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**A QUALITATIVE ASSESSMENT OF
HEALTHY FOOD ACCESS IN NAVAJO NATION**

by

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**Submitted in Partial Fulfillment of the Requirements
for the Master of Medical Sciences in Global Health Delivery**

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A Qualitative Assessment of Healthy Food Access in Navajo Nation

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Abstract

Background: *The Navajo population experiences high rates of food insecurity, contributing to high rates of chronic disease. We conducted in-depth interviews with Navajo tribal members in order to understand food insecurity in this community and inform the design of an intervention to improve access to healthy foods.*

Methods: *Thirty individuals were interviewed over a three-month period, including Chapter House officials, Community Health Representatives and heads of households living in the Crownpoint Service Unit in Navajo Nation. Data was coded, grouped into analytical categories and integrated into a thematic framework.*

Results: *Food insecurity in Navajo Nation demonstrates variability at the structural, community, and individual and household levels. Income, transportation, vendors, Chapter Houses, social support and health literacy were the main factors contributing to participants' access to healthy foods. Responses to food insecurity were explored through coping strategies as well as through food purchasing strategies such as price, proximity, shelf life, family preferences, and ease of preparation. Lastly, participants discussed their endorsement for a proposed intervention to increase access to healthy foods.*

Conclusion: *Food insecurity in Navajo Nation is a complex issue, influenced by the dynamic relationship between determinants of individual behavior and the broader environmental context in which they are embedded. A community-based multi-level intervention is necessary in order to achieve sustainable improvement in access to healthy foods.*

Introduction

Over the past several decades, the burden of disease in American Indian (AI) populations has shifted from epidemics of infectious diseases to chronic non-communicable diseases, many of which are diet-related. Rates of these diseases have been steadily rising [Hutchinson & Shin, 2014]. For example, diabetes has climbed from the eighth leading cause of death among AIs in 1980 to the fourth leading cause in 2010 [National Center for Health Statistics, 2013] and is currently twice as prevalent among AIs as compared to the general US population [Gordon & Oddo, 2012].

Several studies demonstrate that food insecurity, or unreliable access to sufficient healthy foods [Coleman-Jensen, Nord, & Singh, 2013], is a major risk factor for obesity and diet-related chronic disease [Wilde & Peterman, 2006; Seligman, Laraia, & Kushel, 2010; Seligman, Jacobs, Lopez, Tschann, & Fernandez, 2012]. Food insecure individuals spend less money on food, consume fewer fruits and vegetables, and have less healthy diets. Due to resource limitations, their diets are often composed of low-cost, calorie-dense foods that promote obesity [Drewnowski & Specter, 2004; Pan, Sherry, Njai, & Blanck, 2012].

The relationship between food insecurity and food consumption is heavily influenced by the surrounding food environment, which includes proximity to stores and restaurants. Residents of neighborhoods with greater access to supermarkets, as opposed to convenience stores, have healthier diets and decreased obesity rates, likely due to their exposure to a wider array of healthy food options [Morland, Diez Roux, & Wing 2006; Larson, Story, & Nelson 2009]. Low-income and rural areas are particularly disadvantaged. Low-income neighborhoods have far fewer supermarkets and more fast food restaurants than wealthier neighborhoods [Morland,

Wing, Diez Roux, & Poole, 2002], and in one study, rural areas were reported to have 14% fewer supermarkets than urban areas [Powell, Slater, Mirtcheva, Bao, & Chaloupka, 2007].

Given the impact of the physical environment on food insecurity, traditional interventions that target individual behavior alone in order to promote healthy eating are insufficient. Few interventions have been conducted in AI settings. The Apache Healthy Stores (AHS) project and the Zhiwaapenewin Akino'maagewin (ZA) trials were both community-based environmental interventions that worked with local stores to increase healthy food options, encourage food tasting, and promote healthy foods through advertisements. During their implementation periods of one year or less, both projects were successful in increasing healthy food purchasing behavior, demonstrating the success of multilevel interventions that alter the food environment. However, interventions with longer implementation periods that more fully address the factors that contribute to food choices, e.g. by lowering the price of healthy foods or increasing the number of sites where healthy foods are available, are needed to demonstrate the additional community impact and health outcome benefits that accompany sustainable programs [Gittelsohn & Rowan, 2011; Stang, 2009; Economos & Irish-Hauser, 2007].

Navajo Nation is home to one of the largest American Indian tribes in the United States and demonstrates some of the highest rates of chronic disease in the country, including a diabetes prevalence of greater than 40% in Navajo older than 45 years [Ray, Holben, & Holcomb, 2012]. Rates of food insecurity are also very high: a 2012 study of 276 randomly selected Navajo tribal members found that 76.7% were food insecure [Pardilla, Prasad, Suratkar, & Gittelsohn, 2014]. Navajo Nation is committed to improving healthy food access within its borders as demonstrated by recent efforts to pass a Food and Wellness Act that reflects traditional values. To support this growing movement, this needs assessment was designed with the following specific aims: 1) to

understand the determinants of food choices among members of the Navajo Nation living on the reservation and 2) to explore the feasibility and acceptability of an intervention to make healthy foods available at Chapter Houses (community centers).

Methods

Study Setting

Navajo Nation is located in the Southwestern states of Arizona, New Mexico and Utah. Roughly 174,000 people live on the 24,000 square miles of land [Arizona Rural Policy Institute, n.d.]. The unemployment rate is 52%, and more than 50% of the population lives below the federal poverty line [Klotz et al., 2011]. Prior research in Navajo has shown that long distances to market centers, the limited selection and high prices of healthy foods at local convenience stores and gas stations, as well as lack of basic utilities such as running water and electricity pose major barriers to healthy food consumption [Sharma et al., 2009; Cunningham-Sabo et al., 2008]. Nearly one in three households does not have running water, and nearly one in five households lacks electricity [Klotz et al., 2011].

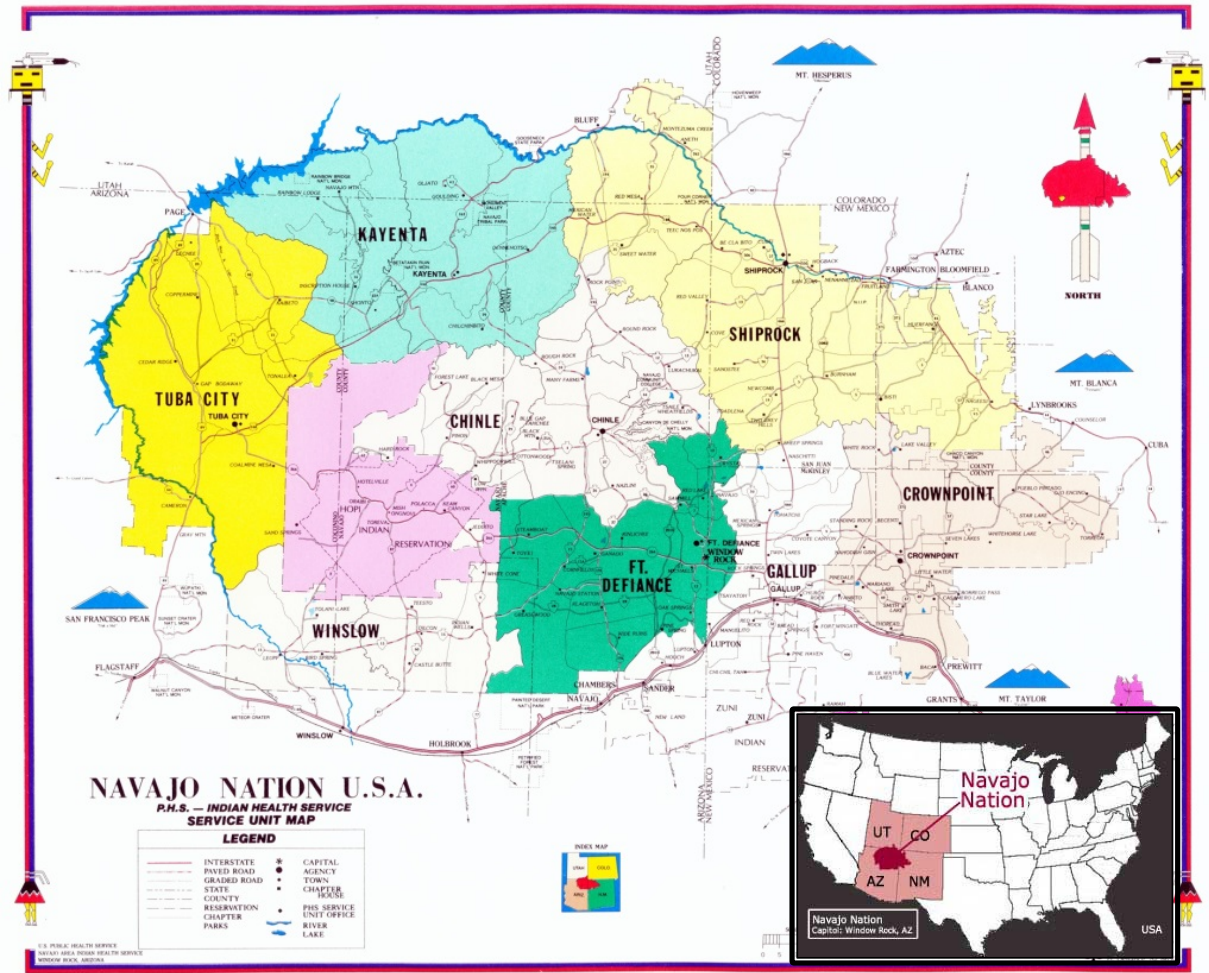


Figure 1. The Navajo Area Indian Health Service is comprised of eight service units. Crownpoint Service Unit is at the eastern border [Navajo, 2006]. The inset shows the location of Navajo Nation within the United States [“Untitled map”, n.d.].

Communities in the Navajo Nation are defined as Chapters, each of which has elected officials, including a president, vice president and secretary. There are 110 Chapters in Navajo Nation [Wilkins, 2013]. Nearly twenty Chapters are located within the Crownpoint Service Unit catchment area in the easternmost region of the Navajo Nation (Figure 1). One of the ten reservation-based supermarkets is located in this region, along with three convenience stores, three gas station stores, two trading posts and one flea market. Residents often travel to border towns at the edges of the reservation, including Gallup, Farmington, Grants, and Cuba, where there are larger shopping centers.

Study Design

This qualitative work was conducted within the larger context of a community-based needs assessment to understand food insecurity in Crownpoint Service Unit for the purpose of designing and implementing a sustainable, community-based intervention to improve access to healthy foods. The assessment was carried out by Navajo Nation Community Health Representatives (CHRs) and the Community Outreach and Patient Empowerment (COPE) Project. It was conducted in two phases using a mixed-methods approach: a preliminary survey followed by in-depth qualitative interviews [Creswell, Klassen, Plano Clark, & Smith, 2011]. The survey was used to obtain quantitative data to understand general patterns related to food insecurity and purchasing behavior. The qualitative interviews were, in turn, constructed to understand the impact of these issues on the personal experiences of community participants, to understand the complex considerations and trade-offs that factor into individual decision making, and to probe more deeply into potential intervention scenarios.

Community-based participatory research (CBPR) methods were central to the development of study materials and data collection. CBPR is a collaborative approach which emphasizes the crucial role of the community as a research partner in order to prioritize community-identified goals and ground studies to the realities of the local context [Israel, 1998; Economos & Irish-Hauser, 2007]. CHRs were consulted at all stages of this work, including the design and implementation of the community-based survey, interpretation and dissemination of survey findings, the design of qualitative interview guides and verbal consent, the recruitment of participants, and facilitation of interviews with community members. In particular, CHRs often accompanied the study team during the interviews to provide reassurance and clarification to community members.

The study was approved by the institutional review board (IRB) at Harvard Medical School.

Approval was also obtained from the Eastern Navajo Health Board as well as the Eastern Navajo Agency Council.

Preliminary findings: Community-Based Survey

In the first phase of the study, a community-based survey was designed and conducted by the Crownpoint Service Unit CHRs (facilitated by the COPE team) in 2012. The survey involved interviews with 253 community members in Crownpoint Service Unit to explore barriers to accessing healthy foods, food sources, and influences on food choices. Furthermore, participants were provided a list of eight possible interventions that could make healthier foods more accessible to their communities (Figure 2) [Eldridge et al., in press]. These interventions were selected in advance by the CHRs and COPE team among evidence-based strategies [Beck, 2009; Fitzgerald, 2006; Peters, 2012] that had been previously piloted in the region and/or had ongoing interest in their communities. The survey revealed that the majority of community members preferred to have healthy food made available at Chapter Houses (community centers). Second-ranked choices included mobile grocery trucks and lower prices at stores where they usually shop for food [Eldridge et al., in press].

Potential Interventions	% endorsed (N=253)
Fruits and vegetables delivered to the Chapter House	78%
Mobile grocery truck - a refrigerated food truck that comes to the local chapter house to sell food	53%
Cheaper prices (or discounts) for healthy foods at the places I usually shop	47%
Certified community kitchen for making & preserving food	32%
Cooking classes	32%
Healthier foods in commodity program	28%
More fresh crops / livestock grown or raised in my community	22%
More options for transportation, for example a van to take you to the grocery store or an organized carpool	13%

Figure 2. Table of potential interventions presented to community members in 2012 survey.

Interview guides

The qualitative interviews were informed by these survey findings. A social-ecological model was used to shape the inquiry (Figure 3). This model provides a framework for understanding how factors that influence individual behavior are connected to and embedded within a larger environmental context. The model highlights multiple levels of influence, extending from the individual and household to the community (or Chapter) and lastly to the broader structural environment which is shaped by political, economical and historical determinants [Stang, 2009; Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008].

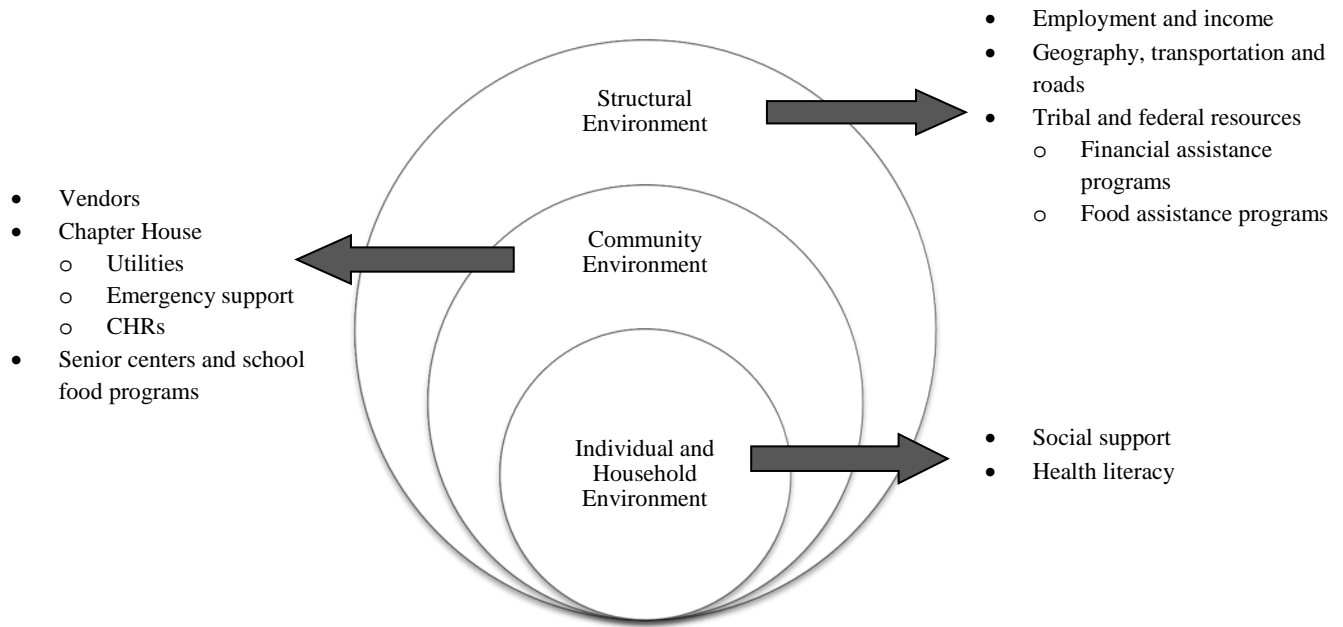


Figure 3. Social-ecological model for exploring food insecurity in Crownpoint Service Unit.

Two interview guides were constructed to further contextualize the findings of the preliminary survey: one for Chapter House officials and Community Health Representatives and one for heads of households. Recognizing Chapter House officials and CHRs as agents who act on behalf of their communities, interview questions were designed to draw on any insights they may have into the lives of their community members. Questions explored difficulties their community members face in preparing meals at home, typical food sources, how food purchasing decisions are made, and opinions regarding the proposed intervention, including what products they would like to see made available at the Chapter House and potential concerns. The interview questions for heads of households covered similar domains with greater emphasis on personal experiences, including questions regarding their typical diets and periods of food insecurity. To aid participants in visualizing the theoretical intervention, they were presented with an image of an indoor food market [Pruitt, 2012].

Sampling and Recruitment

A purposeful sampling design was used to target three different perspectives in the community: 1) Chapter House officials; 2) Community Health Representatives (CHRs); and 3) heads of households. Further inclusion criteria for participants were: 1) at least 18 years of age; 2) tribal member of Navajo Nation; and 3) resident of Crownpoint Service Unit. All twelve CHRs working in the Crownpoint Service Unit were approached to participate in an interview and/or introduce the interviewer to community members who would be willing to participate.

Data Collection

Interviews were conducted over a three month period from March – June 2013. Chapter House officials and other community members were initially approached by the CHR and introduced to the interviewer. Verbal informed consent was obtained for each participant using a scripted consent. Interviews took place in several different locations including community members' homes, Chapter Houses, and senior centers. Interviews were conducted in English, although in some cases, CHRs interpreted in Navajo to clarify certain questions to participants. Interviews lasted between thirty minutes and two hours. Each participant or household (in interviews involving two community members) received a \$25 gift card as a token of appreciation. Interviews were conducted until saturation was reached.

Data Analysis

Interviews were digitally recorded, transcribed and uploaded to Dedoose 4.12.4 [Dedoose, 2014]. Analysis was undertaken using a framework approach [Pope, Ziebland, & Mays, 2000; Gale, Heath, Cameron, Rashid, & Redwood, 2013]. The codebook was initially developed from five transcripts using a combination of inductive and deductive approaches. The primary investigator and a second investigator coded approximately 10% of the data, carrying out iterative revisions

of the codebook. Once the codebook was finalized, the primary investigator coded all transcripts. Codes were grouped into analytical categories and then integrated into a thematic framework to explain the mechanisms that shape access to healthy food as well as receptiveness to the proposed theoretical intervention.

Results

Twenty-five in-depth interviews were conducted with 30 (17 female; 13 male) participants: six CHRs, seven Chapter House officials, and 17 household members. Participants represented nine chapters (close to 50%) in the Crownpoint Service Unit.

After generation and interpretation of analytical categories, the data was organized to 1) explain the variability in food insecurity in Navajo Nation and 2) explore responses to food insecurity through coping strategies as well as food purchasing strategies. Lastly, the data examined advantages of and limitations to a proposed intervention to increase access to healthy foods.

Variability in food insecurity: Balancing barriers and enablers to healthy food access

The variations in food insecurity, from month to month, Chapter to Chapter, and person to person can be explained through a simplified social-ecological framework (Figure 3) that illustrates the overlapping relationships between the structural, community, as well as individual and household environments.

Within the structural environment, participants reported income, transportation, and access to tribal and federal resources as having the greatest impact on their access to food. With few employment opportunities available on the reservation, many community members rely on monthly checks from financial assistance programs such as social security, Supplemental Security Income, General Assistance, and Temporary Assistance for Needy Families. After

purchasing most of their groceries at the start of the month, levels of food insecurity increase toward the end of the month as community members manage on their remaining income until they receive their next check.

“There’s only limited amount of money that they get from the first week of the month. And that’s the time they buy their groceries to last them for the whole month.” [John, Chapter House official]

“Sometimes we only have beans left...we live on beans until [the] end of the month” [Marie, community member]

As funds diminish, participants describe how they must make difficult decisions regarding what they prioritize. Sometimes bills, gas, and school fees take precedence over groceries.

“If you don’t have enough money, you have to forgo something...The same thing applies when people go to the grocery store. If you only have so much money, do you buy gasoline to get home...versus buying grocery...which is more important?” [Larry, Chapter House official]

Reliable transportation on the reservation is vital not only to maintain an income (since mobility confers greater access to employment opportunities) but also to access healthy foods. Miles separate community members from their neighbors and from grocery stores.

“We have no place to get fresh produce that’s near. If we get fresh produce, we got to travel ninety miles one way and back.” [Susan, Chapter House official]

Participants reported turning to family or friends for rides when they could not drive themselves. Community members who do not own a vehicle are most reliant on this support; however, even

community members who own vehicles may face issues with transportation due to limited funds to replace parts, to purchase gasoline, and to maintain a valid license.

“Sometimes they share rides. If one family member is going out there and has a ride, they’ll jump in with them.” [Carl, Community Health Representative]

Some participants described how food insecurity becomes a greater concern in the winter when weather and bad roads make travel to stores even more difficult. Not all roads on the reservation are paved; some are covered in gravel and others are made of dirt. As such, passage is extremely difficult during the winter when the roads become especially dangerous due to mud or ice.

“I think during the winter months, Navajo people tend to keep food that will last them through the winter because in some areas, sometimes the roads become impassible.”
[Larry, Chapter House official]

Food assistance programs, including SNAP (Supplemental Nutrition Assistance Program), CSFP (Commodity Supplemental Food Program), and WIC (Women, Infants, and Children program) can provide stable support for community members to help prevent food insecurity. SNAP, formerly food stamps, and CSFP, also known as commodities, are the most widely accessed of these programs. Young adults and families noted that they prefer SNAP for the variety of foods that can be purchased. The elderly, however, tend to prefer CSFP, which distributes a fixed package of foods. According to Chapter House officials and CHRs, eligibility for CSFP is easier for the elderly to navigate compared to the SNAP program, and some elderly feel that they get more food through CSFP than they would qualify for with SNAP. Participants also report that CSFP has improved over several years to start providing healthier foods.

“Most of the elders don’t use food stamps...If they’re going to get food stamps, they usually get like thirty dollars...so they say, ‘What’s thirty dollars going to do for a whole month? I’d rather go with commodities.’ So they switch.” [Susan, Chapter House official]

“The commodity food from way back then, it was just something like powdered milk...shortening... canned meats and vegetables... But now you have more choices. They give out breakfast cereal. They have juices...they have vegetables...it’s becoming [sic] to the point where they’re serving or giving out food that is healthy.” [Larry, Chapter House official]

Nested within the structural environment is the community, or Chapter. At this level, participants discussed how both access to vendors as well as to resources influence their ability to obtain healthy foods. Types of and access to vendors vary from Chapter to Chapter. In some communities, participants discussed their appreciation for the proximity of a convenience store or trading post, while in other communities, participants discussed how they must travel a distance to neighboring Chapters to find the nearest store.

“They like [the convenience store], because they’re saying that even though the cost of a loaf of bread is like four dollars, they said it’s better than having to try to get gas and then going so far to just get one item and then coming all the way back.” [Sally, Community Health Representative]

The Chapter House has a large role in securing access to resources for the community, including utilities and emergency food support. Chapter House officials and CHRs discussed efforts to organize running water and electricity for community members. Without electricity, community members cannot keep their foods fresh in refrigerators, and without running water, they must

ration what they haul from nearby or distant water access points, which might include their local Chapter House. Those who live close to the Chapter House are more likely to have utilities and thus experience less food insecurity compared to those living farther away who might still be waiting for these services.

“Because we don’t have refrigeration, [fresh food] gets spoiled right away, so we kind of have to hurry up and finish it within two days.” [Jane, community member]

The provision of emergency food support varies from Chapter House to Chapter House. In addition to providing monetary support, the Chapter House might partner with National Relief Charities, Navajo Agricultural Products Industry, and food banks to increase food access in their communities.

“We had an elderly that completely ran out of food, and we had to ask the chapter to buy at least fifty dollars worth of food. And they did. So that’s how we help people out here.” [Susan, Chapter House official]

Finally, the Chapter House provides a base for the CHR, who helps community members to access healthy foods by providing education, transport and meal deliveries. The CHR also helps navigate access to resources, including food assistance programs and caregivers. CHRs often become so invested in their clients (who may be relatives through clanship ties) that they provide food from their personal resources.

“Most of the time I go home and they get some of my own food and I donate it to them, so yeah, it’s like what people say, CHRs wear so many hats.” [Fran, Community Health Representative]

Aside from the Chapter House, participants discussed how, in the past several decades, additional resources have emerged in some Chapters to further help community members access healthy food. Senior centers, which are often co-located with Chapter Houses, provide daily meals, food deliveries and nutritional education for the elderly, while children are supported through school food programs, including Head Start and FACE (Family and Child Education), which provide breakfast and lunch.

“When I was growing up, there’s no such thing as Head Start, there was no senior center.” [John, Chapter House official]

“I think people get more food during the first of the month, the first week, because sometimes their money’s already gone by the second or third week, and then you’ll see an increase over at the senior center.” [Rita, Community Health Representative]

Lastly, within this larger environmental context lie the individual and household. Participants discussed how social support and health literacy influence access to healthy foods. When community members begin to worry about having enough food, they turn to their relatives first, then friends, for help and support. Relatives not only provide food but also help with transport to the grocery store, store food in their freezers for relatives without electricity, and have an important role in teaching relatives about healthy eating and food preparation. Participants discussed how family makes it easier to adopt and maintain changes to their diets.

“My daughter’s the one that’s really pushing to buy good food, like healthy food.” [Jane, community member]

“If people have...somebody there for support, family there for support, I think they could change their diets, they could get their blood sugar under control.” [Sally, Community Health Representative]

However, not all community members have family or even consider their family a source of support. Some participants described how social disputes with family, friends, or clan, for example over land or alcohol abuse, made them less willing to help one another with food or transport. Limited social support also manifested in the abuse and neglect of family members. Adult children, either living with or visiting their parents, were occasionally described as “leeching” from the household, taking money or food while not contributing income, leading their parents to seek out additional help and resources to make ends meet.

“It’s sad to say that some of these younger people that move in [with] their parents or grandparents abuse them...They run up the bill, and they want their grandma and their mom to pay it. And the mom and the grandma, they don’t get [any] income, they’re on their fixed income...so towards the end of the month, everybody’s running out of food or propane.” [Susan, Chapter House official]

Health literacy plays a supportive role in individual and household diets. In this context, health literacy refers to knowledge and awareness of health conditions, of what foods are healthy, and of how to prepare healthy meals. Participants discussed that as they learn about healthy eating habits, thus improving their health literacy, they are more able to incorporate changes into their diets. At times, family might also provide an impetus for adopting healthier eating habits. In particular, heads of households frequently mentioned how the health status of family members motivated them to learn more about their condition.

“A lot of what I buy is guided by what I know about diabetes and what I read, so I don’t buy a whole bunch of donuts and cookies for myself...I know what I’m told is healthy is vegetables and fruits... and more fish and more chicken and turkey and less red meat.”

[Oscar, community member]

“People that want to change are people who went through the experience of having a tragedy hit their family. Those are the kinds that want to change, to be healthier, to live longer...my brother, he changed what he eats after he was told that he’s at the borderline [for diabetes]. So now he’s beginning to eat well.” [Susan, Chapter House official]

When discussing health literacy, however, Chapter House officials and CHRs commonly implicated limited skills in food preparation as a factor in food insecurity. The elderly, in particular, were identified as a vulnerable group; some elderly do not know how to speak or read English and others suffer from disabilities such as arthritis or blindness that limit their ability to prepare meals.

“You’ll go to an elderly’s home and those commodities are just stacked there, and you ask them, ‘How come you don’t eat this? These are good.’ They say, ‘I don’t know what it is. I never taste it... How do you use it?’” [Susan, Chapter House official]

Exploring responses to food insecurity: Coping strategies and food purchasing strategies

When community members experience food insecurity, not only do they turn to family, friends, and Chapter for support, but they also demonstrate their personal sacrifices and resilience through various coping strategies. In response to structural barriers, including limited income and transportation issues, some participants discussed selling or pawning possessions to cover the costs of food and other necessities such as utilities and gas. A few community members grow

their own crops or raise livestock which they can sell for extra income when necessary, and in some communities, participants can borrow on credit at the local trading post. Commonly, in the absence of reliable transportation or shared rides, community members walk or hitchhike to the nearest store, which may be miles away, store gasoline cans at home, or on rare occasions, ride a horse to visit their nearest neighbor.

“If they need food, then usually they ask the trader...to have a credit at the store.” [Sam, Community Health Representative]

“In March, my deadline was coming up to pick up my commodities, so I grabbed my duffel bag and walked...it took almost three and a half hours to walk there.” [David, community member]

Responding to community-level barriers, including limited access to utilities, participants discussed coping without electricity. While some community members own iceboxes, others purchase blocks of ice for their refrigerators, to keep them cool enough to store foods for a short period of time. Without electricity, participants often use propane stoves. Propane, however, can be costly, and when it runs low, cooking meals becomes an even greater challenge. In such cases, community members might turn to wood-burning stoves.

“If they were to run out of propane, they have the food but not the propane, and they won’t be able to cook.” [Sally, Community Health Representative]

Community members also reveal their responses to food insecurity by the factors that they consider when purchasing food, including how they determine where to shop, how frequently to shop, and which foods to buy. Participants indicated that prices, quality, distance and availability play the largest roles when deciding which stores to visit. Overall, participants noted that they

prefer to shop at more distant, larger supermarkets where they find lower prices and better quality produce than they find at local stores. They often use advertisements to find the lowest prices in a given week or purchase items in bulk to further stretch their dollars. Heads of households, in particular, frequently mentioned concerns regarding the quality of produce at local stores and described finding outdated items. Participants preferred local stores for their proximity, particularly when feeling time-constrained or when in need of transportation.

“I think a lot of them go for advertising on certain items within certain weeks, like for an individual, she was telling me that she’ll go to [local supermarket] and purchase whatever’s being sold that’s on the advertisement, cheaper. Then the following week, she may go to [town supermarket] and purchase certain things that are being advertised there.” [Fran, Community Health Representative]

“There’s a lot of outdated [food], that’s why we don’t get those at the convenience stores.” [Claire, community member]

*“If we want something to be cooked right away, we usually go to the trading post.”
[Jane, community member]*

Participants noted that larger supermarkets also have more availability, both in terms of options for healthy and fresh foods as well as for household goods, and serve as a “one stop shop” to purchase several different items. Furthermore, the town itself is a “one stop shop” for community members who prefer to time grocery shopping with multiple errands, such as doctor’s appointments, picking up mail or paying bills.

“All they really have to do is make one stop, do all their shopping and they’re done. And then just go pay for whatever they need to pay for cause a lot of them say they have

certain things in pawn that they need to pay for and so instead of going to another place, they just go to [town].” [Sally, Community Health Representative]

Participants indicated that both income and proximity influence how often and where they purchase foods. Community members with a steady income as well as those who live closer to town tend to purchase food more frequently at the larger supermarkets. However, community members with limited income, who might live farther away from town and who tend to purchase the majority of their groceries at a supermarket at the start of the month, might visit a local store, if possible, later in the month to tide them over until they can make their next large shopping trip.

“People that work, they tend to have the money to go to grocery stores and purchase food three times a week, whereas those that are on fixed income, they purchase food maybe two times a month.” [Larry, Chapter House official]

“Sometimes it’ll be two weeks and I don’t go into town, but I’ll go to the trading store to get food.” [Anna, community member]

Lastly, when deciding which foods to purchase, participants discussed shelf life, family preferences, price, and ease of preparation. Those with limited access to utilities or reliable transportation place the largest emphasis on shelf life when purchasing foods. Without refrigeration, fresh fruits and vegetables spoil quickly, an even larger concern in summer months due to the heat; and without transport or sufficient funds to buy gas, community members cannot make frequent trips to the grocery store. Thus, they tend to purchase foods, such as canned items, that will last weeks without refrigeration, sometimes purchasing them in bulk to further avoid more frequent trips to the store.

“Yeah, summer time, it’s hard to keep. We don’t have the gas to run back and forth, and we don’t have a refrigerator to keep it...so we just have to put up with canned food, canned vegetables.” [Genevieve, community member]

“Sometimes we think about which ones will last the longest...like potatoes, we can get three bags for five dollars and that will last us the whole month.” [Marie, community member]

Participants discussed how they consider the preferences of family members when grocery shopping by including them in decisions about what to purchase and how much food to prepare for meals. They also discussed stocking certain foods at home for when family members, especially children, visit. Children were also frequently described as reluctant to eat healthy foods, influencing their parents or other family members to purchase unhealthier items.

“My son is really picky about what he eats ... And we get him like the heat ups that I know he’ll eat, like the nuggets, and I don’t like him eating it but he likes to eat it.” [Sarah, community member]

“They seem like they buy more junk food than the good food because they have a lot of kids.” [Charles, Chapter House official]

Price, although appearing to play a larger role when participants choose where to shop, also plays a role when deciding what to purchase. One community member commented on the higher cost of fresh produce, which made her opt for canned alternatives.

“Some of the fruits and vegetables will be expensive – bananas cost \$1.49/lb sometimes...sometimes we don’t get fresh fruits and vegetables. We just go to canned

foods, canned fruits and vegetables...they're less expensive.” [Marie, community member]

Finally, respondents voiced a preference for foods that are easy to prepare including ready-to-eat foods, such as canned foods, that may only require heating. These foods are preferred in particular when participants feel time-constrained.

“I know that they purchase a lot of Cup Noodles or those Ramen noodles. Something that’s very easy to make I guess.” [Susan, Chapter House official]

Intervention Feasibility

All participants endorsed the proposed intervention of having low-cost, healthy foods available at the Chapter House. They discussed several advantages, particularly proximity so that community members would no longer have to travel far distances to reach more affordable supermarkets in town. Chapter House officials and CHRs also expressed optimism that the proximity of fresh, affordable produce would promote healthier eating habits in their communities.

“I think it would be good for the people because I want more people to eat right, I want more people to be healthy, and I want them to have access to fresh produce where they don’t have to run ninety miles to get something that they want to eat, to have them eat right instead of choosing what’s not good for them that they have at home. Instead of eating that, they’ll have access to fresh produce.” [Susan, Chapter House official]

Concerns included the actual cost and quality of the foods that would be available, the persistence of difficulty in finding transportation, competition from existing stores, and sustainability in terms of funding and maintaining the interest of both community members and

project organizers. Chapter House officials and CHRs also discussed logistical concerns regarding having the intervention at the Chapter House, including obtaining certification for vendors and theft at the Chapter House.

“The project person...say[s] we’ll be back next week and we’ll start on this or whatever, but the following week, nobody shows up.” [Fran, Community Health Representative]

“They’re gonna [sic] say, oh I’ll just go to [town supermarket]. It’s better, because they know they can do everything there.” [Tracy, Chapter House official]

While participants invariably prefer to see healthy foods at the Chapter House, including a variety of fresh fruits and vegetables as well as meats, many also wish to see common household goods and health-related items, such as diabetic compression socks and dental hygiene products. Perceptions varied considerably regarding how often foods should be made available at the Chapter House and the prices that should be paid for these foods.

Finally, many participants discussed their ideas to improve the intervention or access to healthy food by other means. Many of the suggestions were based on popular past programs that had lost funding, including community gardens, food demonstrations, cooking classes, and student summer lunch programs. Other suggestions included tasting stations and incentives, e.g. for bringing other community members to the Chapter House in order to overcome the barrier of transportation.

“If you bring a friend in, maybe you could get a bunch of ripe bananas to make banana bread.” [Genevieve, community member]

Discussion

This study highlights the complexity of accessing healthy foods in rural areas such as the Navajo Nation. The social-ecological model highlights the various barriers and enablers which are present at the structural, community, and individual and household levels and aids in explanation of the variations in food security between people and communities.

At the structural level, income and lack of transportation were identified as significant barriers to accessing healthy food, consistent with prior food insecurity research on AI reservations [Vastine, Gittelsohn, Ethelbah, Anliker, & Caballero, 2005; Mullany et al., 2012; O'Connell, Buchwald, & Duncan, 2011]. Food insecurity increases as the month progresses and both available income and groceries begin to decrease. Transportation is linked to income for community members who have difficulty purchasing gas to travel the long distances on the reservation, particularly toward the end of the month. However, transportation also impacts seasonal variations in food insecurity as roads become dangerous and “impassable” during the winter and can prevent community members from leaving their homes to purchase foods.

Food insecurity at the community, or Chapter, level is influenced by proximity to vendors, Chapter House initiatives, and the presence of senior centers or school food programs. Due to the limited number of vendors on the reservation, access varies considerably from Chapter to Chapter. Despite higher prices, community members typically appreciate the convenience of having a local store. Chapter Houses are responsible for securing access to utilities for community members as well as liaising with other organizations to provide emergency food support. The importance of lack of utilities on food insecurity is not commonly cited in the discourse on domestic food insecurity, but has been previously cited in reference to AI reservations [Vastine et al., 2005; Sharma et al., 2010].

At the individual and household level, social support and health literacy strongly influence food access, consistent with prior research [Cunningham-Sabo et al., 2008]. Community members with greater social support not only have a safety net in times of need but also feel encouraged to learn about and adopt healthier eating habits. Chapter House officials and CHRs were more likely to express concern that community members lacked health literacy, particularly related to food preparation, compared to heads of households themselves. Heads of households did note a preference for easy to prepare foods, including sandwiches and pre-packaged foods, particularly when feeling time-constrained; however, they did not relate this preference to limited food preparation knowledge. When Chapter House officials and CHRs discussed preference for easy to prepare foods, they felt that elderly were more likely to choose such foods due to limited knowledge while the young chose these foods due to time constraints typically placed on them by children.

Barriers and enablers to healthy food access exist in a precarious balance. Enablers include the network of available resources, such as financial and food assistance programs and Chapter Houses, as well as social support from relatives. When the scale tips in the direction of food insecurity, community members demonstrate their resilience through the coping strategies they utilize to manage during difficult times, such as selling personal possessions, hitchhiking, and purchasing blocks of ice to keep their foods fresh.

The strategies that community members employ to purchase foods demonstrate careful deliberation to make the best use of their resources. Price and proximity strongly influence where and how often community members shop, while shelf life, ease of preparation and family preferences play greater roles once inside the store. The importance that community members

place on each of these strategies depends on the larger environmental, individual, and household factors they are experiencing at the time of their decision making.

Prior to data collection, we had hypothesized that the views of Chapter House officials, as government representatives, would differ significantly from those of heads of households, while the views of CHRs, as community representatives, would align more closely with heads of households. However, all three groups expressed similar views with few exceptions. In those cases, CHRs aligned more closely with Chapter House officials. They were more likely to indicate health literacy as a concern, particularly among the elderly, and commonly suggested pairing the proposed intervention with health education initiatives. Heads of households were more likely to express concerns regarding food quality, both at local stores and for the proposed intervention. One possible explanation for the latter observation is that heads of households, compared to employed Chapter House officials and CHRs, were often unemployed and thus perhaps more likely to rely on local vendors and thus poorer quality foods, particularly toward the end of the month when funds run low and transportation and food insecurity become increasingly problematic.

Subsequent steps include the design and implementation of an intervention to address the barriers that community members face in accessing healthy foods and to capitalize on their expertise regarding the local context and the needs of their communities. Any intervention must be community-based in order to ensure acceptability and sustainability. The proposed intervention received widespread endorsement from participants. Through the provision of low-cost, high quality foods at a proximal location in the Chapter, such an intervention would address barriers to healthy food access at the structural level of the social-ecological model. Those with limited income would be able to afford healthy foods and purchase them more frequently due to

the location within their community. Furthermore, community members provided valuable suggestions, such as incentive programs for shared rides and the provision of on-site education. In this way, participants expanded the scope of the originally proposed intervention and highlighted the necessity for a multi-level intervention in order to address food insecurity.

There are several limitations to the study. First, it was conducted in a limited number of Chapters in one of eight Service Units in Navajo Nation. Thus the findings may not be applicable to other areas of Crownpoint Service Unit or Navajo Nation. Furthermore, while the proposed intervention was widely endorsed by participants, each Chapter has different characteristics and logistical considerations which would need to be further evaluated so that the intervention could be appropriately adjusted to fit the community-specific context of each Chapter. Lastly, given that the majority of interviews were conducted with CHRs and their clientele – a population with known health issues – health literacy may not have as significant an impact on healthy food access as described in this study.

Future work to further understand food access and advance the intervention should include exploration of the food distribution system in Crownpoint Service Unit and how established programs and vendors match their food supply to changes in demand that vary with levels of food insecurity. Furthermore, partnerships with other entities interested in healthy food access on the reservation should be explored to ensure that local stores and thus local economy are not undermined, emphasizing collaboration to achieve shared goals of addressing food insecurity and promoting community development [Eldridge et al., in press]. Maintaining partnerships with local stakeholders will be vital to the creation of a sustainable solution to improve access to healthy foods in Navajo Nation.

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