UIC PUBLIC HEALTH
Policy, Practice and Prevention Research Center

P3RC RESEARCH BRIEF
NO. 139
NOVEMBER 2024

Design of the What's On Your Plate SNAP Study

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Key Takeaways:

- **This research brief describes the design and baseline descriptive characteristics for the *What's On Your Plate* study, a statewide evaluation examining the effect of the *Eat Well, Be Well* incentive program on fruit and vegetable intake in RI using a difference-in-differences approach with CT serving as a comparison site.**
- **Multimodal recruitment methods including leveraging community partnerships, text blasts, and study team involvement at multiple community events helped recruit a diverse sample of more than 1,300 participants between RI and CT for this longitudinal analysis.**
- **Prior to the implementation of the *Eat Well, Be Well* incentive program, participants had relatively high dietary quality as measured by the Healthy Eating Index-2015 (63.9 ± 11.6 (mean ± SD)), with subcomponent scores for total fruits and vegetables of 4.0 ± 1.5 and 4.0 ± 1.2, respectively.**

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Introduction

The Supplemental Nutrition Assistance Program (SNAP) was designed to reduce food insecurity and promote better nutrition-related outcomes among low-income households. Families with household incomes at or below 130% of the poverty line are eligible to receive monthly supplemental income to help cover food costs.[1] While the amount each family receives varies based on need and household size, benefits assume that families will still spend 30% of their net income on food; SNAP benefits are intended to cover the difference between a household's contribution and the cost of the Thrifty Food Plan, which is the lowest cost nutritionally adequate food plan developed by the USDA. Nonetheless, research indicates that these benefits are often insufficient to cover monthly food expenses,[1,2] and a gap in overall diet quality remains between SNAP participants and non-participants.[3] In response, numerous programs have sought to improve diet quality and reduce the gap, with one of the most common strategies being the provision of incentives for purchasing fruits and vegetables (F&V).

Prior studies demonstrate the effectiveness of providing subsidies for F&V to SNAP households.[4-6] However, most studies have offered subsidies only to a small proportion of eligible individuals, limiting the generalizability of the findings. One of the largest and most comprehensive studies of F&V subsidies, the *Healthy Incentives Pilot,* was conducted in Massachusetts and provided direct financial incentives to SNAP participants for purchasing F&V.[7] The study found that these incentives significantly increased both the purchase and consumption of F&V among participating households;[7,8] however, the program was time-limited and did not expand statewide, raising questions about the scalability and sustainability of such interventions. Additionally, while the *Healthy Incentives Pilot* demonstrated success, its limited scope suggests a need for additional research to assess the impact of similar programs on a larger scale and in diverse settings across the country.

One such program was launched statewide on January 23, 2024, in Rhode Island (RI). The *Eat Well, Be Well (EWBW)* program is automatically delivered to all SNAP households in RI and provides a $0.50 credit directly to each participant's EBT card for every dollar spent, up to $25.00/month, on *fresh* F&V at participating retailers.[9] The program will continue until the $11.5 million dollars allocated for the benefits has been spent. To date, all Stop & Shop and Walmart grocery stores in RI participate. At present, online transactions do not count, nor

does fresh produce that is purchased in non-participating stores or across state lines. Despite some restrictions, this is the first statewide program to widely subsidize F&V purchases for SNAP households, with the potential to increase SNAP benefits for the 1 in 8 residents (~140,000 people) who participated in SNAP in fiscal year 2022.[10]

This research brief describes the design of the *What's On Your Plate* study, which aims to evaluate the effect of the *EWBW* incentive program on F&V intake in RI using a difference-in-differences approach with Connecticut (CT) serving as a comparison state. Evidence from this large-scale evaluation on impacts of the *EWBW* program on F&V consumption and diet quality among low-income households will help to inform the development of future state and larger national F&V incentive policy.

Methods

POPULATION

Prior to the launch of *EWBW* (January 2024), research assistants recruited a target sample of 1,250 SNAP participants, between May – September 2023, with an equal distribution between RI (intervention site) and CT (comparison site). The target sample size was based on being able to detect a 0.25 cup difference in F&V intake between intervention and comparison sites assuming 20% attrition at follow-up 6-months post-intervention. Actual recruitment exceeded this target with a total of 1,363 SNAP participants, including 672 in RI and 691 in CT.

Inclusion criteria: Participants were required to be at least 18 years of age, speak English or Spanish, be current SNAP participants, live in RI or CT, have access to email and a phone that receives text messages, and provide consent.

Participants were recruited via numerous methods to ensure broad outreach. Initially, the study team engaged with community partners to explain the study and the recruitment process. Following these meetings, eight community partners between RI and CT received recruitment packages from the study team. These packages included a comprehensive guide, recruitment flyers, and single-use QR code flashcards designed to facilitate participant sign-ups. In addition to leveraging community partners, the study team sent text message blasts directly to Women, Infants, and Children (WIC) program participants to reach eligible individuals. The study team also attended various community events such as vaccine clinics, mobile food pantries, and health fairs to recruit potential eligible participants in-person.

DESIGN/FLOW

All participants first completed a brief screening questionnaire via a Qualtrics survey to confirm eligibility. Participants who were deemed eligible and unlikely to be a duplicate or bot (detailed below) were directed to complete a food frequency questionnaire (FFQ) via VioScreen[11] and a sociodemographic survey (~45 minutes–1 hour) via a Qualtrics survey. Both the questionnaire and FFQ were evaluated in an automated manner for data quality prior to participants receiving the study incentive (a $50 gift card), with research assistants employing additional quality assurance measures for suspicious entries. Participants who failed any quality assurance checks were contacted by research assistants a minimum of 3 times for follow-up via phone.

SURVEY MEASURES

Participants self-reported household characteristics including marital status, housing status, household composition, and participation in other national (e.g., WIC, National School Lunch Program, Medicaid or Medicare) and regional (e.g., RI Food on the Move) assistance programs. Participants were also asked about their length of time on SNAP, race/ethnicity, country of origin, length of time in the US, language spoken at home, self-reported health status, and any dietary changes made because of a health-related diagnosis.

Participants were queried about their household's grocery shopping habits over the prior month if they were one of the primary shoppers for their household or were able to report on their household's usual grocery shopping over the past month, including questions about where they shopped (e.g., supermarket/grocery store, wholesale, small grocers, convenience stores, dollar stores, online, food pantries) and how often (never, sometimes, about half the time, most of the time, always). Participants were also asked about their perception of the food environment using questions adapted from the Gus Schumacher Nutrition Incentive Program (GusNIP) optional modules related to perception of how easy it is to access F&V, their appeal, and their variety.[12]

Measures from GusNIP were used to help understand access barriers for grocery shopping (e.g., transportation options); follow-up questions asked about frequency for any barriers that were selected. A separate 1-item question queried barriers specific to buying and preparing F&V.

The U.S. Household Food Security Survey Module six-item short form was used to assess food security over a 30-day reference period.[13] A single, previously used validated item adapted for a 30-day reference period was used to assess nutrition security (i.e., "in the last 30 days we worried that the food we were able to eat would hurt our health and well-being").[14]

Dietary Assessment: Usual dietary intake was assessed via a validated 155-item, 3-month semi-quantitative FFQ administered by VioScreen. The online VioScreen uses graphics and branching logic (e.g., participants are only queried for detail on foods they report consuming) to estimate usual intake and dietary quality. For this study, we used the Healthy Eating Index (HEI)-2015 measure of dietary quality.[15,16] Briefly, the HEI-2015 is comprised of 13 subcomponents and scored out of 100 points, with higher scores indicative of a dietary pattern that aligns with the U.S. Dietary Guidelines for Americans.[15,16] VioScreen takes approximately 20–25 min to complete, which reduces participant burden compared to other methods.[11,17]

DATA INTEGRITY

Numerous methods were used to reduce fraud and duplicates. Given the online nature of the survey and the relatively large incentive, there was risk of bots and duplicate entries. We employed a variety of strategies to prevent such responses:

To prevent duplicates:

- We set up an Amazon Web Services application programming interface (API) that detected duplicate phone numbers and/or emails. Any repeated entry was flagged and held. Duplicate flags could only be passed by the study coordinator after speaking to the participant on the phone and confirming that the person had not already completed baseline data collection.
- We used Qualtrics' built-in function "RelevantID" during large-scale text messaging (to WIC participants) to filter out duplicates. This technology checks if the respondent is taking the survey multiple times or whether a survey taker is fraudulent by analyzing a user's browser, operating system, and location to provide a fraud score. However, because RelevantID tended to flag legitimate respondents (particularly those using public wireless networks at community partner sites), this feature was turned off and only used in text blasts.

To prevent bots:

- All participants were required to complete a text verification step (i.e., a form of two-factor authentication) as this is known to reduce potential bots. Participants were unable to take the survey if they did not complete text verification or if they failed text verification.
- Qualtrics' built-in reCAPTCHA was used to detect bots. Briefly, this tool asks users to complete a task that is simple for humans to solve but challenging for bots (e.g., select squares on an image that contain a bicycle).
- Geotags were also used to detect bots. During text-blasts, participants were held if their geotag was outside of Rhode Island, Connecticut, or nearby states. Participants that were held due to incorrect geotags were alerted to reach out to the research staff; participants were only passed after their zip code was confirmed via a phone call.
- Open-ended answers were also used to prevent bots from submitting data. Bots often provide nonsensical answers and write "Facebook" or "social media" for how they learned about the study. Since the study was not promoted on social media, open-ended responses that mentioned Facebook or social media were largely filtered out as potential bots. Research assistants manually followed up with any filtered respondents to determine if they were bots or legitimate respondents.
- All participants were required to report their age on the screener and date of birth on the sociodemographic questionnaire. Any participant with a difference of >1 year between the screener and questionnaire was flagged for quality assurance follow-up. Similarly, participants were asked about SNAP participation in both the screener and sociodemographic questionnaire in various formats and discrepancies were flagged by a research assistant.
- Lastly, research assistants followed up with any participant who did not meet data quality checks. Based upon a validation study for VioScreen,[18] participants were flagged if they took <10 minutes or reported values outside of approximately twice the *a-priori* criteria commonly applied to FFQs (< 600 kcals or > 10,000 kcals). Research assistants completed the FFQ again with flagged participants via the phone or Zoom. Additionally, participants flagged with duplicate IP addresses and/or other identifiers (including date of birth) during high-volume periods were called. Participants who could not be reached after at least 3 attempts were unenrolled. A subset of participants (3.5%) were randomly called to confirm that they were not bots.

TABLE 1 Selected Characteristics of Sample of Rhode Island and Connecticut SNAP Participants, 2023 (N=1,234)

	N (%) or Mean (Standard Deviation)	
Age	35.4	11.7
Female	1139	92.3
Race/Ethnicity		
Hispanic	529	42.9
Non-Hispanic American Indian or Alaska Native	6	0.5
Non-Hispanic Asian	21	1.7
Non-Hispanic Black or African American	197	16.0
Non-Hispanic Multiple Race	75	6.1
Non-Hispanic Native Hawaiian or Other Pacific Islander	1	0.1
Non-Hispanic Other (Cape Verdean, Italian, Jewish, Portuguese, human, unspecified)	8	0.6
Non-Hispanic Unknown Race	8	0.6
Non-Hispanic White	389	31.5
Mostly speak English at home	964	78.1
U.S. Born	933	75.6
Educational Attainment		
Less than grade 12	171	13.9
Grade 12 or GED	439	35.6
Some college or trade school	429	34.8
College graduate or higher	195	15.8
Employment		
Employed full-time (30+ hr/wk)	284	23.0
Employed part-time (1-29 hr/wk)	280	22.7
Not employed, seeking employment	296	24.0
Not employed, retired, disabled, stay-at-home, student	374	30.3
Marital Status		
Married or living with a partner	340	27.6
Never married, divorced, widowed, separated	830	67.3
Prefer not to answer	64	5.2
Total Household Size	3.7	1.6
Age 0-5 years	1.1	0.9
Age 6-17 years	0.8	1.0
Age 18-64 years	1.7	1.0
Age 65 years or older	0.1	0.4
Household Living Situation		
Housing where pay to stay (e.g., rent)	937	75.9
Housing where own (outright or have a mortgage)	153	12.4
Friend's or family's housing (do not pay rent)	92	7.5
Shelter, safe haven, or transitional housing	37	3.0
Other (car or vehicle, unsheltered, or other)	15	1.2
SNAP Participation Duration[1]		
< 1 year	289	25.2
> 1 year	860	74.8
Participation in Programs Other than SNAP[1]		
Women, Infants, and Children	872	71.3
Medicaid/Medicare	789	64.5
Free/Reduced-Price School Lunch	454	37.1
Food Banks	293	24.0
Other (Disability, CACFP, UI, TANF)	370	30.3
Food Insecure[2]	712	57.7
Nutrition Insecure[3]	370	30.0

Results

Figure 1 presents participant enrollment and attrition for the baseline sample. A final pooled sample of 1,234 participants (including 613 in RI and 621 in CT) were included in the baseline sample after excluding implausible energy intake (defined here as ≤500 kcal, ≥5500 kcal, or ≤25 different foods from the FFQ) and/or missing data on covariates; energy intake cutoff criteria were liberalized compared to previous studies using VioScreen, which typically excludes individuals with total daily intake of <1000 kcal or >4500 kcal and/or who report <25 different foods,[19] based on considerations for the population surveyed (SNAP participants) and high prevalence of food insecurity.[20]

Table 1 details selected characteristics of the baseline sample. Respondents had a mean age of 35.4 years, 92% were female, and 43% identified as Hispanic. More than 75% of the sample was born in the U.S. and participants reported mostly speaking English at home (78%). More than 50% had some college or trade school with 46% employed part- or full-time. Mean household size was 3.7± 1.6 individuals (mean ± SD), and 76% of participants were living in housing where they paid to stay. Many participants reported food insecurity (58%), with 75% of respondents participating in SNAP for >1 year and most reporting participation in other assistance programs.

As shown in **Table 2,** baseline diet quality as measured via the HEI-2015 was 63.9 ± 11.6. Mean HEI scores for total fruits and vegetables were 4.0 ± 1.5 and 4.0 ± 1.2, respectively. **Figure 2** is a radar plot that visualizes the adequacy and moderation sub-scores; participants are furthest from dietary recommendations for sodium, whole grains, and fatty acids.

CACFP Child and Adult Care Food Program
NH non-Hispanic
SNAP Supplemental Nutrition Assistance Program
TANF Temporary Assistance for Needy Families
UI unemployment insurance

1. Missing data: SNAP participation duration (N=1149), Participation in other programs (N=1223).
2. Food security status is defined using the 6-item USDA Food Security Survey Module. Responses in the affirmative (i.e., often, sometimes, yes, almost or some months) were assigned a 1 (versus 0). A score of 0-1 = high or marginal food security; 2-4 = low food security; 5-6 =very low food security. Food insecure is dichotomized as score of 0-1 (food secure) versus 2-6 (food insecure).
3. Nutrition security status was queried using the 1-item measure developed by the Center for Nutrition and Health Impact.[14] Nutrition insecurity was defined as responding sometimes, often, or always to the question, "In the last 30 days, we worried that the food we were able to eat would hurt our health and well-being."

FIGURE 1 **Participant Flow Diagram**

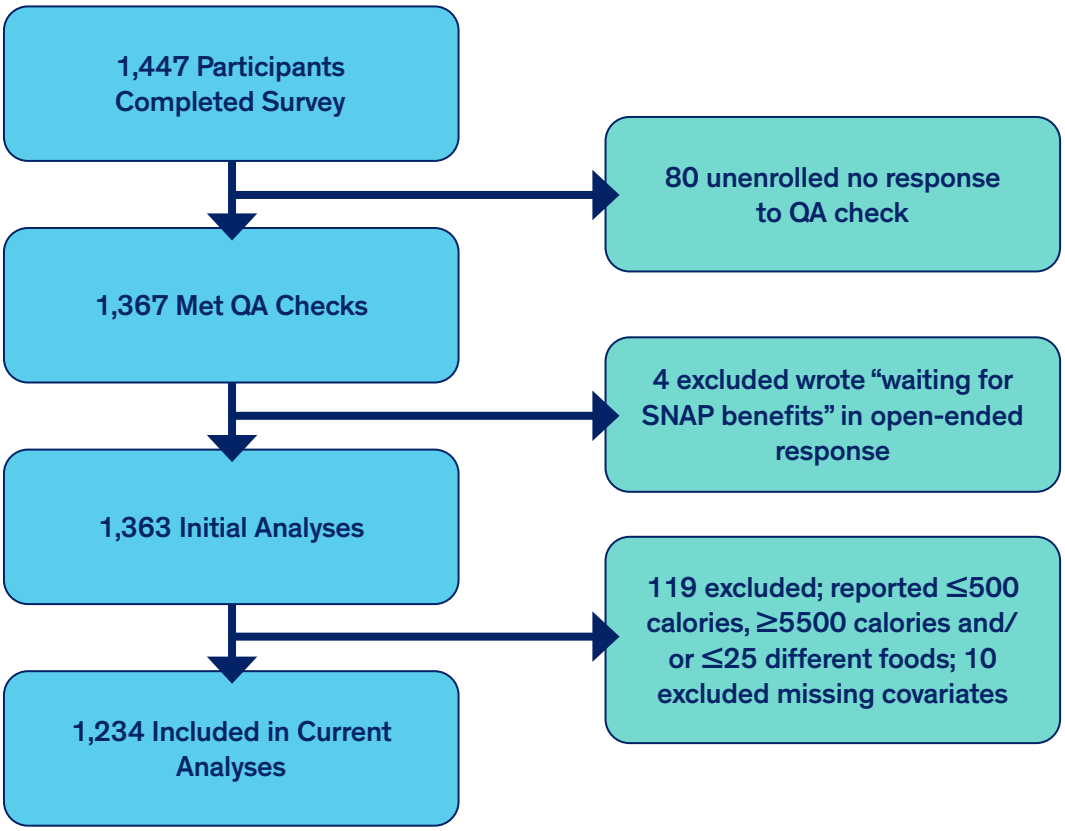
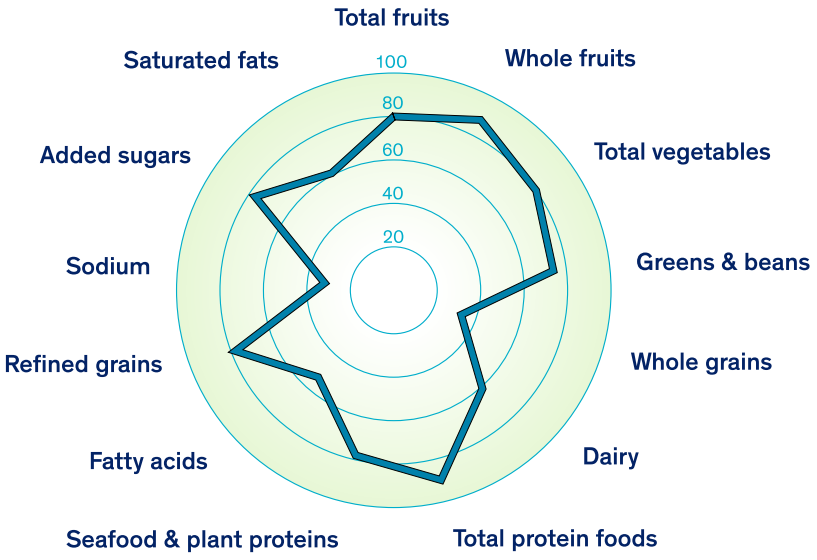


TABLE 2 **Mean Total and Component Healthy Eating Index-2015 Scores Among Sample of Rhode Island and Connecticut SNAP Participants at Baseline (N=1,234)**

HEI-2015 Component	Mean	Standard Deviation
Overall Score	63.9	11.6
Adequacy Components		
Total Fruits (max 5)	4.0	1.5
Whole Fruits (max 5)	4.4	1.3
Total Vegetables (max 5)	4.0	1.2
Greens and Beans (max 5)	3.7	1.7
Whole Grains (max 10)	3.3	2.9
Dairy (max 10)	6.1	2.7
Total Protein Foods (max 5)	4.5	0.9
Seafood and Plant Proteins (max 5)	3.9	1.6
Fatty Acids (max 10)	5.3	3.1
Moderation Components		
Refined Grains (max 10)	7.8	2.7
Sodium (max 10)	3.2	2.9
Added Sugars (max 10)	7.7	2.8
Saturated Fats (max 10)	6.1	3.0

FIGURE 2 **Radar Plot of Healthy Eating Index-2015 Scores Among Sample of Rhode Island and Connecticut SNAP Participants at Baseline (N=1,234)**



Mean scores on each of the 13 HEI-2015 components are shown as percentages out of the maximum possible score.

Discussion

This research brief describes the design, survey measures, and selected baseline characteristics of the *What's On Your Plate* study, which was designed to evaluate the effect of a $0.50 incentive for every $1.00 spent on fresh produce among SNAP-participating households in RI compared to SNAP participants in CT using a difference-in-differences study design.

This study used numerous recruitment methods, including the development of community partnerships, to ensure the sample included a broad and diverse SNAP population. At the same time, the study implemented multiple strategies to ensure data integrity, including API and RelevantID tools to detect duplicates and the use of text verification, reCAPTCHA, geotags, checks on open-ended data fields, built-in logic checks, and follow-up calls to prevent bots. Additional strengths of this study include the large sample size, and recruitment of a comparison sample in CT enabling eventual evaluation of the *EWBW* program while controlling for temporal changes in F&V consumption in the Northeast. Collection of detailed dietary intake data will allow us to determine whether the incentive increases intake of both produce and other foods aligned with a healthy dietary pattern.

Nonetheless, some study limitations are worth noting. First, despite the use of multiple recruitment methods, most participants were female and also participated in WIC (>70%), which may limit the generalizability of the findings to the broader SNAP household population in RI and CT. The average SNAP benefit amount in RI as of fiscal year 2020 was approximately $195 per household or $324 per household with children.[10] The higher benefit amount available to households with children could promote higher diet quality among our sample in comparison to households in RI and CT without children. Indeed, while most of the respondents were categorized as being food insecure, dietary quality was higher than the national average at baseline (mean HEI-2015 score of 64 in our pooled sample vs. mean HEI-2020 score of 57 for adults 19-59 years in the US[21,22]) and higher than national estimates for SNAP households.[23,24] Also of note is that previous research suggests that FFQs may overestimate F&V intake.[25-30] The high proportion of female respondents and WIC participants, social desirability bias, self-administration of the FFQ, and seasonality may also contribute to higher than national average HEI scores. However, any potential overestimates that are consistent over time will not impact our difference-in-differences estimates for the *EWBW* evaluation. Second, SNAP status was self-reported and not independently verified by the study team; however, the survey design incorporated multiple methods to ensure consistency in participant responses—such as asking about SNAP participation in various formats across the screening and sociodemographic questionnaires. To reduce potential misreporting, at follow-up, participants will be required to include a grocery receipt from the past month that shows the last four digits of their EBT card to verify SNAP participation. Lastly, most of this study was conducted online, which may adversely affect data integrity. However, the thoughtful design of this online study that relied on community partners, time delays between components, numerous semi-automated quality checks, and further support from research assistants via phone, Zoom, or in person likely mitigated the negative effects of self-administration and enabled recruitment of a larger total sample. Use of several strategies simultaneously aligns with best practices of implementing multiple deception prevention and mitigation strategies to maximize data integrity.[31]

EWBW is the first statewide produce incentive program in the nation to provide incentives to all SNAP-participating households in the state. Careful evaluation of the program and its ability to promote nutrition security among historically marginalized, low-income households will provide important proof-of-concept data for other states considering similar incentive programs to address food and nutrition insecurity, promote diet quality, and reduce the burden of diet-related chronic diseases in the US.

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ACKNOWLEDGMENTS

The research presented in this brief was supported by a grant (2020-85774) from Bloomberg Philanthropies' Food Policy Program (www.bloomberg.org). The contents of this publication do not necessarily reflect the views or policies of Bloomberg Philanthropies.

SUGGESTED CITATION

Vadiveloo MK, Elenio E, Leider J, Oddo VM, Pipito AA, Powell LM, Tovar A. Design of the What's On Your Plate SNAP Study. Research Brief No. 139. Policy, Practice and Prevention Research Center, University of Illinois Chicago. Chicago, IL. November 2024. doi: 10.25417/uic.27380922. https://p3rc.uic.edu/research-evaluation/evaluation-of-food-policies/