

# Nutrition incentives in action: Exploring nutrition security and community connection in a longitudinal study

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## Abstract

In Montana, Supplemental Nutrition Assistant Program (SNAP) participants qualify for the Double

SNAP Dollar (DSD) Program funded through the U.S. Department of Agriculture's Gus Schumacher Nutrition Incentive Program (USDA GusNIP). The program aims to improve SNAP participants' diets by providing point-of-sale coupons to

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increase access to and consumption of fruits and vegetables (F&V). Our study objective was to examine the impact of the DSD program on participants' characteristics and social factors. This study used a 3-year longitudinal design and convenience sampling at Montana farmers markets where the DSD program is available. A survey instrument measured F&V consumption, food security, health status, community connection, and use of the DSD program. The GusNIP theory of change was used to analyze how the DSD program influences participant experience and community connection. While accessing the program, 60–65% of respondents reported that the amount of F&V they consumed greatly increased due to the DSD program. During the study period, 80% of respondents reported feeling connected to their community, and 75–88% felt that their purchases were making a difference in their community. Longer participation in the DSD program was also associated with higher food security. The study findings suggest that DSD is increasing SNAP participants' purchasing power for F&V, and this, combined with farmers markets' ability to foster community connection, helped spur participants' F&V intake. This study adds to the growing evidence that nutrition incentive programs empower SNAP participants to enhance their diet quality and nutrition security while improving health equity and facilitating healthy choices.

### Keywords

food security, nutrition security, diet quality, Supplemental Nutrition Assistant Program (SNAP), Gus Schumacher Nutrition Incentive Program (GusNIP), social connection, farmers markets

### Introduction

When an individual lacks access to food, whether chronic, cyclical, or episodic, it is referred to as having low food security. In the U.S., social determinants of health are related to disparities in food security status; regarding gender, female-headed households with children  $\leq 18$  experience the highest rates of low food security (33.1%), compared to all households with children  $\leq 18$  (17.3%). With respect to race/ethnicity, African Americans expe-

rience the highest rates of low food security at 22.4%, compared with non-Hispanic whites at 9.3% (USDA Economic Research Service [ERS], 2024a). Low food security can impact diet quality through increased consumption of processed and shelf-stable foods, which tend to be higher in sugar, salt, and unhealthy fats (Drewnowski & Darmon, 2005). Diets high in processed foods and the cyclical nature of not having food during certain times of the month have been linked with poor health outcomes (Drewnowski & Specter, 2004; Laraia, 2013; Leung et al., 2022) and chronic diseases, including type 2 diabetes (Levi et al., 2023). Low food security is further associated with anxiety, depression, and substance use (Ivers & Cullen, 2011; McLaughlin et al., 2012). As these health outcomes co-occur in socioeconomically disadvantaged groups, the gap in health disparities widens.

Nutrition security is a component of food security that emphasizes the role that diet quality plays in individual well-being and health while recognizing that structural and economic inequality contributes to one's ability to maintain a nutritious diet (Levi et al., 2023). Research has predominantly focused on food security, yet nutrition security is an important aspect of food security (Hwalla et al., 2016). Additional research is needed to better understand how nutrition support programs (NSP) can be enhanced to reduce health disparities and improve participants' diet quality and nutrition security including increasing consumption of F&V.

### *Nutrition Support Programs*

The U.S. Department of Agriculture (USDA) oversees the two largest NSPs, the Supplemental Nutrition Assistance Program (SNAP; formerly known as food stamps) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). These programs support 41 million and 6 million Americans, respectively, and in 2022 had a combined annual cost of US\$183 billion (USDA ERS, 2024a). These programs are effective at increasing food security (Ettinger De Cuba et al., 2019; Kreider et al., 2016; Mabli & Ohls, 2015) and have a positive economic benefit with every additional US\$1 billion in SNAP spending translating to US\$1.5 billion in gross domestic product pur-

chases (Canning & Stacy, 2019). Despite this progress, NSP participants have higher rates of processed foods consumption (Leung et al., 2022) and chronic diseases (Gearing et al., 2021).

The 2018 farm bill established (GusNIP) to improve diet quality of SNAP participants. This program provides SNAP participants with price incentives, coupons, or vouchers at point of purchase to increase access, purchase, and consumption of F&V among low-income populations. Multiple states have implemented GusNIP-funded programs. A small number of studies assessing the impacts of these programs show increased F&V purchasing among clients (Durward et al., 2019; Harvey et al., 2021; Savoie-Roskos et al., 2016) and successful implementation strategies such as same-day discounts and user-friendly systems to promote client use (Parks et al., 2023).

The GusNIP program in Montana is called the Double SNAP Dollars (DSD) program and has been operating since 2015. Montana is a rural, frontier state with just over 1 million residents. Recent state-level data indicated that 10.1% of Montana residents are food insecure and 4.6% are very food insecure, with 7.3% enrolled in SNAP and 1.2% in WIC

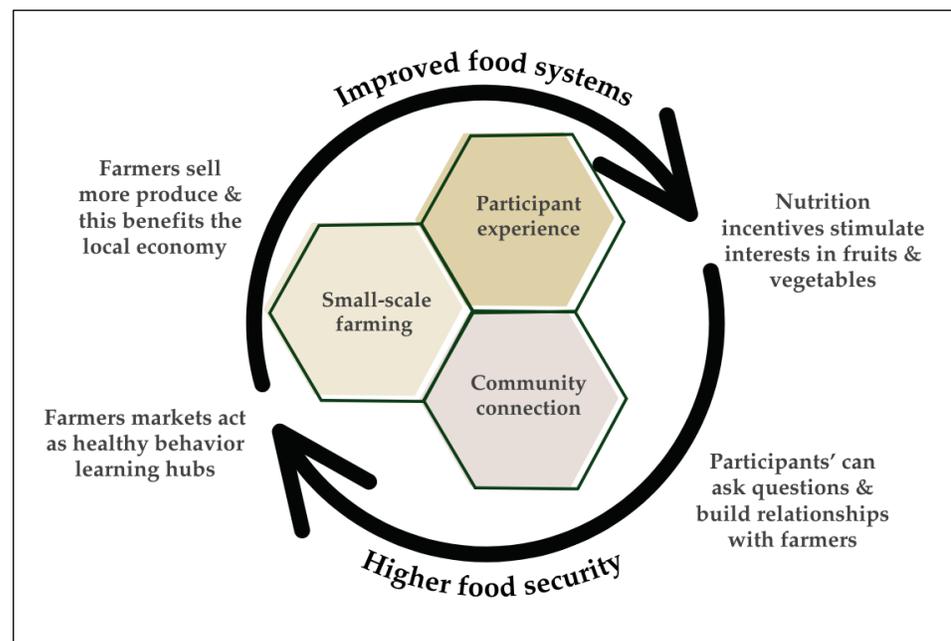
(Montana Department Public Health Human Services, 2024; USDA ERS, 2024b; USDA Food Nutrition Service [FNS], 2024). The DSD program provides matching benefits to SNAP participants who spend SNAP benefits at DSD authorized sites in Montana. These sites include farmers markets, community supported agriculture (CSA) operations and other food box programs, farm stands, and brick-and-mortar retailers. For every

dollar spent using SNAP benefits, participants earn an additional dollar in DSD up to a maximum of US\$30 per day at farmers markets, US\$5–\$10 per week at brick-and-mortar retailers, and US\$250 per season for CSAs. The DSD benefits earned by participants take the form of tokens, coupons or vouchers, accrual into loyalty accounts, or a 50% discount on produce, depending on the needs and technological capacity of the DSD site. The DSD benefits can be redeemed specifically for F&V (including legumes) or seeds and bedding plants that produce edible foods (no cash refunds are permitted). To date, there are no published studies reporting on the experiences of participants using the DSD program, or the relationship of these experiences in terms of participant F&V intake, community connection, food security, and health status.

### *GusNIP Theory of Change Overview*

The GusNIP theory of change (TOC) framework (see Figure 1) contextualizes how participants' diets will be improved by increasing purchasing power of F&V through nutrition incentives. The TOC framework operates under the assumption

**Figure 1. The GusNIP Theory of Change (TOC) Domains: Participant Experience, Community Connection, and Small-scale Farming**



Adapted from Leng et al., 2022.

that people want to eat more F&V, but experience barriers including lack of access or financial capital. The TOC encourages an inclusive shopping experience to stimulate participants' interest in purchasing F&V, particularly at farmers markets (Leng et al., 2022). Food access is often framed around built environments, but social environments (interactions with friends, family, peers, and other community members) play an impactful role in nutrition (Story et al., 2008). Studies on community connection have suggested that social support and cultural ties can improve mental and health outcomes (Tanner et al., 2022). Social gatherings can provide opportunities to model healthy behaviors, de-stress, and facilitate physical activity (Cohen, 2004; Tanner et al., 2022). Community spaces can be useful for exchanging knowledge on nutrition and maintaining healthy lifestyles (Caperon et al., 2019). There is limited research on how community connection can be leveraged to affect household food security and F&V consumption. The TOC hypothesizes that nutrition incentives provide benefits beyond the individual by supporting social connections to farmers/vendors, which affects the local economy and increases the resilience of small-scale farming (Leng et al., 2022).

To our knowledge, no studies have explored these connections by applying the TOC framework to the experience of a nutrition incentive program participant. Thus, one objective of this study was to fill this gap in the literature with a focus on DSD participants' shopping experience at farmers markets in Montana. Examining this topic can provide insight into the benefits of GusNIP programs seeking to increase food and nutrition security in their communities.

The purpose of this longitudinal study was to assess the impact of the Montana DSD program on food security, nutrition, health, and social factors among DSD participants over three years. The first objective was to understand demographic characteristics, food security, F&V intake, and health status of the DSD participants. The second objective explored DSD participant experiences and community connection through the lens of the TOC framework.

## Materials and Methods

The study protocol was approved by the institutional review boards at the University of Montana (#76-19 and #188-21) and Salish Kootenai College (#2021-12 and #2021-28).

### *Study Design and Recruitment*

A longitudinal design was applied to measure the DSD participant experiences during the three-year study. This study was conducted in partnership between the University of Montana and Farm Connect Montana (formerly Community Food and Agriculture Coalition), which oversees the GusNIP grant in Montana under the public name Double SNAP Dollars (DSD). Informed consent was obtained for all participants prior to data collection. To be eligible to participate in the study, individuals had to be aged 18 years or older and participate in the Montana DSD program.

Adult DSD participants were recruited for the survey using a convenience sampling approach. Recruitment predominantly occurred at Montana's farmers markets, with one brick-and-mortar and one CSA farm site participating in the study. Table placards and flyers describing the survey, including barcode and URL links, were displayed at farmers market stands where participants obtained their DSD tokens. The DSD participant had the option to scan the barcode with their phone or write down the URL link and/or take a flyer. The participant could access the online informed consent and survey using the barcode or URL. Paper copies of the survey were available at the market stand, and participants could complete the informed consent and survey while at the market or at home and return it by mail or by hand to researchers at the DSD market stand. Respondents received a US\$10 incentive for completing the survey.

Confidentiality was maintained by using identification numbers on the survey data collection instrument in place of names and other identifying information. A DSD participant could complete the survey each year of the three-year study; however, there was no prospective or retrospective follow-up of the participants.

Several DSD recruitment sites were located on the Flathead Indian Reservation, and so approval from the Salish Kootenai College Institutional

Review Board was required to conduct research and collect data at these locations. Data from DSD participants on the Flathead Indian Reservation was aggregated and included in the three-year dataset. In addition, location-specific data was shared back with the community for the last two years through presentations at the Arlee Food Sovereignty Summit and informational brochures available at each DSD recruitment site.

### *Data and Instrumentation*

The 28-item survey was only available in English, and included questions about demographics, F&V consumption, food security, health status, community connectivity, shopping habits, access to Montana-grown and -made products, and use of the DSD program. Survey items (17 items) focused on F&V intake, food security, and health status were developed by the national Nutrition Incentive Program Training, Technical Assistance, Evaluation, and Information Center. The six-item short form of the Food Security Module, validated by the USDA, was used to measure food security in this section (USDA ERS, 2012). Respondents were scored as having high, marginal, low, or very low food security status. The remaining focus areas included 11 survey items developed by the Montana DSD team, including the program director and manager, statewide steering committee members, and project evaluation team. These items

included both closed and open-ended questions, intended to yield detailed, contextualized information.

### *Data Analysis*

Data were inputted into a Microsoft Excel spreadsheet, proofed for accuracy, and subjected to edit and logic checks to ensure data integrity and quality. Frequencies and descriptive statistics were calculated for each year, including means, SDs, medians, and interquartile ranges. Scales were developed from the food security questions following instructions provided by the USDA and respondents were categorized based on their responses with 1 = High Food Security, 2 = Marginal, 3 = Low, and 4 = Very Low food security (USDA ERS, 2012). For data analyses, Fisher’s Exact test was used to compare two categorical variables, ANOVA was used to model a continuous variable using a categorical one, and proportional odds logistic models were used for ordinal responses.

The survey results for each year of the study were organized into two main groups, participant characteristics and the GusNIP TOC domains. The participant characteristics included respondents’ demographic, health status, F&V intake, and food security scales. The GusNIP TOC items were grouped for interpretation within the TOC domains of participant experience and community connection (see Table 1). Although the study ques-

**Table 1. U.S. Department of Agriculture Gus Schumacher Nutrition Incentive Program (USDA GusNIP) Theory of Change Domains**

Participant Experience	Community Connection
<b>Closed-ended Questions (yes/no response, multiple choice, Likert scales)</b>	
<i>“Overall, how would you rate your experience with the DSD program?”</i>	<i>“How did you hear about Double SNAP dollars?”</i>
<i>“As a result of using DSD at the farmers market, the amount and variety (or different kinds) of fresh fruits and vegetables I have eaten has...”</i>	<i>“Shopping at the farmers market gives me a sense of belonging to my community.”</i>
<i>“How long have you been using DSD to get fruits and vegetables...”</i>	<i>“My food purchases at the farmers market can make a difference in my community.”</i>
<b>Open-ended Question</b>	
<i>“In what ways, if any, does DSD help you learn more about local foods and farmers?”</i>	

Note: This is a table of survey questions that map directly to the GusNIP Theory of Change (TOC) domains.

tions were not originally developed according to the GusNIP TOC framework, several of the items aligned with TOC domains.

Fisher Exact tests and analysis of variance were used to assess the pairwise relationships between measures of demographics, health, F&V consumption, community connection, participant experience, and food security status. We used proportional odds logistic regression to compare the proportion of respondents in poor, fair, good, very good, and excellent health for each of the six ordinal health measures with respect to community connection, participant experience, food security, effects on the local economy, and changes in the amount and variety of F&V consumed. All respondents were included in the analyses; if a respondent chose “prefer not to answer” or skipped a question, their response was excluded from analysis of that question and recorded as a missing response. Missing responses ranged from 0 to 14. Quantitative analyses were conducted in R,

version 4.1.2. Qualitative thematic analysis was performed on responses to the open-ended question (Elo & Kyngäs, 2008).

## Results

This section first presents an overview of participant demographics, followed by results organized into two main sections: (1) participant characteristics relationships to health status and food security, and (2) findings aligned with the GusNIP TOC domains: participant experience and community connection.

### *Participant Demographics*

During the three-year study, 372 DSD participants completed the survey and 48% of the respondents were from two farmers markets located in the city of Missoula, Montana. Participant demographic data are presented in Table 2. Ages ranged from 18 to 89 years (mean age 41); the age distribution was normal and consistent from year to year. The num-

**Table 2. Participant Demographics for Each Survey Year**

	Year 1 (2020–2021)		Year 2 (2021–2022)		Year 3 (2022–2023)	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
<b>Age (years)</b>						
18–29	10	16.9	15	14.4	22	14.9
30–49	36	61	71	68.3	89	60.1
50–69	12	22.2	10	9.1	23	15.6
70–89	1	0	4	3.9	14	0.7
<b>Gender</b>						
Female	21	34.4	55	35.3	67	45.3
Male	39	63.9	94	60.3	74	50
Nonbinary	1	1.6	3	1.9	7	4.7
<b>Race/Ethnicity</b>						
African American	15	24.6	40	25.6	30	20.3
American Indian/ Alaska Native	0	0.0	5	3.2	2	1.4
Asian	0	0.0	2	1.3	3	2.0
Hispanic	0	0.0	8	5.1	15	10.1
White	43	70.5	98	62.8	99	66.9
Other	0	0.0	2	1.3	3	2.0
<b>Total</b>	<b>61</b>		<b>163</b>		<b>148</b>	

ber of male participants was higher than female participants across all three years (see Table 2).

*Health status and food security relationship to participant characteristics*

Participant characteristics included gender, length in program, and reported DSD importance to shopping at farmers markets. These factors were examined with health and food security status.

- The majority of respondents (94% to 97%) ranked their health status as excellent, very good and good across all three years. There is no evidence of a difference in the percentage of respondents who ranked their health status as excellent, very good or good across the three survey years ( $p = 0.396$ ) (see Table 3).
- The percentage of respondents who experienced high food security status, decreased from 85% to 80% to 61% from Years 1–3. There was a higher percentage of respondents indicating the lowest security status in Years 2 and 3 (see Table 3).
- Better reported health was significantly associated with higher food security scores across all three years ( $p = 0.004$  Year 1;  $p <$

0.00001 Year 2;  $p = 0.00004$  Year 3).

- Males were more likely to report being in excellent or very good health compared to females; this finding was significant across all three years ( $p = 0.00025$  Year 1;  $p = 0.00005$  Year 2;  $p = 0.0049$  Year 3).
- Males reported experiencing higher food security than females in Years 2 and 3 ( $p = 0.00005$ ;  $p < 0.00001$ , respectively).
- Further, those who used DSD for a longer period were more likely to experience higher food security, especially in Years 2 and 3 ( $p = 0.067$  Year 1;  $p < 0.00001$  Year 2;  $p = 0.005$  Year 3).
- Of the 20% of participants who responded “Yes” to the questions, “In the last 30 days, did you ever eat less than you felt you should because there wasn’t enough money for food?” and “In the last 30 days, were you ever hungry but didn’t eat because there wasn’t enough money for food?”, the majority answered that the DSD program helped lower their worry about running out of food, with this sentiment growing stronger between Years 1–3.
- Respondents with higher food security status positively corresponded to responses

**Table 3. Participant Health Status and Food Security Status Results by Year**

	Year 1 (2020–2021)		Year 2 (2021–2022)		Year 3 (2022–2023)	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
<b>Health Status</b>						
Excellent	11	18	29	18.6	29	19.6
Very Good	35	57.4	87	55.8	68	45.9
Good	13	21.3	26	16.7	41	27.7
Fair	2	3.3	9	5.8	6	4.1
Poor	0	0	2	1.3	4	2.7
<b>Food Security Status <sup>a</sup></b>						
(High) 1	52	85.2	131	80.4	91	61.5
(Marginal) 2	3	4.9	11	6.7	24	16.2
(Low) 3	4	6.6	5	3.1	19	12.8
(Very Low) 4	2	3.3	16	9.8	14	9.5

<sup>a</sup> Calculated from responses to the six-item short form of the Food Security Module (U.S. Department of Agriculture, Economic Research Service, 2012).

that DSD benefits were “Very Important” to the decision to shop at farmers markets, especially in Year 2 ( $p = 0.061$  Year 1;  $p = 0.00002$  Year 2;  $p = 0.014$  Year 3).

***GusNIP Theory of Change Framework Domains***

The following results include survey responses organized under the GusNIP TOC domains: participant experience and community connection.

*Participant experience domain*

This domain’s results include specific questions about respondents’ experience and longevity in the program and changes in the amount and variety of F&V purchased. Participants provided additional context through open-ended responses.

- Respondents consistently indicated having a “Very Positive” experience with the DSD program (approximately 80%), and there were no negative responses.
- The majority of respondents (approximately 70%) had been accessing the program for over one year.

- Participants reported an increase in DSD importance in their decision to shop at a farmers market across the three-year study (26%, 30%, 55%), respectively.
- When asked whether the DSD program changed the amount and variety of F&V they ate (see Table 4), respondents reported an increase in the amount of F&V (~60-65%), and results were consistent from year to year (Fisher’s Exact test  $p = 0.354$ ).
- Similarly, participants reported an increase in the variety of F&V (58-72%).
- Zero participants reported that the variety of F&V decreased, and there is no evidence of a difference in the proportion of respondents reporting that the variety of F&V decreased across the three years (Fisher’s Exact Test,  $p = 0.254$ ) (see Table 4).

Thematic results from the open-ended question that aligned with this domain contextualized how DSD influences the farmers market shopping experience by acting as an access point for partici-

**Table 4. Participant Responses by Year for the Question of Whether the Amount and Variety of Fruit and Vegetable Consumption Increased Due to the Double SNAP Dollar (DSD) Program**

*“As a result of using Double SNAP Dollars at the farmers market, the amount and variety of fresh fruits and vegetables I have eaten has...”*

	Year 1 (2020–2021)		Year 2 (2021–2022)		Year 3 (2022–2023)	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
<b>Amount</b>						
Increased Greatly	40	65.6	90	58.4	95	64.2
Increased Some	19	31.1	50	32.5	50	33.8
Stayed the Same	2	3.3	9	5.8	2	1.4
Decreased Some	0	0	1	0.6	0	0
Decreased Greatly	0	0	0	0	0	0
<b>Variety</b>						
Increased Greatly	44	72.1	86	58.4	90	60.8
Increased Some	15	24.6	55	32.5	54	36.5
Stayed the Same	2	3.3	7	5.8	3	2
Decreased Some	0	0	0	0	0	0
Decreased Greatly	0	0	0	0	0	0

pants to talk to farmers, ask questions, and try new locally grown foods.

*Spending Double SNAP starts conversation. For example, when I'm looking for something new to try and buy, I like to talk to different farmers, whether it be for recommendations, samples or questions about their business.*

*Farmers are able to introduce me to the foods that they grow. I wouldn't have thought about talking to them without the increased spending limit.*

*I'm more enticed to seek out new and interesting local foods. I've been experimenting a lot with different recipes and I like to talk to different farmers to see if anything they grow can help my dish.*

### Community connection

This domain assessed how participants learned about DSD, whether they felt a sense of belonging while shopping at farmers markets, and whether their purchases made a difference in the community. Participants provided additional context through open-ended responses.

- The majority of respondents (40%) learned about DSD at the farmers market, followed by friends and family (30%), via the internet (~15%), from SNAP (~15%), or other social services (~10%).
- When examining participants' community connection, approximately 80% of respondents "Strongly Agreed" that they felt a sense of belonging while shopping at farmers markets and this was consistent across all three years (Fisher's Exact Test  $p = 0.916$ ).
- Similarly, 75-88% of respondents "Strongly Agreed" that their food purchases made a difference in their community, and 0 respondents disagreed across the three years, with responses consistent between years (Fisher's Exact Test  $p = 0.270$ ).
- For all three years there was strong agreement between the level at which participants felt a sense of belonging and the level of agreement that their purchases

made a difference in the community.

- In Year 3, those who indicated that DSD had high importance in their decision to shop at a farmers market were more likely to have strong agreement to the community connection questions. However, this trend was not observed in Year 1 or 2.
- There was no evidence of association between health status and community connection in any of the study years.

Thematic results from the open-ended responses that aligned with this domain contextualized how participants felt connected to their community or to farmers because of DSD benefits. This included enjoyment in supporting the regional economy, local farmers, and the interest to share the experience with others.

*The more I have to spend helps me have more choices in which vendors I buy from [and] I get to talk to the farmers so I feel more connected to community.*

*Build relationships with farmers. Let my kids help pick out foods.*

*I always spend a little time chatting with my favorite vendors—the Russians, the Syrian, and the local farmers and families who now bring some of their meat directly to market. I like to hear where they are from, and how they got started. Stories like my grandparents who travelled and homesteaded in Central Montana. They are pioneers and innovators.*

### Discussion

Low-income communities and SNAP households face difficulties maintaining and accessing nutritious diets. Nutrition programs like SNAP have helped low-income households get basic food necessities, but the overall quality of diets in participants has decreased. Nutrition security recognizes that environmental and social structures influence one's diet and its sequential role in chronic disease. However, there is limited research on how to apply nutrition security in public health practice. Programs such as DSD have emerged with the potential to improve the diets of low-income households through increased purchasing power and commu-

nity connection. The TOC framework provides insight into nutrition incentive programs' mechanisms for supporting individual and community-level changes towards nutritious diets and benefits to the local economy and small-scale farming. Our study results support these mechanisms by expanding knowledge on the DSD participants, their experiences, and how access to nutrition incentives at farmers markets helps spur dietary changes and F&V intake.

### ***Participant Characteristics: Demographics, Health Status and Food Security***

The study sample included higher representation of minority groups (30–37%) compared to the general population of Montana (16%) (U.S. Census, 2024). This may be due to the higher prevalence of low food security in minority groups, and therefore, they make up a higher proportion of DSD participants. It could also be because 48% of respondents lived in a college town in an urban area in Montana, which might be attractive to minority groups. Why the representation of minority groups and respondents was higher than the general population in this study could be further understood by the TOC framework that suggests that by removing the financial burden through nutrition incentives minority groups may feel more confident accessing farmers markets and thus, increase their participation rates in DSD.

More males completed the survey (50–64%), which was surprising as women typically make up a larger share of customers at farmers markets (Becot et al., 2020). The higher participation of males may be due to similar factors that led to a higher share of minority representation in the study sample, such as recruitment occurring in a college urban area of Montana. Further, the study occurred during the COVID-19 pandemic, when males may have been less hesitant than women to shop at farmers markets. However, we are unaware of any research supporting these inferences, and more research is needed to understand these findings. Males also reported higher food security and better perceived health. A cross-sectional study of nutrition incentives in Michigan found that males had higher reported health and F&V intake than females (Parks et al., 2021). However, additional

research would be beneficial to further understanding the demographics of DSD participants.

Respondents reported that DSD helped lower their worry about running out of food, and that nutrition incentives were an important factor in their decision to shop at farmers markets. Further there was a strong association in years 2 and 3 between participants' length in the program and higher food security. These indicators suggest that program access and duration have a positive effect on participants' food security. This is supported by other nutrition incentive studies, where longer program participation was associated with increased F&V intake and food security (Parks et al., 2021).

### ***Participant Experience***

A primary goal of the GusNIP program is to increase purchasing power and consumption of F&V. According to the GusNIP TOC, an inclusive shopping experience at farmers markets is important to achieve this outcome as it fosters interest in F&V. Our results suggest that this is occurring for the Montana DSD participants. Respondents reported an overall positive opinion of the DSD program, and ~95% reported that the F&V amount and variety they ate increased while using the program. The open-ended response further contextualized this finding, as participants described how DSD helped them start the conversation and explore new foods. Thus, DSD created an environment where farmers acted as innovators and participants as adopters, exchanging information about nutritious, locally grown foods in a safe and nonjudgmental manner. This supports previous suggestions by food security experts that nutrition education for SNAP clients could be enhanced using community-based organizations (Leung et al., 2013). Additionally, studies on the farmers market patronage found that participants trust vendors' knowledge and have greater confidence that their products are healthier and fresher than supermarkets (Norton et al., 2022). This trust within an interactive shopping environment and the DSD participants' increased purchasing power contributed to the program goal of increasing F&V consumption.

Some cross-sectional studies have found an association between nutrition incentives and

increasing F&V intake (Durward et al., 2019; Harvey et al., 2021; Parks et al., 2021; Savoie-Roskos et al., 2016); this study echoes these findings. Yet, results from experimental studies exploring these relationships are mixed; while two experimental studies found that nutrition incentives increased F&V intake among participants (Basu et al., 2019; Olsho, Klerman et al., 2016), others found no difference between groups (Aktary et al., 2023). Additional research is needed to further understand the effect of nutrition incentive programs on F&V consumption in program participants.

Another factor in nutrition incentives and F&V consumption may be the study and measurement collection period. Behavioral changes such as adopting nutritious diets require time, small incremental modification, and are influenced by a range of factors including a person's self-efficacy for change (Hills et al., 2013). The majority of survey respondents in this study reported using the program for at least one year. Longer participation in the DSD program may increase the opportunity for individuals to make long-term changes in their F&V intake and facilitate dietary change. The F&V intake results were determined by two questions and contextualized through the open-ended responses. However, a DSD participant could complete the survey each year of the three-year study and there was no prospective or retrospective follow-up, making it difficult to determine changes to F&V intake in a specific participant. Additional research that utilizes a longitudinal prospective design and more rigorous dietary recall measures will enable a better understanding of the influence DSD has on participants' F&V consumption.

### ***Community Connection***

Findings on community connection suggest that DSD participants felt a sense of belonging while using nutrition incentive benefits at farmers markets and that their purchases made a difference in the community. These findings are similar to the few existing studies on this topic. For example, a marketing study of farmers markets in California found that 55% of participants believed that the markets increased their connection to the commu-

nity and 99% felt that the market increased the health of the community (Market Umbrella, 2008). The open-ended responses in this study further contextualized these findings, as multiple participants stated that talking with DSD vendors made them feel more connected to the community. Others described a fellowship with vendors as they compared the farmers' background to their familial history as homesteaders. A qualitative study found similar results, as participants described farmers markets as not just a place to shop but a social event where people can relax and connect with others (Bomba, 2018).

Overall, these findings demonstrate how nutrition incentive programs at farmers markets can foster community connection. Other studies have suggested that community gathering places can be used to informally exchange information about healthy eating habits and may be more effective at stimulating long-term behavioral change (Caperon et al., 2019) with a cohort study demonstrating that good and poor food choices are influenced by our relationships (Pachucki et al., 2011). Studies specific to community connection have found that social ties help to buffer stressors and build resilience (Tanner et al., 2022). Our findings suggest that farmers markets act as a communal space to stimulate public discussion and awareness about nutritious diets. Moreover, the DSD program is facilitating positive social interactions between participants and the community, which may benefit participants' well-being and continued interest in healthy behaviors. While this may seem intuitive, to our knowledge this is the first study to formally assess the influence of community cohesion within DSD participants at farmers markets on the decision to buy and consume F&V.

Lastly, the majority (~70%) of respondents in Montana learned about the DSD program from farmers markets or through friends and family. This finding follows the contemporary understanding of how information is disseminated through social networks, as individuals are more likely to adopt new ideas from trusted sources (Dearing, 2009). However, if a SNAP participant is not already shopping at the farmers market or has fewer social connections, they may be unaware of the nutrition incentive services available to them. A

study of GusNIP programs have found awareness to be a barrier, with only 31% of eligible individuals who lived near a nutrition incentive-sponsored retailer aware of the program (Vericker et al., 2019). Thus, less socially connected SNAP participants may benefit from widespread advertising by the Office of Public Assistance and other local social services. Marketing techniques should leverage social networks and community hubs to increase trust and awareness of nutrition incentive programs.

### ***Limitation and Strengths***

An important strength of this study was the repeated time points for data collection; study data were collected from 372 participants over a three-year period (2020–2023), providing an opportunity to analyze trends and helped to strengthen inferences. This study was novel in linking program outcomes to the GusNIP TOC framework, which contextualizes how nutrition incentives can improve individual eating habits and sustainability within food systems. Study limitations include the longitudinal design, which did not include control or comparison groups, and did not prospectively follow survey participants during the study period. Participants were asked only two questions about F&V consumption, and responses were self-reported. Future research exploring these topics can be strengthened by using a prospective experimental design and more rigorous dietary intake measures (e.g., 24-hour recall methods). Another limitation was the geographic concentration of study responses; almost half of the survey respondents were located at two farmers markets in one urban area, and the study was conducted in only one rural state in the U.S. These factors limit the generalizability of the findings.

This study did not examine barriers SNAP participants experience when accessing the DSD program or their associated attributes, such as food security, health status, and community connectivity. Informal feedback from market staff suggests that those who chose not to participate in the program generally were not at the market to purchase DSD-eligible foods. Future research could explore strategies to increase participation, which could provide valuable information for future GusNIP

program development. Further, the perspectives of vendors and food retailers were not included in the study, and their viewpoints could have been helpful to understanding the GusNIP programs' effect on small businesses and potential barriers. The TOC framework anticipates that small-scale farmers will benefit from nutrition incentive programs by creating a larger customer base. To better understand whether this is occurring and the broader impacts of nutrition incentive programs on the local economy, additional research that focuses on the experience of vendors and economic impact analyses are needed.

Despite these limitations, the study findings may provide insight to other GusNIP-funded programs, researchers, and policymakers seeking to improve nutrition and food security in their community, as well as provide suggestions to enhance the SNAP participant experience at other nutrition incentive program vendors, including brick-and-mortar.

### **Conclusion**

This study advances understanding of the DSD participant experience, and structures outcomes of the DSD nutrition incentive program within the broader theoretical framework of the GusNIP TOC. Our findings suggest that increased purchasing power for F&V and engagement at farmers markets may serve to build community connection and create a trusting and interactive shopping experience among low-income groups. This may in turn spur participant interest in a nutritious diet and improve food and nutrition security. This study adds to the growing body of evidence that nutrition incentive programs provide low-income individuals and families with an opportunity to enhance their diet quality, reducing risk for chronic disease and contributing to long-term well-being. 

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