**Background.** Food insecurity, affecting approximately 10% of the U.S. population, with up to 40% or higher in some communities, is associated with higher rates of chronic conditions and inversely associated with diet quality. Nutrition interventions implemented at food pantries are an effective strategy to increase healthy food choices and improve health outcomes for people experiencing food and nutrition insecurity. Supporting Wellness at Pantries (SWAP), a stoplight nutrition ranking system, can facilitate healthy food procurement and distribution at pantries.

**Purpose.** Guided by the RE-AIM Framework, this study assesses the implementation and outcomes of SWAP as nutritional guidance and institutional policy intervention, to increase procurement and distribution of healthy foods in pantries. Method. Mixed-methods evaluation included observations, process forms, and in-depth interviews. Food inventory assessments were conducted at baseline and 2-year follow-up. Results. Two large pantries in New Haven, Connecticut, collectively reaching more than 12,200 individuals yearly, implemented SWAP in 2019. Implementation was consistent prepandemic at both pantries. Due to COVID-mandated distribution changes, pantries adapted SWAP implementation during the pandemic.

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**The Implementation of a Nutrition Intervention in Food Pantries: The Spirit of SWAP**

Sofia I. Morales, MPH1,2
Genesis Vicente, BS2,3
Katherine LaMonaca, MPH1,2
Jasmine Rios, BA1,4
Shayna D. Cunningham, MHS, PhD4
Jackson Higginbottom, MPH1,2
Erin Mathios, MPH1,2
Steve Werlin, PhD5
James Cramer, MA, MDiv6
Alycia Santilli, MSW2,3
Kathleen O’Connor Duffany, PhD1,2

1Yale School of Public Health, New Haven, CT, USA
2Community Alliance for Research and Engagement, New Haven, CT, USA
3Southern Connecticut State University, New Haven, CT, USA
4UConn Health, Farmington, CT, USA
5The Downtown Evening Soup Kitchen, New Haven, CT, USA
6Loaves and Fishes, New Haven, CT, USA

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while still maintaining the “spirit of SWAP.” One pantry increased the percentage of Green foods offered. Challenges to healthy food distribution are considered. Discussion. This study has implications for policy, systems, and environmental changes. It shows the potential for SWAP adoption at pantries, which can serve as a guide for continued healthy food procurement and advocacy. Maintaining the “spirit of SWAP” shows promising results for food pantries looking to implement nutrition interventions when standard practice may not be possible.

**Keywords:** community intervention; nutrition; food insecurity; nutrition security; food pantries; program implementation; chronic disease prevention; health promotion; SWAP: Supporting Wellness at Pantries; RE-AIM, REACH: Racial and Ethnic Approaches to Community Health

►BACKGROUND

Food insecurity, a key determinant of health, affects 10.5%, or 13.8 million, of U.S. households, with cities and metropolitan areas experiencing significantly worse rates (Coleman-Jensen et al., 2021). New Haven, Connecticut, is a diverse city with deep and enduring economic and racial disparities, including a Social Vulnerability Index (SVI) within the top quartile (Agency for Toxic Substances and Disease Registry, 2020). Accordingly, rates of food insecurity have historically been much higher than the national average. New Haven residents of color and those with low income have been disproportionately affected, with food insecurity rates of up to 41% (DataHaven and Siena College Research Institute, 2018; Santilli & O’Connor Duffany, 2018). The COVID-19 pandemic produced great hardship to people throughout the globe, and the impact in New Haven was palpable across multiple social needs, including food access needs: more than four in 10 New Haven residents experienced job loss, suffered financially, or needed to use emergency food services during the pandemic (DataHaven and Siena College Research Institute, 2021).

Research shows there is an adverse association between food insecurity and dietary quality, particularly as it relates to intake of nutrient-rich foods that promote good health (Hanson & Connor, 2014). As such, diet is a cornerstone of chronic disease prevention and management. According to the Socio-Ecological Model (SEM), one’s environment, including interpersonal, social, and systems-level factors, should all be considered when assessing dietary behaviors and their impact on chronic disease (Golden & Earp, 2012; Robinson, 2008). Among adults with low incomes or living in poverty, heightened food and nutrition insecurity is strongly associated with increased prevalence of chronic diseases including hypertension, hyperlipidemia, and diabetes (Flint et al., 2020; Santilli & O’Connor Duffany, 2018). The COVID-19 pandemic, which permeated and impacted all levels of social context, significantly exacerbated preexisting health disparities related to food and nutrition security status, with many individuals and families having to seek emergency food services for the first time (Wolfson & Leung, 2020).

The food assistance system, made up of food banks, food pantries, soup kitchens, and other similar programs, which provide free food to individuals experiencing food insecurity, emerged long before the COVID-19 pandemic in response to high rates of food insecurity (Cooksey-Stowers et al., 2018; Ohls & Saleem-Ismail, 2002). Although this “emergency” food system is intended to provide short-term, provisional assistance, data show that food pantry clients visit pantries regularly and just as often as they visit grocery stores (Cooksey-Stowers et al., 2018; Wetherill et al., 2019), and many organizations now refer to themselves as “food assistance” providers instead. Results from a national survey of food pantry clients demonstrate that nutritious foods are among the items most requested, yet are rarely received by clients (Wetherill et al., 2019). A recent Connecticut-based study found that nutrition is the most important factor cited by clients in selecting food pantry items (Cooksey-Stowers et al., 2018).

The Community Alliance for Research and Engagement (CARE) (https://www.carenhv.org/about-care), co-housed at Southern Connecticut State University and Yale School of Public Health, in collaboration with the New Haven Food Policy Council and the City of New Haven, conducted a similar study to the above, surveying food assistance providers and residents reporting food insecurity in New Haven’s six lowest income neighborhoods. Results confirm residents want access to fresh fruits, vegetables, and other healthy foods (Carroll et al., 2018). Some of the barriers to offering nutritious foods at pantries include limited ability to access healthier food options at the...
food bank level, as well as needing nutrition education interventions (Wetherill et al., 2019). Research shows that nutrition interventions, such as Supporting Wellness at Pantries (SWAP), provide sought-after strategies that effectively increase healthy food choices and intake, and thus improve health outcomes for people experiencing food and nutrition insecurity (An et al., 2019; Cooksey-Stowers et al., 2018; Eicher-Miller, 2020; Long et al., 2019; Wetherill et al., 2019).

The implementation of SWAP in New Haven is the primary nutrition intervention strategy for CARE’s (https://www.carenhv.org/about-care) Racial and Ethnic Approaches to Community Health (REACH) (https://www.cdc.gov/nccdphp/dnpao/state-local-programs/reach/index.htm) cooperative agreement (REACH, CDC DP18-1813) with the Centers for Disease Control and Prevention (CDC). SWAP is an evidence-based stoplight nutrition ranking system to promote healthy options at pantries (Martin et al., 2019), which serves as a model for addressing food and nutrition insecurity by tackling the barriers previously outlined. Many nutrition interventions that are commonly implemented at pantries have limitations: They include binary systems (healthy/unhealthy food), exclude food categories commonly found in food banks, and involve complex mechanisms for tracking inventories (Martin et al., 2019). SWAP, however, was designed to be simple and intuitive—with the potential to be implemented at both the pantry level and the food bank level—allowing food items to be ranked, labeled, and organized as Green (choose often), Yellow (choose sometimes), and Red (choose rarely), based on food group and nutritional values (i.e., amount of saturated fat, sodium, and sugar per serving) (Martin et al., 2019, 2021). Based on the recommendations outlined within the Dietary Guidelines for Americans, these three nutrients are most associated with chronic disease risk and directly correlate with nutrition security (Cooksey-Stowers et al., 2022; McKee et al., 2021).

Although ample research exists that shows the positive impact nutrition interventions have on increasing healthy food choices and intake, leading to improved health outcomes, more research is needed to assess how implementing a modified version of a program like SWAP, tailored to the pantry’s operations, can still position them to meet community’s food access needs and increase nutrition security, especially in the context of the COVID-19 pandemic.

**PURPOSE**

This study assesses the impact of SWAP program implementation on food pantry practices in two New Haven pantries, using the RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework. This framework, developed to assess the impact of community-based health interventions across five domains, has been shown to help advance public health policy implementation evaluation (Glasgow et al., 1999; Helmick et al., 2019; Jilcott et al., 2007). The authors report on the five domains of the RE-AIM framework, including adaptations to implementation during the COVID-19 pandemic. As an intervention, the implementation of SWAP is guided by the SEM, accounting for the relationships that exist among the multiple social and community factors that impact health and nutrition (Golden & Earp, 2012; Robinson, 2008). With this study, the authors successfully demonstrate that a nutrition intervention like SWAP can be tailored to meet the needs of pantries and effectively increase the availability of healthier food options, even within the constraints of COVID-19.

**METHOD**

This study was reviewed by the Institutional Review Boards (IRBs) at Southern Connecticut State University and Yale University, where it was determined to be not human subjects research and thus not a regulated activity as defined by 45 CFR 46 nor under the purview of the IRB at either institution.

**Recruitment**

Two of the largest pantries in New Haven were recruited in 2018 for SWAP implementation, when CARE (https://www.carenhv.org/about-care) was applying for CDC REACH (https://www.cdc.gov/nccdphp/dnpao/state-local-programs/reach/index.htm) funding. These pantries have had a long-standing relationship with CARE (https://www.carenhv.org/about-care) and the New Haven Food Policy Council, and are leaders of New Haven’s Coordinated Food Assistance Network (Coordinated Food Assistance Network [CFAN], 2020) (https://www.carenhv.org/cfan), “a unified system of food assistance that ensures equitable, dignified, and culturally appropriate access to nutritious food for all residents of Greater New Haven.” Each pantry was identified as having the capacity and demonstrated interest to implement this type of nutrition intervention. Each pantry received a stipend totaling US$2,500 for their participation, to be used to support implementation.

**Training**

After collecting baseline inventory data but prior to SWAP launch, the CARE (https://www.carenhv.org/about-care) team trained pantry staff and volunteers on SWAP implementation. Training focused on SWAP
guidelines, including categorizing items by food group and ranking as Green, Yellow, or Red based on nutritional values. Pantries received promotional materials and were trained on client-facing promotion of SWAP, such as labeling food items with color-coded tags and displaying Green items more prominently.

**Measures and Data Collection**

Data collection methods included pantry profile, site launch, and site visit forms; food inventory assessments; and interviews. The CARE ([https://www.carenhv.org/about-care](https://www.carenhv.org/about-care)) team conducted site visits for 6 months and collected baseline and 2-year follow-up data. Original plans to conduct follow-up data collection at 1 year were postponed due to COVID-19 restrictions.

**Pantry Profile Forms.** To measure Reach and Adoption, pantry profile forms were completed at baseline and 2-year follow-up. These forms captured key elements of pantry operations, including procurement sources (e.g., regional food bank, purchased or donated by retailers and/or the general public), food distribution setup and food selection process (e.g., prepacked bags, client choice), number of service-contacts per month/year, and pounds of food distributed.

**Site Launch Forms.** To measure Reach, Adoption, and Implementation, site launch forms completed at baseline detailed aspects of SWAP intended to be implemented at each site, anticipated barriers and facilitators to SWAP implementation, and steps taken by pantry staff and volunteers to prepare for launch.

**Site Visit Forms.** To measure Implementation, site visits were conducted throughout the initial 6 months of the intervention to gather observational data on changes to program implementation and reasons for those changes. Field notes were collected weekly during the first 3 months and monthly for the subsequent 3 months.

**Food Inventory Assessments.** To measure Effectiveness, inventory spreadsheets were completed weekly for four consecutive weeks, at both baseline and 2-year follow-up. Number of units (count), weight (lbs), and nutritional data on saturated fat (g), sodium (mg), and total sugar (g) were collected for all inventory items.

**In-Depth Interviews.** To measure Effectiveness, Implementation, and Maintenance, in-depth interviews were conducted with pantry staff at 3-month and 2-year follow-up. All interviewees were Coordinators, Managers, or Directors, and all had been with their respective pantries for at least 1 year at the time of the interviews. Data were assessed to identify changes, successes, and barriers to SWAP implementation and maintenance over the 2-year period, especially related to the COVID-19 pandemic. Five interviews were conducted at 3-month follow-up, and three interviews were conducted at 2-year follow-up. Three-month interviews were conducted in-person using a semi-structured interview guide. Two-year follow-up interviews were conducted over Zoom using a revised interview guide, updated to assess the impact of the COVID-19 pandemic. Interviews were recorded, transcribed verbatim, and checked for accuracy.

**Data Analysis**

Pantry profile forms provided descriptive data. Food inventory data were categorized according to the ranking system; baseline and 2-year means were calculated to determine mean change. First, each food item was assigned to one of 11 food groups and then assigned a color ranking defined by specific ranges of saturated fat, sodium, and sugar ([Martin et al., 2019](#)).

Total weight (lbs) for each item was calculated by multiplying quantity of units (count) by unit weight (lbs). Percent weight of items ranked Green, Yellow, and Red was calculated for each food group, for each day of inventory, and across the 4 days of inventory, to obtain mean summary scores. In addition, the mean SWAP rank by procurement source (i.e., Connecticut Food Bank [CTFB] or other) was calculated. Differences in mean SWAP rank by food group and procurement source between baseline and 2-year follow-up were output as percent change. Data analyses were conducted utilizing Excel 16.57 (Microsoft 365 Suite).

Thematic analysis was conducted for the site launch forms, site visit forms, and in-depth interviews to determine fidelity and adaptations to SWAP implementation. Interview transcripts were analyzed by two coders using a codebook to conduct thematic content analysis. This was followed by debriefing sessions to triangulate the data and arrive at coding consensus. Major themes were summarized from the coded interviews and assessed alongside the quantitative analysis.

**RESULTS**

Findings are reported according to the domains of the RE-AIM framework, presented in the following order: Reach, Adoption, Effectiveness, Implementation, and Maintenance.

**Reach**

Both pantries are open-access, serving residents of Greater New Haven. During SWAP implementation,
Both pantries were trained and began implementing SWAP between May and June 2019. Both pantries operated indoors, with foods displayed on tables for clients to select as they walked through (i.e., client-choice model). When the COVID-19 pandemic began in March 2020, both pantries rapidly halted indoor operations and moved to prepacked outdoor pick-up. This change eliminated most client-facing SWAP components such as color-coded labeling and signage. Selection of food included within prepacked bags was directly influenced by the limited types of food available through the regional food bank (CTFB) and other sources (i.e., food purchased or donated by retailers and the general public) throughout the pandemic.

### Effectiveness

Comparison of baseline and 2-year follow-up food inventories showed that both pantries substantially increased the overall quantity of food offered (See Figure 1). Proportional to the relative total weight of food offered, Pantry 1 had a 5.8% increase in Green foods offered and 2.0% increase in Red foods offered; Pantry 2 had an 11.0% decrease in Green foods offered and 3.5% increase in Red foods offered (see Figure 1).

Change in rank varied by food group (see Tables 2 and 3). Food groups that drive overall SWAP rank at both pantries include dairy, fruit, animal protein, plant-based protein, and vegetables. These groups are the largest by weight. Post hoc analysis indicated that the decrease in Green and increase in Yellow fruit for both pantries were due to canned fruit in syrup provided by the regional food bank at 2-year follow-up. Procurement of cheese and dairy (whole milk) increased Red foods provided by Pantry 2 at 2-year follow-up. If all fruit and dairy offered at 2-year follow-up at Pantry 2 had been Green, there would have been a 3.7% overall increase in Green foods offered, rather than the 11.1% decrease, and less of an increase in Red foods (2.8% rather than 3.5%)

The proportion of food procured from the regional food bank (CTFB) and other sources (i.e., food purchased or donated by retailers and the general public) also varied between baseline and follow-up. Pantry 1 received more food from the CTFB at follow-up (75%) compared with baseline (65%), whereas Pantry 2 received less food from the CTFB at follow-up (85%) compared with baseline (95%). CTFB was unable to meet the demand for food at Pantry 2 at 2-year follow-up during the pandemic. In addition, the food obtained by Pantry 2 from CTFB at follow-up had a lower percentage of Green based on availability. The proportion of Green, Yellow, and Red foods from the CTFB also changed between baseline and follow-up (see Figures 2 and 3).
Implementation

To assess fidelity, site launch forms captured SWAP components that pantries intended to implement. The 3-month interviews and regular site visits showed that both pantries were able to successfully implement all planned aspects of SWAP during the first 6 months, including: categorizing inventories by labeling food items as Green, Yellow, or Red; displaying Green items more prominently on tables; displaying SWAP posters and messaging in client-facing areas; and sustaining client engagement with SWAP through conversations initiated by staff and volunteers. Analysis of 2-year follow-up interviews found that program distribution practices, such as prominently displaying Green items, using SWAP signage in client-facing areas, and client engagement with SWAP through conversations, were not sustained due to the COVID-19 pandemic.

Through in-depth interviews at 3-month and 2-year follow-up, pantry staff described three key successes as well as one primary implementation challenge.
### TABLE 3
Percent Change (Based on lbs) in SWAP Rank by Food Group, Pantry 2

<table>
<thead>
<tr>
<th>Food group</th>
<th>Change in Green foods (%)</th>
<th>Change in Yellow foods (%)</th>
<th>Change in Red foods (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combination foods</td>
<td>+50</td>
<td></td>
<td>−50</td>
</tr>
<tr>
<td>Condiments</td>
<td></td>
<td>+100</td>
<td></td>
</tr>
<tr>
<td>Dairy</td>
<td></td>
<td>−25</td>
<td>+25</td>
</tr>
<tr>
<td>Fruit</td>
<td>−32</td>
<td>+32</td>
<td></td>
</tr>
<tr>
<td>Grains</td>
<td>+14</td>
<td></td>
<td>−14</td>
</tr>
<tr>
<td>Animal protein</td>
<td>+48</td>
<td>−48</td>
<td></td>
</tr>
<tr>
<td>Plant-based protein</td>
<td>+26</td>
<td>−26</td>
<td></td>
</tr>
<tr>
<td>Snacks</td>
<td></td>
<td>+100</td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td>+22</td>
<td>−20</td>
<td>−2</td>
</tr>
</tbody>
</table>

*Note. SWAP = Supporting Wellness at Pantries.*

![Figure 2](image)

**FIGURE 2  Pantry 1 SWAP Rank by Food Procurement Source**

*Note. CTFB = Connecticut Food Bank, regional food bank; Other = procurement sources that include food purchased from or donated by retailers, as well as food donated by the general public.*
Implementation Successes

1. **Easy, intuitive programming.** Pantries reported that SWAP was easier to implement than originally expected and described increasing familiarity with the system over time:

   After a couple of weeks, it didn’t seem like it was going to be a burden, which is what I thought in the very, very beginning before we started.

   I can just ballpark most things . . . I like it, because the things that we get are not that different . . . they’re either high in sugar or they’re not, or they’re high in salt or they’re not . . . . It’s not a complicated algorithm.

2. **SWAP as an organizational tool.** Pantries also described SWAP as a useful organizational tool for food inventory:

   It actually helped me finally get my running inventory that I’ve been struggling with for a few years, because we used the sheet that’s got what we have, what went out, what came back and it’s also got all of the SWAP stuff on it.

   Internally, it did a lot . . . I think it gave us the opportunity and reason to do better inventory, and to quantify then qualify what purchases were being made, what was being provided, [and] where that fell on the stoplight configuration for nutritional values.

3. **Benefit of SWAP signage.** In the initial interviews prior to the COVID-19 pandemic, pantries indicated that SWAP’s client-facing signage facilitated meal planning and discussion for clients:

   For our guests, I think that the signage was helpful more for people to get an idea of what they wanted...
to take with them. Both this blackboard that we’ve put up and the signage that we do along the counters above. It gives people more of an idea ahead of time because they’re waiting and they’re looking at it the entire time . . . It gives them a moment to mentally make their shopping list.

It’s opened up a lot of conversations with people. I think that there’s been more talk about recipes and cooking with people than before.

Implementation Challenge

1. **Limited staff and volunteer time.** Limited staff and volunteer capacity, and high turnover were described as implementation challenges throughout the first 2 years of implementation:

   I think it was a challenge to actually go through and get that done . . . just because of staff resources . . . There’s a lot of running around, to really get everything done in time for pantry . . . So, I think there’s a logistical problem there.

   I think, because we have such a high volunteer turnover it’s hard to explain everything to everyone . . . that’s something with every part of our job.

Maintenance

At 2 years, pantry staff described the impact of the COVID-19 pandemic on their operations and their ability to implement SWAP, noting both substantial challenges and ongoing commitment to leveraging SWAP principles to promote availability of healthy foods.

Impact of COVID-19 Pandemic. Due to COVID-19-related shifts in pantry operations, namely shifting to outdoor prepacked distribution, pantries noted SWAP’s client-facing components were no longer feasible, which inhibited delivery of SWAP information to pantry clients:

   But it’s the messaging that really has suffered because of COVID. It comes down to the signage . . . having these stationary information points has become difficult.

   The shift to prepacked outdoor distribution resulted in limitations to client choice. In addition, the pantries noted challenges and limitations with obtaining foods for prepacked bags, citing a need to procure foods that most clients may find appealing and the limited availability of foods:

   So we’re asking folks . . . if someone tells us that some people want collard greens and some people want peppers, that means that every week if it’s client choice we can offer collard greens and peppers. But if we’re prepacking all of our bags, maybe we’re going to restrict ourselves to like carrots, onions, potatoes, apples, things that we know that sort of fall into everyone’s diet that are healthy . . . We yearn for the days to be able to get back to the time where we have 9 or 10 different produce offerings that hit lots of different ranges and maybe not everybody takes all of them right?

   And then once COVID came, it didn’t matter, there was very little choice left, everything is just getting backed up.

Commitment to SWAP Principles. Despite challenges posed by the pandemic, interviewees from both pantries described ways in which SWAP implementation continued to support provision of healthier food options. The pantry staff remained motivated and enthusiastic about SWAP’s foundational goals, even when specific program components were not possible:

   I think that it helped us with our kind of inventory at first . . . offering a variety of staples . . . it really gave us the data to back up what we, as staff knew, anecdotally; I think that it also, with proper implementation could really empower guests, and pantry goers.

   So I think, for a long time . . . I was . . . very dogmatic about it and really worried about getting it wrong, and it was like it’s 16 grams of sugar versus . . . 15 grams, they’ve switched the label. And you know, like the spirit of SWAP is what we should be protecting and like we should worry about the details . . . you can fall in love with the idea, without getting worried about that . . . anything is better than nothing. Like any amount of SWAP that you do is better than the amount of SWAP that you’re doing right now, and this is the good thing to be doing.

   This dedication to SWAP’s overall mission also facilitated donor and support strategies, influencing general advocacy for increasing healthy food options:

   . . . people want to feel like they’re part of a plan . . . a methodical plan. And SWAP is a very methodical plan that makes sense. It’s very easy to understand, I can pitch it in 20 seconds to people. And I go, “We follow this,” like in Connecticut, you know “We’re leaders in this.”

   Both pantries reported SWAP was effective in helping them request healthier food from donors, such as being
able to request fresh produce drives over canned food drives. Using SWAP as an evidence-based model facilitates pantries articulating their commitment to offering healthy foods by way of this nutrition intervention, providing the appropriate language and guidance for pantries to use when procuring more nutritious foods:

[SWAP] helped us organize our thoughts around food, but also like our donors' and supporters' thoughts around food, so like we tried to stop doing canned food drives. We've converted some folks into doing produce drives for us. Or just donating money to us and I'll promise I'll spend it on produce.

Both pantry sites expressed ongoing and continued dedication to implementing SWAP guidelines, providing a concrete strategy for shared commitment to procuring donations of nutritious foods so that healthy food items make their way to pantry clients.

**DISCUSSION**

Guided by the RE-AIM framework, this study shows the potential for SWAP adoption at local pantries, providing infrastructure and information for healthy food procurement. When standard implementation cannot be maintained, such as during a pandemic, the training and practice of SWAP implementation provide a guide for continued healthy food procurement and advocacy. While only one pantry saw an overall increase in the percentage of Green foods by weight, this study’s findings align with prior research: SWAP can still be a successful intervention for supporting pantries in inventory assessment and requesting healthier food from donors and other food suppliers (Martin et al., 2019; McKee et al., 2021). In its initial stages, when operations were indoors (pre-COVID-19 pandemic), SWAP was promoted with signage and showed potential for influencing healthier food choices among clients. While challenging to continue client-facing practices during the pandemic, knowledge of SWAP algorithms and commitment to the “spirit of SWAP” guided procurement and advocacy, even as need for food dramatically increased and access decreased across the system. Continued commitment to obtaining “more Green and less Red” during a pandemic is noteworthy and meaningful, specifically in relation to serving a population that experiences higher rates of nutrition-related chronic conditions that can greatly impact rates of morbidity and mortality from COVID-19 (Larison et al., 2021; Wolfson & Leung, 2020).

**Strengths and Limitations**

This study extends the current field, providing a robust evaluation of the SWAP program using the RE-AIM framework for the first time, as far as the authors are aware. These findings contribute to the literature on nutrition interventions to increase the availability of nutritious food options in food pantries. Nevertheless, the current study has several limitations. First, due to the COVID-19 pandemic, operations and priorities shifted dramatically at the participating sites, which, in turn, impacted fidelity in SWAP implementation. Second, inventory fluctuates frequently: while collecting inventory data for four consecutive weeks at baseline and for 2 years was considered robust data collection, it does not necessarily represent foods available at food pantries throughout the year. Third, the current study did not collect client data, initially to avoid overburdening pantry clients and staff with survey administration.

**Implications for Future Research**

On an individual level, future studies can look to assess client perspectives, intended and unintended consequences of SWAP, strategies that promote client dignity and respect, and impacts on health outcomes. In addition, aggregating inventory data from multiple pantries across the food assistance system would provide a larger sample size to further evaluate the effectiveness of SWAP across multiple pantries by assessing for statistically significant change. On a systems level, future research should assess the impact of pantries engaging in SWAP on the larger food assistance system, including food banks. These studies should apply the updated SWAP guidelines, which now align with the Healthy Eating Research (HER) Nutrition Guidelines for the Charitable Food System (McKee et al., 2021).

**Implications for Practice and Policy**

This study has implications for policy, systems, and environmental changes. A systems-level perspective, informed by the SEM, further advances the success of health promotion programs such as SWAP (Golden & Earp, 2012; Robinson, 2008). These findings demonstrate that SWAP can be adapted to match pantry needs and capacity, considering the environment and systems at large, to ultimately increase the availability of healthier food options. Pantries that are not fully prepared to implement SWAP could consider a slower rollout while increasing amounts of Green foods offered. These pantries could first implement SWAP on the non-client-facing operations (i.e., back-end inventory storage) to
document the types of foods offered at their sites. SWAP provides intuitive guidelines for pantry leaders which can influence the types of foods they procure, request from donors, and purchase, impacting the pantry environment. Maintaining elements of SWAP, or the “spirit of SWAP,” shows promising results for pantries looking to implement nutrition interventions when standard practice may not be possible.

At the local level, programs like SWAP can be implemented by building a coalition consisting of food assistance programs, people with lived experience (pantry clients), and backbone institutions (regional food banks). In New Haven, the local coalition, CFAN (https://www.carenhv.org/cfan), has helped facilitate the process of gaining buy-in for SWAP and recruiting pantries. Networked partnerships can facilitate capacity-building, which supports infrastructure and sustainability (Lavinghouze et al., 2014). Ultimately, SWAP can be implemented as a system-wide approach with a critical mass of pantries, including fully implementing SWAP at the regional food bank level. In addition, as evidenced in this study, access to healthy foods is greatly impacted by the foods that are readily available to pantries. Given that the regional food bank represents the largest procurement source for both pantries involved in this study, foods received from the food bank have the greatest impact on the percentage of Green, Yellow, and Red foods.

At the state and national levels, as regional food banks continue to improve the food ordering systems for pantries, they can incorporate an ordering system that displays the nutritional content of food items in alignment with SWAP guidelines, so pantries may make informed decisions with food procurement (Martin et al., 2021). This should be accomplished in a rigorous and systematic way that accounts for multilevel leadership, managed resources, engaged data, responsive plans and planning, and networked partnerships (Lavinghouze et al., 2014). With this in place, regional food banks can consider policies and incentives for local pantries to implement programs like SWAP, in combination with implementation support to position pantries for success.

ORCID iDs
Sofia I. Morales https://orcid.org/0000-0001-5973-0073
Genesis Vicente https://orcid.org/0000-0001-8991-7971
Jasmine Rios https://orcid.org/0000-0001-9728-2048
Shayna D. Cunningham https://orcid.org/0000-0001-8876-9962
Jackson Higginbottom https://orcid.org/0000-0001-8228-3208

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REFERENCES


