Journal of Agriculture, Food Systems, and Community Development
ISSN: 2152-0801 online
https://foodsystemsjournal.org

A community supported agriculture produce prescription pilot program in the Northern Black Hills: Dakota Food Rx

Gemma E. Bastian [a] *
South Dakota State University

Sarah Lane,[b] Haley McMahon [c]
University of South Dakota Sanford School of Medicine

Olivia A. Husmann,[d] Evangeline A. Schumacher [e]
South Dakota State University

Submitted August 21, 2025 / Revised October 20, November 20, and December 24, 2025 / Accepted December 24, 2025 / Published online March 5, 2026

Citation: Bastian, G. E., Lane, S., McMahon, J., Husmann, O. A., & Schumacher, E. A. (2026). A community supported agriculture produce prescription pilot program in the Northern Black Hills: Dakota Food Rx. *Journal of Agriculture, Food Systems, and Community Development*. Advance online publication. https://doi.org/10.5304/jafscd.2026.152.014

Abstract

One in eight South Dakota residents faces food insecurity, which has been linked to increased prevalence of chronic diseases such as heart disease and diabetes. Produce prescription (PRx) programs have proliferated to ameliorate food insecurity and prevent chronic disease exacerbation through provision of fresh produce to clinically eligible patients. This study conducted a preliminary process and impact evaluation of Dakota Food Rx, a pilot community-supported agriculture PRx program in the Northern Black Hills of South Dakota. Healthcare providers (Prescribers) referred adults with low income and/or food insecurity and diet-

[a] * *Corresponding author:* Gemma E. Bastian, PhD, RDN, LN, Assistant Professor/Extension Nutrition & Health Specialist, South Dakota State University; Wagner Hall 411, Box 2275A; Brookings, SD 57007 USA; +1-605-688-4046; Gemma.Bastian@sdstate.edu; https://orcid.org/0000-0002-7227-0371

[b] Sarah Lane, Medical Student, University of South Dakota Sanford School of Medicine; 1400 West 22nd Street; Sioux Falls, SD 57105 USA; Sarah.Lane@coyotes.usd.edu

[c] Haley McMahon, Medical Student, University of South Dakota Sanford School of Medicine; 1400 West 22nd Street; Sioux Falls, SD 57105 USA; Haley.McMahon@coyotes.usd.edu

[d] Olivia A. Husmann, Student, Nutrition & Dietetics, South Dakota State University; Olivia.Husmann@jacks.sdstate.edu; https://orcid.org/0009-0005-6773-1603

[e] Evangeline A. Schumacher, Student, Human Biology, South Dakota State University; Evangeline.Schumacher@jacks.sdstate.edu

Disclosures

None

Funding Disclosure

Dakota Food Rx was made possible by a Beyond Idea Grant from the South Dakota Community Foundation.

related chronic disease (Patients) to receive weekly produce boxes from a local specialty producer (Growers). Evaluation measures included Patient pre-post surveys and key informant interviews with Prescribers, Growers, and Patients. Thirty Patients participated in the program, picking up 434 produce boxes (mean 14.5 per patient) valued at over US$14,000 from June–November 2024. Ten pre- and eight post-surveys were completed (seven completed pre-only, five completed post-only, and three completed both); nine interviews were conducted. Overall, program satisfaction was high among all participants. Patients responding at post-test had higher food security and sense of community than those at pre-test. Thematic analysis of the key informant interviews indicated that Patients improved their diet, food access, and overall health; moreover, relationships were built between Patients and other Dakota Food Rx actors. Prescribers, Growers, and Patients all reported ways in which they had to adapt to the program, and future considerations included increased communication, improved workflow, and additional resources. The Dakota Food Rx pilot showed promise for improving diet, food security, and sense of community belonging for Patients in rural South Dakota with low income and experiencing or at risk of diet-related chronic disease.

Keywords
produce prescription program, preventative medicine, community supported agriculture, food security, access to healthy foods, public health, program evaluation

Introduction

Food insecurity, defined by the U.S. Department of Agriculture (USDA) as "a household-level economic and social condition of limited or uncertain access to adequate food" (Hales et al., 2006), is pervasive in the U.S., with 13.5% of households experiencing food insecurity in 2023 (Rabbitt et al., 2024). Food insecurity involves a lack of food availability or access; an inability to properly utilize food resources; or instability in any of these factors over a certain period of time (Food and Agriculture Organization of the United Nations, 2001). Many factors are associated with it, including low income, unemployment, disability, and participation in nutrition assistance programs (Leitz, 2018). Families that experience food insecurity have been shown to have lower diet quality due to increased intake of highly palatable foods (Leung et al., 2014), which subsequently can contribute to chronic health conditions such as cardiovascular disease and diabetes (Leung et al., 2020; Nagata et al., 2019; Te Vazquez et al., 2021). Research has shown that the additional chronic disease burden is associated with higher healthcare expenditures among those who experience food insecurity (Dean et al., 2020), which may further exacerbate food insecurity itself, perpetuating a cycle of food insecurity and chronic disease (Seligman & Schillinger, 2010).

Produce prescription (PRx) programs have been characterized as programs that involve a referral by a healthcare practitioner (e.g., a physician or nurse practitioner), followed by the provision of vegetables, fruits, and sometimes additional foods through a participating partner or retailer (e.g., grocery store, farmers market, or food bank), and typically some sort of nutrition education (Newman et al., 2022). Patients referred to PRx programs by their healthcare providers usually must meet criteria such as experiencing food insecurity, being low-income, or having a diet-related chronic disease (Newman et al., 2022). A majority of these programs are supported by grant funding via the USDA National Institute of Food and Agriculture (2025). In recent years, PRx programs have emerged as a solution to address food insecurity by improving fruit and vegetable consumption (Harper et al., 2024). Between 2010 and 2020, 108 PRx programs were implemented in the U.S. (Rodriguez et al., 2021), with dozens more implemented since.

Despite these overarching characteristics, there is considerable heterogeneity among PRx programs, including how the produce is sourced and distributed. While PRx models using conventional food retailers such as supermarkets are common, many programs also utilize local food channels such as farmers markets, farm stands, and community-supported agriculture (CSA) (Garrity et al., 2024). Locally sourced PRx may have multiple benefits surpassing conventional models. Shorter sup-

ply chains in local food systems decrease the amount of energy used to ship, package, and refrigerate produce while maintaining freshness and nutrient density (Molin et al., 2021; Villa-Rodriguez et al., 2015). Local food systems also facilitate more community building and interactions between the grower and customer (McDaniel et al., 2021), which in a PRx program may improve the social wellbeing of patients while bolstering business for local growers, strengthening the local economy. These programs aim to improve food security, health, and well-being through provision of produce, making the possibility for additional social health and economic benefits from locally sourced PRx programs enticing for practitioners. However, the U.S. is a net importer of both fruits and vegetables, and substantial agricultural shifts would be needed for most U.S. regions to meet dietary needs through self-production (McCarthy et al., 2023), suggesting that locally sourced PRx programs may continue to be a small part of the food system until there is more capacity to produce locally sourced produce at scale.

In South Dakota, one in eight people experienced food insecurity in 2023 (Feeding America, 2025). The state is characterized by its rurality and low population density, leaving gaps in food and healthcare access for many South Dakotans (U.S. Census Bureau, 2025). South Dakota's harsh, dry prairie climate relegates it to trailing behind other states in fruit and vegetable production (USDA National Agricultural Statistics Service, 2022); nevertheless, a small South Dakota specialty crop scene does exist, with a concentration of small regenerative farms in the Black Hills region. A small forested mountain range on the border of South Dakota and Wyoming, the Black Hills provide a cool, more controlled climate, making it easier to grow produce than in the rest of South Dakota.

In 2021, one such farm, Budding Moon Farm of Spearfish, SD, began a "Veggie Rx" PRx program based on models that the owner-operator had been involved with during his farming apprenticeship in Oregon (Summers, 2025). Instead of supplementation by grants or other programmatic funds, Budding Moon Farm charged a US$5 weekly "co-pay" for patients, who were enrolled in the CSA program as if they were full-paying customers. As interest in the program grew, Budding Moon Farm partnered with South Dakota State University (SDSU) Extension to receive funding from the South Dakota Community Foundation to expand the Veggie Rx model to other CSA farms in the area. The program name was changed to Dakota Food Rx to reflect the organizations' combined goal to expand the CSA-based PRx to other farms in the region, and eventually throughout South Dakota.

This preliminary study aimed to evaluate the feasibility and efficacy of the pilot year of Dakota Food Rx, during the 2024 growing season, using a mixed methods process and impact evaluation involving Dakota Food Rx Prescribers, Growers, and Patients. We hypothesized that the pilot program would be feasible for all three stakeholder groups and that the Dakota Food Rx Patients would experience positive impacts in their food security, dietary behavior, and sense of belonging in a rural community.

Methods

Participants and Setting

Participants in Dakota Food Rx can be classified in three main groups:

Dakota Food Rx Prescribers

Healthcare providers who referred the patients into the program. Any provider involved in patient care and who felt they had the clinical judgment necessary for proper referral could participate. In our pilot, these professionals included physicians, nurse practitioners, and registered dietitian nutritionists. Prescribers worked in the local healthcare system (Monument Health) at clinic sites in Spearfish and Sturgis, SD, or at an independent practice in Belle Fourche, SD (Tri-State Medical Center). Some of the Dakota Food Rx Prescribers were paying CSA members at the same farms to which they referred their Patients. Prescriber locations are shown in Figure 1.

Dakota Food Rx Growers

Farmers who enrolled patients into their CSAs. The Growers' operations were either certified

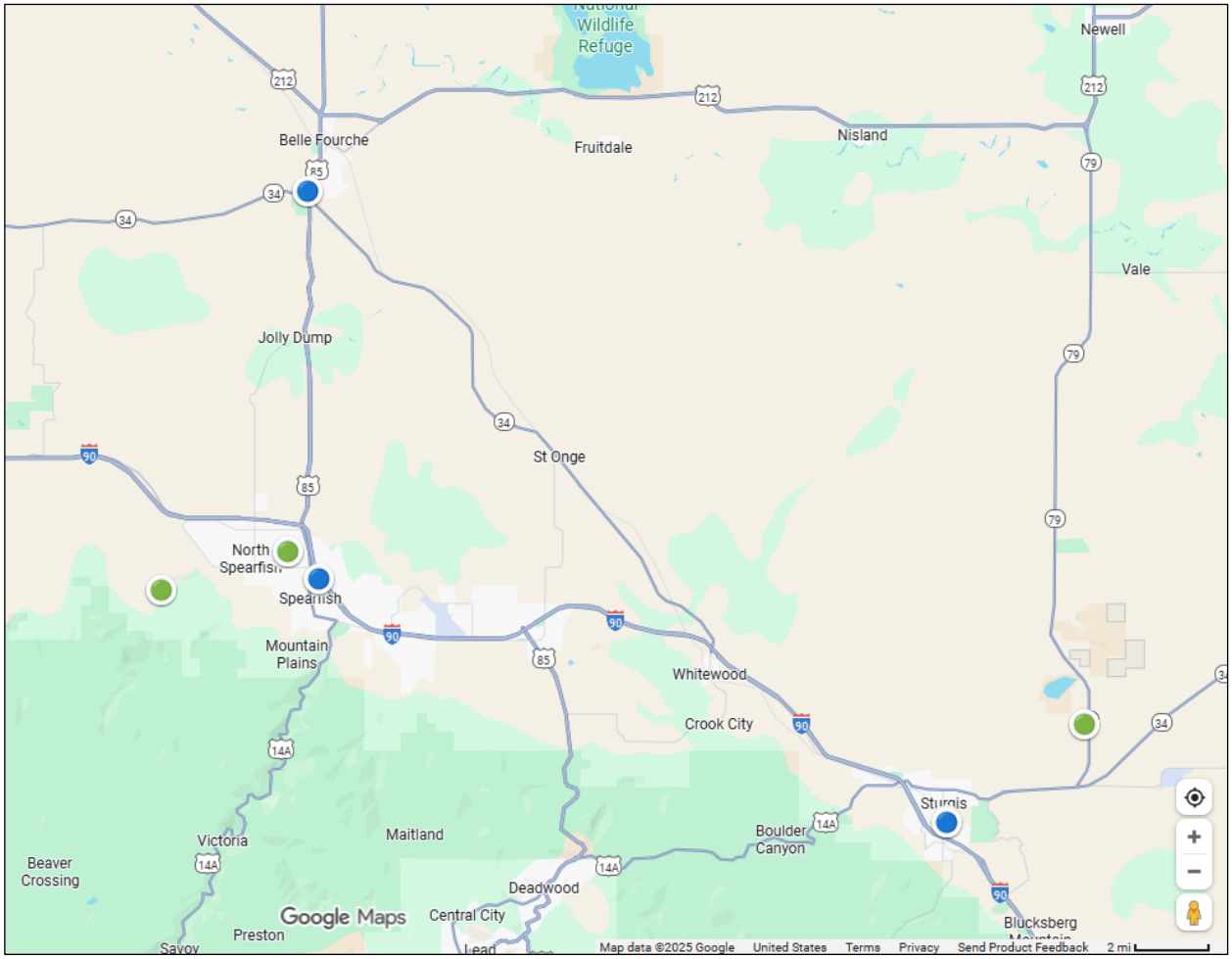
organic or used regenerative agricultural practices. This criterion was important to the owner-operator of Budding Moon Farm, as his farm was certified organic. The CSA seasons for each Grower differed slightly, but they typically ran weekly from June to October/November. The participating growers in our pilot were Budding Moon Farm and Cycle Farm, both located near Spearfish, SD, and Bear Butte Gardens, located near Sturgis, SD (Figure 1).

Dakota Food Rx Patients

Patients were the recipients of the program. Patients could be referred into Dakota Food Rx by a Prescriber if they met three eligibility criteria: (1) They were ≥ 18 years old; (2) they reported either food insecurity or participation in a program like Medicaid or the Supplemental Nutrition Assistance Program (SNAP) designed for low-income populations; and (3) they were experiencing or at risk of developing a diet-related chronic condition. After Prescribers were trained on the criteria, they were given discretion by the team to use their own assessments for identifying food insecurity or program participation. While we consider our audience to be low-income individuals, we did not require means testing for our program. Self-reported income has been shown to be rife with several measurement errors (Moore et al., 2000); moreover, other nutrition programs

Figure 1. Location of Dakota Food Rx Growers and Prescribers in the Northern Black Hills

Green circle icons indicate Dakota Food Rx Growers, blue circle icons indicate Dakota Food Rx prescribing sites.



Source: Google Maps

designed for this population, like free and reduced-price school meals (Food and Nutrition Service, 2025a), and the Special Supplemental Nutrition Assistance Program for Women, Infants, and Children (WIC) (Food and Nutrition Service, 2025b), also use other program participation as a proxy measurement for low income to reduce the burden of means testing for multiple income-based nutrition programs. SDSU Extension provided a list of qualifying diagnoses to Prescribers, such as diabetes/prediabetes, hypertension, hypercholesterolemia, and history of heart attack, transient ischemic attack, or stroke. Notably, to maintain a weight-neutral approach to chronic disease prevention and management, obesity (i.e., body mass index > 30 kg/m^2) was not considered eligible without an existing metabolic comorbidity (Heitmann et al., 2024).

Intervention

Referral

Patients were referred to Dakota Food Rx during a routine visit to their healthcare provider (i.e., the Prescriber). We provided the Prescribers with exam room posters to disseminate more information on the program to Patients (e.g., "Ask your doctor about Dakota Food Rx!"). The Prescriber screened the Patient for eligibility by reviewing their medical records and asking follow-up questions during the visit regarding food insecurity or participation in programs like Medicaid and SNAP. If the Patient was determined to be eligible, the Prescriber provided them with an informational brochure and a "prescription slip" with a QR code that the Patient could scan to enroll in the program.

Enrollment

The QR code led to a form created on the web platform QuestionPro, on which the Patient provided their contact information, household size, preferred CSA pickup locations and time, and details about any dietary allergies or restrictions among the household members. The enrollment forms were screened by SDSU Extension staff and forwarded to an appropriate Grower, who would then reach out to the Patient via phone or text, based on their reported communication preferences. Once the Grower screened the Patient for fit for their specific CSA operation, the Patient was enrolled into the program. All Patient data was kept in a secure cloud-based storage application to which only SDSU Extension staff and Growers had access. No additional contracts or agreements were needed between the Grower and Patient beyond the Growers' typical practices with paying CSA customers.

Distribution

The Dakota Food Rx Patients were treated like regular CSA members by the Growers, and received all CSA member benefits, including identical share sizes for household size, inclusion on CSA email lists, and invitation to CSA member dinners and other gatherings. Patients could pick up CSA shares weekly for the duration of the program (June to October/November). Most Patients picked up shares in the town they lived in (Spearfish and Sturgis); some Patients did travel from neighboring communities such as Deadwood and Belle Fourche (Figure 1). Delivery services were provided to one Patient who had a disability that kept him homebound. Growers direct-billed SDSU Extension to receive payment for Patient CSA shares.

After the team reviewed the typical vegetables grown by the Growers, we anticipated that Patients would be unfamiliar with some of the produce they received (e.g., kohlrabi, Swiss chard). Therefore, to increase program engagement and provide educational resources to the Patients, two additional resources were provided at CSA pickup sites. The first was a suite of 21 "Dakota Food Rx Recipes," developed and tested by a nutrition and dietetics student at SDSU. These recipes were developed to feature vegetables and herbs common in the Growers' CSA shares, to be easy to read by limited-literacy audiences, to use minimal cooking equipment and inexpensive ingredients, and to take a short amount of time to prepare. These recipes were available online (Bastian & Husmann, 2024) and were also printed and distributed at the CSA pickup sites. The second resource was in-person produce and recipe sampling, conducted by two medical students at the University of South Dakota completing rotations in Spearfish. The students

attended CSA pickup periodically and provided samples to all CSA members, featuring produce that was provided in that week's share. This allowed all CSA members, but particularly Patients and their families, to try unfamiliar produce before bringing it home. While non-Patient CSA members' demographic information was not collected for this study, based on conversations with Growers it appeared that Patients typically had lower incomes, less education, and more chronic health conditions than the other members.

Measures

Program impact and success were evaluated using pre- and post-surveys as well as post-program interviews with all three stakeholder groups: Dakota Food Rx Prescribers, Growers, and Patients. The surveys were administered in an online format (QuestionPro) and distributed to participants via email at the beginning and end of the growing season. The majority of measures in the survey were identical to those used by PRx grantees of the USDA Gus Schumacher Nutrition Incentive Program (GusNIP) (Nutrition Incentive Hub, n.d.). All evaluation data were collected after the appropriate Institutional Review Board approvals were granted by SDSU (IRB-2024-63 and IRB-2024-147).

Demographics

Patients provided their age, gender (man, woman, non-binary/third gender, or preference to self-describe), race (American Indian/Alaska Native, Asian, Black/African American, Native Hawaiian, Other Pacific Islander, White, or Other Race), ethnicity (Hispanic/Latino/Spanish origin or not), and zip code. Patients also self-reported their general health status on a 5-point scale from poor to excellent, and if anyone in their household received SNAP in the last 30 days.

Fruit and Vegetable Intake

This 10-item questionnaire was adapted from the larger 26-item Dietary Screener Questionnaire (National Cancer Institute, 2021), an adapted tool used by GusNIP grantees to evaluate other PRx programs. Patients reported their habitual consumption of 100% fruit juice, whole fruit, green leafy or lettuce salad, fried potatoes, other kinds of potatoes, cooked beans, salsa, pizza, tomato sauce, and all other vegetables over the past 30 days. Response options ranged from "never" to "two or more times per day," except for 100% fruit juice, which had an upper range of "six or more times per day."

Food Insecurity

The 6-item USDA Household Food Security Survey Module (USDA Economic Research Service, 2024), wherein Patients answered on behalf of their entire household for the past 30 days, was used to assess Patient food security. Zero or one affirmative responses indicated high or marginal food security (the scale is not sensitive enough to distinguish the two), 2–4 affirmative responses indicated low food security, and five or six affirmative responses indicated very low food security (USDA Economic Research Service, 2024).

Rural Perception Scale

To better understand the effects of Dakota Food Rx on Patients' sense of community belonging, we utilized the 18-item Rural Perception Scale (Kim et al., 2024). The scale has four subfactors: belonging, attitudes, loneliness, and social ties. Patients rated statements on 5-point scales for each question. Two questions on the attitudes subfactor were reverse-coded; we re-coded these questions during our analysis so that we could generate a whole scale score (Kim et al., 2024).

Key Informant Interviews

Key informant interviews were conducted in October 2024, towards the end of the pilot program. Semi-structured interviews were conducted by the first author (G.E.B.) over Zoom, with student research assistants taking notes. The interview scripts were tailored for each of the three stakeholder groups (Table 1). The questions followed the structure of the RE-AIM model, typically used in public health to evaluate community-based interventions (Glasgow et al., 1999). The five RE-AIM components include reach, effectiveness, adoption, implementation, and maintenance. Utilizing this model allowed us to ensure that the interview scripts appropriately addressed all critical compo-

Table 1. Interview Scripts for Each Dakota Food Rx Participant Group

Prescribers	1. What was your experience screening and referring Patients to the program? 2. Were there any specific criteria you used for making referrals? Was there a certain type of patient that was a good fit for referral? 3. Tell me more about the materials provided by SDSU[a] Extension, like the posters, referral pads, and brochures. What was your experience using them? What could SDSU Extension improve upon? 4. Regarding the referral process overall, what would you change to improve it? 5. What feedback, if any, did you receive from Patients who were referred to the program? What clinical improvements, if any, were seen in these Patients? 6. If a colleague at another clinic was about to become a Dakota Food Rx Prescriber, what advice would you give him or her?
Growers	1. Let's start by discussing your interactions with Dakota Food Rx Patients. What has been your experience with the Patients versus your regular CSA[b] customers? 2. As you interacted with patients over the course of the CSA season, what changes did you see? 3. Let's talk about the enrollment process. What was your experience calling up Patients and officially enrolling them in your CSA? What changes, if any, would you make to this process? 4. Let's talk about other logistics. As part of this pilot, SDSU Extension requested invoices for reimbursements and had participant tracking through an online Excel spreadsheet. What was your experience with these processes? What made them successful or not so successful? 5. If you were part of a program like this again, what would you need to be more successful? 6. Let's say a colleague of yours wants to be a Dakota Food Rx Grower next year. What advice would you give him or her?
Patients	1. How did you hear about Dakota Food Rx? 2. You may have gotten produce boxes for several weeks, or you may have only gotten a few. What factors influenced your decision to either stay in the program or stop earlier? 3. What changes in your life happened because of your participation in Dakota Food Rx? 4. Tell us about your experience with the produce you received from the produce boxes. 5. Tell us about your experience with the educational resources provided, such as the recipe samples and recipe sheets. 6. How do you plan to continue the changes you have made after the program ends? 7. If the program comes back next year, what would you want to be different?

[a] South Dakota State University; [b] community supported agriculture

nents of the intervention to gather as much process feedback from each of the three stakeholder groups as possible. The interviewer asked additional, prewritten follow-up questions to elicit additional information when needed (e.g., a potential follow-up to Question 2 in the Patient Interview script detailed in Table 1 was, "Tell us what it was like accessing the farm or pickup site," if the Patient did not describe the pickup process in their answer or struggled to come up with a response). Interviews were recorded and transcribed by the first author with the assistance of an AI web platform for interview transcription (Revoldiv). All interview participants received a US$20 e-gift card as remuneration.

Data Analysis

Quantitative data from the pre- and post-surveys were analyzed using SAS 9.4M7 and descriptive statistics were generated. Inferential statistics were conducted; however, all tests were nonpaired due to the small number of Patients who responded to both the pre- and post-test. T-tests or Wilcoxon signed rank tests were used to determine pre-post differences, as appropriate.

We analyzed the key informant interviews using an inductive thematic analysis utilizing an essentialist framework (Braun & Clarke, 2006). A team of four researchers (G.E.B., S.L., H.M., O.A.H.) familiarized themselves with the data and reviewed two interview transcripts separately, cre-

ating initial semantic codes (i.e., codes based on a surface-level interpretation of the data). These codes were discussed at a team meeting to develop an initial codebook that was then used to code the rest of the transcripts, with only one researcher assigned to each. Code assignments and newly generated codes were discussed at subsequent team meetings, and adjustments to the codebook were made upon consensus by all four researchers. Themes and subthemes were then collectively compiled from codes generated from the analysis and organized in a way that corroborated all researchers' understanding of the data (Braun & Clarke, 2006).

Results

A total of 30 Patients and their families were enrolled in Dakota Food Rx during the 2024 growing season. A total of 434 weekly shares were picked up by Patients, with the average Patient redeeming 14.5 shares (range 1–26). The total value of the produce redeemed by Patients, and paid by SDSU Extension via our pilot grant funds, was US$14,293.80, according to Grower invoicing based on their standard CSA rates.

Survey Results

Ten Patients completed a pre-season survey (RR = 33%) and eight completed a post-season survey (RR = 27%). Only three Patients completed both assessments; the rest of the respondents completed a pre- or post-survey only. Thus, results in Table 2 are presented separately by timepoint and not for the full sample. Most respondents who provided demographic information were female and White non-Hispanic, with a mean age around 60 years. Considerably fewer respondents reported using SNAP benefits in the past 30 days at the end of the program than at the beginning; however, inferential statistics were not performed since the sample sizes were too low to meet the assumptions of a chi-square test of difference. Moreover, food security status was significantly better among the post-season sample ($p = 0.004$), with more respondents indicating a score of high/marginal food security and fewer indicating low/very low food security. No significant differences in vegetable intake were captured in the survey data. Only eight Patients completed

Table 2. Responses from Pre- and Post-Season Surveys ($n = 18$) for Dakota Food Rx Patients

Characteristic [*n* (%) [a] or mean ± SD]	Pre-Season ($n = 10$) [b]	Post-Season ($n = 8$) [b]
Age (years)	59.50 (12.72)	62.50 (15.48)
Gender		
Male	1 (10)	1 (13)
Female	8 (80)	6 (75)
Prefer not to respond [c]	1 (10)	1 (13)
Race		
American Indian or Alaska Native (non-Hispanic)	3 (30)	1 (13)
White (non-Hispanic)	5 (50)	5 (63)
Prefer not to answer [c]	2 (20)	2 (25)
SNAP[d] Participation in last 30 days		
Yes	7 (70)	1 (13)
No	1 (10)	4 (50)
Prefer not to answer [c]	2 (20)	3 (38)
Overall Health Rating		
Poor	1 (10)	0
Fair	3 (30)	1 (13)
Good	2 (20)	3 (38)
Very good	0	1 (13)
Excellent	1 (10)	0
Prefer not to answer [c]	3 (30)	3 (38)
Food Security Score [e,f]	3 (2.16)	2.5 (2.98)
Food Security Category [e]		
High or marginal	2 (20)	4 (50)
Low	4 (40)	1 (13)
Very low	4 (40)	3 (38)

[a] Some percentages do not add to 100% due to rounding.
[b] These data are not matched; only three Patients completed both a pre- and post-survey.
[c] Patients were given the option of "Prefer not to answer" on most survey questions to maintain consistency with the evaluation instrument used by the Gus Schumacher Nutrition Incentive Program.
[d] Supplemental Nutrition Assistance Program
[e] As measured by the U.S. Department of Agriculture 6-item Household Food Security Survey Module.
[f] Wilcoxon Signed Rank $p = 0.004$ between pre- and post-season.

the full Rural Perceptions Scale at pre-season and five completed it at post-season. The pre- and post-season mean scale totals were 53.75 and 68.60, respectively, which were significantly different from each other (T = -2.45, p = 0.03), indicating a higher sense of community belonging and engagement among the post-season sample.

Interview Results

Nine interviews were conducted (Prescribers n = 2, Growers n = 2, Patients n = 5). The thematic analysis indicated nine major themes, defined in Table 3.

Program Fit

Many participants expressed that it takes a certain kind of person to be a Dakota Food Rx Prescriber, Grower, or Patient. Prescribers needed to understand patients holistically and care about social determinants of health. For example, one Patient recounted that she was referred to Dakota Food Rx because her nurse practitioner got to know her and learned that she loved gardening and vegetables, which had not happened with other providers. Regarding Growers, it was indicated that they needed to be passionate about food access in their community to be a good fit for the program. One Grower stated:

> It has to be something that you're passionate about. You have to be passionate about increasing people's access to local food, not just the broad population, but for, you know, the marginalized and at-risk populations. That is a little bit more work than enrolling a regular CSA member. (Grower 2)

He went on to suggest that Growers should "make sure that they're growing and providing a steady supply of the basic accessible fruits, herbs, and vegetables" that would not "intimidate or turn people away."

Both Prescribers and Growers seemed to suggest that there was a specific motivation inherent in Patients that made them a good program fit. One Grower reported that "the ones that were truly interested in changing their diets to improve their health were easy to communicate with. They responded well" (Grower 1). In a similar vein, a Prescriber described:

> Almost every patient was ecstatic for knowing that they could utilize [Dakota Food Rx]. There was a couple that would, I'm going to call it excuses. "I can't drive over to Spearfish and get it," or…I don't think the willpower was there to help themselves. And so I feel like a lot of it is me trying to help Patients that don't want to help themselves. (Prescriber 2)

Relationship Building

Relationships were noted to have been bolstered between Patients and Growers, Patients and Prescribers, and Patients and other community members (e.g., neighbors, non-household family members), but rarely between Patients. Patients expressed deep gratitude for the Growers who provided them with produce, and for the Prescribers who enrolled them into the program. Growers and Patients both expressed that CSA pickup times were moments of socialization, especially for Patients who were disabled or mostly homebound. Relationships with other community members were bolstered through sharing excess produce and herbs from the Patient's CSA share. For example:

> I have shared some [produce] if I have excess or if there's something that I specifically cannot fit into a menu, I do share. And sometimes I cook and I have two or three ladies in my level to come and we'll go down by the mailboxes and have a meal. So it gets shared. It does not get thrown away. (Patient 1)

Adaptability

All groups expressed a level of adaptability that was incorporated into being part of Dakota Food Rx. For Growers, slight changes were made to their CSA operations, usually in the frequency or medium of communication. However, some Growers also adapted their pickup schedules for Patients. One Grower brought a share to a local farmers market to help reduce a Patient's commute; another Grower used his personal vehicle to deliver a share to a Patient who was quadriplegic and homebound. Prescribers expressed that they

Journal of Agriculture, Food Systems, and Community Development
ISSN: 2152-0801 online
https://foodsystemsjournal.org

Table 3. Themes and Subthemes Identified from Qualitative Interviews with Dakota Food Rx (DFRx) Growers, Prescribers, and Patients (*n* = 9)

Theme or Subtheme	Definition	Example Quote
Program Fit	An expression that DFRx is a good fit for some Prescribers, Growers, and Patients, but not all.	"A few drop out early on because it doesn't work for them, but the ones that it works for are extremely enthusiastic because it's something that they desire and are unable to access financially during the rest of their life." (Grower 2)
Relationship Building	Improved relationships between DFRx patients and other DFRx stakeholders.	
Patient-Grower Relationships	Improved relationships between DFRx Patients and their DFRx Growers.	"I think it's really rewarding, just the feedback and the encouragement that Patients give to the farmers that I feel embarrassed sometimes of the thanks I get. Because I'm like, no, it's just what I do. I just grow veggies." (Grower 2)
Patient-Prescriber Relationships	Improved relationships between DFRx Patients and their DFRx Prescribers.	"I really appreciate that [a nurse practitioner provided a program referral] because a lot of people would not have pursued it if that wasn't one of their priorities…or would have gone to the lengths that she went to." (Patient 1)
Patient-Community Relationships	Improved relationships between DFRx Patients and non-Patient community members.	"They would gradually get more interactive with my other CSA[a] customers as well." (Grower 1)
Adaptability	When DFRx stakeholders make some sort of change to be part of this program, as opposed to their normal behavior.	
CSA Adjustments	Adjustments DFRx Growers made to accommodate a low-income customer base.	"I think being ready and available for a little bit more communication or interaction, text seems like the most successful and best way for most [Patients]…That's often how I'll get communication of 'I'm going to be late,' asking for reminders, sharing pictures of what they're cooking or pictures of something that they forgot what it was later in the week. So being ready and available with that." (Grower 2)
Screening and Referral Changes	When DFRx Prescribers made changes or expressed making future changes to how they interacted with patients to ensure appropriate patients get referred to DFRx.	"Next year, I would probably, as a provider, I would probably kind of make my list as well of who I referred and maybe contact them a little bit to make sure that we're utilizing it. 'Hey, just reminder it's there. Please utilize it.'" (Prescriber 2)
Cooking Changes	When DFRx Patients cooked more or differently because they had more produce.	"We took the zucchini…and made it into noodles, right? Made into spaghetti. It's the coolest thing ever." (Patient 5)
Food Preservation	When DFRx Patients were preserving excess produce by freezing, canning, dehydrating, etc.	"I've filled that thing [freezer] up…I can tell I'm going to have my winter meals provided to me by the use of the crock pot, just assuming the electricity doesn't go out." (Patient 6)
Education	When DFRx Patients expressed learning a new skill or behavior due to the program.	"Well, lettuce that he introduced to me that he let me taste. And it was bitter. And I'm, 'Oh, no, no, I'll stick to my old lettuce.' And then the [med student] said, 'Well, it's in this recipe.' So, I said, really? 'Yeah, this is how you cook it. And this is how you use it.'" (Patient 1)

continued

Journal of Agriculture, Food Systems, and Community Development
ISSN: 2152-0801 online
https://foodsystemsjournal.org

Table 3 continued

Food Access	Patients able to access foods that they generally could not afford or access.	
Produce Quality	An expression that the CSA produce is of higher quality than produce bought elsewhere.	"If I go to the grocery store to buy these vegetables, I am not going to be buying the ones that [Grower] be [sic] growing and introducing to me." (Patient 1)
Exposure to New Vegetables	An expression that Patients tried a vegetable that they didn't know about before the program.	"I loved it in a great variety, like just stuff that I had never tried before, and really good, lasted a long time. It didn't like rot or anything like that. So, it was really fresh, really good, nutritious produce." (Patient 4)
Increased Purchasing Power	An expression that Patients could buy more or better-quality food because of the program.	"If it's just us, it was always those instant meals or those frozen pot pies because they're cheap. But now we've been able to put money out of the budget and allot for better food like buying fish now. You couldn't afford fish before, you know, that tilapia, like [US]$6 a bag…But when you got to get all these other veggies instead…that makes a difference, you know." (Patient 5)
Difference from Other Programs	An expressed difference between DFRx and other food access programs for people with low income.	"Other types of food programs have boxed items, boxed items and frozen items often have preservatives, salt, sodium products and other chemicals. I can count on the fact that those things are eliminated when I'm getting the food fresh out of the ground." (Patient 6)
Financial Accessibility	An expression that without DFRx, Patients would not be able to afford the food that they now had access to.	"If this program wasn't here, I'd be begging." (Patient 6)
Diet Improvement	Improvements in Patients' diet quality.	
Increased Vegetables	An expression that Patients are eating more vegetables than they did before the program.	"Now we've been having cucumbers in dip, or some of that weird stuff [Grower] gives us. We've been dipping. So, the snacks have changed considerably." (Patient 5)
Other Diet Improvements	A stated dietary change that was not related to vegetables.	"I would say, by getting more exposure to the different types of vegetables … I've expanded … my taste for all these different kind of things too." (Patient 6)
Health Improvement	Improvements in Patient physical and/or mental health.	
Weight Loss	An expression that Patients lost weight while on the program.	"I've lost 55 pounds [24.9 kilograms]." (Patient 1)
Chronic Disease Management	An improvement in how Patients managed a chronic disease using the program.	"So, I've been able to keep a good, you know, glucose levels. I've had a history of high blood pressure. I've been able to decrease the amount of blood pressure medication that I've taken." (Patient 6)
Mental Health and Well-being	An improvement in Patients' mood, mental health disorders, or overall disposition.	"[My physician has] noticed, like, I've had a lot more energy and stuff compared to before. … It just seems like we're less likely just to lay around and slouch." (Patient 5)

continued

Journal of Agriculture, Food Systems, and Community Development
ISSN: 2152-0801 online
https://foodsystemsjournal.org

Table 3 continued

Future Directions	Possibilities to improve and/or expand the reach of DFRx.	
No Change	An expression that something about DFRx is working perfectly with no need for change.	"I never felt confused of pickings. It was on full display. The [med students] were on full display with their sample. They were very friendly, very helpful. I have nothing I can add." (Patient 1)
Pediatric Expansion	An expression that children should be eligible for or have access to DFRx.	"I noticed, see years ago when I had WIC[b] with my kid, you couldn't get vegetables. Now my kids [*sic*] have a baby on WIC, and she nurses her. She gets vegetables, fresh vegetables, which is fine, but I guess after they turn five years, there's no more, they don't even give them a link where they could possibly get another program. Would that be a possibility that WIC could like refer them or give them a card or, you know, instead of just saying, 'Well, if you're five, good luck,' you know?" (Patient 5)
More Resources	An expression that more resources are needed for DFRx stakeholders.	"I think more preseason coordination with like education and recipe resources for participants, so that there could be a little bit of … forethought or collaboration of, okay, I'm going to share this recipe on the second week of June when I've got this combination of veggies or share this cooking tidbit or storage tidbit, you know, this week in the season. … I guess I think of it a lot kind of from my former teaching perspective of really planning out the entire year, all the units and how everything scaffolds and builds on itself and finding kind of the right place to put it in but needing to know ahead of time to be able to implement it most successfully." (Grower 2)
Workflow	An expression that the logistics and workflow of the program could be improved.	"Next year, I was going to kind of prescreen before it even started. Just my patients, because I can run stuff in the background. I can run audits so I can figure out who would qualify and stuff like that. And I would even get in touch with them, not prior, but at the earliest convenience and make sure that I get it started." (Prescriber 2)
Communication	An expression that increased communication would be beneficial.	"Maybe an email notification of like the ones you put up might have caught my eye more." (Patient 7)

[a] CSA = community supported agriculture

[b] WIC = Special Supplemental Nutrition Program for Women, Infants, and Children

would change the ways in which they review medical charts and identify Patients to refer before the initial enrollment period started next year. One Prescriber said, "Next year, I was going to kind of prescreen before it even started…so I can figure out who would qualify and stuff like that" (Prescriber 2). Patients modified how they would prepare and store food in their homes. Many Patients spoke of cooking more since being in the program; some were utilizing the recipe resources provided by SDSU Extension, whereas others found recipes online or in recipe books they had at home. Patients also discussed preserving excess produce and herbs to save for the winter months. One Patient and her husband taught themselves how to dehydrate herbs and vegetables. Another Patient was gifted a chest freezer from a friend and was able to freeze excess meals to reheat during the winter.

Education

A certain amount of education was needed, as expressed by the participants, to most effectively utilize the program to its fullest potential. One Prescriber stated that while SNAP participation was one of the proxy measurements for low-income status, many of her patients were eligible for SNAP but not enrolled and she remarked that SNAP enrollment materials for her patients could be helpful. Patients were often unfamiliar with some of the vegetables they received and relied on the Grower and/or the medical students who were involved with sampling to help them understand how to store and prepare the vegetables in their share.

Produce Quality

Patients all said that the vegetables they received from the program were of higher quality than those they would buy at other stores, like Walmart. One Patient stated, "I've never had green peppers so good" (Patient 7). Patients expressed dismay at having to buy lower-quality produce at the grocery store at the end of the CSA season.

Food Access

Patients reported trying vegetables they never had before, such as sprouts, heirloom tomatoes, lettuce varieties, and eggplant. There were also reports of being able to purchase more or better-quality food because of the program, particularly as Patients could stretch their SNAP benefits and buy healthier, more expensive protein foods. Patients expressed that Dakota Food Rx was different from other food assistance programs, like SNAP and emergency foods, because of the increased access they had to fresh foods. For instance, one Grower recounted that a Patient told him that they finally could eat all the tomatoes they could handle. Patients reported that without the program, they would have to buy lower-quality foods or use food pantries. One Patient with a physical disability said, "If this program wasn't here, I'd be begging" (Patient 6).

Diet Improvement

In contrast with our quantitative findings, Patients reported that they were improving the quality of their diet, particularly due to the produce they received. For example, Patient 4 described using the sprouts from her CSA box to top a routine lunch meal of a turkey and cheese sandwich. Another Patient explained how he felt his diet changed:

> Other types of food programs have boxed items. Boxed items and frozen items often have preservatives, salt, sodium products and other chemicals. I can count on the fact that those things are eliminated when I'm getting the food fresh out of the ground. (Patient 6)

Notably, Patients responded that they made dietary changes beyond simply eating more vegetables. One couple stated that they are using less oil because they bought an air fryer while in the program. "Plus," one spouse said, "a lot of the veggies, we won't even fry up anymore since [Grower] showed us so many different ways to cook them that aren't in oil. It's just, it's been amazing" (Patient 5). Other families felt inspired to make other dietary changes while enrolled in Dakota Food Rx, like getting rid of table salt: "I took away the Morton salt…we just had sea salt for cooking" (Patient 7).

Health Improvement

All Patients also reported some improvement in their health or wellbeing. Many Patients reported changes in their chronic conditions, particularly lowering fasting glucose/hemoglobin A1c and lower blood pressure. Some Patients reported no longer needing medicine for their conditions or taking lower doses. These accounts were corroborated by Prescribers and even Growers: "I had one Patient share that they were no longer seeing a specialty doctor for their kidney function. They thought that the higher vegetable diet had made that difference over a couple of years of participating" (Grower 2). Moreover, Patients reported having improved energy and mood since being in Dakota Food Rx. While weight loss was not the focus of this program, one Patient noted losing 55 pounds (24.9 kg) after struggling with excessive weight gain after a traumatic brain injury. She remarked, "[Dakota Food Rx] saved my life because of the depression I have been in over this situation" (Patient 1).

Future Directions

While some participants felt no changes to Dakota Food Rx were necessary beyond continued funding, several opportunities for future iterations of the program were identified. Prescribers, Growers, and Patients all expressed interest in expanding the program to children, due to increasing childhood obesity and food security gaps caused by age criteria in other programs, such as WIC. Patients and Growers indicated that more educational resources for Patients, like recipes, could be compiled and shared by SDSU Extension. One Grower expressed an idea for a Patient-only website where recipes and other resources could be stored. Prescribers and Growers reported wanting changes in the overall workflow of the program, particularly regarding referrals and patient/invoice tracking, respectively. Finally, all participant groups expressed a need for increased communication with project staff at SDSU Extension. The pilot funds for this program were small (<US$50,000) and mostly went to reimbursing Growers and developing marketing and educational materials. Minimal personnel costs were used to support one undergraduate research assistant; the principal investigator's salary was provided in-kind by SDSU Extension. Therefore, the program team was small, and they found it challenging to keep up communications with all program stakeholders.

Discussion

This preliminary evaluation of the Dakota Food Rx pilot indicated several successful impacts of the program, as well as opportunities for improvement and refinement. Both quantitative and qualitative analyses showed promise for Dakota Food Rx to potentially improve Patient household food security and sense of community belonging. Our key informant interviews indicated that Patients reported trying new vegetables, having access to better-quality vegetables, and improving their physical and mental health in a variety of ways. Prescribers, Growers, and Patients overall had positive impressions of the pilot program and had suggestions for improvement that included increased resources and communication, and expanded eligibility criteria, particularly for children experiencing food insecurity and diet-related chronic disease.

Our evaluation found that there was a certain level of "program fit" that Prescribers, Growers, and Patients all must have to benefit from Dakota Food Rx; however, even for participants that did have good fit, there was a certain amount of adaptability required, such as changes in cooking, communication, or workflow. Research has indicated that factors that make consumers with low income more likely to participate in CSA include being female, higher educational attainment, high food preparation self-efficacy (Hanson et al., 2024). One notable barrier reported was unfamiliarity with CSA produce (Hanson et al., 2024). These findings indicate opportunities to educate potential Patients about CSA and provide resources on cooking and storing produce ahead of enrollment, which could help with preparing Patients for developing adaptability as well as overall program retention. Moreover, our results indicated that some Prescribers and Growers seem unaware of the structural barriers that prevent some Patients from participating in PRx, such as time and transportation restrictions (Mydels et al., 2025). Instead, they indicated that Patients lacked "willpower" or "didn't want to help

themselves." Opportunities to train potential Prescribers and Growers on how to better interact with people from low-income backgrounds, like integrating aspects of cultural humility (Stubbe, 2020) in program trainings, could also help with better preparing these partners to be a better fit for the program and could inform the adjustments needed to better serve the Patient population.

A critical aim of our evaluation was to determine the impact of Dakota Food Rx on community belonging and relationship building, primarily among Patients but also other program stakeholders. Social isolation and loneliness are endemic in rural America (Rainer & Martin, 2012), particularly among those with advanced age and chronic illness (Southerland et al., 2024; Theeke & Mallow, 2013), and are associated with poorer health outcomes (Courtin & Knapp, 2017) and physician visits (Gerst-Emerson & Jayawardhana, 2015). Similar to our study, other evaluations of PRx implemented using CSA shares or other locally sourced produce have also demonstrated Patients feeling more socially connected and less isolated (Hileman, 2021; Joseph & Seguin, 2023; Shostak et al., 2025). Owens (2024) posited that social connection may be an unintended, but valued and sought-for effect of PRx for Patients. We further attest that PRx programs that connect Patients to local foodways, as Dakota Food Rx and other CSA-share PRx programs do, foster improved social connections by building relationships between Patients and local farmers, healthcare providers, other PRx actors (e.g., nutrition educators), and even other community members. However, it is important to note that not all customers who engage with local foodways exhibit an improved sense of community, particularly those with low income or belonging to racial and ethnic minority groups (Russomanno & Jabson Tree, 2021).

Another finding of note was that Patients surveyed at the end of the program had higher food security than those at pre-intervention. While a paired test could not be conducted because we had two independent samples, improved food security is a common finding among other PRx programs (Hager et al., 2023; Muleta et al., 2024). Interviewed Patients indicated that Dakota Food Rx provided healthier foods than other food programs they had access to and allowed them to purchase healthy foods that they otherwise could not afford. This, combined with the educational resources provided to Patients, suggests that their food security may have improved via changes in both access to and utilization of food resources. Fewer Patients also reported not using SNAP benefits post-intervention; while causality cannot be inferred, this contrasts with other research indicating that SNAP participation is not generally associated with seasonal changes in food security (Bastian, 2024), as we saw in this study.

Our study had notable strengths. The mixed methods design allowed for a comprehensive process and impact assessment of the pilot program. Questions in the Patient surveys utilized evaluation measures used by GusNIP grantees and a validated rural perceptions scale. Additionally, the key informant interviews gathered input from all three Dakota Food Rx participant types: Prescribers, Growers, and Patients. However, limitations must also be considered. Our results from both the quantitative and qualitative arms were limited by small sample sizes due to low response rates (33% pre-survey, 27% post-survey, and only nine stakeholder interviews) that were not necessarily representative of our entire participant population. Small sample sizes limited our ability to conduct more rigorous analyses (e.g., the changes in SNAP participation from pre- to post-intervention could only be reported descriptively). Rural populations tend to be more reluctant to participate in research than their more urban counterparts due to factors like trust and time commitments (Awuruonye et al., 2024; Morgan et al., 2005). Because this was the pilot program of Dakota Food Rx, and the previous Veggie Rx program had no formal evaluation, there may have been some reluctance to participate in this study due to lack of trust built with the SDSU Extension team. Future project iterations could involve more interaction with Dakota Food Rx participants by SDSU Extension staff to improve rapport and increase evaluation participation rates.

Another limitation of our study was the apparent inconsistency between the quantitative and qualitative findings on the outcome of increased produce intake. Patient interviews indicated that

they did indeed eat more vegetables; however, only five Patients (17% of our enrolled Patients) participated in interviews. Patients who had more favorable experiences with the program may have been more inclined to participate in a research interview. The survey results indicated that there were no changes in vegetable intake. The scale used for the questions we utilized measured the number of times per day or week that each type of vegetable was consumed, as opposed to the serving sizes of the vegetables. Therefore, it is possible that Patients did increase their serving sizes but not the number of their eating occasions. While the questions used were chosen to limit Patient response burden, future assessment with dietary recalls[1] may be needed to ensure valid measurements of vegetable intakes.

Despite the small sample studied, our findings still provide valuable insight into CSA-based PRx programs in rural communities, which are not well represented in academic literature; for example, only 13 of the 108 programs in a PRx field scan used CSA, and only nine were located in the U.S. Plains region (Rodriguez et al, 2021). A comparable mixed methods evaluation of VegRx, a CSA-based PRx near Boston in urban Waltham, Massachusetts, had a similar number of Patients (32), and with all but one completing evaluation surveys, their results indicated positive improvements in food access, vegetable intake, and overall and mental health (Shostak et al., 2025). These quantitative findings suggested that community connections were built among farmers and clinicians; however, patients were not involved in interviews. Notably, while we engaged fewer Patients in our study's quantitative assessment, we reported similar trends in food security status, and qualitative data from Prescribers, Growers, and Patients further showcased the community belonging, food access, and health impacts of a CSA-based PRx in a rural Great Plains state.

Conclusion

The Dakota Food Rx pilot has shown promise for improving the diet quality, food security, social connections, and overall health of its Patients, who have low income and are at risk of diet-related chronic disease. While the program was overall well-received by all stakeholders, there were opportunities for improvement that would include streamlined communication and logistical workflow, as well as additional resources and potential expansion to pediatric populations. As the program continues to expand in size, strategies to increase evaluation participation could be implemented, such as building stronger relationships between SDSU Extension and all Dakota Food Rx participants.

Acknowledgments

We would like to thank Sierra Doherty, Marissa Gasner, Madison Kadlec, Autumn List, Kimberly Maesse, and Jacie Montis for their help with note-taking during the key informant interviews; as well as all Dakota Food Rx prescribers, growers, and patients for being part of the pilot program. Special thanks to Jared Lukens-Black of Budding Moon Farm for his trust and camaraderie in stewarding his Veggie Rx into this larger-scale pilot project.

References

Awuruonye, A., Henderson, F., Ferrell, C., Harris, K. K., Ramachandran, V., & Fox, E. (2024). Facilitators and barriers to research participation in rural communities. *Journal of Rural Social Sciences*, *39*(1), Article 2. https://open.clemson.edu/jrss/vol39/iss1/2

Bastian, G., & Husmann, O. (2024). *Dakota Food Rx recipes*. South Dakota State University Extension. https://extension.sdstate.edu/dakota-food-rx-recipes

Bastian, G. E. (2024). Exploring sociodemographic and chronic disease factors associated with chronic, seasonal, intramonthly, and intermittent presentations of food security instability. *Journal of the Academy of Nutrition and Dietetics*, *124*(6), 686–699. https://doi.org/10.1016/j.jand.2023.12.002

[1] Twenty-four-hour dietary recalls are a common method in nutritional sciences to estimate the daily intake of a study population. They are typically structured interviews that have participants give detailed accounts of all the foods and drinks they consumed during a 24-hour period (https://epi.grants.cancer.gov/dietary-assessment-primer/profiles/recall/).

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Courtin, E., & Knapp, M. (2017). Social isolation, loneliness and health in old age: A scoping review. *Health and Social Care in the Community*, *25*(3), 799–812. https://doi.org/10.1111/hsc.12311

Dean, E. B., French, M. T., & Mortensen, K. (2020). Food insecurity, health care utilization, and health care expenditures. *Health Services Research*, *55*(S2), 883–893. https://doi.org/10.1111/1475-6773.13283

Feeding America. (2025). *Food insecurity among the overall population in South Dakota*. https://map.feedingamerica.org/county/2022/overall/south-dakota

Food and Agriculture Organization of the United Nations. (2001). *The state of food insecurity in the world 2001*. https://www.fao.org/3/y1500e/y1500e.pdf

Garrity, K., Krzyzanowski Guerra, K., Hart, H., Al-Muhanna, K., Kunkler, E. C., Braun, A., Poppe, K. I., Johnson, K., Lazor, E., Liu, Y., & Garner, J. A. (2024). Local food system approaches to address food and nutrition security among low-income populations: A systematic review. *Advances in Nutrition*, *15*(4), Article 100156. https://doi.org/10.1016/j.advnut.2023.100156

Gerst-Emerson, K., & Jayawardhana, J. (2015). Loneliness as a public health issue: The impact of loneliness on health care utilization among older adults. *American Journal of Public Health*, *105*(5), 1013–1019. https://doi.org/10.2105/AJPH.2014.302427

Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the public health impact of health promotion interventions: The RE-AIM framework. *American Journal of Public Health*, *89*(9), 1322–1327. https://doi.org/10.2105/ajph.89.9.1322

Hager, K., Du, M., Li, Z., Mozaffarian, D., Chui, K., Shi, P., Ling, B., Cash, S. B., Folta, S. C., & Zhang, F. F. (2023). Impact of produce prescriptions on diet, food security, and cardiometabolic health outcomes: A multisite evaluation of 9 produce prescription programs in the United States. *Circulation: Cardiovascular Quality and Outcomes*, *16*(9), Article e009520. https://doi.org/10.1161/CIRCOUTCOMES.122.009520

Hales, L. J., Reed-Jones, M., & Suttles, S. (2006). *Food security in the U.S.—Definitions of food security*. U.S. Department of Agriculture Economic Research Service. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security

Hanson, K. L., Concepcion, C., & Volpe, L. C. (2024). Factors associated with participation in community supported agriculture (CSA) among low-income households: A scoping review. *Nutrients*, *16*(15), Article 2450. https://doi.org/10.3390/nu16152450

Harper, Z., Alvarado, A. V., Katz, S. E., Rovner, A. J., Steeves, E. A., Raynor, H. A., & Robson, S. M. (2024). Examining food security, fruit and vegetable intake, and cardiovascular disease risk outcomes of produce prescription (PPR) programs: A systematic review. *Journal of Nutrition Education and Behavior*, *56*(11), 794–821. https://doi.org/10.1016/j.jneb.2024.06.012

Heitmann, B. L., Koster-Rasmussen, R., Meyer, L. B., Larsen, S. C., Thorsteinsdottir, F., Sandholdt, C. T., Bojsen-Moller, K. N., Overbeck, G., Waldorff, F. B., Kousgaard, M. B., Specht, I. O., & Dirksen, C. (2024). Debating weight loss vs. weight neutral strategies for improvements of health. *Current Obesity Reports*, *13*(4), 832–842. https://doi.org/10.1007/s13679-024-00587-8

Hileman, E. (2021). Empowerment, love, and connection: Lessons learned from the Farmacy Project, a food-is-medicine program in Rutland, Vermont. *Journal of Agriculture, Food Systems, and Community Development*, *11*(1), 11–13. https://doi.org/10.5304/jafscd.2021.111.011

Joseph, C. A., & Seguin, M. L. (2023). "Something fun to look forward to": Lessons from implementing the Prescription for Health farmers' market initiative in rural Upper Michigan. *Health Promotion Practice*, *24*(5), 903–910. https://doi.org/10.1177/15248399221093966

Kim, S. J., Alford-Teaster, J., Schiffelbein, J. E., & Onega, T. (2024). Development of the Rural Perception Scale (RPS-18). *Journal of Rural Health*, *40*(2), 348–367. https://doi.org/10.1111/jrh.12795

Leitz, D. (2018). Identifying the risk factors for food insecurity in the United States. *Major Themes in Economics*, *20*(1), 49–71. https://scholarworks.uni.edu/mtie/vol20/iss1/4

Leung, C. W., Epel, E. S., Ritchie, L. D., Crawford, P. B., & Laraia, B. A. (2014). Food insecurity is inversely associated with diet quality of lower-income adults. *Journal of the Academy of Nutrition and Dietetics*, *114*(12), 1943–1953. https://doi.org/10.1016/j.jand.2014.06.353

Leung, C. W., Kullgren, J. T., Malani, P. N., Singer, D. C., Kirch, M., Solway, E., & Wolfson, J. A. (2020). Food insecurity is associated with multiple chronic conditions and physical health status among older US adults. *Preventive Medicine Reports*, *20*, Article 101211. https://doi.org/10.1016/j.pmedr.2020.101211

McCarthy, A. C., Griffin, T. S., Srinivasan, S., & Peters, C. J. (2023). Capacity for national and regional self-reliance in fruit and vegetable production in the United States. *Agronomy Journal*, *115*(2), 647–657. https://doi.org/10.1002/agj2.21305

McDaniel, T., Soto Mas, F., & Sussman, A. L. (2021). Growing connections: Local food systems and community resilience. *Society & Natural Resources*, *34*(10), 1375–1393. https://doi.org/10.1080/08941920.2021.1958965

Molin, E., Martin, M., & Björklund, A. (2021). Addressing sustainability within public procurement of food: A systematic literature review. *Sustainability*, *13*(23), Article 13395. https://doi.org/10.3390/su132313395

Moore, J. C., Stinson, L. L., & Welniak, E. J. (2000). Income measurement error in surveys: A review. *Journal of Official Statistics*, *16*(4), 331–361. https://www.census.gov/content/dam/Census/library/working-papers/1997/adrm/sm97-05.pdf

Morgan, L. L., Fahs, P. S., & Klesh, J. (2005). Barriers to research participation identified by rural people. *Journal of Agricultural Safety and Health*, *11*(4), 407–414. https://doi.org/10.13031/2013.19719

Muleta, H., Fischer, L., Ali, Q., Menezes, S., Kim, N., Minkah-Premo, E., & Essel, K. (2024). Impact of a pediatric produce prescription intervention on food security and perceived nutrition-related behaviors: A mixed-methods study. *Journal of Primary Care & Community Health*, *15*, Article 21501319241276780. https://doi.org/10.1177/21501319241276780

Mydels, S., Schreiber, L., Colby, H., Blakeman, T., Gebauer, H., & Gannett, S. (2025). Using implementation science to understand the implementation factors in a rural Produce Prescription program. *Journal of Agriculture, Food Systems, and Community Development*, *14*(3), 371–392. https://doi.org/10.5304/jafscd.2025.143.028

Nagata, J. M., Palar, K., Gooding, H. C., Garber, A. K., Bibbins-Domingo, K., & Weiser, S. D. (2019). Food insecurity and chronic disease in US young adults: Findings from the National Longitudinal Study of Adolescent to Adult Health. *Journal of General Internal Medicine*, *34*(12), 2756–2762. https://doi.org/10.1007/s11606-019-05317-8

National Cancer Institute Division of Cancer Control & Population Sciences. (2021). *Dietary Screener Questionnaires (DSQ) in the NHANES 2009-10: DSQ*. Department of Health and Human Services (HHS), National Institutes of Health. https://epi.grants.cancer.gov/nhanes/dietscreen/questionnaires.html

Newman, T., Lee, J. S., Thompson, J. J., & Rajbhandari-Thapa, J. (2022). Current landscape of produce prescription programs in the US. *Journal of Nutritional Education and Behavior*, *54*(6), 575–581. https://doi.org/10.1016/j.jneb.2022.02.011

Nutrition Incentive Hub. (n.d.). *Core metrics—Produce prescription projects*. U.S. Department of Agriculture, The Nutrition Incentive Program Training, Technical Assistance, Evaluation, and Information Center (NTAE), Gus Schumacher Nutrition Incentive Program (GusNIP). https://www.nutritionincentivehub.org/resources/resources/reporting-evaluation/core-metrics-produce-prescription/participant-level-metrics

Owens, C. (2024). Beyond a prescription: Applying a relational framework to the 'Food is Medicine' movement. *Human Organization*, *83*(4), 326–339. https://doi.org/10.1080/00187259.2024.2360483

Rabbitt, M. P., Reed-Jones, M., Hales, L. J., & Burke, M. P. (2024). *Household food security in the United States in 2023* (Report No. ERR-337). U.S. Department of Agriculture Economic Research Service. https://www.ers.usda.gov/publications/pub-details?pubid=109895

Rainer, J. P., & Martin, J. C. (2012). Loneliness and isolation in rural areas. In K. B. Smalley, J. C. Warren, & J. P. Rainer (Eds.), *Rural mental health: Issues, policies, and best practices* (pp. 65–78). Springer. https://www.springerpub.com/rural-mental-health-9780826107992.html

Rodriguez, M. E., Drew, C., Bellin, R., Babaian, A., & Ross, D. (2021). *Produce prescription programs US field scan report: 2010–2020*. DAISA Enterprises. https://www.daisaenterprises.com/uploads/4/4/0/5/44054359/produce_prescription_programs_us_field_scan_report__june_2021_final.pdf

Russomanno, J., & Jabson Tree, J. (2021). Assessing sense of community at farmers markets: A systematic review. *Journal of Agriculture, Food Systems, and Community Development*, *10*(2), 489–506. https://doi.org/10.5304/jafscd.2021.102.032

Seligman, H. K., & Schillinger, D. (2010). Hunger and socioeconomic disparities in chronic disease. *The New England Journal of Medicine*, *363*(1), 6–9. https://doi.org/10.1056/NEJMp1000072

Shostak, S., Kehoe, A., Black, J., & Bindman, R. (2025). Growing community, food sovereignty, and health: A case study of a farm-based produce prescription program. *Journal of Agriculture, Food Systems, and Community Development*, *14*(3), 355–370. https://doi.org/10.5304/jafscd.2025.143.016

Southerland, J. L., Zheng, S., Dodson, K., Mauck, E., Bacsu, J. R., Brown, M. J., Holloway, J., Kim, S. M., Malatyali, A., & Smith, M. L. (2024). Social isolation and loneliness prevention among rural older adults aging-in-place: A needs assessment. *Frontiers in Public Health*, *12*, Article 1404869. https://doi.org/10.3389/fpubh.2024.1404869

Stubbe, D. E. (2020). Practicing cultural competence and cultural humility in the care of diverse patients. *Focus: The Journal of Lifelong Learning in Psychiatry*, *18*(1), 49–51. https://doi.org/10.1176/appi.focus.20190041

Summers, K. (2025). *What is Veggie Rx?* Oregon State University Extension Service. https://extension.oregonstate.edu/ask-extension/featured/what-veggie-rx

Te Vazquez, J., Feng, S. N., Orr, C. J., & Berkowitz, S. A. (2021). Food insecurity and cardiometabolic conditions: A review of recent research. *Current Nutrition Reports*, *10*(4), 243–254. https://doi.org/10.1007/s13668-021-00364-2

Theeke, L. A., & Mallow, J. (2013). Loneliness and quality of life in chronically ill rural older adults. *American Journal of Nursing*, *113*(9), 28–37. https://doi.org/10.1097/01.NAJ.0000434169.53750.14

U.S. Census Bureau. (2025). *Historical population density data (1910-2020)*. https://www.census.gov/data/tables/time-series/dec/density-data-text.html

U.S. Department of Agriculture [USDA] Economic Research Service. (2024). *Six-item short form of the Food Security Survey Module*. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools

USDA Food and Nutrition Service [FNS]. (2025a). *Community eligibility provision*. https://www.fns.usda.gov/cn/cep

USDA FNS. (2025b). *WIC eligibility*. https://www.fns.usda.gov/wic/applicant-participant/eligibility

USDA National Agricultural Statistics Service [NASS]. (2022). *2022 Census of Agriculture state profile: South Dakota*. https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/South_Dakota/cp99046.pdf

USDA National Institute of Food and Agriculture [NIFA]. (2025). *Gus Schumacher Nutrition Incentive Program—Produce Prescription (GusNIP-PPR)*. https://www.nifa.usda.gov/gusnip-request-applications-resources-ppr

Villa-Rodriguez, J. A., Palafox-Carlos, H., Yahia, E. M., Ayala-Zavala, J. F., & Gonzalez-Aguilar, G. A. (2015). Maintaining antioxidant potential of fresh fruits and vegetables after harvest. *Critical Reviews in Food Science and Nutrition*, *55*(6), 806–822. https://doi.org/10.1080/10408398.2012.685631