vegetables
□I don't know

7. Did you buy any produce today at the store? We're curious if you got any fresh, frozen, canned or dried fruits and vegetables today at this store.

□ Yes Which fruits and vegetables did you purchase today?
□ No (skip to Question 9)

Fruits:

7a. Fresh-

_____

7b. Frozen-

_____

7c. Canned-

_____

7d. Dried-

_____

Vegetables

8a. Fresh-

8b. Frozen-

8c. Canned-

8d. Dried-

9. Did you buy any produce at the store in the past week? We're curious if you got any fresh, frozen, canned or dried fruits and vegetables in the past 7 days at this store.

□ Yes Which fruits and vegetables did you purchase in the past month?
□ No (skip to Question 12)

Fruits:

9a. Fresh-

9b. Frozen-

9c. Canned-

9d. Dried-

Vegetables

10a. Fresh-

10b. Frozen-

10c. Canned-

10d. Dried-

11. Why do you buy produce here?

12. Are there foods that you would like to buy but cannot find in [*store name*]?
□ No □ Yes *(please list foods)*

13. Do you buy food at farmers' markets, roadside stands, or other places where

farmers sell directly to customers? □ Yes □ No

14. Do you grow any of your own food? □ Yes □ No □ No but family member does

In the next question, I am asking for your thoughts about the future of shopping at this store.

15. What influences your decision to buy produce at this store?

16. What would make it easier for you to buy more fruits and vegetables at [*store name*]?
□ More stocking of healthy food

□ More variety/choices of fruits and vegetables

□ Better prices

□ Better produce quality

□ Other_____

Now that I understand more about food in your household, I would like to ask some questions about you.

1. How old are you? _____

2. How many people live with you?_____

3. How many people are you usually shopping for? _____
4. How many people are you shopping for today?_____

5. How do you usually get to [*store name*]?
   □ Drive myself □ Get a ride □ Take public transportation □ Other _____

6. □ Male □ Female

7. Does your home have electricity?
   □ Yes (is it reliable enough to operate appliances like a refrigerator, stove, microwave for use when you store food and cook?) □ Yes □ No
   □ No

8. Do you have a working refrigerator at home? □ Yes □ No

9. At home do you have a kitchen sink with running water you can use to wash and prepare fruits and vegetables?

□ Yes □ No If no, how do you prepare food at home?

10. What is your employment status?
Are you currently...?
Employed for wages (circle) → Full time? Part time?
Self-employed
Out of work and looking for work
Out of work but not currently looking for work
A homemaker
A student
Retired
Unable to work
other_____

11. A. Does anyone in your household participate in….: *(check all that apply)*
□Food Stamps □ Commodities □ School Breakfast/Lunch, □WIC, □SSI
□Head Start □ No

12. In the past month, were you worried (at any time) that you wouldn't have enough food to feed your family?

□ Yes □ No (skip to Question 11)

Were you: □ A little worried □ Somewhat worried □ Very worried

13. What is the highest degree or level of school you have completed? If currently enrolled, mark the previous grade or highest degree received.

No schooling completed
Nursery school to 8th grade
9th, 10th or 11th grade
12th grade, no diploma
High school graduate - high school diploma or the equivalent (for example: GED)
Some college credit, but less than 1 year
1 or more years of college, no degree
Bachelor's degree (for example: BA, AB, BS)
Graduate degree

Do you have any other thoughts about foods that are available in this chapter/region that you would like to share?

Thank you for taking the time to complete this survey. We appreciate your thoughts and comments.