Impacts of the Navajo Fruit and Vegetable Prescription (FVRx) Program on Childhood Obesity in an American Indian Community: A Mixed-Methods Study in Northern Navajo Nation

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IMPACTS OF THE NAVAJO FRUIT AND VEGETABLE PRESCRIPTION (FVRx) PROGRAM ON CHILDHOOD OBESITY IN AN AMERICAN INDIAN COMMUNITY: A MIXED-METHODS STUDY IN NORTHERN NAVAJO NATION

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Abstract

Background

In the United States, American Indian and Alaskan Native (AI/AN) populations continue to experience poor health status and high levels of food insecurity when compared to the rest of their U.S. counterparts.\(^1\)-\(^8\) In Navajo Nation, 20% of adults suffer from diabetes, while 50% of children are either overweight or obese.\(^9,10\) Furthermore, it is estimated that 75% of the Navajo population is considered food insecure due to various systemic barriers.\(^9\) The Navajo Fruit and Vegetable Prescription (FVRx) program is a locally-implemented program which aims to increase the fruits and vegetable consumption of participating families, and to promote a healthy lifestyle in the Navajo community.\(^11,12\)

Methods

In order to better understand benefits and the long-term impacts of the FVRx program on the health of participating children and their families, we conducted a mixed-methods study that utilized both quantitative and qualitative analyses in the Northern Navajo Nation. The changes in the pediatric patients’ BMI-for-age percentiles between baseline, exit, and post-intervention follow-up were analyzed. Qualitative in-person interviews were also conducted with caregivers of the patients who completed FVRx.

Results

While the number of healthy weight, at-risk for overweight and overweight patients decreased between exit and post-intervention follow-up, the number of obese children doubled
between these two time periods. The qualitative results revealed 1) barriers faced by the participating patients and their families; 2) the benefits and values of the FVRx program delivered to the participating families and community members; and 3) the meaningful and desirable changes the participating families made throughout and after FVRx. Both the quantitative and qualitative findings suggest that some of the pediatric patients might experience weight gain or rebound after weight loss once FVRx terminated after six months due to the families’ financial challenges in purchasing the same amount of fresh produce without the FVRx vouchers.

**Conclusion**

Many Diné families continue to experience the inter-generational impacts of food and nutrition colonization and resulting food insecurity. Despite the number of systemic challenges and barriers associated with food insecurity, this study showed that the FVRx program counteracted many of the historically-entrenched challenges to good nutrition, creating meaningful positive nutritional and dietary changes for the participating patients and their families. Additional elements which could amplify the program’s impact include a longer program duration, program transition coaching, and shopping and food preparation skills for working parents with limited time and budget.
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Part 1: Background

1. Introduction: “A Life Restored”

Saturday, July 13, 2019
Shiprock, Navajo Nation

I woke up as I slowly gained consciousness. I couldn’t tell what time it was in the morning, and my vision and head were so foggy as if I was rising to the surface of a tranquil lake in a utopian fantasy. It was so quiet. I didn’t hear anything, but I immediately felt a dry, prickly sensation in my throat. The room was still dark, but I could already feel the warmth of a shaft of sunlight filtering through the hardly transparent window covered in the yellow-beige dust. Still half asleep, I only felt my legs itching from an old coarse army blanket, which is stamped “Property of the United States Department of Health and Human Services” in washed-out black ink. The blanket reminded me of the ones my late grandmother used to warm me with when I stayed at her old house in the cold winter nights, though they were fuzzier, more comfortable, and in cheerful colors, like rose pink. I kept staring at the grey ceiling above my still body while wondering whether or not the dead insects laying on the hallway have been properly removed. Not that the giant dead insects close to my temporary living space bothered me so much, but seeing them dead and abandoned for days and weeks made me ponder what being mortal is all about; all beings die eventually. At least physically. But do insects carry on with inner spirits or soul post-mortem?

As I rolled over and reached my now-useless mobile phone on an old wooden cabinet next to the squeaky bed, I remembered that it was Saturday. I should perhaps get out of this dusty, dark, empty room and explore the Southwestern desert and beautiful ecosystem.
Otherwise, the day would just mercilessly pass and leave me with a sense of remorse and guilt for wasting the entire day.

I stretched like a bear after a long hibernation and quickly jumped into the semi-functioning shower, and timidly checked the water temperature. *Yup, it’s freezing cold.* I heard myself sigh disappointedly. My slight, yet desperate hope was crushed in a second as goosebumps appeared all over my body. The water system seems to be not working for a while, and it takes less than two minutes to shower now, especially in the morning. I do not even bother washing my long hair. The early morning in the desert, even in the summertime, can be quite chilly. I should still be extremely grateful that I have some running water, I know. And if I wanted to be optimistic, I could convince myself that it is definitely a much more effective awakening ritual than having any number of disturbing alarms ringing next to my head. Every morning and evening, I keep asking my own body, “Will you ever get used to getting splashed with cold water?” I start seeing my terracotta-like skin showing a march of goosebumps, and my muscles nervously contract. I psych myself up like a silly karate kid fighting an invisible master. My body has adapted and fully embraced the tropical climate for long, but never cold showers; the first five seconds is especially dreadful.

I have been in Shiprock, a town in the Northern Navajo Nation for nearly a month now. During the week, I walk from my dorm inside the hospital compound to the adjacent Northern Navajo Medical Center (NNMC), one of the five Indian Health Service (IHS) facilities located within the Shiprock Service Unit. Shiprock is located in the area called the Four Corners of the American Southwest, where corners of the four states, New Mexico, Colorado, Arizona, and Utah merge. According to the IHS website\(^{13}\), the Shiprock Service Unit is the largest service unit of the Navajo Nation, and the NNMC serves approximately 81,000 Native Americans, who are
mostly Navajo¹³, or Diné.

Having no car on the reservation means I am pretty much confined to the hospital compound. I cannot seem to brush off the thought that lingers in my head and reminds me that I am intruding on someone else’s private land, even though there is no one around me to interact with when I am outside the hospital. There is no Internet in the room I am staying in, and my mobile phone receives no signals in the area except an instance of occasional unpredictable network connection, which comes and goes if I am lucky enough. I have named those random spots where I get connected to the rest of the world, “the twinkle little hot spots,” which I have become increasingly appreciative of. When sporadic thunderstorms come to moisten the soil, there is absolutely no signal whatsoever. The enormous changing sky gets saturated with layers of dark, smoky clouds. Five seconds later, all I could hear is a roaring thunderstorm aggressively striking the earth and whiplashing the window as if the electrified sky and clouds are all inconsolably outraged. A little anxiety hits, and I worry if the window is going to crack. I have been isolated since my arrival here, yet strangely enough, I feel I am always being watched over by the surrounding immortal nature. I am indeed living a solitary life.

Every Saturday, there is a local market at Begaye Flea Market, where people sell a variety of items, including baked goods, kettle corns, second-hand clothes, shoes, blankets, handmade jewelry, tortilla chips, and salsa, mutton stew, and of course, frybreads and the Navajo taco. The only way I can get there is by walking down the highway. So today, I finally decided to brave the sun and dry heat to check out the flea market. To prepare myself for the excursion, I dressed in a very light long sleeve shirt, long thick jeans, a pair of New Balance, sunglasses, and my newly purchased UPF 50+ hat with an adjustable chin strap. I should be perfectly ready for whatever is coming, I thought to myself. Little did I know how badly I had underestimated the
harsh climate.

As soon as I left the hospital compound and hit Highway 491, I immediately realized that what I was doing was unwise. I regretted my decision. Nobody walks around here. It was awkward to walk alone. I felt uneasy, and perhaps somewhat vulnerable. As I walked down the sidewalk of the 491 towards Highway 64, dozens of cars and trucks continuously passed me. Curious gazes from the drivers, which I am sure were just my imagination, made me hyper self-conscious. “Do I look like I am hitchhiking? I hope nobody stops…Or do people think I am crazy?”

Wherever there is soil—no matter dry and sun-scorched—wild weeds and creepers, some of them prickly and spiny, seem to grow thick and somehow thrive. Among the resilient and vibrant Southwest desert flora and fauna are countless fire ants and prairie dogs playfully creating their underground habitats. In order to nervously avoid my imaginary eye contact with the driving passersby, I looked down the unappreciated “pedestrian” sidewalk, which is an irregular mixture of half-paved asphalt and naked soil. Every so often, there were newly installed pedestrian signals, which would allow me to cross small roads about 0.5 seconds after I pushed the buttons. I had never encountered traffic lights that recognize pedestrians so fast and respectfully. “No waiting, this is great!”

I have been warned to watch out for black widows (the most venomous spiders in North America), so I gazed down at my feet while walking, wondering whether this would have been more fun and exciting excursion if I were an entomologist or a geologist. I never sought to be either one of them, but I sometimes envy those individuals for their capacity to deeply and passionately care, respect, and love nature and the planet.

I have traveled to and lived in various parts of the world, but this is my very first time
coming to the American Southwest. The majesty of breathtaking mesas proudly floating on the terrain, boundless azure sky, and the inexhaustible energies and vitalities that sustain all living things fill me with feelings of awe and reverence. Although I have no clue what to imagine, the thought of attempting to imagine what these volcano rocks have witnessed for the past dozens of millions of years is just so exciting. Breathing and feeling the state of my being in this incredibly magnificent, crude environment every single day still feels surreal. Nature is truly divine. I am constantly swaddled in the sense of solitude, but at the same time, I am filled with an immense sense of freedom. My existence feels so minuscule against the titanic forces of nature in this space. Despite all the living and moving matters around me, it feels as if time has stopped.

I kept on walking down the highway extremely uncomfortably. I had to be careful not to trip on an army of tumbleweeds. It was the heat and sizzling of the intense sun, but the other was a sense of being a strange human walking along the highway under the vast, boundless sky overlooking myself. I almost felt embarrassed and deeply alienated, but I never experienced loneliness. I just felt the “aloneness” of my existence on the reservation as an outsider. Between the wildly overgrown grasses were large and small empty bottles of Jack Daniel’s, gin, vodka, and beer cans lying around, supposedly thrown out from the passing cars and trucks. It was a perplexing sight to me because I remembered that alcohol was prohibited in the Navajo Nation. The emptied glass bottles were catching and reflecting the sunlight, glistering brightly. They were sadly beautiful and made me crave a glass of fresh cold water.

I walked about two miles, but it felt like ten. I finally reached the Highway 64 and caught a glimpse of the dilapidated flea market sign. The place looked fairly crowded, and cars kept driving into the open-air market place, which looked like a bare, fenced parking lot. As I got closer to the market, I started smelling the frybread cooking in fat. I wondered whether they were
deep-fried in lard or vegetable oil. Some children were skipping and running with large plastic cups of brightly colored soda in their hands. The artificially colored soda was as blue as the vast sky overlooking us. It was nice to see humans walking around near me finally. A sense of relief and excitement hit me briefly, only until I saw some handmade paper signs with a picture of a woman in her early thirty’s pasted on utility poles lining at the traffic lights.

“MISSING PERSON,” the sign read on the top in large bold fonts. For a moment, I stood on the intersection between the highways in disbelief. I then remembered that there are thousands of missing and murdered Indigenous women and girls in North America alone. According to the Urban Indian Health Institute’s 2018 report, 5712 cases of missing and murdered indigenous women and girls were reported in 2016.\(^1\) And the brutal violence and injustice continue today. The long-lasting legacies of settler-colonialism are often overlooked but are tangible, especially on the Indigenous land. I looked into the picture of the missing woman on the pole closely and read the description. She went missing only a few weeks ago. “Where are you right now? Are you safe?” Talking to her in my head did not bring us closer, unfortunately. Her apathetic, photo-copied monochrome face was just in front of me quietly looking into my eyes, but she was already so far away. Imagining the unimaginable pains, unspeakable generational trauma, and strata of grief upon grief seeping through the Indigenous peoples and communities that have been forgotten and ignored, yet permanently stained on this very soil I stood upon deeply sunk my heart. My heart was racing and squeezing tightly, forcing me to repeat a few sets of deep inhalation and exhalation. It was a visceral discomfort as if my heart sunk deep enough to push down my diaphragm and abdominal organs, and I felt cold sweats in my hands. Looking at the missing woman’s sign, I wondered if she had walked by where I was standing before she went missing. I realized then, for a moment, that I was trying to trace her
soul in vain.

I finally managed to find a chance to cross the highways between the speeding cars and reached the flea market. There was no crossing light where the two highways merged. The sun was scorching above my head, and I felt the skin of my back getting burnt and starting to irritate underneath my sheer flower-printed shirt. Dry heat in the desert allows no perspiration. My sneakers were all covered in the yellowish-orange aridisol that I no longer recognized their original pearl-gray color. My bare ankles between my cropped jeans and socks itched from scratches by the tumbleweeds and insect bites. I tried looking up to see the brilliant azure sky, but felt too dizzy and nauseated; perhaps mildly dehydrated, I knew my body, mind, and heart were all synchronizing. I reached out to a bottle of water in my shoulder bag and took a few sips. A stream of water flowing through my inner body, although lukewarm, felt so rejuvenating. I was still slightly dizzy but regained the energy to walk around the market and found a booth that was selling Navajo tacos.

On the way back to the hospital compound, I encountered a few large, but emaciated stray dogs on the highway, which made me feel guilty for having eaten a huge piece of greasy taco earlier at the market. “Can they smell the taco?” I wondered as their sad and curious eyes fixated on me as I distantly passed by. Their skin-to-bone frames broke my heart. I adore dogs, but the hunger and deprivation that have made them desperate for lives slightly frightened me for a moment. And I felt guilty again for being scared of the innocent animals.

The return hike was uphill, and the sun was relentlessly much hotter than in the morning. I looked up searching for my destination in a vista that continued in front of me, but the now familiar highway 491 seemed like an endless road. Strangely enough, despite my physical dehydration, I was in a better spirit this time than a few hours ago. I was still hiking the very
same burning-coal-like asphalt road, but my heart has somehow lightened as if I have forged a new road.

Finally, a vague figure of the Shiprock emerged on the horizon in a mirage. My mud-covered feet no longer felt like dumbbells. I felt as if the invisible spirits were looking down from the top of the mesas. My few hours of freedom and solitude turned out to be surprisingly enjoyable. And the little excursion unexpectedly restored my body and soul, or, more precisely, unknowingly replenished my being. I am alone in the middle of the desert. Despite the lack of connection to the world, solitude and self-reflection make me more aware of my own “being.” What an enlightening and empowering this experience has been. I have not yet fully comprehended this transformative experience; maybe I never will. But one thing is certain: I feel more alive than ever, thanks to this sacred Dinétah.
2. The Diné History of Deracination

“Our nation was born in genocide.... We are perhaps the only nation which tried as a matter of national policy to wipe out its indigenous population. Moreover, we elevated that tragic experience into a noble crusade. Indeed, even today, we have not permitted ourselves to reject or feel remorse for this shameful episode.”

– Martin Luther King, Jr.

What is *deracination*? The word “deracinate” originates from a late sixteen-century French déraciner. Dé- means removal and Racine, which derives from Latin “radix,” meaning “root.” Thus, to deracinate means to “uproot.” So, what does it mean to deracinate Indigenous peoples? Not only does it mean to physically “remove or separate” them from their native land, but it specifically means to disconnect them from their traditional identities, culture, belief systems, and any other “racial or ethnic characteristics or influences.” For anyone to fully understand the racial health inequities and disparities in the United States, we must learn the long history of settler colonialism, brutal genocides, and Indigenous deracination, and ongoing exploitation and deprivation that continuously cause human suffering. This thesis is dedicated to the future of the Diné and other Indigenous peoples in the world, and I believe that appreciating the Indigenous history and human experiences of those who preceded us is a necessary and worthwhile pursuit for this study.

*The Origins of the Diné and Dinétah*

In this paper, I will refer to the Navajo people as the Diné, which is their native language.
Diné means “man” in the Athapascan language, and has been translated as “the People” or “Children of the Holy People” by the Diné themselves. And Dinétah, the ancestral homeland of the Diné people.

The relationship between the Diné and their Native lands and foods, is fundamental and indispensable to the origins of the Diné as a distinct people. According to Diné oral tradition, the Diyin Dine’é (Holy People) from the Lower Worlds ascended to provide the Diné people with essential knowledge and tools so that all the Diné would be protected and blessed with wellness. Certain plants—corn, beans, squash, and tobacco—were brought by the Holy People and placed on the earth “for the people with laws and rules,” so that they can appropriately interact “with the sacred living beings.” The Holy People told the Diné that everything the people needed in order to achieve a healthy life, prosperity, and longevity could be found in Diné Bikéyah, the Diné homeland bordered by the four sacred mountains. The sacred food plants were given to the Diné people after the deity Changing Woman, whose name derives from the fact that she restored her youth as the seasons transitioned, gave the blessings of these plants. Among these sacred food plants, corn has particularly vital meanings for the Diné people because the Diné are believed to have emerged from corn. The plant was used in the creation of their “physical beings,” especially the right and left hemispheres of their brain. Another account of the origins claims that First Man and First Woman, the original ancestors of the Diné people, were created from “two primordial ears of corn.” Corn, therefore, symbolizes “transformation into human form” and is “divine, a gift of life” for the Diné.

In contrast to the legendary narrative of the birth of the Diné, Indigenous peoples’ history documents that the Diné people have arrived in the Southwest between 800 and 1,000 years ago. Anthropologists believe that the Diné originates from the two ancestral groups:
Athabaskans, who left Canada and migrated to Southwest, and Puebloans, who inhabited the Southwest for a thousand of years since their beginnings. Their ancestral heritages are significantly important in the shaping of the Diné traditional lifestyle. The Athabaskans, on the one hand, survived mainly by gathering and hunting, and they probably learned the rudiments of agriculture to some extent as they migrated to the south. The Puebloans, on the other hand, were primarily farmers. Therefore, after arriving in the Southwest, the Diné employed all means of hunting, gathering, farming, as well as trading with other tribes having great access to a variety of wild plants and animals as they seasonally traveled within the region. For example, the Diné traded with the neighboring Hopi people and obtained cherries and plums. Charlotte J. Frisbie, through her extensive and pioneering work in the Diné traditional food system and the dietary practices of the Diné, informs us that the wild plants and animals the Diné obtained were rich in varieties and nutritional values. Frisbie documents her communication with Klara Kelley, who worked extensively with documents in the Navajo Land Claims Collection of the Navajo Nation Library and contributed the following:

“Navajo elders interviewed circa 1960 recalled that food sources of their parents and grandparents in the mid-late 1800s included hunting, gathering, farming, and herding. In the driest part of Navajoland, the far southwester section, people depended on herding more than farming, but everywhere else, elders emphasized farming more than herding. Crops were mainly corn and squash, with some melons and beans. Farms of many families were clustered together in places with the best runoff water. Wild game consisted mainly of deer, antelope, rabbits, prairie dogs, groundhogs, and sometimes porcupines, with bighorn sheep also mentioned for people of northern Navajoland, and turkey for those in
the southwestern part. Wild plants most commonly mentioned were pinyon [pine] nuts, juniper berries, yucca fruit, wild grass seeds, various berries (wolfberry, sumac), wild potatoes, wild onions, wild carrots, greens (probably beeweed), tansy mustard, and goosefoot or amaranth, with mescal for people along the southern edge of Navajoland and wild walnuts and grapes for those in the southwest.”

Availability of wild food obtained by the Diné depended on locations and climate within the region. Other sources also mention that the Diné diet included, in addition to the list mentioned above, wild celery, cattail, wild buckwheat roots, pigweed, milkweed, and different kinds of cacti. To survive, their lifestyle required the Diné to stay physically active in nature at all times.

The arrival of Spaniards in the early 1500s familiarized the Diné with domesticated livestock. It equipped them to undertake “shepherding and horsemanship.” By this time, the Diné truly belonged to and lived with the natural environment. Having gained “extensive, fine-tuned, shared knowledge of the environment,” they were well-versed in all plants and animals that could be found in the region. By the 1600s, under the influence of Spanish colonists, the Diné also adapted to herding goats, and most notably, the Churro sheep to their livelihood. Naturally, mutton became a central and indispensable aspect of the Diné diet. Corn was also their major staple food, but also, the Diné had developed a long and rich tradition of planting and cultivating other crops such as squash, melons, wheat, and beans. In some areas, they were also able to grow fruit trees as well. For example, in areas like Canyon de Chelly, the Diné enjoyed planting and consuming apricots, apples, and peaches. Until the late 1800s, the Diné sustained themselves by acquiring food through the mixture of hunting, gathering, farming, and
herding.\textsuperscript{18,19}

\textit{The U.S. Conquest, Colonization, and Deracination of the Diné}

As a result of the United States (U.S.) government’s aggressive and violent Western expansion under the premise of “Manifest Destiny” in the 1800s, the lands inhabited by the Diné were violently invaded by the American settlers. This expansion led to the Mexican-American War, which was concluded by the Treaty of Guadalupe Hidalgo in 1848.\textsuperscript{19} The treaty enabled the United States to invade and occupy the Diné sovereign territory. Clearly, the invasion and occupation were justified and executed only “through the lens of American legalities.”\textsuperscript{19} In 1851, under military order, the American troops entered Canyon De Chelly, which was considered by the colonial governments as “the garden spot”\textsuperscript{18} of Diné Bikéyah, and employed scorched-earth tactics to burn all the agricultural fields, crops, and orchards they could find.\textsuperscript{18,19} They also killed the Native people on the field as well.\textsuperscript{25} What followed was the building of Fort Defiance on the Diné homeland, which became the center of U.S. military campaigns. The fort was also used as a place for distributing the monthly rations and food trading between the Diné and U.S. soldiers.\textsuperscript{19}

In 1861, a U.S. Army colonel James H. Carleton established the Volunteer Army of the Pacific, which was based in California.\textsuperscript{22} While other U.S. colonels were massacring unarmed and defenseless Indigenous peoples in the region, Carleton also led volunteer militias to kill and destroy the lives and livelihoods of the Apaches in Arizona, who righteously resisted the U.S. colonization.\textsuperscript{22} After executing another scorched-earth campaign against the Apaches, Carleton was promoted to the rank of brigadier general and became a U.S. military commander of New Mexico.\textsuperscript{22} Carleton, then, “declared total war” on the Diné.\textsuperscript{22} He enlisted Christopher Houston “Kit” Carson—a notorious “Indian hater and killer”\textsuperscript{22}—as a U.S. Army principal commander. He gave an order to eradicate the Diné from their land and to carry out “the most aggressive and
systematic attack on the Diné and their food system.” Carleton’s intentions were, among others, to let the American settlers to take over the Diné Bikéyah and fulfill the U.S. mining interest. The Diné fields and orchards were burned, their livestock slaughtered, and their water sources were destroyed extensively. Emboldened by an evil amalgam of his disgust against Indians, ungovernable authority, and bloodthirsty desire to eradicate the Indigenous peoples, Carson stayed in the Southwest for the entire period of the Civil War in order to carry out “a series of search-and-destroy missions” against the Diné.

_Hwééldi_

Ultimately, many Diné people were starved to death and forced into surrender. In March 1864, the U.S. Army rounded up the eight thousand captured and tortured Diné and marched 300 miles to Bosque Redondo, where a military concentration camp was located in Fort Sumner, New Mexico. This tragic history is known as _Hwééldi_ (“time or place of great suffering”), or “the Long Walk.” Deaths and violence constantly accompanied them along the Walk and during the incarceration. Because of the high alkali content of the Bosque Redondo soil, no food plants could be adequately farmed and cultivated. Crops failed to grow year after year as thousands of Diné perished—a quarter of them due to starvation and diseases—during four long years of inhumane incarceration, which lasted until 1868. Regardless of their edibility, some of the items the starving Diné ate during the incarceration included “doves, rats, mice, prairie dogs, locusts, porcupine, badger, lynx, three kinds of greens, the inside of strawberry cactus, seeds, and roots.” These atrocities committed against the Diné inevitably brought them a forced dietary conversion and adaptation, which ultimately led to their dependence on unfamiliar foreign foods that were “nutritionally inferior” to their traditional Diné diet.
A treaty with the U.S. was signed in 1868, allowing the Diné, who survived the ordeal to finally return to their designated homeland currently occupied in the Four Corners area of the Southwest United States.\textsuperscript{21,22} Although the incarceration ended, what is abhorrent is that the release of the Diné was deemed reasonable not because of the lethal living conditions and harsh environment of the concentration camp, but because it was determined by the U.S. Congress that “the incarceration was too expensive to maintain.”\textsuperscript{22,31,32} What was even more egregious was that for his “noble” accomplishments, General Carleton was awarded the title of a major general in the U.S. Army in 1865, which encouraged and entitled him to conduct subsequent scorched-earth raids against Plain Indians.\textsuperscript{22}

For the U.S. settler colonialism to succeed, conquering Indigenous bodies and minds through the deprivation of necessities was the cruelest, yet the most effective tactics being devised in order to create Native dependency. Food in all of its forms is an absolute necessity for all living beings. If food is life, then hunger and malnutrition would ultimately lead to sickness and death. Disruption of their entire sacred food system—including their traditional food knowledge, the deep and sublime connection with their natural environment—and extinguishing the self-sustenance of Indigenous peoples were both physically and metaphorically fatal for the Indigenous peoples. Furthermore, these acts committed by the U.S. settlers were mostly intentional and deliberate in order to “undermine Indigenous self-determination.”\textsuperscript{23} Uprooting and erasure of the Native cultures, knowledge, traditions, food systems, spiritual connections with their sacred environment and ancestors, sovereignty, and all the other changes in their Indigenous livelihood is what many Indigenous scholars and activists call “cultural genocide.”\textsuperscript{23} Hence, these despicable military tactics of the U.S. government played a pivotal role in Manifest Destiny as they were the most destructive weapons utilized in the genocides and deracination of
the Indigenous peoples.

3. Dietary Deprivation and the U.S. Nutritional Colonialism

What happened during the period of Hwééldí was the beginning of the end of the Diné food sovereignty and their subsistent traditional food system. While incarcerated in Fort Sumner, the Diné were unable to hunt, farm, herd, gather to feed themselves as they did on their homeland for centuries. Being deprived of their Native food—the very essence of the Indigenous life—the Diné had to adopt the Anglo-origin colonial foods. In his Navajo Stories of the Long Walk Period, Broderick H. Johnson documents a list of foods that were made available to the Diné before the Hwééldí and during the incarceration in Fort Sumner.28 The food rations distributed by the colonizers mainly consisted of white flour, coffee, sugar, salt, lard, bacon, or salted pork.28 Not only the quantity of the rations was inadequate to feed nearly ten thousand incarcerated Diné, but their quality was also vile.19,28 White flour was often infested with vermin, meat rotten, and coffee beans still green, some of which caused the illnesses and deaths of many Diné as results of consuming such inedibles.28 This extremely poor diet penetrated the Diné’s daily life while they alienated the people from their subsistent food system, which was rooted in their estranged Diné Bikéyah. Consequently, the Diné were forced to rely on food rations provided by the U.S. military.18,19 Many scholars claim that the origin of frybread—flour dough mixed with skim milk and deep-fried in lard or shortening—emerged during this period.18,29,33 Thus, although frybread is considered a “traditional” by many,18 it is one example of the colonial foods, which was born at the loss of the Diné identity, their tradition, food sovereignty, homeland, “the indigenous Tó éí iiná, water is life ethos, the Dibé bee iiná, Sheep is life ethos,”34 and everything that constituted the Diné way of living.
The Treaty of 1868

At the end of the traumatic Hwééldi, the Treaty of 1868 returned a margin of homeland to the Diné as “the form of a reservation.” Upon returning to their homeland in 1868, the Diné struggled to adequately procure their food since much of the Diné Bikéyah, which had provided its people with suitable hunting, farming, and gathering environment, was already occupied by Hispanic and Anglo settlers. The Treaty of 1868 also illegally granted the U.S. government the authority to control the Diné people and their native homeland. In order to use their own agricultural land, the Diné were required to go through a certification process that was “administered by an Indian agent.” Hence, the Diné were stripped of their traditional and communal way of land management. Furthermore, the new process was highly individualistic, profiteering, and it undermined the matrilineal tradition of the Diné society.

The 1868 treaty also stipulated the government distribution of livestock to the people, so they could start herding again. For pastoral Diné, herding was an integral part of their life and culture since livestock was not only a source of nutritional food but also their “means of subsistence, their years of labor invested in building herds, their legacy to their children.” With the colonial invasion and control over the Diné society, the entire economic system transformed. Their subsistent lifestyle diminished and was significantly impacted by the U.S. capitalist economy, which promoted wage labors. Many Diné were pushed to rely heavily on herding for exchanging livestock products at emerging trading posts with mass-produced food items. They also traded handmade jewelry, weaving, and wool in order to sustain their daily living. Unfortunately, however, their intense herding ironically led to overgrazing and a devastating imbalance in the native ecosystem.

The advent of the railroad in the 1880s and arrival of traders further exposed the Diné to influxes of Anglo-origin food as well as culture. Although the Diné were able to recover their
pre-colonial self-sufficiency by 1880 through some hunting, gathering wild plants, and the
“judicious management of their livestock,”¹⁸ their diet was already significantly influenced and
invaded by the colonial food items; tea, sugar, salt, white flour, rice, baking powder, and canned
vegetables were some of such commonly introduced commodities.¹⁸,¹⁹ These food items became
rapidly available and were often obtained from the trading posts.¹⁸,¹⁹

**The Stock Reduction Program & the Taylor Grazing Act**

As if the U.S. encroachment had not inflicted enough suffering upon the Diné, the
Bureau of Indian Affairs (BIA) in 1933 issued the first reservation-wide order to reduce the
number of livestock the Diné people were allowed to care for, claiming that overgrazing was the
primary reason for the extensive soil erosion within the reservation.¹⁹ The BIA repeated the same
order again and again in 1935 and 1945.¹⁹ From the original number of 1.3 million goats and
sheep the Diné owned, the Stock Reduction Program aimed to reduce the livestock by more than
a half.¹⁹ The program was evidently detrimental to the lives of Diné, who relied on their
livestock as a valuable source of “animal protein and minerals from organ meats,”¹⁸ such as
vitamin A, iron, and calcium. This created the Diné’s even deeper dependence on the colonial
government and the food rations distributed by the federal food programs.

The Taylor Grazing Act, which was passed in 1934, further accelerated the
desertification of Native homeland.¹⁹ Every Diné livestock owner was required to register the
number of their livestock, and to limit their grazing range and confine their herd in a designated
boundary, in which the owners were only permitted to continue herding.¹⁹ Confiscation of the
Native land and the accompanying animals was another genocidal act against the Diné. As
historian Patrick Wolfe claims, “the question of genocide is never far from discussions of settler
colonialism. Land is life—or, at least, land is necessary for life.”³⁷ Despite such brutality and
dehumanization, the colonial expansion continued to terrorize and traumatize the Indigenous people, and the U.S. government was only motivated to destroy the Diné economy, their way of living, and cruelly denied their Indigenous self-determination.18

The U.S. Federal Food Assistance Programs

Under the same 1868 treaty, the U.S. government also initiated the federal food assistance programs for Indian communities.19,23 This practice of the federal food program continues today, which is known as the Food Distribution Program on Indian Reservations (FDPIR).23,38 The foods initially distributed by the federal food programs were only dry foods or highly processed and canned food items. In addition, in the late 1930s, there was still a lack of running water, electricity, and refrigeration system available on the reservation.6 For these reasons, most Diné people were not able to consume sufficient amounts of fresh fruits and vegetables and other nutritious food items that were perishable,18 other than what they were able to acquire through trades with other neighboring Indigenous groups such as the Pueblos, the Hopis, and the Acoma people.18

As reliance on the U.S. food assistance programs and Anglo food items obtained from trading posts increased, Diné’s cooking and dietary habits were completely altered. By 1940, gathering and hunting of the wild plants and animals were mostly abandoned.18,39 Cultivated plant foods such as corn, squash, and melons, which could be consumed immediately or dried and stored for wintertime, became popular.39 Wild animals were displaced by “mutton, goatmeat, horsemeat, and beef by 1955.”18, 39 Instead of the traditional cornbread, frybread and tortilla became staple foods.18,40 Potatoes, store-bought cornmeal, and white wheat flour replaced the hand-grinded corn flour as the culinary ash and clay disappeared from their traditional cooking.18 While juniper ash—which was an excellent source of calcium18—became increasingly scarce,
sugar, soda, and other sugar-sweetened beverage had become commonly available by the 1980s.\textsuperscript{18}

An ethnographic study conducted by Wendy Wolfe in the early 1980s documenting the dietary patterns and nutritional status of the Diné\textsuperscript{41} revealed that the most common Diné diet included “coffee, tortillas and/or frybread, potatoes, and sugar in coffee or tea,”\textsuperscript{41} which lacked in some micronutrients necessary for nutritional well-being such as vitamin C, A, and iron, calcium, and phosphorus.\textsuperscript{41} Demonstrably, the introduction of the Anglo foods that infiltrated into the Diné society was “nutritionally inadequate and culturally inappropriate,”\textsuperscript{23} which a scholar Melanie Lindholm refers to as “nutritional colonialism.”\textsuperscript{42} The inferior nutritional qualities of the colonial diet were further revealed by another important study conducted in the early 1990s.\textsuperscript{43} A group of researchers published their findings of the Navajo Health and Nutrition Survey, which comprehensively investigated the nutritional status of 985 Diné people living either on or near the reservation.\textsuperscript{43} Although the study was conducted nearly three decades ago, the findings pointed out serious malnutrition of the Diné population; inadequate intake of essential micronutrients, which were abundantly supplied by their traditional Diné diets, such as iron, calcium, vitamins A and C, and folate.\textsuperscript{43} The study also showed an excess daily intake of total and saturated fats among the Diné people who primarily consumed energy-dense Anglo-origin foods.\textsuperscript{43} This malnutrition inevitably put the vulnerable people, namely the elderly, within the Diné communities at the risk of developing diet-related non-communicable diseases (NCDs). Also, the study findings indicated that the barriers to improvement of dietary habits for the Diné then were “cost, availability, and shelf life.”\textsuperscript{43} These same barriers continue to be the major systemic challenges faced by the Diné people to this day, especially those who live in rural areas without adequate resources and infrastructure.
Nutritional colonialism that deracinated the traditional Diné food system and destroyed the health and well-being of the people can be better understood by going through each of the characteristics that define nutritional colonialism. Table 1 below lists the ten characteristics of nutritional colonialism described by Lindholm, which illuminates another brutal facet of the cultural genocide committed by the U.S. colonialism.

<table>
<thead>
<tr>
<th>Table 1. Characteristics of Nutritional Colonialism</th>
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<tbody>
<tr>
<td>1. Negation of subsistence lifestyles</td>
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<tr>
<td>2. Loss of food sovereignty</td>
</tr>
<tr>
<td>3. Fostering of dependency and sedentary lifestyles</td>
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<tr>
<td>4. Negation of any dominant sense of responsibility</td>
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<tr>
<td>5. Cultural suppression and marginalization</td>
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<tr>
<td>6. Destruction of health and well-being, increase in non-communicable diseases</td>
</tr>
<tr>
<td>7. Denial of control over price, availability, accessibility, quality, and appropriateness of food choices</td>
</tr>
<tr>
<td>8. The necessity for cash</td>
</tr>
<tr>
<td>9. Profit-driven food provisioning systems</td>
</tr>
<tr>
<td>10. Damage to the natural environment and biotas</td>
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</tbody>
</table>

The boarding school programs which started in the late nineteenth century and forcibly separated Indigenous children and youths from their families also facilitated the penetration of the nutritional colonialism into the Diné society. These government- and missionary-run schools imposed the colonial educational curriculum on the Native children and profoundly altered their diet and nutrition. By introducing the Western diet, food culture, and dining, the colonial schools indoctrinated the Native children and youths that Western foods were superior to the native ones, and that the Diné foods were “dirty, backward, unhealthy, and not a valuable as Western ones.” Hence, the cultural genocides continued in the colonial schools, and the Native children were forced to give up their traditional food, language, clothing, hair, and their tie to the Indigenous communities. The relocation programs throughout the country after the World
War II also pushed the Native population to the urban area, further exposing them to the Western notion of food and diet, and forcing them to embody the Eurocentric culture and lifestyle.18,19

4. “Food Desert” as an Example of Cultural Violence

According to the United States Department of Agriculture, Navajo Nation is classified as “food desert.”45 Title VII, Sec. 7527 of the 2008 Farm Bill Food defines a food desert as “an area in the United States with limited access to affordable and nutritious food, particularly such an area composed of predominantly lower-income neighborhoods and communities.”46

Navajo Nation is home to approximately 330,000 Diné (Navajo) members.47 It is the largest Indian reservation in the United States today, comprising about 27,400 square miles, approximately the size of the state of West Virginia.11,48 Despite its vast land size and dispersed residential communities within the reservation, there are only 13 grocery stores on the entire Navajo Nation.11 Among the American Indians and Alaskan Natives (AIs/ANs), the Diné people experience one of the highest food insecurity rates in the United States.48,49

As evidenced by the traumatic loss of the Diné traditional food system and sovereignty as well as the resulting malnutrition and associated diseases described in the previous sections, a healthy and balanced diet is imperative to one’s holistic well-being. If health is a human right, so must be healthy food and clean water. Denying anyone access to safe, affordable, nutritious, and socially, culturally, and ethically acceptable food is a violation of the basic human right.

The term “food desert” is too often indifferently used in our society without being given careful consideration and critical analyses. When we refer to a “food desert” in the context of health and social equity, we must realize that the term does not necessarily shed light on the fundamental problems of food injustice, which in and of itself is a social injustice. Drawing on
Johan Galtung’s theory of “Cultural Violence,” I argue that conventional use of “food desert” to indicate and measure the lack of reliable and continuous access to adequate and balanced nutritious food is a form of cultural violence.

According to Galtung, cultural violence is any “aspects of culture, the symbolic sphere of our existence—exemplified by religion and ideology, language and art, empirical science and formal science—that can be used to justify or legitimate structural or direct violence in our society. In the case of “food desert,” it legitimizes and justifies the food insecurity often experienced by the poor and marginalized, which is a form of structural violence. “The study of cultural violence,” Galtung argues, illuminates how “fact of structural violence are legitimized and thus rendered acceptable in society.” As such, we must acknowledge that food insecurity experienced by the Diné people is a vestige and manifestation of the settler colonialism and brutal deracination of the Indigenous peoples that stripped them of their land, livestock, food, language, family, community, traditions, and their identity; their very way of life.

Before discussing the “food desert” further, it is necessary to clarify that it is the notion and language of “food desert” that is culturally violent, and not the state of “food desert” itself. The state of “food desert” is, when analyzed based on the study of violence, a form of structural violence, as I elaborate further in the next section of this thesis. In addition, it should be emphasized that cultural violence is different from a violent culture. Cultural violence here is not meant by “imposing a culture” on someone. Rather, it infers that the “cultural aspects legitimizing that imposition”—whether “empirically or potentially”—are the “violence built into that culture,” which we interpret as cultural violence.

The violent aspects embedded in the language of “food desert” must be addressed and analyzed, since they allow and enable our society to create and accept the existence of an
environment in which certain groups of people are being deprived of food. Safe and nutritious food is a minimal necessity to live our lives and enjoy our health and well-being fully. Put differently, “food desert” is cultural violence that serves as an impetus to neglect the health and well-being of the Diné and other Indigenous peoples of North America. This analysis becomes even more comprehensible when we look at Galtung’s theory of peace, which can be interpreted as “the opposite of violence.”

If the opposite of cultural violence was “cultural peace,” then what would the opposite of food desert look like? Although it might be expressed or defined in various ways depending on the contexts, the opposite of food desert should certainly be an aspect of a culture that may “serve to justify and legitimize direct peace and structural peace,” which in turn may encompass health and well-being of all people in the context of health equity and justice. I argue that, therefore, the opposite of the food desert may be food justice and “Indigenous food sovereignty,” which will be explored later in this thesis.

Desert, as we know it, is a natural product of Mother Nature. Desert is described as an “extremely dry area of land with sparse vegetation,” and it is “one of Earth’s major types of ecosystems, supporting a community of distinctive plants and animals specially adapted to the harsh environment.” If the ecosystem of this earth thrives and continues to nurture its living beings, then there must be life. Indeed, the desert is full of life. When the term “food desert” is used, the word “desert” is expressed to emphatically imply an emptiness, aridness, desiccation, and lifelessness of an environment. The word is associated with barren, anemic, and infertile land, a lack of vitality, and it gives people a sense of desolation. A life—a living being—requires adequate nutrients that sustain and nurture it. If food is life, then it is infeasible for “food deserts” to support and nurture the lives of plants, animals, and humans, let alone healthy, vibrant, productive, and flourishing communities of people who live in them.
“Food desert” is a deliberate, yet disingenuous label and potentially violent one because although it is socially created, it normalizes the scarcity in which the individuals are forced to survive. Not only does it normalize, but it also facilitates the characterizations of people in our society in ways that perpetuate a sense of otherness and alienation: Indigenous peoples and people of color, for example. Such indifference creates the ostensible binary of them versus us. Furthermore, given its prejudiced definition, “food desert” also stigmatizes, thus, automatically marginalizes—physically, mentally, and socially—those who have lived on their ancient Native lands since the birth of their first ancestors, or those who are confined to racially segregated parts of urban areas, which have been turned into “food deserts” by all means of structural and direct violence.50,53 “Food desert,” thus, is neither a geographic nor environmental problem. Rather it is a socially, economically, racially, politically, and historically constructed one. “Food desert,” in other words, is “symbolic violence,”50 which makes the presence of food insecurity “look, even feel, right—or at least not wrong.”50 Moreover, what is so pernicious is that this cultural violence “preaches, teaches, admonishes, eggs on, and dulls us into seeing exploitation and/or repression as normal and natural, or into not seeing them at all.”50

Our society, indeed, overlooks the violence and the harmful nature of “food desert”; studying this cultural violence and its impact on structural and direct violence through a critical biosocial analysis54 is surely warranted.

5. Structural Violence of Food Apartheid: Exploitation, Penetration, and Marginalization of the Access to Food

Concepts of the Three Violence

Violence, Galtung asserts, can be understood as “avoidable insults to basic human
needs," In essence, “both direct and structural violence create needs-deficits.” He lays out the three different violence—direct, structural, and cultural—in “the violence triangle,” which is framed by “the linkages and casual flows” that run in all six directions. This violent triangle is a vicious cycle in nature because “violence breeds violence.” Although the three types of violence shape and maintain the triangle by feeding into each other in all directions, Galtung highlights a fundamental difference between the three kinds of violence in relation to time. That is, “direct violence is an event; structural violence is a process with ups and downs; cultural violence is an invariant, a ‘permanence,’ remaining essentially the same for long periods,” as long as basic culture does not transform rapidly.

Table 2 describes the typology of violence theorized by Galtung. Although the four types of needs that are listed in the table are all centered around human life, according to Galtung, the fifth column, “Ecological balance,” may be added to emphasize that environmental system maintenance is required for human maintenance and “peace.” The negation of ecological balance is “ecological degradation, breakdown, and imbalance,” which would ultimately impair human needs. Ecological balance, survival, well-being, freedom, identity for basic human maintenance are, therefore, all prerequisites for the peace, and if anyone of them is missing, then, human degradation ensues. Hence, the symbiotic relationship between humans and the nature is a precondition for peace.

Based on Galtung’s violence theory, we can now see that the nutritional colonialism which was discussed in the previous section is a prime example of the violence that causes insults to all levels of needs, including the ecological balance. Nutritional colonialism is cultural violence because imposing the Western food and diet on the Indigenous peoples was premised on Eurocentrism. Nutritional colonialism is also structural violence, as well as direct violence.
Table 2. A Typology of Violence*

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<tbody>
<tr>
<td>Direct violence</td>
<td>Killing</td>
<td>Maiming Siege, Sanctions Misery</td>
<td>Desocialization Resocialization Secondary Citizen</td>
<td>Repression Detention Expulsion</td>
<td>Harming biota (directly); Harming abiota (indirectly)</td>
</tr>
<tr>
<td>Structural violence</td>
<td>Exploitation A (e.g. starvation)</td>
<td>Exploitation B (e.g. malnutrition, disease)</td>
<td>Penetration Segmentation</td>
<td>Marginalization Fragmentation</td>
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*Recreated and modified from Galtung (1990).50

Throughout the Diné history, this violence caused starvation and deaths by denying their survival needs; second, it led to malnutrition, diseases, and misery through sanctions and by insulting their well-being needs; third, it denied the Diné’s identity and freedom needs by destroying and fragmenting their food sovereignty and traditional food system. Then, nutritional colonialism penetrated the Anglo-based colonial foods into the Indigenous society, and marginalized the Diné people’s access to foods and left with the only options that were only culturally inappropriate and nutritionally inferior. Finally, nutritional colonialism ultimately resulted in the ecological degradation and imbalance by damaging the natural environment and biota (e.g., soil degradation, livestock reduction, overgrazing, mining, water and environmental pollution) on which the Diné had depended for centuries.

**Structural Violence: Food Insecurity and Food Apartheid**

Food insecurity that disproportionately affects the Diné and many Black, Brown, and other Indigenous peoples in the United States today is another example of structural violence.
Structural violence, according to a physician and anthropologist Paul Farmer, can be interpreted as “processes and forces that conspire—whether through routine, ritual, or as is more commonly the case, the hard surfaces of life—to constrain agency.” They are social by nature, often invisible, and also violent because they result in pains and suffering. Sufferings that occur as results of the food insecurity—namely, the persistent health inequities and disparities among the Diné in this particular context—are structured by “historically given” and “economically driven” causes, as it has already been well-documented through the Indigenous peoples’ history in the United States.

“Massive direct violence” of Indigenous genocides and deracination “over centuries seeps down and sediments as massive structural violence”—of racism, segregation, and poverty. The direct violence in the past would be forgotten, but its remnants unyieldingly remain in our society; food insecurity as structural violence and “food desert” as cultural violence are just a few examples. The historical exploitations by the oppressors continue in the forms of structural poverty and high rates of unemployment, which impair the Diné’s effort to remediate and restitute a healthy and sustainable Diné food system. Moreover, it becomes clear that “sanitation of language” itself is cultural violence, because “food desert” that characterizes Navajo Nation and many Indigenous and impoverished communities is a “food apartheid” in disguise. The language “food desert” has never been innocent or accidental. It is another manifestation of the long history of racism, discrimination, and ostracization of the oppressed, which should simply be referred to as food apartheid.

Any groups of people may be affected by food apartheid, including poor white population. Nonetheless, since it is a racially and socioeconomically characterized structural violence, people of color are more likely to suffer from it. The Movement of Black Lives defines food apartheid as
“the systematic destruction of Black self-determination to control our food (including land, resource theft and discrimination), a hyper-saturation of destructive foods and predatory marketing, and a blatantly discriminatory corporate-controlled food system that results in our communities suffering from some of the highest rates of heart disease and diabetes of all times.”\textsuperscript{58,59} In addition, a writer Jacqueline Bediako states that food apartheid “is a relentless social construct that devalues human beings and assumes that people are unworthy of having access to nutritious food.”\textsuperscript{60} This definition perfectly applies to many Indigenous communities as well. Dietary options for the Diné communities are saturated with an overabundance of fast food franchise restaurants and “junk food” on the reservation. For example, a very limited number of full-service grocery stores are located in the Diné communities with higher population, such as Window Rock, Chinle, Kayenta, Tuba City, Crownpoint, and Shiprock.\textsuperscript{19} At the same time, these highly populated centers in the Navajo Nation also have many fast-food franchise restaurants as well.\textsuperscript{18,19} While healthy food items such as fresh fruits and vegetables are available at grocery stores, the data collected from the DPI’s Community Food Assessment and an evaluation conducted by the Diné Community Advocacy Alliance (DCAA) suggests that “the fresh and healthy food offerings are available in limited quantities, inadequate, and far outweighed by unhealthy, highly processed food, and high calorie options.”\textsuperscript{19} Those people living in more remote communities in the Navajo Nation often do not have any access to food retail locations in their local communities, or they only have gas stations or small convenience stores which mostly carry “junk food.”\textsuperscript{19}

Since food accessibility and availability essentially determine people’s food choices, they ultimately affect the individual diet and health outcomes. In many impoverished and geographically isolated communities within the Navajo Nation, the lack of access to adequate healthy foods such as fresh fruits and vegetables results in frequent consumptions of highly
processed and calorie-dense, but nutritiously poor foods. Consumption of such cheap but undesirable foods regularly most likely would lead to a plethora of negative health consequences, including shockingly high rates of overweight and obesity seen among Diné children, youth, and adults.

**Food Justice**

Food apartheid and food insecurity are food injustice. Food injustice is health injustice, and they are both inextricably interwoven with racial injustice. To fight for the just, equitable, and healthy world, we must not overlook the violence of food injustice that inflicts insults upon the basic needs of our fellow Indigenous, Black, and Brown peoples. Instead, the world needs to fight for food justice. Food justice is defined as “a process whereby communities most impacted and exploited by our current corporate-controlled, extractive agricultural system shift power to re-shape, re-define and provide Indigenous, community-based solutions to accessing and controlling food that are humanizing, fair, healthy, accessible, racially equitable, environmentally sound and just.”

Food justice, I believe, is an integral part of our effort to achieve health equity and social justice in our society.

6. Restoring and Advancing Indigenous Food Sovereignty: COPE FVRx Program

Thus far, I have discussed the violence of food apartheid, commonly known as “food desert,” and food insecurity that persistently exists in our society. Food apartheid sounds violent because it is. Food apartheid that exists today is indeed an epitome of the legacies of settler colonialism, internment, slavery, redlining, and segregation in the United States. Its perpetual existence is emblematic of how the Eurocentric world order navigates in ways that enable white
supremacy to thrive, corporate business industries (including global food giants) to flourish, and neoliberalism to exploit and encroach in the Black, Brown, and Indigenous bodies still being oppressed in this post-colonial world.

How do we then begin to dismantle these violence and systemic oppressions that have agonized Indigenous peoples for centuries? What can we envision as a cultural and structural peace—the opposite of “food desert” and food apartheid, respectively—for Indigenous peoples? What does it take to decolonize our present-day nutrition and food system? I believe the solutions lie in the concept and realization of “Indigenous food sovereignty,” which is food sovereignty of the Indigenous peoples, by the Indigenous peoples, and for the Indigenous peoples.

The Movement of Food Sovereignty

The political vision of “food sovereignty” was first launched in 1996 at the First World Food Summit by La Via Campesina. La Via Campesina was founded in 1993 in Belgium by a group of agricultural representatives from the continents of Africa, Asia, Europe, and the Americas, and currently represents 200 million farmers worldwide. It is “an autonomous, pluralist, multicultural movement” organized by peasants, small/medium-scale farmers, landless producers, rural women, and youth, and Indigenous and migrant communities, who seek to articulate a united response against corporate dominant agriculture, neoliberalism, patriarchy, and to promote social justice, human rights, dignity, and gender and social equality.

The term “food sovereignty” was then introduced to the world when the First International Forum for Food Sovereignty was held in Nyéléni Village, Sélingué, Mali. According to the Declaration of Nyéléni, “Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who
produce, distribute, and consume food at the heart of food systems and policies rather than the demands of markets and corporations.” At the 2007 Forum in Nyéléni, six principles of food sovereignty were developed, and the seventh principle, “food is sacred,” was added by members of the Indigenous Circle during the People’s Food Policy process. These principles are: 1) Food for people; 2) Value placed on food providers; 3) Localized food system; 4) Local control; 5) Building and sharing knowledge and skills; 6) Harmony with nature; 7) Food is sacred.

Although the term “food security” has long existed and often utilized to counteract food insecurity worldwide, the narrow and myopic definition merely addresses the availability of food in a given circumstance, and “adequacy of food supply without specifying the means of food acquisition.” Put simply, food security is only concerned “with the protection and distribution of existing food systems.” For example, the 1996 World Food Summit definition claims that food security “exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”

In the specific context of Indigenous food insecurity, many Indigenous scholars argue that the current definition of food insecurity is inadequate since focusing on the food supply in order to only meet dietary needs and preference fails to address fundamental issues that stem from the cultural, historical, political, economic, and environmental deprivation and exploitation Indigenous peoples have been experiencing for far too long. Food security also does not at all involve restoring Indigenous traditional food systems that have been destroyed by the settler-colonialism.

In contrast, while the food sovereignty movement works to accomplish “the production, consumption, and distribution of culturally appropriate food,” it also values the importance of
“strengthening community, livelihoods, and environmental sustainability.” It is a grassroots movement that “seeks to address intersecting issues of hunger, environmentally unsustainable production, economic inequality, and social justice on a political level.” The food sovereignty movement is a resistance against inequalities and injustices. For Indigenous communities, food sovereignty is a “right of the peoples,” and this pluralistic concept emphasizes “a collective action to assert and maintain political autonomy at multiple scales.” Furthermore, Indigenous food sovereignty is “a continuation of anticolonial struggles.” The politics of Indigenous food sovereignty is “not only a politics moored in both space and place but a politics developed as part of longer struggles against exploitation and colonization of that place.”

**Diné Food Sovereignty**

In Navajo Nation, their anti-colonial struggles are making some fruitful progress, one of which is the Healthy Diné Nation Act of 2014. To combat the ongoing obesity and diabetes crisis in the Diné communities, the Diné Community Advocacy Alliance (DCAA) was established in March 2012. After years of encountering numerous hurdles, disappointments, and the lobbyists and opposition efforts within the community, the DCAA—a group of activists, community health advocates, and food justice organizers—was able to bring the act into law successfully. The Healthy Diné Nation Act of 2014 introduced the Unhealthy (“junk”) Foods 2% Sales Tax, compounding the 5% Navajo Nation sales tax on: 1) sweetened (both sugar and artificially) beverages; 2) sweets (including baked and fried deserts and goods); 3) fried, baked, or toasted chips and crisps; 4) fast food; and 5) flavor enhancers (i.e., sugar, salt, and sweeteners). The revenues derived from the “junk food tax” would be collected into the Community Wellness Development Projects Fund, which would help establish various wellness projects and initiatives to promote a healthy lifestyle in the Navajo Nation. In order to encourage purchase and
consumption of healthy foods instead of “junk” food in the Navajo communities, the Elimination of Tax on Fresh Fruits, Fresh Vegetables, Water, Nuts, Seeds, and Nut Butters was passed, and the 5% sales tax on these healthful food items was eliminated in 2014 as well.

In 2005, the Diné Policy Institute (DPI) was established by the Navajo Nation Council and the Diné College Board of Regents “to articulate, analyze and apply the Diné Bi Beehaz’ áannii (the Fundamental Law of the Diné) to issues impacting the Navajo people by educating, collaborating and serving as a resource for policy and research.” Since 2011, the DPI has been working on the Navajo Nation Food System research under the Diné Food Sovereignty Initiative. According to the DPI, Diné Food Sovereignty is defined as follows:

“[T]he right of people to define their own policies and strategies for sustainable production, distribution, and consumption of food, with respect to Diné culture, philosophy, and values, and is considered to be a precondition for food security on the Navajo Nation. Diné Food Sovereignty ensures the ability to establish our own culturally appropriate and sustainable systems of managing natural resources, including lands, territories, waters, seeds, livestock, and biodiversity. Diné Food Sovereignty empowers Diné people by putting the Diné people, cooks, farmers, ranchers, hunters, and wild food collectors at the center of decision-making on policies, strategies, and natural resource management.”

One of the objectives of this thesis was to demonstrate that healing and recovery for the innate health and wealth of the Diné way of living are certainly possible through re-learning and restoring the Diné traditional food system based on the philosophy of the Indigenous food sovereignty. Indigenous peoples identify themselves with their sacred foods and intimate connection to their divine homeland. Indigenous food sovereignty, according to an Anishinaabe (Ojibway) economist, scholar, activist, and community leader Winona LaDuke, is “an
affirmation of who we are as Indigenous peoples, and a way, one of the most sure-footed ways, to restore our relationship with the world around us.\textsuperscript{70} And I, too, firmly believe that their wholesome lives and holistic well-being are possible only when “food deserts” and food apartheid are no longer existent, and the Indigenous peoples’ access to healthy, ethical, equitable, and sustainable food system has finally been restituted.

**COPE FVRx Program**

Community Outreach and Patient Empowerment (COPE) Program in Gallup, New Mexico is a patient-focused, community-based non-profit organization that works “to promote healthy, prosperous, and empowered Native communities through three collaborative approaches: Robust, community-based outreach; Local capacity building and system-level partnerships; and Increasing access to healthy foods.”\textsuperscript{71} COPE is a sister organization of Partners in Health (PIH), a globally recognized non-profit healthcare organization whose mission is “to provide a preferential option for the poor in health care”\textsuperscript{72} through bringing “the benefits of modern medical science to those most in need of them and to serve as an antidote to despair.”\textsuperscript{72} With these philosophies in mind, the COPE program continues to work with the Diné communities and other stakeholders every day to achieve its vision, “to eliminate health disparities and improve the well-being of American Indians and Alaska Natives.”\textsuperscript{71}

The following study was conducted in order to assess the impacts of the Navajo Fruit and Vegetable Prescription (FVRx) program on the health and well-being of young children in Shiprock, a town in the Northern Navajo Nation. The FVRx is one of the flagship programs of COPE delivered directly to the Diné communities in an effort to increase fruit and vegetable consumptions of participating families, and to promote healthy lifestyle and sustainable local businesses in the communities.\textsuperscript{12} This study is part of the continuous efforts to restore the lives
and livelihoods of the Diné by investing “in existing community resources,” and transforming healthcare delivery that is aligned with the Indigenous food sovereignty, culture, identity, and values of the Diné people.

7. Conclusion

“So much has been forgotten, but it is not lost as long as the land endures, and we cultivate people who have the humility and ability to listen and learn. And the people are not alone. All along the path, nonhuman people help. What knowledge the people have forgotten is remembered by the land. The others want to live, too. The path is lined with all the world’s people, in all colors of the medicine wheel – red, white, black, yellow—who understand the choice ahead, who share a vision of respect and reciprocity, of fellowship with the more-than-human world.”

-Robin Wall Kimmerer

This thesis aimed to dissect the cultural violence of “food desert” as well as structural violence of food insecurity that have continuously caused the profound and immeasurable inter-generational loss and suffering among the Diné and Indigenous peoples in the United States. Food apartheid and the resulting lack of access to safe, nutritious, affordable food are some of the primary risk factors that attribute to the persistent health inequalities and disparities among the Diné children, youths, and adults. Learning the Indigenous history helps us understand the fact that Indigenous deracination, nutritional colonialism, historical disinvestment in health and other living necessities, extraction and exploitation of the Diné’s rich tradition, knowledge, resources, and culture by the colonial power are the major underlying forces that created the food apartheid that exists in the Diné communities today.
Through studying the past history, understanding the current challenges, and creating the future opportunities, we global health professionals, scholars, activists, and leaders strive to learn how to envision and realize truly just health and social equities in the not too distant future. For us to be able to achieve these goals, we must learn to listen to and work with the Indigenous communities. Only then will we begin to heal and learn how to bring ourselves to move forward. It is my humble wish that this study offers a sliver of hope and knowledge that may contribute to the betterment of the lives and future of the Diné and Indigenous peoples throughout the world. And, to help facilitate discussions and inspire ideas that may ultimately alleviate the sufferings of the world’s vulnerable and marginalized. Our work is long overdue. Nevertheless, it is critical now more than ever for the world to actively and diligently engage in accompaniment and social justice, seek accountability, and to build structural peace in the space of healing and growth. Shijéí bitł’aádéę́́’ ts’ídí yéígo ahéhee’. 
Part 2: Impacts of the Navajo Fruit and Vegetable Prescription (FVRx) Program on Childhood Obesity in an American Indian Community: A Mixed-Methods Study in Northern Navajo Nation

1. Introduction
1.1 Background

Today, the global double burden of malnutrition is one of the most serious health concerns for both adults and children. Overwhelming scientific evidence shows that the consumption of unhealthy food—heavily-processed food, foods and beverages that are high in sugar, sodium, and fat contents—is a major risk factor that contributes to a large number of premature deaths and morbidity worldwide. The risk of morbidity and mortality posed by unhealthy diets alone is in fact greater than the risk posed by smoking, alcohol and drug use, and unsafe sex all combined.

In the United States, the 2017-2018 prevalence of obesity and severe obesity among adults over 20 years of age were 42.4% and 9.2%, respectively, and according to the National Center for Health Statistics, these numbers are rising every year. In 2015-2016, 13.7 million children and adolescents aged 2 – 19 years (18.5%) in the United States were obese. Furthermore, approximately 34.2 million people of all ages (10.5% of the total U.S. population) were estimated to suffer from diabetes in 2018, which include both diagnosed and undiagnosed cases. Diet-related health conditions such as obesity and type 2 diabetes (T2DM) are strongly associated with socioeconomic status (SES), and the burden of these diseases disproportionately affects lives of the poor, racial and ethnic minorities, and those with limited resources.

A recently published national report shows that among U.S. adults aged 18 years or older, American Indians/Alaska Natives (AIs/ANs) had the highest prevalence of diagnosed diabetes for women (14.8%) and second-highest for men (14.5%) after Mexican Americans (16.2%) in 2017-2018. Furthermore, many previous studies have shown that the prevalence of overweight,
obesity, and associated conditions such as T2DM is significantly higher among American Indian children when compared to the rest of their US counterparts.\(^2\)\(^-\)\(^8\) A study conducted based on the data from the Indian Health Service National Data Warehouse estimated that the prevalence of overweight and obesity among AI/AN children aged 2 to 19 years in 2015 was 18.5% and 29.7%, respectively.\(^83\) In particular, the prevalence of severe obesity among AI/AN children between 2 to 19 years of age was almost double the estimate of the US prevalence from the National Health and Nutrition Examination Survey (NHANES) in 2016.\(^84\)

The grave health disparities and inequities experienced by the Indigenous peoples in the United States for generations are deeply linked to persistent food insecurity. AI/AN communities continuously live with a higher level of food insecurity than the US average.\(^85\) A household is considered food insecure when “the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain.”\(^86\) Although the prevalence of food insecurity among US households declined for the first time since 2008, 11.1% (14.3 million) of US households were food insecure in 2018.\(^87\) In Navajo Nation, home to more than 300,000 Navajo (Diné) people, and one of the largest Indian nations in the United States located in the Four Corners of the Southwest,\(^88\) 75% of the population is considered food insecure due to a lack of access to adequate and quality food.\(^9\) A survey of 276 households in ten communities in the Navajo Nation conducted in 2012 also revealed that 76.7% of the households had some level of food insecurity.\(^89\) Of 76.7%, approximately 22% were food insecure at the household level, nearly 26% at the adult level, and almost 29% of the households experienced food insecurity at the child level.\(^89\) Food insecurity at the child level is the most severe level of food insecurity, since adult family members generally prioritize children’s meals by reducing the quantity of meals consumed by adults to ensure that children have enough food
to eat. The high level of food insecurity in the Navajo Nation is attributable to various systemic barriers, including poverty, high unemployment rates, geographic isolation, and the absence of grocery establishments in their rural communities. The lack of adequate and consistent access to fresh and healthy foods may result in frequent consumption of inexpensive, highly processed, and calorie-dense, but nutritionally poor foods, which are often the most easily accessible food items for many Diné families. Such diets with empty calories can cause malnutrition, including obesity and micronutrient deficiencies, which in turn has long-term negative health consequences, some of which are reflected upon the alarmingly high prevalence of obesity and T2DM in the Navajo population. Particularly in children, chronic micronutrient deficiencies can lead to various long-term and serious health consequences such as stunting, cognitive impairments, and weakened immune system.

Due to the extremely concerning levels of food insecurity and other historically-entrenched systemic challenges within the Diné community, health indicators are worse in this Indian nation than in the rest of the U.S.: 20% of the adult Navajos suffer from diabetes, and 50% of children are either overweight or obese. Obesity and diabetes, if left untreated, can lead to serious complications such as cardiovascular diseases, liver disease, kidney failure, musculoskeletal disorders, some cancers, limb amputation, blindness, and some mental and psychosocial disorders. Given that obesity and diabetes are associated with a significant decrease in quality of life and life expectancy, reducing the prevalence of obesity and T2DM is paramount to preventing various complications and decreasing the risks of preventable premature deaths.

1.2 Significance of the study

The need to address the food insecurity and extremely alarming diet-related public health
problems in Navajo Nation has led to the development of an innovative nutrition program. The Navajo Fruit and Vegetable Prescription (FVRx) is a program run by Community Outreach and Patient Empowerment (COPE). This patient-focused, community-based non-profit organization works in partnership with the Navajo Nation Community Health Representative Outreach Program to improve the health of the Diné community. The Navajo FVRx program has been integrated into the local health system to increase the fruits and vegetable consumption of participating families and to promote a healthy lifestyle and sustainable local businesses in the communities. Participating pediatric patients and their families receive fruit and vegetable “prescriptions” in the form of vouchers that can be redeemed at designated partnering local stores and trading posts to purchase fresh fruits and vegetables, frozen fruits and vegetables with no additives, and traditional Navajo food items. The number of voucher booklets prescribed to the participating families every month is determined based on the size of households; 1 US dollar (USD) per household member per day, with a maximum of 4 USD per day. Additionally, participating families attend a monthly interactive group session led by the program providers to learn about nutrition and children’s health through a holistic approach for six months while receiving the vouchers.

After three years of program implementation, COPE data showed that the FVRx program may be effective in improving the health of the Diné communities. For example, 31% of children who were overweight at the start of the program managed to reach normal weight criteria upon completion of the program. There was also an average reduction of over 14% in the body mass index (BMI) percentile of children who participated in the program. However, despite the successful program implementation over the past few years, data on any lasting impacts on the program participants’ health after they completed the six-months FVRx program are missing.
There exists a need for knowledge regarding what aspects of the program were beneficial and valuable for the participating families, and how exactly they addressed the various existing systemic challenges and barriers to achieving healthy dietary habits and nutritional well-being. In order to better understand the potential benefits of the FVRx program for the Navajo communities and the long-term impacts of the program on the health of participating children and their families, we conducted a mixed-methods study that combined both quantitative and qualitative methods.

The study findings demonstrated that the FVRx program provided participating families with various benefits to improve their children’s and families’ health and well-being through a comprehensive approach. The program successfully addressed a unique set of challenges surrounding the families’ access to healthful foods and having means to prepare and consume nutritionally balanced meals. Through its holistic approach and program implementation, the FVRx program counteracted many of the historically-entrenched challenges to good nutrition and health the Diné communities face daily. The FVRx program is, therefore, beneficial for the health and well-being of the Navajo Nation, because it helps create meaningful positive dietary changes for the families and community members.

1.3 Theoretical framework

For this study, the author used the Empowerment (meta-) theory to emphasize that food insecurity and the consequential health inequities and disparities among the Diné are the results of structural violence “rooted in social processes that disempower entire populations.” AIs and ANs (as well as Black, Brown, and other Indigenous peoples elsewhere in the world) continue to suffer from the legacies of white colonization and post-colonial systemic racism and sociopolitical and
economic discriminations. Using this framework, the study aspires to “influence the oppressed human agency and the social structure within the limitations and possibilities in which this human agency exists and reacts.”

Through our work, we strive to continue to carry hopes and faith in social justice that we have the will, power, and knowledge to create a more just, equitable, peaceful, and healthier world.

Figure 1. Map of the Navajo Nation
(Source: Navajo Epidemiology Center. https://www.nec.navajo-nsn.gov/.)

2. Study design and setting

We conducted an observational cohort study, which utilized a mixed-methods convergent design combining a quantitative and qualitative analysis. The study consisted of two parts: the quantitative part involved collecting and analyzing the de-identified data of pediatric patients
who participated in the FVRx program in 2017-2018 from the electric health record (EHR). The qualitative part involved recruiting the parents of the children who completed the FVRx program and conducting in-person interviews, which were recorded, transcribed, and analyzed. Data collection took place between June 2019 and July 2019 at the Northern Navajo Medical Center (NNMC) located in Shiprock, New Mexico. NNMC is one of the five Indian Health Service (IHS) facilities located within the Shiprock Service Unit, and the hospital serves nearly 81,000 Native Americans, who are mostly Navajo (Diné).13

3. Quantitative study
3.1 Study population

All infants and children who received care and enrolled in the FVRx Program at the NNMC between January 2017 and December 2018 were included in the study. Those who enrolled in the FVRx program but whose medical records were not available at the NNMC were excluded.

3.2 Sampling

The pediatric participants were identified using the provider registry of the FVRx enrollees and were screened using the EHR at the NNMC. The Navajo FVRx program was delivered to the patients as a part of routine pediatric care (not a research intervention). Therefore, all the parents and caregivers who enrolled in the FVRx program had consented to take part in the program, including the collection of caregiver-reported surveys, their children’s weight, height/length, and BMI data for program evaluation.
3.3 Data collection

The EHRs of pediatric patients who enrolled and participated in the FVRx program at the NNMC between January 2017 and December 2018 were reviewed. Patients who either participated partially or completed the entire FVRx program were determined using the FVRx registry. The patients were considered to have completed the FVRx program if they attended at least four out of six FVRx sessions. The following data from each pediatric patient were abstracted from the EHR: date of birth, gender, and all measurements of height or length, weight, which were available in the EHR up to the date of chart review. The FVRx registries were also reviewed in order to collect the date of FVRx enrollment, the date of FVRx completion, the number of sessions attended, as well as the number of people living in the household, the number of children under age 12 in the household, and history of enrolling in any one of the Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), Food Distribution Program on Indian Reservations (FDPIR) in the past. The pre-enrollment surveys were also reviewed in order to assess the household food security status of the participating families.

All the identifiable data from the EHR and the FVRx registries and surveys were de-identified as follows. All dates were de-identified by calculating the number of months and weeks from the date of FVRx enrollment and using a “Time from Enrollment” rather than date variable. We used the FVRx ID as the participant identifier, rather than the patient name or medical record number. We used the age at the time of enrollment, program completion, and the post-intervention follow-up rather than the date of birth. We defined the key variables as follows:

- Baseline measurements: the pediatric patients’ body weight and height (for age >24 months) and length (for age 0-24 months) taken on the day of the FVRx enrollment.
- Completion/Exit BMI: the pediatric patients’ body weight and height (for age >24 months) and length (for age 0-24 months) taken on the day of the FVRx completion.
• Post-intervention follow-up BMI: the pediatric patients’ body weight and height (for age >24 months) and length (for age 0-24 months) taken between 5 months and 21 months after the date of FVRx completion, depending on when the patient was seen for his or her routine health check-up.

3.4 Data analysis

Based on the age of the patients at the time of program enrollment, the participants were divided into two categories; those patients aged 0-24 months and those aged older than 24 months. Using patients’ age, gender, weight, and height/length, their BMI-for-age percentiles were calculated. For the group 0-24 months, calculations were done based on the WHO BMI-for-age Birth to 2 years (boys) percentile and BMI-for-age (girls) Birth to 2 years percentile. For the group of those older than 24 months, the BMI-for-age percentiles were based on the CDC growth charts for children and teens (ages 2 through 19 years). Table 3 below shows the classification of pediatric nutritional status by age.

| Table 3. The Classification of Pediatric Nutritional Status by Age |
|------------------------|-----------------|---------------|-----------------|-----------------|-------------|
| Age (Months) | Underweight | Healthy weight | At risk for overweight | Overweight | Obese |
| 0–24 (WHO BMI-for-age percentile) | <2nd percentile | ≥2nd to <84th percentile | 84.1st to 97.7th percentile | >97.7th percentile | N/A |
| >24 (CDC BMI-for-age percentile) | <5th percentile | 5th to 84.9th percentile | N/A | 85th to 95th percentile | >95th percentile |

Sources: a) [http://www.who.int/childgrowth/en/index.html](http://www.who.int/childgrowth/en/index.html); b) [https://www.cdc.gov/obesity/childhood/defining.html](https://www.cdc.gov/obesity/childhood/defining.html)

The changes in BMI-for-age percentiles from baseline to FVRx completion and post-intervention were then analyzed. For the analysis of the nutritional status of the pediatric patients (Table 6), we only included the data of those patients who completed the FVRx program, and whose necessary measurements were complete and available at all baseline, exit, and post-intervention follow-up. To make the results more consistent, we decided to exclude those patients whose measurements were missing at any one of the baseline, exit, or post-intervention follow-up.
up. Due to the very small sample size of the study, we did not use any statistical tests to evaluate the changes in the patients’ BMI-for-age percentiles over the period between the baseline and post-intervention follow-up. Over the course of the program, pediatric patients moved from the 0-24 months age group to the >24 months age group as the time periods advanced. This made it relatively difficult to compare among the three time periods because the number of patients in each age cohort was different. Thus, we combined the two age groups to better observe the trend in the changes in their nutritional status over time. The categories of the pediatric nutritional status were simplified; underweight, healthy weight, at risk for overweight or overweight, and obese.

In lieu of statistical tests, we simply summarized the overall trend of changes in BMI-for-age percentiles of the pediatric patients by categorizing them into two groups: 1) BMI-for-age percentiles increased, and 2) BMI-for-age percentiles decreased (Table 7).

3.5 Ethical considerations

The study was accepted and approved by the Navajo Nation Human Research Review Board. The study was also approved by the Institutional Review Board (IRB) of the Harvard Faculty of Medicine. As part of the requirements by the NNHRRB, the Northern Navajo Tribal Agency Council Resolution, an approval letter from the Northern Navajo Medical Center, and the Harvard IRB approval were obtained and submitted to the NNHRRB. For the quantitative study, child assent was waived by the Harvard IRB. The principal investigator (PI) who collected the data applied for and completed the federally mandated training and clinical and security clearance processes at the Northern Navajo Medical Center in order to obtain an authorization to access protected medical records of the patients.
3.6 Quantitative results

A total of 25 pediatric patients enrolled in the FVRx program between January 2017 and December 2018. Of 25 patients, one patient never came back after the enrollment, and 6 patients did not complete the program. Out of the remaining 18 patients who completed the program, 3 of them did so in less than four months (they made up for the missed FVRx sessions individually with one of the providers). For the quantitative analysis, 4 patients out of 24 were initially excluded from the data because their measurements were missing considerably in the EHRs, which prevented the PI from analyzing the changes in their BMI-for-age percentiles. In addition, one patient was missing baseline measurements, one missing exit measurements, and the other missing post-intervention follow-up measurements. Figure 2 shows a flow diagram illustrating how the observational study was conducted.
Table 4 illustrates the descriptive characteristics of pediatric patients who enrolled in the FVRx program. The mean age of the children under and equal to 24 months was 13.5 months, and their age ranged from 0.25 (1 week) to 24 months. The mean age of the children older than 24 months was 56.3 months, and their age ranged from 29 to 78 months. The household characteristics also showed that 56.5% of all participating families were enrolled in some type of the federal nutrition program, which is indicative of low household food security in the Navajo Nation.

Table 4. Descriptive characteristics of children enrolled in the Navajo FVRx Program in 2017-2018 (n=24)

<table>
<thead>
<tr>
<th>Child characteristics (at the time of enrollment)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>16 (67%)</td>
</tr>
<tr>
<td>Male</td>
<td>8 (33%)</td>
</tr>
<tr>
<td>Age (months)</td>
<td></td>
</tr>
<tr>
<td>0-24</td>
<td>10 (42%)</td>
</tr>
<tr>
<td>&gt;24</td>
<td>14 (58%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household characteristics (at the time of enrollment)</th>
<th>N (%) or Median (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of people living in home</td>
<td>Median (Range) 5 (3-12)</td>
</tr>
<tr>
<td>Number of children in the household aged 0-12 years (n=23)*</td>
<td>Median (Range) 2 (1-8)</td>
</tr>
<tr>
<td>Do you or anyone who lives in your house receive any of these benefits?†(n=23)*</td>
<td>SNAP 11 (47.8%) WIC 7 (30.4%) FDPIR 0 (0%) At least one of the above 13 (56.5%)</td>
</tr>
<tr>
<td>Pre-program survey (n=20)* Thinking about the past twelve months:</td>
<td></td>
</tr>
<tr>
<td>1) The food we bought just didn’t last and we didn’t have money to buy more</td>
<td></td>
</tr>
<tr>
<td>Often</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>15 (75%)</td>
</tr>
<tr>
<td>Never</td>
<td>4 (20%)</td>
</tr>
<tr>
<td>2) We couldn’t afford to eat balanced meals</td>
<td></td>
</tr>
<tr>
<td>Often</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>12 (60%)</td>
</tr>
<tr>
<td>Never</td>
<td>6 (30%)</td>
</tr>
</tbody>
</table>

*Variables less than n=24 are due to missing data.
Table 5 shows the participants’ program completion and the number of sessions attended. Of the 24 participants, 13 (54.2%) families attended all six sessions, 3 (12.5%) attended five sessions, and 2 (8.3%) attended four sessions. The duration of the post-intervention follow-up ranged between 5 and 21 months, and the mean was 12.2 months.

Table 5. Participant program completion of the Navajo FVRx Program at NNMC in 2017-2018 (n=24)

<table>
<thead>
<tr>
<th>FVRx Program</th>
<th>N (%) or Mean (SD*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program completion status</td>
<td></td>
</tr>
<tr>
<td>Complete</td>
<td>18 (75%)</td>
</tr>
<tr>
<td>Incomplete</td>
<td>6 (25%)</td>
</tr>
<tr>
<td>Number of sessions attended§</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>13 (54.2%)</td>
</tr>
<tr>
<td>5</td>
<td>3 (12.5%)</td>
</tr>
<tr>
<td>4</td>
<td>2 (8.3%)</td>
</tr>
<tr>
<td>3</td>
<td>0 (0%)</td>
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<tr>
<td>2</td>
<td>1 (4.2%)</td>
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<tr>
<td>1</td>
<td>3 (12.5%)</td>
</tr>
<tr>
<td>0</td>
<td>2 (8.3%)</td>
</tr>
<tr>
<td>Post-intervention follow-up duration in months (n=19)*</td>
<td>12.2 (5.21)</td>
</tr>
</tbody>
</table>

*SD= Standard Deviation
§ Note: Attending ≥4 sessions was considered complete.

Table 6 shows the nutritional status of the pediatric patients who enrolled in and completed the FVRx program at baseline, exit, and post-intervention follow-up measurements. Note that as the patients grew up, most of them graduated to the >24 months category by the time of the post-intervention follow-up.

In addition to the 14 children who were older than 24 months and completed the program and had the exit measurements, there was one underweight child who did not complete the FVRx program. Similarly, in addition to the 17 children who were older than 24 months and completed the program and had the post-intervention follow-up measurements, there were one underweight
child and one overweight child who did not complete the FVRx program.

Table 6. Nutritional status of the children who completed the Navajo FVRx Program at the baseline, exit, and post-intervention follow-up (the age groups combined)

<table>
<thead>
<tr>
<th>Interpretation of Nutritional Status</th>
<th>N (%) FVRx Complete at Baseline (n=17)*</th>
<th>N (%) FVRx Complete at Exit (n=17)*</th>
<th>N (%) FVRx Complete at Post-intervention follow-up (n=17)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>6 (35.3%)</td>
<td>6 (35.3%)</td>
<td>5 (29.4%)</td>
</tr>
<tr>
<td>At risk for overweight or overweight</td>
<td>7 (41.2%)</td>
<td>7 (41.2%)</td>
<td>4 (23.5%)</td>
</tr>
<tr>
<td>Obese</td>
<td>4 (23.5%)</td>
<td>4 (23.5%)</td>
<td>8 (47.1%)</td>
</tr>
</tbody>
</table>

*n less than n=24 due to missing data. The data only includes those children who completed the FVRx program, and whose necessary measurements are complete and available at the baseline, exit, and post-intervention follow-up.

Table 7 describes the overall trend of the change in BMI-for-age percentiles among pediatric patients who completed the FVRx program. Nearly 59% of them experienced an increase in their BMI-for-age percentiles between the exit and post-intervention follow-up. Conversely, approximately 41% of the patients experienced a decrease in their BMI-for-age percentiles.

Table 7. Change in BMI-for-age percentiles of the children who enrolled in the Navajo FVRx Program between the program exit and post-intervention follow-up (n=17)*

<table>
<thead>
<tr>
<th>Changes in BMI-for-age percentiles</th>
<th>N (%) FVRx Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased</td>
<td>10 (58.8%)</td>
</tr>
<tr>
<td>Decreased</td>
<td>7 (41.2%)</td>
</tr>
</tbody>
</table>

*n less than n=24 due to missing data. The data only includes those children who completed the FVRx program, and whose necessary measurements are complete and available at the baseline, exit, and post-intervention follow-up. Five children did not complete the program, one child was missing the exit data, and the other child was missing the post-intervention follow-up data.
4. Qualitative study
4.1 Sampling

Given the small number of patients who completed the FVRx program, the PI attempted to reach out to all the parents or caregivers of pediatric patients who participated and completed the FVRx program between January 2017 and December 2018 through phone calls. Before the recruitment was planned, the parents or caregivers of the patients who did not complete the FVRx (n=6) were excluded from the list of the participating candidates since the qualitative interview required the parents to share specifically about their experience with the FVRx throughout the program and to compare their food-related habits and circumstances pre-enrollment and post-completion.

4.2 Recruitment

Recruitment of the adult participants took place between June and July 2019 at the NNMC. A total of 18 parents were contacted through phone calls by the PI, and 15 parents answered the phone call. The remaining 3 parents could not be reached at the contact numbers provided in the FVRx registry despite several phone call attempts were made for a few consecutive days. All 15 parents who could be reached were recruited using a prepared recruitment script (Appendix 1), and the participants were offered a 50 US dollar gift card for their participation in the interview. During the recruitment calls, all of them agreed to participate in an individual in-person interview. One of the parents was unable to make an appointment with the interviewer due to her work commitment. In the end, a total of 14 parents ended up making an appointment with the interviewer (who was also the PI).
4.3 Data collection

In-person interviews with a total of 14 parents (n=14) took place at the pediatric outpatient clinic of the NNMC. Each parent made an appointment in advance and came to the clinic to meet with the interviewer. The interview was conducted in a closed-room located inside the clinic to protect the privacy of the participating parents. There were no other health care professionals or hospital staff inside the room while the interviews were conducted. Most, but not all parents brought their child or children with them to their interviews. Before the interviews began, the participating parents were asked to read the Adult Consent Form and to provide the date and their signature at the bottom of the consent form. One of the parents was unable to read due to physical impairment. Therefore, the interviewer read the consent information out loud for the parent. The interviewer also dated and signed the same consent form before proceeding to the interview. All the participating parents each received a copy of the signed consent form, which contained the consent information. For all parents, consent was obtained in English.

A semi-structured interview guide (Appendix 2) was developed in advance, which was approved by both the NNHRRB and Harvard IRB. The interview guide was designed to elicit perspectives from participating parents on their experience with food shopping and dietary habits before and during the FVRx Program. In addition, the interviews aimed to identify any behavior changes that they made while participating in the program, and any subsequent behavior changes that they had made and/or maintained since completing the program. We also explored the availability and accessibility of food in their local communities, and also whether the participating families experienced any difficulties with participating in the FVRx program. The duration of the interviews varied, but they ranged from approximately 40 minutes to 90 minutes. All the interviews were audio-recorded using a portable audio recorder with each parent’s permission. The participating parents were initially given an explanation for the purpose of the
recording, and were told they have the right to decline an audio-recording of their interview. All 14 parents agreed to have their interviews recorded. The recorded interviews were then manually transcribed in English by the interviewer. Each interview was saved as one individual Word document. At the time of transcriptions, pseudonyms were used to replace all names of those mentioned during the interviews, including patients, their family members, the providers, and the names of specific stores and restaurants.

4.4 Data analysis

This qualitative study utilized an inductive content analysis approach, which involved identifying emerging themes and common patterns, categorizing and organizing the contents of the interview texts. First, the PI carefully read the text of all the 14 transcribed interviews (the dataset) and searched for the parts that would illustrate the participants’ experience in the FVRx Program, behavior changes that they made while participating the program, and any subsequent behavior changes that they have made and/or maintained since completing the program. The data analysis also highlighted the barriers or challenges the participating families encountered in accessing healthful foods as well as in preparing nutritionally well-balanced meals for their children and family. The transcripts were then open-coded, and the relevant conversations were given specific code names. The code names were listed in a table to create a codebook later.

For each code name, a concise definition was given to clarify what the code name meant. Also, several illustrative quotes that were directly derived from the dataset were added to the codebook to support the idea of each code name. Each illustrative quote was cited with the interview number, page number, and the lines according to the separated individual data set to indicate where exactly it was extracted from. Secondly, the PI analyzed the reduced data on the codebook to develop level I categories. Finally, based on the level I categories the PI found any
common themes in these categories in order to develop level II categories, which implied broader themes and topics. These level II categories, in turn, were developed into elaborations of the ultimate concepts and a set of framing propositions that addressed and satisfied the research objectives.

4.5 Ethical consideration

The study was accepted and approved by the NNHRRB. The study was also approved by the IRB of the Harvard Faculty of Medicine. For the qualitative study, written consent was obtained from each of the participating parents before the qualitative interviews. The interview recruitment phone script, as well as the interview guide, were both approved in advance by the NNHRRB and Harvard IRB.

4.6 Qualitative results

The qualitative results are presented in three primary sections. The first section addresses barriers faced by the FVRx participating patients and their families, which may discourage or prevent them from establishing healthy dietary habits and lifestyle. These barriers often stem from historically-entrenched challenges that systemically affect physical, psychological, social, and economic facets of the participating families’ day-to-day life. The Level II categories in the first section were: 1) Financial barriers; 2) Availability and accessibility of food; 3) Challenges within the household; 4) Intergenerational social inequity, and 5) Long-distance travel for shopping.

The second section illustrates the benefits and values of the FVRx program delivered to the participating patients, families, and also some other community members, which helped to address the barriers and challenges presented in the first section. These values and benefits were
exemplified by the positive impacts the FVRx program had on the participating patients and their families. The Level II categories in the first section were: 1) FVRx vouchers as special currency; 2) Added dietary quality and balance; 3) Educational benefits of the FVRx program; 4) Impacts of the FVRx on the health of the children’s, families and the community members; and 5) Social cohesion.

The third and last section, then, elaborates on the meaningful and desirable changes the participating families made throughout the program participation and even beyond the completion of FVRx. The Level II categories in the last section included: 1) Adopted dietary changes the post-FVRx participation; 2) Changes in cooking and storage techniques the post-FVRx participation; and 3) Shopping for fresh produce after the FVRx program.

I. Structural barriers and challenges

1) Financial barriers

   i. Income to buy food

      Many FVRx participating families mentioned the financial barriers that prevent them from purchasing the foods for the entire family that are satisfactory both in terms of quantities and qualities. Some participating parents indicated that their family’s limited income hinders them from buying as much fresh fruits and vegetables as they wish.

      “And the vouchers were, we liked that too, because the income part of it for our family, we knew it would help a lot to buy more fresh food.” (Parent 6)

      “P: Well, no, it’s just like, income income-wise. Our income income-wise. You know, we, I make a list, and that’s what we go by. And I can’t really get, you know, this, this, this, this.” (Parent 19)
“P: Um, I think because of my limited income, it’s changed in a way dramatically, of course, I don’t do canned foods as much as I used to. Um, I think a lot of it is just the cost.
R: So, much less fruits and vegetables?
P: Yeah. Because of the cost. But I do find that I cook more beans.” (Parent 21)

2) Availability and accessibility of food
   i. Fast food restaurants

An overwhelming presence and invasion of fast-food restaurants have been normalized in the Northern Navajo community. Once they are normalized and assimilated into the community, they would predictably become part of the community’s daily life. Having multiple fast-food restaurants nearby both on and off the reservation makes it easy and convenient for the community members to access and consume fast-food regularly. The data suggested that “they are everywhere” and fast-food is one of the most easily accessible types of food in the local community.

“R: In Shiprock, okay. And what kind of food is really easy to access or purchase?
P: [Fast food franchise 1] (laughs)
R: [Fast food franchise 1]? Okay. Do you feel that people often use fast food restaurants?
P: Yeah.” (Parent 6)

“R: So, back when you lived in Shiprock, so in Shiprock, what would you say is most easily accessible food?
P: Fast food.
R: Fast food, okay. So, burgers, like [Fast food franchise 1], and things like that?
P: Mmhmm mmh. ” (Parent 11)

“P: I would say the most popular place in Cortez probably would have been [Fast food franchise 2], of course [Fast food franchise 1].
ii. Junk food

In addition to the fast-food restaurants, an incessant influx of junk food into the Navajo community alters the community members’ access to food. The dominant presence of junk food overshadows the accessibility of more nutritious, healthier food items in stores. Frequent consumptions of junk food among the participating patients and their families described later in the second section exemplify such structural barriers. The data repeatedly highlighted that these nutritionally inadequate food items—that are high in calories, sugar, fat, and sodium—are easily accessible and excessively available in the community. Moreover, small stores that sell mostly the nutritionally poor food items are sometimes the only option as a place for food purchasing for the participating families in their rural and remote communities.

“P: The things you see right away are the junk food. I don’t really go for the junk food; you have to kind of go way in the back to get to the dairy or to the fresh fruits and veggies.
R: Mmhm. What kind of junk food is most accessible here?
P: Oh, soda, chips, candy... you see those everywhere. Every store you go to.”
(Parent 6)

“R: What kind of food is most readily available in your community? Like, food that is most accessible to people in your community.
P: Junk food. Like chips.
R: Junk food? Okay. At the stores?
P: If you walk into the store, the only thing you see is candy and chips. Because they are the first things, you see when you walk into the store.
R: So, isles of candies and chips...
P: So that’s the store in [town] R, and that’s the first thing we see. Just chips and candies, oh my gosh.... all the groceries, they are just so small in the
corner, and three isles of candies and chips...

R: Is that a [big-box store 1]?
P: No, it’s just a store in [town] R. So that’s just right there.
R: Mnhm.
P: That’s the only store that’s close.” (Parent 14)

“P: Well, in [town] R, we just have a little store. It doesn’t have, like, much of
anything. If they do have fruits, they, it runs out quickly. If they get vegetables,
it runs out quickly.
R: Okay.
P: So, only the junk food is readily available.
R: Oh. When you say junk food, what kind...
P: Like potato chips, candy aisle, soda...
R: Okay. Do people buy junk foods?
P: Oh yeah. I just wish that they had more vegetables.” (Parent 19)

iii. Canned food

Frequent use of and reliance on canned food, such as canned vegetables and
meat products for daily meals, appeared to be also very common among the
participating families. Some participating parents described that they solely used canned
vegetables in their meal preparations before they enrolled in the FVRx program. The
canned goods have been one of the staple food items for many families in the Navajo
community for generations, and they are indicative of various historical and
socioeconomic challenges surrounding lives on and off the reservation. Stocking and
consuming canned food items daily also reflects the fact that many of the families have
to rely on very limited options of food items.

“P: And of course, at that time, when the program started, um, living situation
wasn’t all that great, so everything had to be canned, had to be really limited.
[...] Um, yeah, just like SPAM, corn beef, Vienna sausage, everything was
always canned. Canned meat that could be frozen and last for a while. Either
that or we would have to limit our groceries to two-hundred [dollars] every
week, and you know, of course, the SNAP benefits only give you so much, so…” (Parent 10)

“P: I cook more with fresh vegetables and fresh fruits, too.
R: Okay. So, does that mean less canned veggies?
P: Mmhm, yes. I would buy canned vegetables at [big-box store 2], that would last us maybe like two full weeks, but ever since we were introduced to fresh fruits and vegetables, I bought one case maybe two months ago, but we still have maybe like half. So I try to, I’ve been using more fresh vegetables and fruits.” (Parent 14)

“P: Um, cans. Because I use coupons, I couponed a lot, and there is not that much coupon for fresh fruits. So, I did a lot of canned food. But now we don’t really have many canned food in our pantry.
R: What kind of canned food? Canned veggies?
P: SPAM, just like what was on the...
R: On the ads?
P: Yeah. So usually like SPAM, beans, chili beans, some veggies, tamales, um, what else, cream of mushroom or chicken soup.” (Parent 21)

3) Challenges within the household

i. Discordant attitudes toward food and dietary habits

Family’s role in feeding young children is imperative to good nutrition and health, since children, particularly those who are too young to feed themselves yet, depend on adults to choose, prepare, and nourish them with what is available to them. The participating parents revealed their family dynamics in which different adult family members have different ways of feeding children. A parent may try to discourage their children from consuming unhealthy snacks or drinks. However, the other family members may encourage or invite such behavior, which creates discrepancies or contradictions in children’s eating habits. Discordant attitudes toward food and dietary
habits among caregivers and other household members (e.g., between father and mother, between parents and grandparents) also showed the nature of the relationships each household member has with one another. The conflicting values, ideas, and behaviors regarding food and diet, which result from a discordance, appeared to pose challenges within a family when it comes to enforcing healthy eating habits in children’s daily life.

“P: They cry, they get upset, and I’m always the bad guy. I’m the one that always says no, but they get over it, you know, after a while, they cry for a little bit, and they stop. I just tell them, ‘You can’t have any, you can’t have any candy this morning.’ I think that’s the biggest challenge, just, their grandparents give them, give them what they want, but with me, I don’t, so we are always fighting about it. But they are eating pretty balanced, you know, it’s not just totally snacks and junk food or not just totally, it’s kind of a mixture of both.” (Parent 6)

“P: I usually try to push water, push water every morning like, at least finish this, and you can have whatever. And then, Capri Sun or mix juice. But father-in-law buys soda, they are giving them soda, but I try to limit it to one if they are gonna have it, or not so late.” (Parent 8)

“P: I dilute it [a sugar-sweetened beverage] because it’s really sugary, I told him [the husband] that, and he’s all like, ‘I don’t taste anything,’ and I’m like, ‘It’s really really sugary.’
R: Oh, so how you taste it and how your husband taste it are different.
P: Mmhm. So for me, it’s really sugary, and when he [the child] wants something to drink, I dilute pretty much everything for him, half and half. You know, I do that for him. When he asks his dad when he wants something to drink, he doesn’t dilute. And I’m like, ‘Add water!’ but he’s kinda like.... I’m like, ‘That’s a lot of sugar,’ you know? I’m like ‘Don’t give him any sugar, I said that sugar really gets him hyper tone.’ And I said, ‘I’m the one that has to stay with him, I know you have to work,’ I said, but I’m the one that has to stay with him at home. So, when he [the husband] has a soda, and he’ll come in, I say, ‘Don’t show it to him.’ He’ll even just offer it to him, I go ‘Don’t, don’t give him any soda, babe,’ you know. I give a damn; he is my son.
R: But he doesn’t really listen to you?
P: He doesn’t listen to me when it comes to sugar. I mean, health-wise, you know, it’s just, he’s stubborn. So that’s kind of hard, but I’m trying to when I can have one way, but he has his own. It’s like he has a wall that he puts up, ‘It’s gonna be my way, no one can change that for me.’ So, when he’s away out of town, and I’m okay with how I’m parenting, you know. So, when he’s not home, we don’t have soda. When it’s just us, we have water. I don’t buy the Orange Punch or citrus punch he likes.” (Parent 14)

ii. Time constraints

Some participating parents were stay-at-home mothers. However, most of them worked either part-time or full-time. Because their time at home and with their children are limited and they often have multiple household responsibilities and other obligations, many parents said that they spent minimal time and energy preparing meals at home. Others were simply busy and wanted to hurry when it comes to preparing and eating meals. The data also revealed that many families would go to fast-food restaurants to have take-out menus or eat out. When the parents are away from home for work, other family members or a baby sitter would be in charge of feeding their children, but not being able to have control over the children’s meals and snacks posed significant challenges for many parents.

"P: Yeah. We didn’t really care for like...well, I shouldn’t say that. I never went out and bought to make sure we had vegetables on our plate. I just did the fast, fast stuff, you know. Whatever, fast food, or we go out and eat at a restaurant. Or, when I prepare something it had to be something very quick. Like, something I can just make right away. That’s what it was like before, trying to hurry. But now, it’s different.” (Parent 5)

“But with my little one, I mean, even though working eight hours a day, well, you are gone, what, like nine hours because you have to travel there and back. So, it still feels like not enough time being with him, and trying to...it’s hard to
give him what you want, because I’m not there. And it’s just like his sister wants to see him along his dad, so it’s kind of hard to tell them to give, ‘This is what I want’, and they are just like, ‘Ehhh,’ and I’m just like, ‘Okay.’ So, for me, I try to give him, I’m trying to set the path so he can be healthier, that way I know. Yeah, like for sure, like every night I’m there, because with my two older ones I was working during the day and at night, I had two jobs. So, for sure, I’m always there to brush his teeth, and what not. So that way I know that’s being done. And then, in the evening, just trying to encourage him to eat more healthier, trying to give him the right food because I don’t know what they are giving him during the day. (laughs)” (Parent 7)

“P: I would say take-out. Yeah, I mean if just more time-consuming, I would say take-out. Yeah. Just because I don’t get off work until five or five thirty and then pick up the kids from after-school program, and then we get home about six-thirty, seven o’clock. If they haven’t finished their homework, finish that. And they are hungry, so…and then I gotta get them in bed by eight or nine o’clock at the latest. So it’s very time-consuming […] Sometimes we’ll call for pizza, [Fast food franchise 1].” (Parent 8)

“P: I changed her babysitter, so hopefully that works a little bit better.
R: How does having a babysitter affect the way you raise your children?
P: Because of what they [the children] tell me what they are given.
R: Oh, the baby sitter feeds them during the day.
P: Yeah.
R: Do you know what the baby sitter feeds them?
P: They get like junk food, and I told her not to, but he [the child] tells me everything.” (laughs) (Parent 16)

4) Intergenerational social inequity

i. Disparities in notions of “healthy eating”

Some participating parents suggested that the families enrolled in the FVRx program have different social and family backgrounds, thus have different understandings and experiences of “healthy eating” and a healthy lifestyle. This includes parental feeding knowledge and skills that play important roles in the development of
children’s eating habits and patterns, and consequently, their overall health. The data illustrated the importance of having knowledge and skills for healthy feedings such as nutrition facts, age-appropriate portion sizes, and the ways to prevent overeating.

“P: I think one thing that would be good is just kind of get the understanding of what kind of homes they are coming from? You know, like, the parents, the caretakers, what kind of diet and living they had growing up, like what were they taught. Maybe, just kind of understand and know what types of families you have in your session. Like you know, some families, they were probably raised around healthy eating, and then some that were not. So, and then, that way, you kind of know how to start your program, because some people might not know the healthy eating portion of it. I kind of got that feeling when I was in the sessions, you could tell some of them were very quiet, and they just kind of looked lost and then some of them were really talking, so... You know, I didn’t know, I don’t know if they knew what all the healthy eating was, or if they didn’t.” (Parent 6)

“I was so unprepared. I didn’t know, you know, and when they came to that age to where they were eating, I’ll be honest, I started out where I didn’t know what healthy cooking was, until this program has started.” (Parent 10)

“P: Like I was like, like the sleeping. There was a sleeping class, having too much TV...I don’t have a TV at home, but I just thought it meant TV but when I did the class, it meant actually like, Screen time?
P: Yeah. So I was like, ‘Ohhh, well, I kind of let my kids go over that.’ And then, a lot of them was, like having gone to fast food because it was simple and a lot easier, but when I’m finding it out, it wasn’t, it was more adversarial to their health. Not really understanding a lot of the things, um...Just admitting that some of my parenting skills weren’t what, not what they said it should be, but what I was doing wrong in a sense that because I was doing it all this time I just thought it was right, and then knowing that it was like certain things, the screen time, brushing your teeth, they could just skip here and there. And not knowing that, I just thought when they eat fruits, they don’t have to brush their teeth, but they have to, and you know, just things like that.” (Parent 21)
“P: Yeah, overeating and...
R: Could you elaborate?
P: Like, you know like I said, with him, you know, learning to have the kids stop. Stop when they are done eating, and don’t push that. Because like I said I didn’t do that with my first two kids.
R: I see.
P: Yeah. Yeah, like if they say they’re done, they’re done. And don’t push.”
(Parent 19)

ii. Generational inaccessibility and disinvestment in health resources

A number of participating parents shared their personal experiences of not having opportunities to learn about healthy eating and other healthy lifestyles while they were growing up. The way the parents prepare meals and feed children is fundamentally influenced by how they were raised and fed by their parents or caregivers of previous generations. The data demonstrated that the information the FVRx program offered to the participating parents was considerably meaningful and substantive to them.

“And like for me, when I was growing up, my dad would just tell us, ‘Go get the groceries,’ you know, and we get the groceries, but he wasn’t really there as a parent to say, ‘Oh that’s not healthy, you should get that,’ because he wasn’t raised like that, so he didn’t know. So, it kind of just continued.” (Parent 6)

“Living on the reservation, you know, there is a lot of things that are not taught. There is a lot of things that you are not told. I feel like, we, being the Native Americans stuck on the reservation, you are forgotten. People forget about who you are; people forget to teach. To teach, you know, nutritional facts like these, and they talk about food chain. You know, I feel like we are way on the low level of it like where nobody cares to even teach, to teach us anything of it. Or, either that, or we are just too stubborn to acknowledge the facts of the healthiness, you know. I just felt that way. So when it came to me when I had my kids, I was like, ‘Okay..., nobody taught me.’ Nobody said, ‘This is how you are supposed to eat, or this is what’s in this, and this is how much you are supposed to eat.’” (Parent 10)
Throughout the data, it became apparent that many participating parents in the FVRx program were aware of the certain diet-related chronic diseases because they either have someone in their families who are suffering from the diseases, or they have been affected by the diseases themselves such as diabetes mellitus and its complications. Because the diet-related chronic diseases are so prevalent in the community, the participants acknowledged and understood how debilitating and life-threatening some of the conditions may be. The participating parents’ health literacy was already high prior to enrolling in the FVRx program, and most of them understood that nutrition and balanced-diet are some of the essential components of one’s health, the parents want their children to eat well and healthfully. After all, no parent would want their children to be unhealthy, especially when they know what consequential loss and suffering might look like when the chronic diseases devastate their well-being. Some of the participating parents expressed their will and determination to raise their children better and healthier through their actions. Many of them reflected on their own upbringings and their experience of raising their older children in the past. Regardless of the personal circumstances in the past, they have learned the lessons and are actively making efforts to raise their young children healthier and better than they did in the past.

“Because for myself, for my personal upbringing, when I was growing up, we didn’t have all the healthy eating, we didn’t have the fresh veggies. My dad raised us, and we kind of just, um, went to the grocery store and picked whatever we wanted to eat. And a lot of the times, I wasn’t raised to eat healthy or exercise. And I didn’t learn any of that until I was a freshman in high school when I went to a health ed, I started learning the difference between the carbs and protein and all that, because I was never raised around that. But for me as a parent, I knew that I was gonna raise my kids better, you know, I didn’t want them to grow up like I did, so that’s why I kind of started learning more for them and then also for myself to try to improve my eating, too.” (Parent 6)
“P: Um, they used to. Yeah, they used to get chips and stuff like that. They used to ask for that and then, I would be like, ‘Yeah, we’ll have one’, you know... But then ever since we started learning all the stuff, we did a real big change. Like they’d ask for chips, but then after that I’d be like, ‘Nope’ and then they’d be like, ‘Okay, then,’ you know. And then, before it was kind of hard because they would just keep asking, keep asking, but now it’s like they’ll ask once and if I say ‘No,’ it’s just like, ‘Okay, then.’ (laughs)

R: So, do you think they understand why you’d say ‘No’ to them?

P: I try to explain to them, yeah. Because they, um, I have diabetes, I was diagnosed with diabetes when I was like twelve? And, um..you know, I know how they feel because I wanted those foods, too (laughs). Yeah, and then you know, my grandma or my mom would just give in, and stuff like that. And, I, developed, um, renal, kidney failure five years ago. Yeah, so, I explain to them, you know, ‘You guys need to eat these kinds of food because you guys don’t wanna end up like me.’ (laughs) Because you know, I’m blind in this side, in the right eye, and then this side is barely like, I can barely see and stuff like that...And you know, I have to go to dialysis clinic, and then I keep on reminding them, you know, ‘You guys don’t wanna be there. It’s not fun. You guys don’t like getting shots, like flu shots and stuff like that, you are not gonna like it when the needle goes in.’ (laughs) Yeah. I say that to them a lot. And until now, I think that’s the reason, like I said they really changed their eating habits, so it’s pretty good.” (Parent 23)

5) Long-distance travel for shopping

Most participating parents, especially those who live on the reservation, explained that they have to travel a significant distance to get to the grocery stores. They normally did regular shopping mostly outside of the reservation. There is a grocery store in Shiprock. However, even those who live in Shiprock or nearby neighborhoods told that they prefer shopping off the reservation to go to large nation-wide retail and grocery stores (“big-box stores”). They would normally have to drive forty to forty-five minutes on average, one way, to go shopping in the larger cities outside the reservation. The primary reasons were to save the cost of food since these large stores sell food for a lower price, in bulk sizes, and they generally have more options for food, other personal
and household items than the smaller stores on the reservation. Another reason was that the stores off the reservation do not charge tax on food, which helps keep down their expenses as much as possible.

i. Cost of food

The data elucidated that cost of food is the most significant factor that played a role in the participating families’ decisions to choose which stores to go to and what items to purchase. Their account reflected that the cost of food is inarguably the one single determinant that affects the accessibility of food they wish to purchase. In general, it was more economical to buy food items at the larger stores in the neighboring towns outside the reservation than the local smaller stores within their rural communities. Taking advantage of sales and discount items was also one of the shopping strategies that many participating parents used to save money. They explained that because they are on a tight budget, they pay attention to discount items and purchase foods that are on sale when they go to grocery shopping.

"P: We usually go to [grocery store].
R: [grocery store], okay. And may I ask the reason why you shop in Farmington?
P: Oh, it's a lot cheaper.
R: Cheaper, okay.
P: Yeah. It's not as much as [a grocery store in Shiprock] is expensive, and in Farmington, it's a little bit less.
R: Uh-huh. [The grocery store in Shiprock] is expensive, you say. Is everything at [the grocery store in Shiprock] expensive, or certain food items that are expensive?
P: Certain food items.
R: Such as?
P: Like the fruits. They, all of them are more expensive than they are in Farmington.
R: Okay. So, the cost is one thing that the reason that you go to Farmington. Okay.
P: Yeah. When you work on a budget...(laughs)” (Parent 3)

“R: And you mentioned about no tax on groceries in Farmington. How does that affect the way you shop?
P: Well, if I’m trying to stay in the budget and if I know I can get it, I know maybe just like a few cents, but it’s still a few cents that adds up. So I just mainly get what I need, like, yeah, what I need right now from here, and then later on in the week whenever I do go to Farmington, then that’s when I would get the rest.
R: Oh, I see. So, before you go to the stores, do you check like the ads?
P: Yeah.” (Parent 7)

“P: Well, in Cortez, there is like, maybe two dollars, anywhere from a dollar to two, three dollars price difference. So really a can of SPAM here or Farmington, I could get a can of SPAM for like, 2.28, or 2.38. If I were to get a can of SPAM in at [big-box store 1] in Cortez, I’d be spending like 2.78, 2.89, just for a can of SPAM.
R: I see. So, there is a 40 to 50 cents difference. Okay.
P: Yes. And then, for instance, if I was to go to [grocery store] in Cortez, and I would go for a family pack of, um, top sirloin steak, in Cortez, it would be like 32, 35 dollars for maybe a pound of, what, six pounds. And I could come here either in Shiprock [grocery store] and get the same pound, but I could get it here for only like, at a sale, only like 16, 17 dollars.
R: Really.
P: Or, I could go to Aztec, to go to their grocery store and I could get it maybe anywhere from, the same top sirloin, the same beef, everything, I could either go to Aztec grocery store and get it maybe a couple dollars less than in Shiprock. So there is a major, MAJOR price difference in Cortez, Shiprock, and Farmington.
R: I see. So even the same [the grocery store chain in Shiprock], the store is the same, but in Cortez, the price is almost twice?
P: Right, right.” (Parent 10)

“P: At [big-box store 1], sausages are cheaper than [grocery store in Shiprock]. And sugar-free drinks, they have more variety over there. They have like um, seven-size packages of mixed varieties. They usually have more options.
R: Oh, I see. More options. And what are the other stores you stop by in Farmington?
P: [grocery store]. Their meat is just much cheaper. So their chicken is cheaper, the steak is cheaper.” (Parent 16)

“P: Yeah, sometimes I come to Shiprock and get my produce, and then, I go to [big-box store 1] or [big-box store 2] to get my meat. Or [grocery store].
R: Okay, so for meat, you go to [big-box store 2], or [big-box store 1].
P: Or [grocery store].
R: Okay. What is the difference between the meat sold at [grocery store in Shiprock] and other places you just mentioned?
P: They are cheaper. I mean, they have more meat in there, for kind of less cost.
R: Okay, I see. So, the bigger package and cost less.
P: There’s a lot of us, so I try to get a big pack.” (Parent 17)

“R: And, how do you feel about, you mentioned a little bit about your community, [town] R. How do you feel about shopping locally? In other words, shopping for food at a local small store in [town] R?
P: It costs more. You end up paying more in a small form. So if you pick this, and pick that, it’s more.
R: So, it costs more at the local store in your community.
P: Yes, yes. Because I think they are adding junk food tax to everything.
R: Oh, I see.
P: Yes, that’s what they are doing, mmhm.
R: So, per item costs more as well?
P: Yeah, maybe like, you know, maybe fifty cents more. Or forty cents more. Like for a banana, you know, which says probably like a dollar, you pay like one fifty for it. Whereas you could get a bunch for one fifty at [grocery store in Shiprock].” (Parent 19)

“P: Mmhm. I get a lot of my food in Farmington now, only because I used to really like shopping at [grocery store in Shiprock], but they still charge the food tax. But in Farmington, they don’t charge that even though, you know, people say, well, ‘I would make the argument that you still got to take the fuel up there,’ you know, all that stuff. I would argue that too, but it seems like there is more of a variety too, out there. And more stores and more discounts without
The data also illustrated that many families opt for bulk shopping in the nearby city off the reservation, which allows them to purchase more food for less money. Food that can be frozen and stored and non-perishable items are often purchased in bulk, which can save money as well as trips to the stores for a period of time.

“R: Okay. Besides the cost, the cheaper prices in Farmington, are there any other factors that shape your choices in your shopping for food? [...] What factors do you consider?
P: I guess how much they have. Because I usually buy in bulk, we only shop once a month. So, we buy everything at once.” (Parent 3)

“P: Mmm, let’s see…I think that it’s available, but the prices are a little bit high. And the amount, because we have, you know, six people, so we kind of have to buy in a bigger bulk, so it’s not really what food is available, it’s just the cost and amount of it. That’s a little different because we would have to go to Farmington, like [big-box store 2] to get the bigger stuff. The less costly stuff.” (Parent 6)

II. Values and benefits of FVRx Program

The second section describes the specific values and benefits the FVRx program offered and delivered to the participating patients, their families, and other community members. It then elaborates on the mechanisms by which these benefits encouraged and supported the children and their families in order to make healthy changes in their diet and lifestyles. These values and benefits can be described as facilitators of desirable dietary and health behaviors among the program participants.

1) FVRx vouchers as special currency

Although the FVRx vouchers are prescribed specifically to purchase only fruits,
vegetables, and some traditional food items, they function just like money. Having the additional health-promoting “currency” on a monthly basis meant more freedom and greater purchasing power for the participating family to bring fresh fruits and vegetables to the family. The vouchers were powerful and appealing incentives for the families because they could get “free” fruits and vegetables of their choice. They enhanced the families’ monthly budget, which frequently was, according to some of the participating parents, very limited. The special currency also simply meant more good food on the family table, which they would otherwise have to pay out of pocket. The participants were able to save their money on food by using the vouchers as well. The data highlighted that the vouchers significantly aided the program participants financially.

“P: I thought it was really nice and...yeah, it was really fun and nice for the program to, you know, offer, I mean, practically free vegetables and fruits to us, so we are really grateful for that.” (Parent 9)

“P: And it was just a plus that we didn’t have to spend money on food, too, you know.” (Parent 14)

“P: Um, it just helped out financially. Especially for the fruits, because fruits are expensive. Some of the fresh vegetables, um, I’d say it helped out financially.” (Parent 8)

“P: I liked it. Because being, I don’t work. I stay home, and I take these guys [the two children] to school, and my husband works. So, we are REALLY limited to certain fruits and certain vegetables. So that kind of gave us like, um, you know, it opened our doors to, you know, buying stuff that we normally didn’t buy. So they really helped.” (Parent 19)
2) Added dietary quality and balance

i. Varieties and quantities of healthy food items

The FVRx vouchers helped improve participating families’ diet not only by increasing the amount of fruits and vegetables they consumed but also by adding varieties of healthy food items. Including different food items in their diet meant adding nutritional qualities to their diet, which is a greatly desirable benefit for the growing children as well as their families. The vouchers provided them with an opportunity to explore different kinds of fresh fruits and vegetables they had never tried before. For most participating families, the more varieties of fruits and vegetables in their diet, the better for their overall health. Many participating parents highlighted that the FVRx vouchers allowed their families to “eat better and healthier” by improving their nutrition and dietary balance.

“P: But I think we...before we weren’t so much getting the fruits and vegetables, because...I don’t know. But after we got the vouchers, you know, we always had fruits and veggies. And I think that’s where he opened up to different kinds of fruits because you know, we would just get a little bit of everything, and then tried to test and see what he likes. Yeah, so.... Now, you know he loves vegetables, I mean, more fruits. Vegetables are normally only certain kinds he would eat, but... You know, I think it was, yeah, I think before we focused mainly like on meat and perishables maybe, yeah. But you know, now, I think, we try to get more grains and more veggies. And then, we try to have more of that, and then, you know, just portion-size control are our stuff, you know.” (Parent 9)

“P: They [the vouchers] made me focus more on eating healthier vegetables and fruits. The freshness and to be able to get it in, to his [the child’s] eating habits.” (Parent 11)
ii. Complementary to SNAP and WIC

A total of 56.5% of the participating families responded that they have received in the past or were currently receiving either one of the Supplemental Nutrition Assistance Program (SNAP) or Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) benefits. Some of the participating parents described that having been enrolled in these federal nutrition programs in the past helped them navigate the FVRx participation smoothly because they were already familiar with the process of the voucher redemptions at the grocery store. While these families have continued or will continue to benefit from SNAP and/or WIC, they also mentioned several differences between the two federal programs and the FVRx program, which shed light on the strengths and benefits that are unique to FVRx. Because FVRx exclusively focuses on fruits and vegetables, it can complement SNAP and WIC since these federal programs mostly focus on other staple food items such as dairy products, meat, eggs, bread, and rice, which are not redeemable with the FVRx vouchers. Therefore, FVRx, SNAP, and WIC programs can further strengthen their unique benefits by complementing one another.

“P: It was hard because it was hard to purchase the veggies because we were only getting SNAP benefits. So you know, the majority of the SNAP benefits would go to like, to the meat, and to canned foods, and stuff like that. So before I started the program, it was all canned. Canned veggies, canned mix veggies, canned sweet corn, everything was canned. (Parent 10)

“P: [With WIC] Like you can buy cheese, you can buy milk, cereal, a lot of dairy products, and then the fruits [and vegetables] were only like eight bucks. Just eight bucks. And then you had, of course, peanut butter; you have juice. So mostly the dairy products, not so much emphasis on the fruits and veggies, yeah.” (Parent 21)"
3) Educational benefits of the FVRx program

i. Informative and applicable sessions

The participating parents reflected on their experience with the monthly FVRx sessions they attended with their children. Everyone who participated in the qualitative interviews claimed that they found the session topics interesting, informative, helpful for them to improve not only nutrition but the overall health of their children. These topics included but were not limited to, meal preparation strategies, snack recipes, sleep time, screen time, brushing teeth, and getting physical exercises. The data demonstrated how truly comprehensive and pragmatic the FVRx program was for the participating families.

P: “I think every session was pretty inspiring, you know, there was a lot of things, topics that we were educated on that we had no knowledge on. You know, so I can’t pick any one particular thing.” (Parent 14)

The data also illustrated that the participating parents learned the important roles sleep play in their children’s total well-being. For example, limiting screen time and sugar consumption are both closely related to getting quality and adequate sleep, which in turn has significant impacts on the children’s optimal growth and development, including their brain health. Although not directly related to nutritional health, the educational components of the FVRx program were helpful for the participating parents in developing skills and strategies to improve their children’s overall health.

“P: But then when we watched, you know, and learned about the brushing and stuff, and going to bed for twelve hours, thirteen hours for kids, I was like. ‘WHAT?!’ That sleeping deal. Okay so, yeah, makes you a better parent, because those are things that you didn’t know, nobody talks about that, and how they retain what they learned at school during the day and the brain needs the rest to remember what they learn! So, I’d say it makes you a better parent when you understand and know how your child’s body is developing.” (Parent 5)
“P: It was educational. You know, it was really crucial. They gave us a lecture on screen time. You know, how eating does reflect different, every day of our life. You do every day. You gotta eat right to get your good night sleep. So, like I was saying, not giving him sugar before he goes to bed in the night. Then it affects him, and it affects me because I had to try to stay awake with him. So, kind of throws my life out of balance. So that’s why I’m always like, ‘No, sugar, please!’ You know, not before he’s supposed to go to bed. So, it helped in so many ways. I think so. You gotta be healthy to live your life.” (Parent 14)

P: “Oh, one thing we really, we were getting her ready for starting school. And It helped to support us to tell her you need to go to bed on time. You need to get better rest. So, it kind of helped her understand that getting rest helps her grow, eating healthier helps her grow, to be strong. Because she always says, ‘I’m really fast, I got super speed, I’m really tall.’ So, she knows that is part of sleeping good and eating healthier. So, she liked that part, you know, she was doing the activities, you know, they were playing in the gym, they play with balls and run around and stuff, and she liked that part.” (Parent 6)

Oral health is an integral part of our well-being; thus, it was a very relevant health topic for the participating families with young children. Maintaining healthy teeth and oral hygiene is essential for the children’s ability to eat well and grow healthily. It was no surprise that many parents discussed how the oral health session was very informative and useful for them.

“P: I think how they demonstrated and what they showed, I think that played a pretty big part. Especially like how the sugar can eat your teeth. So, I was like, ‘You don’t wanna lose your adult teeth.’” (Parent 3)

“P: It was okay that group interaction was better, yeah, because like I said, it was like a whole different kind of families, and they all went through and gotta talk about some ideas. Because [we] talked about teeth, brushing teeth because he was still in the process of learning how to do it. So trying to get him into comfortably do it himself, or getting him just wiping his teeth. Yeah.” (Parent 11)
ii. **Hands-on experience**

While the parents and adults enjoyed learning during the sessions, they described that their children also enjoyed various hands-on activities that helped nurture their sense of what healthy lifestyles may involve. These hands-on activities included cooking demonstrations, healthy and easy snack preparations, gardening, and nutrition-related games. These interactive activities were all highly valuable, meaningful, and engaging for both the participating children, as well as their parents and family.

“P: Um, I thought that was good. It’s a good way to learn. I learned a lot of snack-making ideas from them. So, I took them home, and kids and I tried them. They loved it.” (Parent 3)

“P: Oh, yeah, we had lessons, and we did have games. I liked one of my favorite ones was when we were outside, and we did exercise. That was fun. And we made something outside, too. I think one of her favorite sandwiches is the peanut butter and apple slices. That’s what she takes for her lunch sometimes, for school lunch. Um, learning how to do things, and they show you right there, you know, and you get to taste it, that helps, too…it was fun.” (Parent 5)

“P: Yeah. They [the children] were excited about the tomato plant, and then the toothbrushes, the toothbrush session, um, a lot of the hands-on, they just had fun because of the playground, the playground was open at the time, so the adults were watching their kids, so they loved that.” (Parent 21)

“P: It was nice. Um, we had fun attending their classes, and it was pretty interesting (laughs), yeah, to learn about, like, how things are grown. I think that was her main one because they gave us like. I think they gave us a plant or something?  
R: Mmhm. The gardening session?  
P: Yes. That was pretty neat.” (Parent 23)
iii. Learning as a family

The participating parents described that enrolling in the FVRx program and attending the sessions as a family was a collective learning experience. The FVRx sessions, for many, were opportunities to discover and learn together new ideas and skills the families could immediately bring back home and implement in their day-to-day life.

“P: Um, they [husband and other son] liked it, they were interested, I think it kind of motivated my husband to eat a little bit more, because he’s not really big on veggies, but when we were doing it as a family, learning as a family, he eats a little bit more than before with the veggies.” (Parent 6)

“P: They [the family members] were like, ‘That’s neat.’ Well, like mom, like I said, my mom showed up one session for me. And I missed out one session, but it was on soda. Sugar, how much sugar content...So I asked her what it was about, and she gave the paperwork, and she just told me, ‘This is what we did, and this is what we talked about.’ Like that, yes, I did share my information and what I learned with my family members. How to make different stuff with fresh fruits or vegetables, just all those things, I did share with them. Because they were like, ‘What did you guys do, what did you guys do down there?’” (Parent 5)

‘R: Have you ever shared your experience with your family members or friends or relatives?
P: Yeah, my mother, and daughters-in-law.
R: Okay. What did you share, and how did they react?
P: Um, they liked it. You know, they were like, ‘How do you get on the program?’ Everyone wanted to get on the program, so, I said to my mom, ‘Mom, you have to have kids under five, I’m sorry.’ (laughs) And I introduced some of the recipes that I had, and the fresh vegetables I introduce that to them, too. They liked it. Fresh green beans, they hardly ever had fresh green beans, so, now she makes fresh green beans for my dad.” (Parent 14)

In addition to their child who was enrolled in the pediatric FVRx program, the participating parents brought additional family members such as their other children,
spouse, partner, or their own parents or siblings to the sessions to participate. Lesson materials and activities were useful and enjoyable for the family members as well. In many cases, the sessions, directly and indirectly, benefited these additional family members who accompanied the enrolled parent-child pair.

“R: What did they [the siblings] think about the program or the session they attended?

P: They liked it. Yeah, especially when they were doing the demonstrations.

R: Like the cooking demo?

P: I think my son had a really big impact on the flavoring your water. So, he does that.

R: Oh, like putting different fruits in the water?

P: Yeah. So, he does that, he still does that.

R: What does he like to put in the water?

P: He puts anything in there, like, watermelon, lemon, I think he is really fond of lemons. He is always putting lemons.” (Parent 3)

“P: I thought that was awesome. I enjoyed it, well actually, we both enjoyed it. And, at the time when the program had started, um, I was the guardian of a nine-year-old, obese niece. She was overweight, heavily overweight. And when the program was, when we did the sessions, we brought her with us. And it was really a lot of help, it helped E [the child] and also helped my niece. So yeah, it was really a lot of help and a lot of learning experiences that we did. So that was awesome.” (Parent 10)

iv. The role of the FVRx Program providers

Champion providers are a fundamental and vital part of any effective health programs. They ensure that the program is well-designed, managed, delivered, and monitored. First and foremost, however, the FVRx Program providers were the key players in bringing the effective educational benefits to the participating families. They created a safe, welcoming, and friendly space for the program participants, and supported them to make the most out of FVRx. Although not all families who enrolled in FVRx completed the program, many of
them did complete and were able to gain extremely positive experiences. The role the FVRx Program providers played was particularly important in encouraging the families to continue attending and stay engaged in the program throughout the period of six months. Their effort, compassion, and success were exemplified by the positive feedback from many participating parents who commended the program providers.

“P: I just think everything went smoothly. I just liked how they ran the program. The providers, I liked how prepared they were, the providers, you know, they are not just about themselves. They are not just about the program. They don’t make the sessions just about them and on them. You know, it’s an open floor. They make sure the participants are involved. They are not just right there over there in the background, or left alone or just hiding back there, you know. They get them involved. They get everybody involved, which I really liked that. I really enjoyed that. Nobody was left out, so I don’t know, I would tell the providers keep rocking what they are doing.” (laughs) (Parent 10)

“P: Well, the group did a good job. We’ve We have seen this one lady often. She was really nice. She was really good. They were great with the kids. And that’s what I was really happy with because if somebody takes interest in your child, you know, you bring them back.” (Parent 19)

“P: I was back in school, and so the staff was very, um,...how would you say it....they were very understanding, and they worked with me. So even though I missed the first two classes, I still made it up with the doctor, and so she gave me a short class, like fifteen-minute, thirty-minute, and they gave me the handout, with the book. So that was something I really liked, and I started going and tried to make it. As long as I kept in contact with them and let them know I could make it at certain times, so...” (Parent 21)

4) Impacts of FVRx on the health of the children’s, families and community members

Having completed the FVRx program, the parents reflected on and revealed the
significant clinical, nutritional, and social impacts the FVRx program had on their children and families. Furthermore, it became apparent that the program was also beneficial for some of the participating parents who also worked as community healthcare providers caring for patients who have diet-related health conditions. This was indicative of how the FVRx program may be beneficial specifically for some at-risk community members beyond the circle of the program participants.

i. **Children’s body weight and health**

When asked about their children’s health since they took part in the program, many participating parents described the changes in their children’s body weight over the course of their FVRx program enrollment. The data indicated that many previously overweight children had visibly lost their weight primarily due to the changes in their dietary habits and physical activities.

“P: Okay, before we started the program, the kids were a little bit chunkier, I think it was because they were eating a lot more sugar, drinking a lot of that juice, so once we cut back on the sugar part of it, their weight has gotten better. They had a growth spurt, too, so they are kind of even now. And, they always have been pretty healthy, you know, they are pretty healthy kids. We didn’t have any problems with them cavities or anything like that. Their teeth are pretty healthy. It’s always been that way. Yeah, I think that was the main thing. Their sugar and their weight went down a little bit.” (Parent 6)

“P: She [the niece] started to eat a lot more healthier. She lost a lot of weight. She started exercising, her skin tone had started to change. Before I became the guardian of her and her siblings, their diet consisted nothing but of sugar.” (Parent 10)

“P: Um, her health is, I guess, it’s pretty good. She likes to exercise more, and,
or run around and do stuff like that. Before, you know, we just pretty much stayed at home. [...] But now she’s more active and she likes to go to swimming. And her eating habits, like I said, they changed a lot. Um, she used to eat a lot more junk food, but now, it’s really been cut down. And like I mentioned she was getting weighed, she actually lost four pounds.

R: Oh, since when? Last time you were here?
P: Um, I think it’s like a month now. Month or maybe less.”

(Parent 23)

ii. Children’s taste in food

Nearly all participating parents discussed an increase in the families’ fruits and vegetable consumptions after they enrolled and participated in the FVRx Program. Because the vouchers gave them an opportunity to taste and explore various fruits and vegetables, the parents explained that their children were able to discover their new preference and joy in eating various fruits and vegetables, which the parents themselves were never aware of or anticipated. The data also elucidated that nutrition information delivered during the FVRx sessions also helped children understand what are “healthy” options for them.

“P: Well, before, we used to always use those canned vegetables, and now my children have fallen in love with frozen vegetables. So, they are like, ‘Oh my god, this taste so good!’ (laughs) I’m shocked, you know, some kids, they don’t like vegetables. And C [the child], she is the one that shocks us the most. Because you know how children, they want candy. They want chips, they want juice. She chooses apples, oranges, bananas, and milk.

R: Okay. So rather than going for candies and junk food, she goes for fresh fruits and milk.
P: Yeah. And she asks for them all the time.” (laughs) (Parent 3)

“P: She’s more willing to try out different foods now. She is not as closed as before. She talks about like, what is healthier, so she is more conscious about what’s healthy and what’s not healthy. And I’d say she is healthier, she is still chubby, but (laughs) I don’t know...she likes to go swimming and we always go camping, we do things. I mean we are active, of course, we’ve always been that
way. It’s just that, she’s still chunky. (laughs) But she realizes, you know, like her weight, and I think she understands making choices, as far as fast food or cook at home. You know, like that, she understands that.” (Parent 5)

“P: They began to eat more fruits. And, they eat vegetables that they would not before.
R: Can you give me some examples? Like what kind of vegetables?
P: With her [the younger child], I’m surprised that when I make salad, sometimes I just make it with cucumbers and tomatoes. And she ate that, and I was like, ‘Wow.’ And then, like spinach sometimes I use fresh spinach for salad. Sometimes it’ll be just fresh spring mix with tomatoes and cucumbers. And he [the older child] ’ll eat it. I was like, ‘Did you know that’s spinach?’ And he’s like, ‘What?!’
R: Oh, so they didn’t know what they were eating?
P: No. They don’t eat spinach, even from the can. Even my husband doesn’t eat spinach. But, in my salad, we make it spinach and he’ll eat it. I was like, ‘You are eating spinach, you know that, right?’ And he’s like, ‘It’s good.’ I said, ‘It is good. Even good with your cold cuts, too.’ I told him.
R: Okay. So, being exposed to new things?
P: Things that I thought they wouldn’t try. She likes broccoli, too. I’m surprised he ate pears. I never introduced that to him so I was surprised.” (Parent 14)

“P: He started eating broccoli and, which was, we were like, ‘Oh, okay he likes that,’ and I never bought that before. […] Yeah, so now when we go eat out, he’ll ask for broccoli if it’s available.” (Parent 19)

iii. Benefits via Community Healthcare Providers

The data illustrated that most participating parents believed the FVRx program would be beneficial for many of the community members in the Northern Navajo Nation. All participating parents indicated that they would recommend the FVRx Program to other families and community members because they believed it offers a wide range of benefits and opportunities for everyone. Furthermore, the data also exhibited how some of the participating parents shared their experience with the FVRx
program and disseminated the nutritional information as well as what they had learned from the FVRx sessions with their clients who live with challenges associated with food and diet-related chronic health conditions. These indirect impacts through the past program participants are certainly positive influences for the other community members who are not enrolled in the FVRx program.

“Oh, and in the community, because I’m a care coordinator and do home visits, so sometimes I’d be in visits with families with small children. And if they mention, you know, something like they don’t have enough food or I kind of notice their kids are eating a lot of junk food, I’ll just kind of bring my own experience, and I will tell them, ‘Check it out, go to the pediatric clinic and ask about it. And then see if you can get into the program.’” (Parent 6)

“P: Anybody, just anybody. Actually, I’m a CNA [certified nurse assistant] for Colorado. I’m a home caregiver right now. I care for an eighty-two-year-old male, he is diabetic, his A1c level was really really high, and I told him about this program, and I told him that I learned a lot. And he’s really stubborn, and he doesn’t wanna listen to me, he doesn’t really...he’s had a rough time with caregivers, and I have to prep food for him. So sometimes he doesn’t wanna eat, but what I learned through the [the FVRx] program and what was taught, how I have to cook for my kids, you know, I do that for him. And he’s slowly coming around, so all this has really come part of my career also. You know, I’m using it with my job. So, it’s really taught me a lot, in a lot of ways, not only in my life styles with my kids, but also in my job. So, teaching not only myself, but I’m also teaching my client that he needs to eat healthy and that his diet is really important, especially at his age right now and stuff like that. So yeah, I’m really thankful and grateful that I, and we were participants of this program because it really did a lot for me and my family.” (Parent 10)

5) Social cohesion

i. Parents meeting new people and networking

The data repeatedly demonstrated that the FVRx session was an integral part of the FVRx program, which provided the participating families with not only educational
experiences, but also created a unique socializing force for both adults and children. Many participating parents revealed that meeting new people from the community, networking, making friends, sharing practical information and tips related to healthy lifestyles were all very positive and transformative experiences for them. Many of them looked forward to the monthly session, and they cultivated a sense of community. The group session was a place where all the participants gathered for one common goal: to promote and achieve holistic well-being of their children and families.

“P: It was everybody, everyone was involved, I think that’s better because you know, other people have different ideas and they are on the Internet more than you are. Some people look up things on the Internet a lot more than some other people. So then, they are like, ‘If you look this up or look that up,’ like, you are brushing your teeth, I didn’t know there were apps for brushing your teeth. So, we did one session on how to brush teeth, and after that, I downloaded the app on how to brush your teeth.” (Parent 5)

“P: It was nice. We got to know some people, some families at the sessions. And there were some ladies, we ended up sharing recipes. Yeah, so we ended up doing that. And how we talked to each other before the session started like, ‘Oh you know, this is what I made,’ ‘I know, this dish is good with this type of vegetables,’ you know, it was really neat. And they were really educational sessions also. So, we learned a lot. My kids were there throughout all the sessions.” (Parent 14)

“P: And not only that, during the sessions, it was all different age groups, I mean, there were older families, older ladies with five, six-year-old kids. And then there were younger ones, you know, teenagers that were barely coming new moms and stuff like that, so yeah, it was just different age groups and which was really awesome. And I got to learn a lot from the older ones, and the new moms that were coming in and you know, I was there at one time. (laughs) So yeah, it was really awesome, I got to, you know just all the way around, even from the providers, there was stuff that the providers learned from the participants. So yeah, it was awesome.” (Parent 10)
“And another parent from Cove right here is Red Valley, it’s a little community, she came, too. So, and I got to know her more because I didn’t really know her then. But we all came to the class, and got to know her more.” (Parent 19)

ii. Socialization for the children

The participating parents explained that the sessions were a good opportunity for the children to interact with one another, learn, and play together. Their parents remembered that they were pleased to see how much the children enjoyed their time with their peers.

“P: Yeah, there were other children that came with their families, and so she [the child] would go and play with them, and they had some activities for them to do, like exercising, or games, I think they did jump roping and all kinds of different activities. And they involved us, too, at point, I was like, ‘Oh my gosh.’ But it was fun, though, because not everyone wants to participate because they are shy about it or whatever, but I don’t think I’m that shy. So yeah, it was fun to participate and to show her to help, show her it’s okay to do activities and stuff.” (Parent 5)

“P: We loved the sessions because he is the only child, so...it was nice for him to interact with other little kids. And then it was just me (laughs) so...I liked being amongst other adults. And learning,... not only that but learning, you know, healthier ways or other ways to feed your child.” (Parent 9)

“P: He thought that was fun, because they always did a little bit of exercises, so he did it, and there were other kids there, so he was excited.” (Parent 16)

III. Meaningful changes the post-FVRx participation

The third and last part of the qualitative results highlights some of the meaningful and desirable changes the participating families have made during and after the FVRx Program, which attributed to the improvements in the children and their family’s diet and health. These
changes were significant and substantial enough for the parents to be able to acknowledge the
differences in the health and daily lifestyle of their children and other family members from pre-
to post-FVRx program participation. The data also exhibits how the FVRx program contributes
to the overall well-being of participating children, families, and the larger Navajo community.

1) Adopted dietary changes the post-FVRx program participation

   i. Cutting back on sugar

   The data showed that after starting the FVRx Program, many parents made an
effort to reduce their children’s sugar intake by cutting back on soda, sugar-sweetened
beverages, or other snack and food items that are high in sugar.

   “P: They eat a balance of everything. You know, they still, it’s mainly their
grandparents that give them the sweets and chips and everything, so they still
eat those, but I limit it. I cut it down, and you know, I gotta say, ‘That’s enough,
you can’t eat the whole bag, you can’t have it anymore, you have to share.’ So,
it’s cut back, and we don’t let them drink as much juice. And they hardly ever
drink soda. I don’t let them drink soda. Ah, and we still give them the fresh
fruits and veggies. We still make sure they have that.” (Parent 6)

   “But now, we like, we are really, really trying to watch. Yeah. We try. But it’s a
challenge, but we slowly... We cut soda and all juices, so that was like a really
big thing for us before. So, we are really happy.” (Parent 9)

   “P: I stopped buying certain stuff, things I know are bad. Potato chips, I don’t
really give them candy. I think chips are the big one. Soda is the other one. And
I used to get ice cream. Now, I do like yogurt or just fruit.[...] Towards the
evenings, they used to always have like juice, something like sugar drinks, but
what I noticed since there is any changes, because I’ve seen water bottles on
top of their beds, so at night they have water. Before I used to have little juice
boxes, they’d have that there, but I noticed that we have water now. They have
to have water.” (Parent 16)
ii. More fresh vegetables

Due to the effective usage of the FVRx vouchers, most participating parents told how they were able to manage incorporating an increased amount of fresh produce into their diet, particularly vegetables even after the completion of the program. The parents also emphasized that they learned from the FVRx sessions the benefits of eating fresh (versus canned or processed) vegetables. By increasing the amount of fresh vegetables in their diet, the participating families were also able to reduce the amount of canned vegetables they had previously purchased and consumed regularly.

“P: I liked it [the FVRx program], it was interesting. And you do learn more, you know. I’m not like a kitchen person, so I don’t cook that much, but you learn how to cook with the recipes, they are good. And you get to take those recipes home with you. And eating fresh, like changing from, like, the canned vegetables or no vegetables at all (laughs). That changed whole a lot for us because we didn’t really eat bread or vegetables, but now we do some bread and more vegetables and fruits now than we used to.” (Parent 5)

“P: But honestly, I did continue to get the SNAP benefits, and I did learn how to shop and to get the fresh produce involved with all my other grocery shopping. So, you know, I’ve learned how to shop with getting fresh veggies and fresh fruits on my shopping list using my SNAP benefits.
R: Oh, okay, so even after the FVRx program ended, you continued to incorporate what you learned, with the SNAP benefits.
P: Mmhm, yeah. So, I took a lot more, I would buy eight to ten cans of canned vegies. So now, I’m down to four cans, I do four cans each corn, mixed, green beans, carrots, all that a can for each. Everything else is all fresh produce.
R: Oh okay. So, you are able to increase the amount of fresh produce now.
P: Mmhm. And then decrease the cans.” (Parent 10)

“P: It was neat, I thought so. I learned a lot. I didn’t know, you know, how important it was to eat fresh vegetables and fresh fruits. And there was a lot of things I did learn from the sessions, so it was really beneficial to our family,
“P: We try to be healthier, yeah. Like more vegetables and fruits, and less sugar. And I try to use fresh stuff, instead of cans.” (Parent 17)

iii. Frozen vegetables

Besides fresh fruits and vegetables, the FVRx vouchers allowed the participating families to purchase frozen vegetables and fruits that contained no additives. The data illustrated that some families discovered the palatableness and benefits of using frozen vegetables in their daily meals for the first time. This helped the families to continuously purchase and consume frozen vegetables, which also have the advantage of lasting longer than fresh vegetables and providing convenience in meal preparations.

“P: Well, you can only buy fruits and vegetables, so that’s a big change for us, you know? I mean, we did get fruits here and there, but we weren’t big fruit eaters or vegetable eaters. Um, so you get it, I mean that’s what you are there to get, and the thing is learning about fresh is probably the best, you know fresh produce, and then the next would be the frozen, with no added you know, something in there. Um, I think that’s when I started buying more frozen vegetables so it can last a little bit longer. You know what I mean? Like, we have it, and we always have it for dinner. For sure, we always have vegetables for dinner. (laughs) (Parent 5)

iv. Portion size control

Many participating families addressed the challenges of feeding children and explained that learning about age-appropriate serving size and portion size control was new, but very informative and effective. For the parents, it was important to catch the cue that their children have finished eating and to understand how much was enough. The families applied what they learned at the sessions and made an effort to reduce previously large meal portions or the amount of snack served at home.
“P: Well, I’m actually tryin’ um, you know how they have those like, thin pork chops [pointing a sliced meat food replica]? And like those really tiny servings? We cut...we switched all of our meat to those [small serving size]. So, before we would, you know we had the really huge chunk of meat or big steaks. But now it’s like...umm, and now we are trying to change like, to brown rice, and that...Yeah, we are just trying to change a little. And every now and then, you know, someone wants, you know, a big fatty meal, I make one, but it’s not like...not like every day we do it.” (Parent 9)

“P: Yeah. And just knowing how to do the portion sizes, too, because you guys gave out the little plates and stuff like that. So that helped a little, too, yeah.” (Parent 11)

“P: Oh, yes, yeah. Because my first one, we raised him kind of overweight. And this one [the second child] too, she is kind of, you know, like that, but she is aware of herself now. This one [the youngest child], we didn’t let him get too big. We didn’t let him, if he was done eating, he was done. Not like the other two were, I was like, ‘Eat it all! Eat it all! Finish it, finish your plate!’ And now, I’m like, you know, he is done, he is done. And he excuses himself. Before, I was pushing. And I realize, yes, I realize that was not a good thing. Yeah. So he’s not like the way his brother and sister were.” (Parent 19)

v. **Incorporating traditional food items in diet**

In addition to fresh fruits and vegetables, some families took the advantage of the opportunity to learn about some traditional Diné food items and include them in their menus at home.

“P: I was only looking for the vegetables like, I didn’t know we could get potatoes. And we could get like the blue mush, the corn,

R: Yes, traditional food items. Did you ever get traditional food items?

P: Yeah, yeah. My kids love blue mush. But I had to ask my mom how to make it. (laughs)

‘Mom, how do you make blue mush?’ But she was happy to tell me, she was like, ‘You just use this and use that. Just like oatmeal, just like oatmeal, yeah.’ [...]

If we weren’t on the program, I probably wouldn’t even thought about
buying blue corn and things like that, but because we were on that, ‘Hey, let’s try!’” (laughs) (Parent 3)

“P: They had it on a fire yard, the blue mush with berries. And I was like, ‘Wow, that’s a good idea I didn’t think of.’ And I thought, but I never thought to add blueberries. But I was like, you know, maybe they could add more of the traditional diet and something that we are more familiar with. But they can actually add variety to it, and it’s okay to add variety to it. Not just the basic.” (Parent 21)

2) Changes in cooking and storage techniques the post-FVRx participation

i. Home cooking

Even though many participating families suggested that going to fast food restaurants and getting take-outs were very convenient and easy for their families, the data illustrated that some of them started preparing meals at home more often during and after the FVRx Program. Some parents also elaborated how they started to see nutrition differently, and the FVRx program helped them focus on the quality of each meal they prepare for their children rather than merely cooking a meal for the sake of having a meal.

“P: More cooking at home. I did try to do morning, lunch, and dinner. A lot of it at home, before. But like I said, if I was trying to be fast or whatever, and a lot of time, that’s what it was, we would eat out. But we did try to eat morning, lunch, and dinner. Now it’s still the same. We do have the breakfast, lunch, and dinner, but I think more conscious of what we are preparing. Like, I don’t do it all the time, but once in a while, he likes SPAM and potatoes. I see a can of SPAM right there (pointing to the food model). Like if we are camping or something, we’d do something like that, something special. But we try to stick to something good for them.” (Parent 5)

“P: Yeah, I think more of um, it has changed me in a way to look at the
difference with how I feed my children a lot more than before. I never, I used to just cook and not think about it. But now I cook, and I’m like, “Okay, what’s gonna sustain my kids for the rest of the day?” Rather than just a meal here and after, you know, it was just like, ‘slave over a stove’ versus ‘what’s gonna maximize the nutrition for my kids that won’t have to have me constantly getting stuff for them to keep snacking on?’ But something that fill them up and then for the next snack or the next meal and something that’s healthy, rather than just chips or candy or whatever it is.” (Parent 21)

ii. Cooking methods

Since the FVRx sessions offered various helpful information regarding cooking, some participating families tried and adopted new cooking methods after enrolling in the program. Some parents revealed that they since switched from frequent frying to more baking and steaming. Using less oil or fat in their cooking was another change some parents consciously made.

“P: Um, it was mainly veggies, and well, I did a lot of frying. And then, when the program had started, through the program I learned to steam. I didn’t steam before because I didn’t understand, I didn’t understand steaming. (laughs) So now I steam, I bake, and I boil. Less frying.” (Parent 10)

“P: I cook less with like grease, or I just use oil, olive oil. I try to bake. R: What kind of grease would you use before? P: Vegetable oil. But growing up, you know, I had the lard. R: Lard, okay. And why would you use vegetable oil instead of lard now? P: Just the content. After the program, I just started buying more vegetable oil, instead of buying butter, so. R: Okay. Did the program talk anything about lard or oil or different kinds of fats? P: They just told us what’s good, and I started reading labels.” (Parent 16)
iii. Storage technique

Some of the participating families shared that they found sharing food storage techniques and tips to make purchased food items last as long as possible was extremely helpful.

“P: Before, it was so hard. It was before, like during the same time we were doing the FVRx, we would only buy enough that would fit in our refrigerator freezer. But now, it’s like we buy more, so we don’t have to go back [to the store]. Before we used to, if we run out, we would have to go back and stock up again. But now it’s all in one, so we have both freezers.
R: Okay. So, the way you shop is a little different from before the program. How did the program impact to change the way you shop?
P: I think it’s because we have more room to store, stuff like corn, squash with the FVRx, we would cut it and then we would freeze it. So that’s there. The kids, all of the kids love squash.” (Parent 3)

“P: Just sharing, like what they used their vouchers for, their recipes, or how they can store it?
R: Oh okay. Storing veggies or fruits?
P: Yeah, like canning and stuff like that.
R: Oh, okay. Some of them shared tips.
P: Yeah. […] Because some of them were talking about not having electricity and then having to store food, make it last.” (Parent 17)

3) Shopping for fresh produce after the FVRx program

After the FVRx program ended, the participating families no longer received the vouchers. Nonetheless, the parents claimed they were more aware of their diet compared to before enrolling in the program, which made a difference in their shopping and eating. The data demonstrated that the dietary changes the families had made during the program persisted, at least for a while and to some extent. Many of the meaningful changes the participating families had adopted were still maintained at the time of the interviews.
“P: Umm...we didn’t really change anything; well, I guess I try to get more vegetables now. More vegetables and fruits. Because when I had the vouchers, we had a lot of fruits and vegetables and my kids kind of got used to it. Now, I try to keep that in the fridge for them to snack.” (Parent 17)

For most of the families, however, not having the vouchers meant losing the financial ability to buy as many fruits and vegetables as they wished to buy. While the FVRx program tremendously helped the participating families improve their fruits and vegetable consumptions, some families also acknowledged that purchasing fruits and vegetables remained a challenge without the vouchers after the six-months program ended. This was particularly true for those families who could not afford to purchase adequate amounts of fruits and vegetables before the FVRx program. Most families made an effort to maintain the amount of fresh produce they purchased even after the program ended. As a result, their fruits and vegetable consumptions increased compared to before the program. However, without the vouchers, some families were no longer able to maintain the same amount of fresh fruits and vegetables that they consumed during the program. This again highlights one of the structural barriers and challenges presented in the first section of the qualitative results. Limited income and financial barriers continued to be the significant challenge for many of the program participating families.

“P: I guess... I think it really has changed. Well, kind of, because you know, we don’t get as much as we did when we were getting the vouchers. Yeah, I think that’s the only thing.
R: So, less fruits and vegetables? Not as much as you would like to have.
P: Yeah. (laughs)
R: Right. Do you still buy some vegetables and fruits?
P: Yeah, I do. I still buy them.
R: Okay. Would you say you buy more or less now compared to before you participated in the program?
P: Less. Well, more. Compared to before the program, yes, more. It’s more than before we started the program.” (Parent 23)

5. Study Implications
5.1 Discussion

This mixed-methods study involved a small group of pediatric patients and their caregivers who enrolled in the Navajo FVRx program in 2017 and 2018 at one of the major medical facilities within the Shiprock Service Unit in the Northern Navajo Nation. The alarmingly high prevalence of overweight, obesity, and associated non-communicable diseases among young children and youths continues to be a priority public health concern in this Native population. Hence, a healthcare program that emphasizes nutritional well-being and promotes healthy dietary habits is much needed and a welcome intervention. Adding to these health disparities is another challenge that a majority of the community members experience some levels of food insecurity. Our findings supported the previously published data on household food insecurity9,19,89 that 56.5% of the program participant of the present study relied on at least either one of the SNAP or WIC assistance programs to cope with their food insecurity. Furthermore, the pre-enrollment surveys revealed that 80% of the participating families responded that the food they bought just did not last and they did not have money to buy more food either often or sometimes in the last two months. 70% of them responded that they could not sometimes or often afford to eat balanced meals in the last two months. Many of the Diné community members have limited access to fresh fruits and vegetables, as well as a means to prepare healthy meals at home for a variety of reasons. Thus, providing the families—particularly those who are food insecure—with a monthly incentive exclusively designated for purchasing fruits and vegetables and traditional food in the form of vouchers is extremely helpful
to improve dietary diversity and balance of daily meals at household levels.

Our quantitative data did not find any significant long-term impacts of the FVRx program on the pediatric patients’ BMI-for-age percentiles. The nutritional status of the pediatric patients who completed the FVRx Program at the baseline, exit, and post-intervention follow-up showed that the number of healthy weight patients did not change between the baseline and exit, but decreased between the exit and post-intervention follow-up. Similarly, the number of at-risk for overweight and overweight patients did not change between the baseline and exit but decreased between the exit and post-intervention follow-up. This, however, may be explained by the fact that the number of obese children doubled from the exit to the post-intervention follow-up. It is perhaps that the overweight children, as they grew, shifted to the obese category by the time of the post-intervention follow-up.

The lack of significant long-term positive impacts on the patients’ BMI-for-age and the increase in the number of pediatric patients who were obese after the program completion may be explained by our qualitative results. Both the quantitative and qualitative findings suggest that some, but not all, of the pediatric patients might experience an acceleration of their weight gain or rebound after weight loss once the FVRx program terminates after six months. Integration of the overall results indicate that these waning treatment effects after the program completion may be due to the families’ financial challenges in purchasing the same amount of fresh produce without the FVRx vouchers.

In addition to our quantitative findings, the qualitative component of our study provided some meaningful and hopeful data. The qualitative findings demonstrated that the FVRx program could have long-term positive impacts on the dietary and shopping behaviors of the participating families even after the program ended. Moreover, the present study revealed that
the FVRx could be complementary to any of the federal food assistance programs because of its exclusive emphasis on fruits, vegetables, and traditional food items. The FVRx program is unique in the sense that it may serve a larger population in the Diné communities regardless of their SNAP and WIC eligibility, which is a great advantage for the beneficiaries. Those who are SNAP/WIC recipients, as well as those who are not both may benefit from the FVRx program. FVRx program participants who also enrolled in either or both SNAP and WIC may allocate their SNAP/WIC benefits to extra non-fruits and vegetable food items, which may improve their food security level.

Our findings indicated that the FVRx program is a highly valued and beneficial program for the program participants because of its comprehensive nature and implementation to holistically improve and promote the health and well-being of the pediatric patients as well as their family members. At the same time, however, our study also elucidated the structural challenges in which the FVRx program operates.

One of the limitations of the FVRx program was the duration of the program. All the participating parents responded that the FVRx vouchers were valuable and helped them purchase more fruits and vegetables than they otherwise would or could. However, the FVRx program lasted for six months. Therefore, termination of the voucher prescriptions made their newly adopted shopping and dietary habits difficult to maintain. Many parents mentioned the financial challenges due to limited income; thus, a continuation of the financial assistance in some forms would be a key to an adaptation of sustainable and desirable shopping and dietary changes for the long run. Based upon these findings, one of the recommendations for the FVRx program would be to extend the program duration for some eligible families in order to maintain the treatment effects. Another strategy for the FVRx program could be a coaching curriculum within
the FVRx sessions to help participating parents smoothly transition off the FVRx program, and to assist them in navigating their shopping on a budget. This coaching may include how to use “Double Up Food Bucks” in SNAP and/or WIC program so that the families may maximize their fruits and vegetable consumptions.

The participating parents also described that voucher redemption occurred at one particular grocery store in Shiprock. While some families still shopped at this local store regularly, most of the families claimed they prefer to do shopping at “big-box stores” outside the reservation. As the FVRx program may scale up and expand its partners, having a longer list of FVRx redemption sites both on and off the reservation may help ease their shopping experience and also save their time to travel to multiple stores. A recently published study\textsuperscript{100} also indicates that the purchase of fresh fruits and vegetables increased at the stores participating in the Healthy Navajo Store Initiative (HNSI), a multifaceted healthy store intervention delivered on the Navajo Nation. Having access to healthy and fresh produce at larger grocery stores is important especially for the AI/AN and rural populations, as customers who shop at larger grocery stores tend to purchase more of these food items than those who shop at smaller shops such as convenient stores.\textsuperscript{100,101}

Another barrier for the participating parents to prepare healthy meals for their children was time constraints. Not being able to allocate enough time for shopping and meal preparations daily was also a challenge that many of the participating parents continued to face but was not necessarily overcome by enrolling in the FVRx program. A majority of the participating families understood and acknowledged the importance of and the needs for their nutritional and dietary changes for their children and the families in order to achieve a healthier life. However, systemic constraints continue to persist in their daily living. The FVRx program may have made healthy
food accessible and available to the participating families. Nevertheless, if the parents did not have the luxury of spending enough time on shopping and healthy meal preparation due to their work commitments or multiple responsibilities, establishing and maintaining consistent healthy dietary habits remain a significant challenge. Moreover, the overabundance of fast-food restaurants in their local communities and hyper-saturation of processed “junk” food items can create pressure and frustration for the parents. If meal options that were both healthy and quick were not available, many of them would resort to the easily-accessible but unhealthy meal options if they were unable to afford their time to devote to well-thought-out and planned shopping and meal preparations.

In order to address these challenges, it may be beneficial for the participating parents if the FVRx sessions could also emphasize developing the parents’ food preparation skills with limited time and maximizing the resources they have to prepare both quick and healthy meals for their children and their families. Every household has different challenges. Therefore, tailoring the shopping and cooking skills to the realities of each household may greatly enhance the impacts of the educational values of the FVRx program. Including frozen fruits and vegetables to the FVRx list of redeemable items is, for example, an accommodating implementation as they can provide a convenient cooking option for those who struggle with securing enough time for meal preparations.

Our data also illustrated the existing disparities in notions of “healthy eating” among the participating families, which is reflective of the long history of disinvestment in health, nutrition education, and adequate access to healthy food and resources on the Navajo Nation. Heavy reliance on canned food items and processed meat products among the Diné is an exemplar of historical dietary deprivation by the U.S. colonial government and how nutritional colonialism
disrupted and destroyed the traditional Diné food system and sovereignty. These highly processed food commodities are a symbol of staple items on the reservation, which represents financial and environmental barriers, geographical isolation, a lack of adequate infrastructures such as electricity, refrigeration, and running water, food injustice, and health and social inequity. Besides, life-long consumption of these canned and processed food items may also pose a potential risk factor for developing non-communicable diseases such as hypertension and cardiovascular diseases, which are highly prevalent among the Diné population.

Despite all these deep systemic challenges, our findings indicated that the FVRx programs helped the participating families disrupt the vicious cycle of poor diet and health. What was inspiring and unique about the participating parents was that they were well aware of and willing to acknowledge the historical and generational patterns of poor nutritional and dietary habits. However, they were also making efforts to disrupt those patterns so that their children would not have to live through what they and their parents’ generation did while growing up on the reservation. Due to the high prevalence of non-communicable diseases in the Diné communities, many parents were also concerned about the risk of developing obesity, diabetes, hypertension, and their complications that many of their family members, relatives, and neighbors suffer. Understanding the nature of these health conditions and the severity of consequent suffering also seemed to help motivate them to learn about nutrition and improve their children's and family’s health, which also encouraged them to enroll in the FVRx program.

The imperative of the FVRx program was a comprehensive program design and delivery. It provided participating families with financial assistance (in the form of vouchers) to purchase fruits, vegetables, and traditional food items, but also provided an educational program that promoted the total well-being of the participating children. The educational components were not
limited to nutritional well-being, but also covered other aspects of the children’s health, such as sleep, screen time, oral health, physical activities, cooking demo, and gardening. The present study supports other previous studies that the impacts of fresh produce prescription program for at-risk populations are enhanced by accompanied nutrition education, interactive lessons, and activities that promote healthy shopping, meal preparations, and eating balanced and portioned meals.\textsuperscript{102-107} The FVRx program’s holistic approach also extended to the family members as well. Involving all members of the household is, in fact, important and necessary since introducing changes to shopping, cooking, eating together as a family all require understanding and cooperation from other family members, especially those who are also caregivers to the children. Also, the role the FVRx program providers played was critical in designing, managing, and implementing the successful program. Without the champion providers who are not only professional and competent but also who deeply care about the health and well-being of their patients and the community members, the participating families would not be as actively engaged and willing to participate in the program. Our study highlighted that these comprehensive program contents and holistic approach meaningfully amplified the experience the participating families gained through the FVRx program, as they were able to catalyze choices and lifestyles that redefine and reshape the health of a whole family.

On the one hand, our study reminded us that poverty, unemployment, psychosocial isolation, and marginalization, and many other broader systemic challenges exist within the Diné communities. Some participating parents acknowledged that various systemic barriers prevent community members from accessing and benefiting from health programs and information that are available in the community. On the other hand, the study elucidated that the FVRx program could be an effective intervention to tackle some of these systemic barriers and changes.
Moreover, most participating parents believed the FVRx program would be beneficial for the Navajo community as a whole. All participating parents passionately expressed that they would recommend the FVRx Program to other families and community members because they believed it would offer a wide range of benefits and opportunities for everyone in the Navajo Nation. The data also successfully exhibited how the participating families shared their personal experiences and what they had learned from the FVRx sessions with other community members, including their family members. The impacts of the program on the community as a whole may not necessarily be immediately visible. Nevertheless, they are certainly positive influences for the community members and a step towards a healthier Navajo Nation in the future.

5.2 Limitations of the study

First, the quantitative method of this study had to solely rely on the secondary data obtained from the EHRs at the hospital, and the PI had no way of knowing the accuracy of the anthropometric measurements abstracted from the EHR. We acknowledge that potentially inaccurate information may have resulted in a miscalculation of BMI (if body weight and height measurements were inaccurate or mis-recorded), and eventually misinterpretation of the pediatric patients’ nutritional status (e.g., obese instead of overweight). Also, since the FVRx participants did not go through the post-intervention anthropometric measurements at the same time (i.e., it ranged from 5 to 21 months), we had to use the measurements taken at various times after the participants completed the program. The age of pediatric patients was another challenge in the process of analyzing the data. Since many of them were younger than 24 months at the time of enrollment but grew up to be older than 24 months at the exit and post-intervention measurements, their BMI-for-age percentiles were interpreted using two different standards.
(WHO and CDC) according to their age groups. This is not necessarily a limitation; however, it possibly might have resulted in an inconsistency in the change in the nutritional status of each pediatric patient. To evaluate the clinical impacts of the FVRx program on patients’ BMI, it may be helpful to define the eligibility age range clearly, and/or divide the pediatric patients into respective age categories when enrolling in the FVRx program to obtain age-stratified data.

Due to the small number of pediatric patients who completed the FVRx program in 2017 and 2018, all children enrolled in the program regardless of whether they completed the program were included in a part of the quantitative analysis. However, we had to exclude those who were missing any measurements at the baseline, exit, or post-intervention follow-up, which further reduced the sample size. Having a complete anthropometric dataset and larger sample size would have allowed us to conduct statistical analyses, which could have produced stronger quantitative findings in terms of the changes in the pediatric patients’ BMI-for-age percentiles. Moreover, since we were unable to follow-up on the pediatric patients who did not complete the FVRx program, any barriers encountered by the families, potential benefits and impacts of the FVRx program on these patients and their families could not be evaluated and analyzed.

Second, as for the qualitative interviews, it is essential to address potential issues concerning a social desirability bias. Granted that the participating families were incentivized for the interview participation and that they all had benefitted at least to some extent from the FVRx program in the past, it would be understandable for the participating parents to intentionally or unintentionally appear and respond to the interviewer in a way they thought was desirable and/or satisfactory for the interviewer to hear or perceive. Although the interviewer made it clear to participating parents that the interviewer was not a part of the FVRx program, it is still plausible that some participating parents might have thought or expected that if they gave positive
feedback on the FVRx program, they could be invited to enroll in the program again and receive further benefits from the program. For instance, some of the parents repeatedly told the interviewer how disappointed they were—understandably so—when the FVRx program ended after six months, and they no longer received the vouchers.

Lastly, there is a limitation to the generalizability of the study since this study focuses only on the part of the Northern Navajo Nation. The Navajo Nation is a geographically vast and diverse Indian nation and, therefore, the people’s living environment and circumstances vary significantly. This required the PI to consider the geographical, socioeconomic, and cultural variations among the Diné people and make this study valuable in ways that could still apply to other communities within the Navajo Nation as well as other Indigenous communities throughout the U.S.

5.3 Strengths of the study

This study was an observational study, which was designed to provide descriptive qualitative and quantitative data based on the participating children and their families’ experience with the FVRx Program. We believed that using both qualitative and quantitative methods was necessary in order to better understand and accurately describe the impacts of FVRx after the participating families have completed the program. The study originally aimed to address the drivers and barriers for the Diné children and their families to access healthy food from all clinical, socioeconomic, cultural, geographical, and historical perspectives. Given the study aims, neither a quantitative nor qualitative study alone would have been able to capture the impacts of the FVRx program and various factors that could potentially contribute to the outcomes of the program. Moreover, this study was highly context-specific. Navajo Nation, like many other
Indigenous communities in the United States, is geographically, socially, economically, and politically marginalized. The PI of this study is an “outsider” who does not belong to the Navajo community and initially had very little knowledge about their tradition, culture, values, and identity. Therefore, hearing the narratives of Navajo residents, and making an effort to understand their situatedness and the reality of their living situations were all crucial aspects of the study in order to respond to the research objectives with cultural humility and respect. We believe that the mixed-methods study approach, therefore, strengthened the rigor and validity of the findings.

6. Conclusion

Our study illustrated that many Diné families continue to experience the inter-generational impacts of food and nutrition colonization and resulting food insecurity. Despite the number of systemic challenges and barriers associated with food access and insecurity in the Diné communities, this study showed that the FVRx program counteracted many of the historically-entrenched challenges to good nutrition, creating meaningful positive nutritional and dietary changes for the participating pediatric patients and their families. The participating families uniformly expressed that FVRx was beneficial for their children, families and communities. This included not only the direct impact of consuming more fruits and vegetables, but the additional benefits of learning about the children’s health and positive parenting skills, as well as the opportunity for social bonding and networking with other caregivers, children, and the program providers.

After program completion, many participating families continued to maintain some of the skills and healthy habits they learned and adopted from the program. Despite this positive
impact, the lack of vouchers made it difficult for some families to maintain the same level of fruits and vegetable consumption due to the financial barrier. The variable experience of the participating families after the program may explain the fact that while the BMI-for-age percentiles improved in approximately 41% of the pediatric patients, they worsened in nearly 59% of the patients after they completed the FVRx program. Major key program elements that may have contributed to its effectiveness include: 1) providing a significant purchasing power exclusively for fruits, vegetables, and traditional foods; 2) comprehensive, interactive monthly sessions, which provided broad educational experience, food demonstrations and other hands-on experience, and peer support; and 3) motivated and empathic program providers. Additional elements which could increase the program’s impact include a longer duration for eligible families, program transition coaching, and shopping and food preparation skills for working parents with limited budget and time.

The potential long-term impacts of the FVRx program need to be further studied and assessed, so that the program may be better scaled and become available to a greater number of the Navajo community members. In order to increase accessibility and availability of fresh fruits, vegetables, and healthy traditional foods for the community members, partnerships with more grocery stores and store owners both on and off the reservation would make greater shopping options for the program participants. Furthermore, the FVRx program could provide benefits to older children, youths, the elderly, and also at-risk adults who live with obesity, diabetes, hypertension, and other health conditions that require nutrition interventions. Working with the Navajo Nation government, public and private health sectors, food producers and grocery stores, and healthcare facilities on and near the reservation to make the FVRx program longer and extensive would certainly help the nutritional as well as total well-being of the Navajo
communities.
References


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Appendices
Appendix 1 Qualitative Interview Recruitment Script

**NNMC FVRx Peds Qualitative Study Recruitment Phone Script**

**Researcher:** Good morning/afternoon, may I please speak with [name]?

*If the Person is not available: Thank the person who answered and tell him/her I will call back again.*

*If the Person is available: First confirm that I am speaking to the correct person.*

**Researcher:** My name is Manami Uechi, calling from the NNMC pediatrics department. I am calling to invite you to for an interview as part of a study on the FVRx Program. I am working with Dr. [name] and Dr. [name].

Is this an Ok time for you to speak?

*If the Person says “No” or “I’m not sure”*

**Researcher:** Okay. [Ask if I can schedule another time to talk. If the person is not sure or seems hesitant, thank him/her and say goodbye.]

*If the Person says “Yes”*

**Researcher:** Great. The reason I am reaching out to you is because you and your child took part in the Navajo Fruit and Vegetable Prescription (FVRx) program. We would like to know if FVRx improves the health of participating children, even after the program is over. We are hoping to interview parents and caregivers like yourself to learn about your experience in the FVRx program. Would you like to hear more about this study?

*If the Person says “No” or “I’m not sure”*

**Researcher:** No problem. Thank you for your time.

*If the Person says “Yes”*

**Researcher:** This is a study to understand if the FVRx program has made any changes in your child’s health and the way you buy food and prepare meals every day. We would like to talk with people like yourself to also understand how the FVRx program can improve the lives of families living on Navajo Nation. This project is called Long-term impacts of the FVRx on Childhood Obesity in Navajo Nation.

Taking part in this study is totally up to you. If you agree to an interview, we can meet at a time and place that is convenient for you, such as the hospital or your home.
The interview will last between 60 and 90 minutes. You can skip any questions and you can stop the meeting at any time. Your answers are confidential, which means that I will not share your name or any personal information with anyone outside of our study team. None of your answers can be traced back to your name.

To thank you for your participation, I have a $50 gift card for you.

**Researcher:** Would you be interested in participating in an interview?

*If the Person is interested in the interview:*

**Researcher:** When would be a good time for you to meet with me? Ask the time and date that the person is available for the interview.

*If the person is unsure about the schedule, offer to send a consent form: see below.*

*If the Person says no or shows no interest in the interview:*

**Researcher:** No problem. If you have any questions later, please feel free to contact me any time. I can be reached at: [Phone number]. Thank you for your time.

**Researcher:** I am happy to send you a consent form to look over if you would like to know details about this research study. The consent form is a document that tells you what your rights are as a participant, what the study is about, and the risks and benefits of participating.

*If the Person is interested in receiving a copy of the consent form:*

**Researcher:** Does email work for you?

If the Person says “Yes” ask for their email: ______________

**Researcher:** Thanks, I got that. I will email you a copy of the consent form. Please feel free to look it over and discuss with friends and family. You can contact me with any questions too. I will check back in with you in a few days as well.

Please feel free to call us with any questions or concerns. You can call me with questions at any time. My phone is [phone number].

**Researcher:** Do you have any questions for me at this time?

*Answer any questions parent may have.*

Thank you very much. It was nice speaking with you, and we will be in touch.
Appendix 2 Interview Guide

Interview Guide

Thank you for your time and being here to speak with me today. I would like to talk to you to understand your experiences with the Navajo Fruits and Vegetables Prescription (FVRx) Program. Please feel free to share with me your personal and actual experiences. The information that you share with me will not be shared with anyone outside of the research team. This means that your answers will not be shared with doctors, nurses or other community members. If you don’t know the answer or would prefer not to answer a certain question, please know that you do not have to answer. Also, if you don’t understand my questions, please don’t hesitate to ask me to repeat or clarify my questions. This interview will last for approximately 60 minutes. If it is alright with you, I will use a recorder to record our conversation, so that we will remember later what was being said. Before we begin, do you have any questions?

Data Collector ID: __________________________ Date: __________________________

1) How did you first learn about the FVRx Program?
2) How did you feel about the program? (Probe: what did you think about the idea of using food vouchers? How about the idea of going to sessions / classes?)
3) Can you describe a typical FVRx session when you received the vouchers? (Probe: What did the providers say to you about your child’s health? What did they say to your child? How did your child react?)
4) Were there any problems going to the session or getting the vouchers?

Now I would like to ask you about food:
5) How would you describe your family’s eating habits before you started the program?
6) How has the FVRx program changed these eating habits? (Probe: Do you prepare your meals any differently? Any other changes in mealtime at your house? If yes, ask to describe changes.)

Now I would like to ask you about food shopping:
7) What kind of food is available in your community? Is there any food that is not available but you would like to buy?
8) Thinking about shopping before you joined the FVRx program. What foods would you usually buy? (Probe: Where would you usually go to shop? How do you get to these places to buy food? What factors shaped your choices when shopping for food?)
9) While you were in the FVRx program, how did the vouchers change the way you shopped? (Probe: Where would you go to redeem the vouchers? Did you go to the same store(s) before you enrolled in the FVRx program? If not, how did you feel about going to a new store? What types of foods did you purchase with the vouchers?)
10) Did you have any problems using the vouchers? (Probe: difficulties using all the vouchers, needed more vouchers, not accepted at stores, didn’t know which items were allowed, etc.)
11) Since the program has ended, how has your shopping changed?
12) How do you feel about shopping locally (in other words, shopping for food at a local small store instead of driving off the reservation for groceries)? Do you think FVRx has made you shop locally more often? How about after the program ended?
I would like to ask about your child’s health since being in the FVRx program:

13) Since you took part in the FVRx program, how would you describe your child’s health or eating habits? (Probe: can you give some examples of how these have changed?)

14) What parts of the FVRx Program had the biggest impact on your child’s health? (Probe: vouchers, sessions / teaching; in what way?)

15) How has the FVRx Program changed the way you raise your child as a parent? How has the program changed your child’s tastes in food?

16) What changes would you recommend to the FVRx Program to make the experience better for future families?

17) Would you recommend the FVRx to people you know? Why?

Is there anything else I should know to better understand your FVRx experience?

Thank you for speaking with me today.

-The end of interview-