

A Novel Food Pantry Program

Food Security, Self-Sufficiency, and Diet-Quality Outcomes

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Background: The number of food pantries in the U.S. has grown dramatically over 3 decades, yet food insecurity remains a persistent public health problem.

Purpose: The goal of the study was to examine the impact of a food pantry intervention called Freshplace, designed to promote food security.

Design: Randomized parallel-group study with equal randomization.

Setting/participants: Data were collected from June 2010 to June 2012; a total of 228 adults were recruited over 1 year from traditional food pantries and randomized to the Freshplace intervention ($n=113$) or control group ($n=115$), with quarterly follow-ups for 12 months.

Intervention: The Freshplace intervention included a client-choice pantry, monthly meetings with a project manager to receive motivational interviewing, and targeted referrals to community services. Control group participants went to traditional food pantries where they received bags of food.

Main outcome measures: Data analyses were conducted from July 2012 to January 2013. Outcomes were food security, self-sufficiency, and fruit and vegetable consumption. Multivariate regression models were used to predict the three outcomes, controlling for gender, age, household size, income, and presence of children in the household.

Results: At baseline, half of the sample experienced very low food security. Over 1 year, Freshplace members were less than half as likely to experience very low food security, increased self-sufficiency by 4.1 points, and increased fruits and vegetables by one serving per day compared to the control group, all outcomes $p < 0.01$.

Conclusions: Freshplace may serve as a model for other food pantries to promote food security rather than short-term assistance by addressing the underlying causes of poverty.
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Introduction

Food insecurity is a serious public health issue in the U.S., with enduring social and health impacts. Food insecurity is defined as the limited availability of nutritionally adequate and safe foods, or limited

ability to acquire acceptable foods in socially acceptable ways.¹ In 2011, 14.9% of American households (17.9 million) experienced food insecurity, of which 5.7% reported very low food security.² The most recent estimates show that the prevalence of food insecurity has remained stable whereas the prevalence of very low food security has increased.²

Food insecurity is associated with long-term, negative health outcomes. For example, food insecurity is linked to chronic diseases in adults such as hyperlipidemia, hypertension, and diabetes,^{3,4} depression and anxiety in adults,^{5–7} obesity among women,⁸ poor maternal mental health status,^{9,10} and lower levels of academic achievement and higher anxiety and aggression among children.^{11–15} Parents experiencing food insecurity serve

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fruits and vegetables less often than food-secure parents, which may contribute to a greater prevalence of chronic disease.¹⁶ When food is available, food-insecure individuals report overeating or eating foods they dislike to compensate for periods without food.¹⁷

Food Assistance Programs

Numerous public and private food assistance programs have been established to address food insecurity. The largest federal response to food insecurity is the Supplemental Nutrition Assistance Program (SNAP, formerly known as Food Stamps), which served 47 million households in 2011.¹⁸ In the late 1970s and early 1980s, private charitable groups and faith-based organizations created “emergency” food assistance programs such as regional food banks, local food pantries, soup kitchens, and shelters. Private food assistance programs have grown rapidly over the past 30 years. A national network of 202 food banks serves approximately 33,500 food pantries, and the number of people served by food banks rose 46% from 2006 to 2010.¹⁹

Historically, food pantries were created to provide emergency food in times of crisis; however many households now rely on them long-term.¹⁹ Food pantry use is especially high among low-income households, particularly black and Hispanic households, and those headed by single mothers.²⁰ Although food pantries have become widespread, there is a lack of research documenting their ability to increase food security and self-sufficiency. Self-sufficiency is often broadly defined as holding a paying job or being in a state of well-being, with limited reliance on welfare benefits.²¹

The goal of this study is to evaluate a new food pantry intervention called Freshplace, comparing outcomes between people participating in Freshplace and those participating in traditional food pantries. The hypotheses are that Freshplace members will have significant improvements in food security, self-sufficiency, and diet quality compared to a control group over 1 year.

Methods

Freshplace Food Pantry Model

Freshplace is an innovative food pantry collaborative that was founded by three community agencies—Foodshare; Chrysalis Center, Inc.; and the Junior League of Hartford, Inc.—to foster long-term food security and self-sufficiency among residents of the North End neighborhood of Hartford CT. An in-depth history of Freshplace can be found elsewhere.²² The goal of Freshplace is to provide a fundamental approach to the problem of hunger by addressing the underlying causes of poverty (e.g., underemployment, unstable housing, and mental health issues).²³ In 2009, the three founding organizations formed a community–university partnership with the University of Connecticut to help design the Freshplace intervention and evaluate its effectiveness.

Traditional food pantries provide pre-packaged bags of short-term food supplies without supplemental services. By contrast, Freshplace is designed around three main components. First, Freshplace is a client-choice food pantry where members choose their own food, the majority of which is fresh and perishable. Client-choice pantries impart a sense of dignity and allow clients to exercise personal and cultural food preferences.²⁴ People who attend Freshplace are called “members,” and they can shop at the pantry twice per month.

Second, Freshplace members meet with a project manager once per month to develop and monitor a Freshstart Plan, which tracks personal goals for becoming food secure and self-sufficient, as well as expectations and potential barriers to achieving them. The project manager received training in motivational interviewing and employs these techniques to reinforce positive changes in behavior and convey confidence in the member’s ability to achieve their goals. Motivational interviewing is a collaborative, person-centered form of counseling that elicits and strengthens an individual’s motivation to change.²⁵ Motivational interviewing is nonjudgmental, client-centered, and goal-driven. Through empirical research and clinical experience, the principles of motivational interviewing have been applied and tested in a variety of settings with demonstrated efficacy.²⁶ Supervision of the Freshplace project manager is provided by Chrysalis Center to ensure that motivational interviewing techniques are performed well.

Third, to help members reach their goals, Freshplace offers a range of services and referrals tailored to the individual needs of each member. These services are often provided onsite, such as a 6-week Cooking Matters class.²⁷

Theoretic Background

The theoretic framework for Freshplace draws from social cognitive theory²⁸ and the Stages of Change Model.²⁹ Social cognitive theory focuses on an individual’s self-efficacy and ability to be an agent of his or her own change. The Stages of Change Model suggests that people’s ability to make a change in their life circumstances varies according to their self-efficacy and readiness for change; hence, services are most effective when tailored to these factors.

Target Community and Study Participants

Hartford had an estimated poverty level of 30.6% in 2010. The prevalence of poverty in the study neighborhood is higher, at 39.3%.³⁰ Approximately 85% of Hartford’s North End is Afro-Caribbean, 14% is Hispanic, less than 1% is Asian and Caucasian, and 23% are foreign-born residents.³⁰ Study participants were recruited from two local food pantries that serve residents of the North End of Hartford CT. Details of the recruitment process are reported elsewhere.³¹ This research was approved by the University of Connecticut Health Center IRB.

Recruitment for the study began in June 2010, and Freshplace opened the following month. The Freshplace steering committee set a goal of serving 100 members within the first year. Sample size was determined according to program goals and determined as 100 people per intervention and control group, with oversampling to accommodate attrition. A total of 241 people were recruited to participate between June 2010 and June 2011; a total of 15 were excluded based on ZIP code, and 228 were randomized to

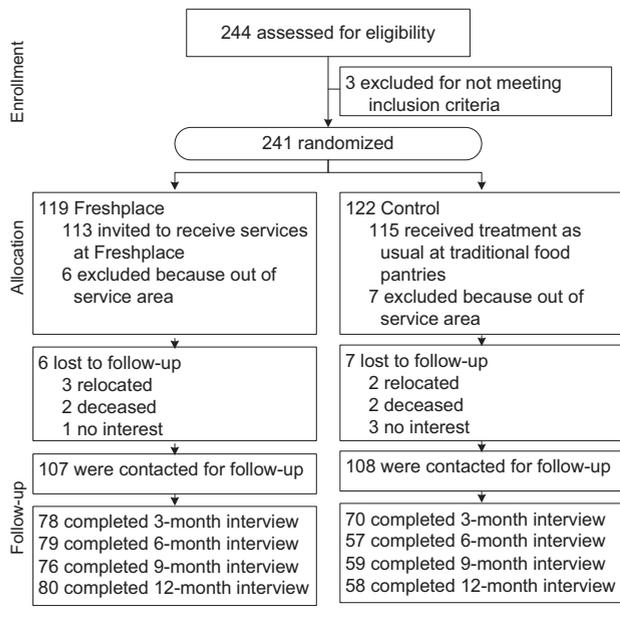


Figure 1. Study participant flow diagram

Freshplace or control group. All participants provided written informed consent (Fig. 1).

After completing baseline data collection, participants helped determine randomization. They blindly selected one of two colored balls from a bag indicating either Freshplace (red) or control group (blue). This method was chosen as a more participatory process than assigning people to a group. Participants that were randomized to the intervention were invited by the research team to go to Freshplace and given a scheduled appointment. The control group continued to receive food from traditional food pantries, with no limits to the number of visits. On average, 89% of the control group went to food pantries at least twice per month. Follow-up surveys were conducted every 3 months for 12 months, ending in June 2012. All study participants received incentives of \$10 at baseline data collection and 12 months, and \$5 for quarterly data collections.

Survey Instruments

The primary outcomes were measures of food security, self-sufficiency, and fruit and vegetable consumption. The validated USDA Food Security Module was used, which consists of 18 questions that ask about a household's experiences with food insufficiency during the previous 12-month period, or previous 3-month period for follow-up surveys.³² Food security status was determined as (1) high; (2) marginal (some concerns or difficulties in obtaining enough food); (3) low (problems with food access and reduced food quality); and (4) very low (multiple indications of disrupted eating patterns and reduced food intake). For the multivariate analysis, responses were dichotomized into very low food secure (Category 4) versus not very low food secure (Categories 1–3).

Self-sufficiency was measured using the Missouri Community Action Family Self-Sufficiency Scale, which includes ten scales that assess levels of education, employment, income, physical health, mental health, housing, health insurance, child care, transportation, and psychosocial stress.³³ Each of the ten scales is scored from 1 to

10 for a total score of 100. The scale was created to assess self-sufficiency progress of families served by case management programs and to provide information for program evaluation.

The Block Food Frequency Screener, a validated tool for measuring usual dietary nutrient intake over 1 month, was used to assess fruit and vegetable consumption.³⁴ This screener measures fruit and vegetable intake, and provides nutrient estimates that correlate with the “gold standard” 1995 Block 100-item Food Frequency Questionnaire.³⁵ Portion sizes were not included. The Screener consisted of seven questions about usual intake of fruit and vegetables. Total scores ranged from 0 to 35. Scores equate to the following number of servings: 0–10: <3 servings of fruits and vegetables per day, indicating very low amounts of micronutrients; 11 or 12: <4 servings per day; 13–15: <5 servings, indicating a healthy diet but still less than the recommended number of servings; ≥ 16 : ≥ 5 servings, consistent with several national guidelines.³⁶

Household demographic variables included gender, age, household size, ethnicity, marital status, education, employment, household income, and participation in SNAP, food pantries, and soup kitchens. Participants were asked if they or someone else in their household had been diagnosed with diabetes or high blood pressure. Height was measured using a Seca 213 stadiometer; weight was measured using a Healthometer digital medical scale.

Data Analysis

Data analyses were conducted from July 2012 to January 2013. Statistical analyses were performed using PAWS (SPSS, version 18.0) and SAS (version 9.2 or 9.3). Bivariate analyses included chi-square tests for categorical variables and *t*-tests for continuous variables. To compare changes over time between Freshplace and control groups, a repeated-measures general linear mixed model (GLMM) analysis utilizing restricted maximum likelihood estimation was used to obtain parameter estimates of the continuous measures of self-sufficiency and fruit and vegetable consumption. Several types of covariance structure, including unstructured, compound symmetry (CS) and AR(1), were tested, and the models with compound symmetry showed best fit with lowest Akaike's information criterion (AIC) and Bayesian information criterion (BIC). For the dichotomous measure of very low food security, the generalized estimating equation (GEE) approach was used with a Logistic link function.

All models included the predictors of intervention (Freshplace vs controls); time (as a categorical variable: baseline, 3, 6, 9, and 12 months); the (intervention \times time) interaction term; and gender, age, household size, presence of children in the household, and monthly household income. If covariates were significant, interaction terms with intervention were tested. The (monthly income \times intervention) interaction remained significant and was included in the self-sufficiency model. Other nonsignificant interactions were removed. The comparisons of average change over 1 year between intervention groups were tested using linear contrasts from the models.

Results

Few significant differences were found between the intervention ($n=113$) and control groups ($n=115$) at

Table 1. Characteristics of sample population, *n* (%) unless otherwise indicated

| Characteristic | Control, <i>n</i> =115 | Freshplace, <i>n</i> =113 |
|--|---------------------------|------------------------------|
| Gender | | |
| Male | 48 (41.7) | 44 (38.9) |
| Female | 67 (58.3) | 69 (61.1) |
| Age, years, M (SD) | 51.2 (11.8) | 51.8 (12.0) |
| Household size, M (SD) | 2.6 (1.6) | 3.1 (1.6)* |
| Race | | |
| Black | 84 (73.0) | 81 (71.7) |
| West Indian | 21 (18.3) | 22 (19.5) |
| Other/mixed | 10 (8.7) | 10 (9.8) |
| Education | | |
| < High school degree | 50 (43.5) | 47 (41.6) |
| High school/GED or greater | 65 (56.5) | 66 (58.4) |
| Marital status | | |
| Single | 70 (60.9) | 66 (58.4) |
| Married/living with partner | 21 (18.3) | 21 (18.6) |
| Separated/divorced/widowed | 24 (20.8) | 26 (23.0) |
| Employment status | | |
| Employed | 25 (21.7) | 21 (18.8) |
| Unemployed | 76 (66.1) | 79 (70.5) |
| Retired | 14 (12.2) | 12 (10.8) |
| Monthly household income category, \$ | | |
| No income | 20 (19.4) | 22 (20.6) |
| 1-500 | 24 (23.3) | 20 (18.7) |
| > 500-1000 | 39 (37.9) | 29 (27.1) |
| ≥ 1001 | 20 (19.4) | 36 (33.6) |
| Food security level | | |
| High | 9 (7.8) | 9 (8.0) |
| Marginal | 8 (7.0) | 10 (8.8) |
| Low | 43 (37.4) | 35 (31.0) |
| Very low | 55 (47.8) | 59 (52.2) |
| Receive SNAP (formerly Food Stamps) | | |
| Yes | 70 (60.9) | 64 (56.6) |
| No | 45 (39.1) | 49 (43.4) |

(continued)

Table 1. (continued)

| Characteristic | Control, <i>n</i> =115 | Freshplace, <i>n</i> =113 |
|--|---------------------------|------------------------------|
| Food pantry usage, times per week | | |
| ≤ 1 | 78 (67.8) | 85 (75.2) |
| > 1 | 37 (32.2) | 28 (24.8) |
| Diabetes (self-reported) | | |
| Yes | 28 (24.3) | 31 (27.4) |
| No | 87 (75.7) | 82 (72.6) |
| High blood pressure (self-reported) | | |
| Yes | 72 (62.6) | 77 (68.1) |
| No | 43 (37.4) | 36 (31.9) |
| BMI classification | | |
| Underweight | 4 (3.5) | 3 (2.7) |
| Normal weight | 26 (23.0) | 33 (29.5) |
| Overweight | 41 (36.3) | 29 (25.9) |
| Obese/very obese | 42 (37.2) | 47 (41.9) |

Note: Boldface indicates significance.

**p* < 0.05

GED, general educational development test; SNAP, Supplemental Nutrition Assistance Program

baseline (Table 1). The only significant difference was that those randomized to Freshplace had a larger household size (*p*=0.01) than the control group. The sample was predominantly single, black women with at least a high school degree. At baseline, participants visited multiple food pantries on a chronic basis, with 63% going at least once per week, and 38% visiting three or more pantries. More than half (57%) of participants received SNAP, and 42% ate meals at a soup kitchen. A high prevalence of chronic health conditions was reported, including 26% with diabetes and 65% with high blood pressure. Almost one third (31%) were overweight, 30% were obese, and 10% were morbidly obese (BMI > 40).

At the baseline measurement, 15.8% of the sample was food secure. Of these households, half (7.9%) were marginally food secure. A third of participants (34.2%) had low food security, and the remaining half (50%) had very low food security. At baseline, diet quality was poor, with more than one third of pantry users (38.8%) consuming less than three servings of fruits and vegetables per day. More than half of those experiencing very low food security (53.5%) consumed less than three servings of fruits and vegetables per day, compared to 23.9% of those who were more food secure (*p* < 0.01, results not shown).

Table 2. Comparison of quarterly outcomes to baseline within groups

| Time, months | Self-sufficiency score, M (SD) | | Fruit and vegetable score, M (SD) | |
|--------------|--------------------------------|----------------------|-----------------------------------|---------------------|
| | Control | Freshplace | Control | Freshplace |
| Baseline | 64.7 (11.2) (n=115) | 63.5 (11) (n=113) | 12.4 (5.9) (n=115) | 12.7 (5.8) (n=112) |
| 3 | 63.3 (11.6) (n=71) | 65.2 (12)* (n=82) | 11.8 (5.4) (n=70) | 14.7 (5.7)** (n=82) |
| 6 | 63.2 (12.2) (n=57) | 68 (12.2)** (n=80) | 12 (4.8) (n=56) | 13.5 (6) (n=80) |
| 9 | 65.5 (13.7) (n=60) | 68.7 (10.4)** (n=80) | 12.2 (5.5) (n=60) | 14.4 (6.3)** (n=80) |
| 12 | 66.7 (12)* (n=58) | 70.2 (11.4)** (n=82) | 12.6 (5.6) (n=59) | 14.4 (5.6)* (n=82) |

Note: Paired *t*-tests comparing means within groups to baseline scores were used.

* $p < 0.05$; ** $p < 0.01$

Differences Within Groups at 3-Month Follow-Ups

Differences within groups for self-sufficiency and fruit and vegetable consumption at each time point compared to baseline are displayed in Table 2. Among Freshplace members, average fruit and vegetable scores increased significantly during the first 3 months at Freshplace, then dropped slightly, then increased again ($p < 0.01$ at 3 and 9 months, $p < 0.05$ at 12 months). The control group showed no significant differences in fruit and vegetable scores over time.

Multivariate Regression Models

In the GEE model, Freshplace members improved their food security to a considerably greater extent than the control group. In follow-up surveys beginning 3 months after the intervention began, Freshplace members were less than half as likely as the control group to experience very low food security (ROR=0.42 [95% CI=0.24, 0.72]), controlling for gender, age, household size, household income, and presence of children in the household, and taking into account their food security status at baseline. Results indicate that on average, Freshplace members gained 4.1 points in self-sufficiency scores, across all time points compared to the control group. Households with lower monthly incomes benefited more from the Freshplace intervention in regard to self-sufficiency scores compared to the control group (household income X intervention interaction, $p=0.03$; Table 3).

Over 1 year, Freshplace members had significantly greater gains in fruit and vegetable consumption scores compared to the control group, on average 2 additional points during the study ($p=0.005$), which equates to approximately one additional serving per day. Age was a positive significant predictor of self-sufficiency and fruit and vegetable consumption ($p=0.005$).

Discussion

This is the first study to measure changes in food security, self-sufficiency, and diet quality in a food pantry population, and multivariate results were strong and sustained over 1 year. At baseline, half of the study participants experienced very low food security, despite the majority of the sample going to multiple food pantries several times a week while also receiving SNAP. After baseline, those participating in Freshplace were less than half as likely to experience very low food security compared to the control group. This is particularly promising considering that the percentage of U.S. households with food insecurity in this severe range increased in 2011.²

Consistent with existing literature, this food pantry population had a very high prevalence of diet-related chronic diseases such as diabetes, high blood pressure, and obesity.^{3,4} The significant improvements in fruit and vegetable consumption among Freshplace members suggest that food pantries can serve as important community sites for improving diet quality. At a time when most Americans are not meeting the dietary recommendations for fruit and vegetable consumption,³⁶ the increases among Freshplace members are noteworthy. Although bundling intervention components is common in research, it is difficult to know exactly what worked since this was a multicomponent intervention. Future research could help test the various intervention factors.

Limitations

This study has a few limitations that should be taken into consideration. The randomization method was not fully robust because the ball selection process could be open to adjustment by participants. All data were self-reported by participants, except for height and weight, introducing a possible response bias. Findings from this study are specific to food pantry clients who attended food pantries

Table 3. Regression models predicting very low food security, self-sufficiency, and fruit and vegetable consumption

| | Very low food secure GEE | | Self-sufficiency score GLMM | | Fruit and vegetable score GLMM | |
|-----------------------------------|-----------------------------|-------------------------|--------------------------------|-------------------------|-----------------------------------|-------------------------|
| | OR (95% CI) | p-value | Estimate (SE) | p-value | Estimate (SE) | p-value |
| Freshplace × time (ref: baseline) | | 0.01^a | | 0.01^a | | 0.05^a |
| Freshplace × time 3 months | 0.35 (0.18, 0.69) | < 0.01 | 2.76 (1.60) | 0.09 | 2.63 (0.93) | 0.01 |
| Freshplace × time 6 months | 0.55 (0.28, 1.09) | 0.09 | 5.11 (1.64) | < 0.01 | 1.91 (0.96) | 0.05 |
| Freshplace × time 9 months | 0.29 (0.14, 0.61) | < 0.01 | 3.96 (1.69) | 0.02 | 2.01 (0.98) | 0.04 |
| Freshplace × time 12 months | 0.53 (0.24, 1.17) | 0.12 | 4.75 (1.66) | 0.05 | 1.43 (0.96) | 0.14 |
| Women (vs men) | 0.61 (0.37, 1.02) | 0.06 | -0.19 (1.32) | 0.89 | -0.10 (0.69) | 0.89 |
| Age | 0.98 (0.96, 1.01) | 0.15 | 0.17 (0.05) | < 0.01 | 0.08 (0.03) | < 0.01 |
| Household size | 0.95 (0.80, 1.12) | 0.54 | 0.10 (0.46) | 0.82 | 0.18 (0.26) | 0.48 |
| Children in household | 1.14 (0.65, 1.99) | 0.64 | -0.71 (1.24) | 0.57 | 0.25 (0.70) | 0.72 |
| Monthly household income | 0.98 (0.82, 1.18) | 0.86 | 4.08 (0.63) | < 0.01 | 0.29 (0.22) | 0.19 |
| Monthly income × Freshplace | N/A | | -1.71 (0.80) | 0.03 | N/A | |

Note: Main effects of Freshplace and the four time dummy variables were also included in the model.

^ap-value for (Freshplace × time) interaction (3 df)

GEE, generalized estimating equation; GLMM, repeated-measures general linear mixed model; N/A, interaction term not included in the model

and reside in the North End of Hartford and who are predominantly black or West Indian, limiting generalization to other food pantry populations.

Conclusion

Food pantries were created to treat emergencies.³⁷ The traditional food pantry model caters to those living in survival mode who worry whether they will have enough food at the end of the week, rather than those experiencing chronic food insecurity.¹⁹ The mechanism for change in the Freshplace intervention is rooted in a theory-based, person-centered approach by allowing food choices with dignity, providing motivation, and building skills and resources so that families can plan for their future.²²

In a time of fiscal belt-tightening and looming budget cuts, it is imperative to assess the strength of the nutritional safety net to serve those in need. Even during strong financial times, such as during the mid- to late 1990s, the prevalence of food insecurity remained high, above 10%.³⁸ Continuing to distribute more food without addressing the underlying causes of poverty is an approach that has failed to adequately reduce food insecurity. New strategies are needed to address the underlying causes of food insecurity, such as unstable housing conditions, mental health issues, and underemployment.³⁹ Several food bank directors have begun to question how long they will need to continue distributing food, and are looking for alternative approaches

(G McAdam, Foodshare, and E Talkin, Food Bank of Santa Barbara County, personal communication, 2012).

The main cost difference between Freshplace and traditional food pantries is one full-time project manager who meets with members once per month to provide motivational interviewing and to review goals and progress. Additional services such as the Cooking Matters class may be offered through existing community partnerships or may require additional funding. The Freshplace model has potential for generalizability but will require a change in current roles of volunteers and staff.

There is a tremendous amount of people power involved with donating and distributing emergency food, a process that could be reconfigured. Existing pantry staff or volunteers could be trained in motivational interviewing to provide this type of intervention in traditional food pantries. Freshplace is changing the conversation about hunger from providing “emergency” food to helping members set goals and gain skills to address the multifaceted causes of food insecurity. Incorporating the Freshplace model of a client choice pantry, motivational interviewing, and targeted referrals within food pantries may be part of an effective solution to help break the cycle of the food pantry line.

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