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## Maternal Strategies to Access Food Differ by Food Security Status

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### Abstract

**Background**—Household food insecurity is associated with health and behavior risk. Much less is known about how food insecurity is related to strategies that adults use in accessing food: how and where they shop, use of alternative food sources and their ability to manage resources.

**Objective**—To examine how maternal behaviors including shopping, accessing alternative sources of food and managing resources are related to household food security status (HHFSS).

**Design**—Cross-sectional study collecting survey data on HHFSS, shopping behaviors, use of alternative food sources and managing resources obtained from low income mothers of preschoolers.

**Participants**—164 low-income mothers of young children (55% Hispanic) from two communities in Rhode Island.

**Measures**—HHFSS was measured using ten items from the 18-item Core Food Security Module to assess adult food security. Mothers were surveyed about where, when and how often they shopped; the strategies they use when shopping; their use of alternative sources of food including federal, state and local assistance; and their ability to manage their resources.

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**Statistical analyses**—Analysis of Variance and Chi-square analyses assessed the associations between demographic variables, shopping, accessing alternative food sources and managing resources, and HHFSS. Multivariate logistic regression assessed the associations between HHFSS and maternal demographic variables, food shopping strategies, alternative sources of food and ability to manage resources.

**Results**—Maternal age and language spoken at home were significantly associated with HHFSS; food insecurity was 10% more likely among older mothers (AOR=1.10; 95% CI 1.03-1.17) and 2.5 times more likely among Spanish speaking households (compared to non-Spanish speaking-AOR=3.57; 95% CI 1.25-10.18). Food insecurity was more likely among mothers reporting more informal strategies (AOR=1.98; 95% CI 1.28-3.01,  $p<.05$ ) and perceiving greater inability to manage resources (AOR=1.60; 95% CI 1.30-1.98,  $p<.05$ ).

**Conclusions**—The results suggest that low-income mothers use a variety of strategies in order to feed their families and that the strategies they use vary by HHFSS. Community nutrition programs and providers will need to consider these strategies when counseling families at risk for food insecurity and provide guidance to minimize the impact on healthy food choices.

### Keywords

Food Insecurity; Low-income mothers; Shopping behavior; Food access

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Food insecurity is defined as having limited and/or uncertain availability to enough food for an active and healthy life.<sup>1</sup> Approximately 14% of households in 2014 reported food insecurity with a third of those households reporting a more extreme form of food insecurity known as very low food security.<sup>1</sup> The prevalence of household food insecurity rose steadily from 1998 until 2008, and reached its highest level (14.9%) in 2011.<sup>1</sup> Levels of household food insecurity have remained fairly stable or declined slightly.<sup>1</sup>

Income is highly predictive of food security status. Household food insecurity was reported by 40% of respondents living in households with incomes below the federal poverty level (\$19,790 for a household of 3 in 2014), and by fewer than 7% of those in households with incomes over 185% of the federal poverty level.<sup>1</sup> Food insecurity rates vary significantly by household demographics (e.g., education, income, race and ethnicity). As compared to the national average of 14%, rates of food insecurity were higher for households headed by single mothers (35%), households with young (under six) children (20%), Black non-Hispanic households (26%), and Hispanic households (22%).<sup>1</sup>

A wide variety of additional factors (e.g., access to grocery stores, transportation, and education) contribute to a household's ability to purchase adequate and nutritious food. For example, many lower income households have limited access to healthy food options<sup>3</sup> despite the fact that only a small percentage of households are considered by USDA to live in food deserts (2.3 million, or 2% live more than a mile from a supermarket and do not have access to a vehicle).<sup>4</sup> Cost is another factor affecting a household's ability to purchase adequate and nutritious food; research has documented wide disparities in the costs of healthy foods by geographic region.<sup>5</sup> Low-income neighborhoods and communities of color not only have fewer grocery stores overall, but stores in these communities offer fewer

healthy food options (e.g., fruits and vegetables) and charge higher prices than in middle-income, predominantly white neighborhoods.<sup>3</sup>

Paradoxically, more than half of low-income families do not report food insecurity. Research suggests that further exploration of what happens at a household level in terms of shopping, food access, and management of food resources may shed light on factors that distinguish between food secure and food insecure households.<sup>6</sup> Key informant interviews and focus groups with low-income heads of households have been the primary research methodology for identifying strategies that poor families use to stretch their food resources.<sup>6,7</sup> Identified strategies include shopping to maximize one's food dollars (e.g., frequenting sales, buying in bulk), "social network strategies" that involve seeking assistance with food from relatives and neighbors, and the use of food assistance programs.<sup>8</sup> For example, Jarrett, Behar & Odoms-Young (2014) interviewed 12 low income female caregivers and reported that families with inadequate food supplies were more likely to use social networking strategies and 'food consumption strategies (e.g., eating less, utilizing left-overs) than those with adequate food supplies<sup>8</sup>. Mothers in both groups reported using a variety of shopping strategies to stretch dollars. In contrast, a qualitative study involving interviews with 90 heads of households receiving benefits from the Supplemental Nutrition Assistance Program (SNAP) reported different results.<sup>9</sup> They found that food secure households were more likely to use family networks and shop for sales while households with the lowest food security had no network to turn to and were the least likely to shop for sales.<sup>9</sup> Lack of consistency across these qualitative studies, and a lack of any quantitative measurement of frequencies of coping mechanisms, suggest that further examination of these associations is warranted.

The purpose of this paper is to examine factors that may help account for differences between food secure and food insecure households within a low-income population. An important question explored in this paper is whether or not household level behaviors that adults use vary as a function of food security status. Specifically, we examine variability in HHFSS in relation to 1) how, when and where household members shop for food; 2) other sources of assistance or strategies low-income mothers use when trying to feed their family, and 3) mother's ability to manage household resources.

## Materials and Methods

### Sample and Procedures

This study's data is derived from a broader cross-sectional study examining the associations between family feeding behaviors, maternal depression, and child obesity among low-income households.<sup>10</sup> A sample of over 200 mothers and their preschool aged children were recruited between October 2009 and May 2011 from seven day care centers and at social service agencies that served low-income populations where SNAP Outreach activities were conducted. All day care centers targeted low-income families in two urban communities in Rhode Island. The sample used to address the questions herein includes 164 mothers of preschool-aged children.

At each day care center, flyers in English and Spanish were placed in the child's backpack or mailbox describing the study and informing parents that a research assistant would be inviting parents and their children to participate. Research staff visited during peak hours and approached women when dropping off or picking up their children. In these cases, mothers were asked to participate in a study on the challenges of feeding their children healthy food. After obtaining informed consent in writing, trained bilingual research staff interviewed the mothers, using English or Spanish versions of the survey instrument as appropriate. All procedures were approved by the Institutional Review Board at the University of Rhode Island. The interview took 30-40 minutes to complete. Participating mothers were provided with \$20 for their study involvement. For purposes of this study, only data from household and maternal socio-demographic variables are included.

### Dependent (Outcome) Variable

**Household food security**—The original study assessed each family's food security status using the USDA 18-item Food Security Core Module.<sup>11</sup> The module includes questions about the amount, quality and ability of the household to access food in the previous 12 months. For purposes of this study, results of the 10 items assessing adult HHFSS were used. Household food security status is classified into three groups, based on the USDA standard criteria: food secure (FS; fewer than 3 affirmative responses), low food security (LFS; 3-7 affirmative responses) and very low food security (VLFS; 8 or more affirmative responses).<sup>11</sup> Households classified as LFS and VLFS are collectively referred to as food insecure (FI). While all FI households are considered to experience inadequate diets due to limited resources, LFS is thought to reflect poor food quality with a diet of inexpensive but energy-rich, nutrient-poor foods, while VLFS reflects an inadequate quantity of food or hunger.<sup>12</sup>

### Independent (Predictor) Variables

Information on shopping behavior, alternative sources of food access and management of resources were collected as part of the broader study cited above.<sup>10</sup> A detailed list of all independent variables and their coding are presented in Table 1. A brief description of each is provided below,

**Grocery shopping**—Information about the frequency (e.g., daily, weekly, monthly), store location, and the amount of money spent on food at each store was collected. Parents were asked to rate the frequency of their shopping strategies use over the past 30 days on a 5 point scale (0 = never to 4 = often). Types of stores and shopping strategies are listed in Table 1. A composite variable representing the total number of strategies used was calculated as the sum of the number of strategies that subjects reported they ever used (i.e. rarely, sometimes, often), with higher scores indicating a greater number of shopping strategies used. The internal consistency of this scale as calculated using Cronbach's alpha on this analytic sample was acceptable ( $\alpha = .71$ ).

**Alternative sources of food**—A detailed list of alternative sources of food are presented in Table 1. Participants reported on their use of alternative sources of food over the past 30 days including participation in federal nutrition assistance programs and community food

programs. Two questions assessed frequency of eating at a fast food restaurant and/or a full service restaurant during the past week. Questions to assess these different food sources came from a variety of measures, including modules from the Current Population Survey Food Security Supplement<sup>13</sup> and project-developed items based on the work of Kempson and colleagues.<sup>14-16</sup>

Informal sources of food acquisition (e.g., borrowing, trading, etc) were assessed by asking participants to rate the frequency of their use on a 4-point Likert scale (1 = never to 4 = often). Higher scores on each item indicated more frequent use. A composite variable representing the total number of informal sources used, was calculated as the sum of the number of sources that subjects reported they ever used, with higher scores indicating a greater number of different sources used. Internal consistency of the composite as measured by Cronbach's alpha for the composite was moderate ( $\alpha = .53$ ); individual items and the sum score were examined in the analyses.

**Maternal ability to manage household resources**—A 4-item project constructed scale assessed mothers' perceptions of their ability to keep within a family budget. Items were developed based on research with low-income families experiencing difficulties managing their resources.<sup>17</sup> Parents rated their ability on a five point, Likert scale (1= strongly agree to 5 = strongly disagree). The items (Table 1) were summed to create a measure of perceived ability to manage family resources, which achieved an acceptable internal consistency (Cronbach's  $\alpha = .69$ ). Higher scores indicated higher levels of perceived *inability*.

### Covariates

Participants provided data on household demographic characteristics including household size, partner/marital status (married or lives with partner/no partner or spouse), maternal age, maternal race/ethnicity (Black, non-Hispanic White), language spoken in the home (Spanish only, English, or both Spanish and English), years mother attended school, and maternal employment (yes/no). Data on monthly income, collected in \$500 increments, was included for those above and below \$1500 since this amount was the closest to the median split and most closely approximated the federal poverty level for a household of 3 at the time of data collection (\$1,627 per month) (<http://aspe.hhs.gov/poverty/figures-fed-reg.cfm>). Participants were asked about their receipt (yes/no) of any type of assistance program including Social Security Income, subsidized child care, heating assistance, cash assistance (Temporary Assistance to Need Families), health care (Medicaid, State Children's Health Insurance Program).

### Statistical Analysis

Preliminary analyses assessed variables for normality, completeness of data, and collinearity. Means, standard deviations, and frequencies were examined, composite scores calculated, and reliabilities established. Bivariate associations between FSS and the following continuous variables were examined using Analysis of Variance (ANOVA) followed by post-hoc test with Duncan's test of mean values: demographic variables (maternal age and education, household size, number of children) and independent variables (shopping, use of

other food sources, ability to manage resources and monitoring children's behavior). Bivariate associations between FSS and the categorical demographic (marital status, race/ethnicity, language spoken, household monthly income) and independent variables (shopping frequency) used Chi-square analysis. Bivariate analyses were examined using both 2 levels of food security (FS, FI) and 3 levels (FS, LFS, VLFS) and are reported for the 3 levels except where results differ between the two specifications.

Multivariate logistic regression was used to predict food security status using the independent variables adjusting for demographic variables (as covariates). Only those that were significantly associated with FSS in the bivariate analyses were included in the multivariate analysis. Only participants with complete data on all variables were included ( $n=152$ ) in the multivariate analysis. Given limited sample size, multivariate analyses were conducted using the two levels of food security status only.

## Results

### Sample Description

On average, mothers in the sample ( $n=164$ ) were 30 years old, and had completed 12 years of education (Table 2). Households were generally small, averaging four people, including two children. Over half of participants were Hispanic and the majority of participants reported speaking English or both English and Spanish; 21 % reported speaking only Spanish. A little over half (56.7%) of households were classified as food secure, and the remaining (43.3%) food insecure; 29.0% had low food security (LFS), and 14.1% had very low food security (VLFS). Two thirds of the mothers were employed, with more than 60% of households reporting less than \$1500 per month in income (data not shown). Almost all participants (96%) reported receiving at least some form of assistance including nutritional or heating assistance, subsidized early childhood education & care, health care, Supplemental Security Income, and/or cash assistance.

In terms of shopping patterns, almost all participants (88%) shopped at least once at a supermarket during the prior week, and 30% shopped at discount stores (Table 3). Far fewer shopped for groceries at corner stores (15%), specialty stores (12%), or convenience stores (10%). Individuals varied widely in how often they reported doing their major food shopping ranging from daily (2%) to monthly (34%) and the amount of money spent on food varied widely (range 0 to \$550 in past week). When asked about strategies they used (e.g., coupons, buying in bulk, shopping at multiple stores and using a shopping list), the top five most common were purchasing lower cost foods (83%), taking advantage of sales/discount offers (74%), purchasing less junk food (73%), shopping at multiple stores (65%) and buying in bulk (63%). The least common strategy was reducing their purchases of fruits and vegetables (31%). Mothers reported using an average of 6 ( $M=5.83$ ,  $SD= 1.94$ ) of the 8 strategies at least some of the time when they shopped (data not shown).

Low-income women in our sample reported utilizing other sources of assistance in order to increase their ability to provide food for their families. Most women reported participating in a variety of federal nutrition assistance programs (e.g., SNAP, WIC, and both the National School Lunch Program and School Breakfast Program), with only 6 percent of respondents

not receiving assistance from any of these programs (Table 4). In contrast, relatively few reported using community food pantries and/or soup kitchens (15% and 3% respectively). Participants differed in the degree to which they borrowed, pooled their resources, traded and used credit as alternative food sources. About 56% of the participants reported never using any of the four sources and the majority of the remaining participants reporting 1 or 2 sources (data not shown). On average mothers used one of these sources ( $M = .97$ ) (data not shown). More than half of the participants reported eating at least once during the previous week at fast food restaurants (57%) but far fewer ate at a full service restaurant (22%).

In terms of their ability to manage resources (data not shown), mothers reported high levels of their abilities: 77% able to manage bills (agree or strongly agree), 70% able to keep within budget, 74% able to make money last throughout the month, and 92% able to make balanced meals.

### **Bivariate associations between household characteristics, food acquisition strategies, maternal ability to manage resources and household food security as a three level variable**

Results of the ANOVA examining the bivariate association between each demographic variable and household food security status, as a three level variable (FS, LFS, VLFS) show that the number of children in a household, as well as maternal age varied by food security status (Table 5). Households classified as having VLFS had significantly more children (2.84) than either FS (2.20) or LFS (2.01) households. Mothers in VLFS households were significantly older than mothers in FS households. Bivariate analyses combining the two food insecure groups yielded similar findings.

Chi-square analyses yielded several additional demographic differences by food security status (data not shown). Households in which Spanish was spoken were significantly less likely to be classified as FS than households in which English or both English and Spanish were spoken (42.9% Spanish as compared to 60% English and 83.3% English and Spanish). There were no differences in food security status by household size, ethnicity (Hispanic or not), income, employment status, marital status or overall utilization of assistance programs.

Results of the bivariate analyses (ANOVA) of informal food sources, shopping strategies and perceived ability to manage resources in relation to food security status (Table 6) show that there were significant differences by food security status in the use of informal sources of food (borrowing, trading, pooling and using store credit). VLFS households were significantly more likely to borrow, pool, exchange/trade foods and use store credit than all other households. LFS households were also more likely to borrow food than FS households. Mothers in food insecure households (both LFS and VLFS) reported a greater inability to manage their household budget ( $F = 20.10$ ,  $p < .001$ ) than FS households.

In terms of shopping behavior, mothers in VLFS households used a significantly greater number of strategies (e.g., using coupons, going to different stores, buying generic brands, etc.) than mothers in FS households (6.64 vs. 5.53 strategies respectively) while those in LFS households did not differ from either FS or VLFS households (Table 6). Post-hoc analysis of the eight individual shopping strategies revealed that mothers in food insecure households (LFS and VLFS) more often reported that in order to save money, they reduced

their purchases of fruits/vegetables, bought less junk food and went to two or more grocery stores in order to find cheaper food than mothers from FS households.

Mothers in LFS and VLFS households reported food shopping significantly more often (36% and 40%, respectively reported shopping daily to weekly) than mothers in FS households (18% reported daily to weekly food shopping) (Chi-square = 21.09,  $p < .05$ ; data not shown). There was a significant association between shopping in specialty stores and food security status ( $F = 2.994$ ,  $p < .05$ ); an examination of the means indicated that none of the VLFS households reported shopping at specialty stores. Food secure households shopped significantly more often at specialty stores than LFS households. There were no significant differences in the frequency of shopping at any of the other types of stores, amount spent on food, or of eating at restaurants by food security status. Moreover, there were no significant differences in use of federal or community nutrition programs as a function of food security status.

### **Multivariate analysis of the associations between predictors and household food security status as a two level variable**

The results of the multivariate logistic regression to predict food security status as a two level variable (food secure vs food insecure) are shown in Table 7. Significant predictors of food security status were mother's education and age, Spanish speaking household, maternal perceived inability to manage resources, number of shopping strategies, and the number of informal sources of food. The final analysis resulted in a highly significant model (ChiSquare = 67.06,  $p < .000$ ). The strongest predictor of risk of household food insecurity was whether or not the household was solely Spanish-speaking: households that were Spanish speaking were three and a half times as likely to be food insecure, compared to those who spoke English or both English and Spanish at home. Older maternal age was also associated with an increased risk of household food insecurity. Each additional informal food source used was associated with twice the risk of food insecurity and the use of additional shopping strategies was associated with an increase in food insecurity risk as well. Perceived inability to manage resources was associated with a higher risk of food insecurity. Due to concerns about combining LFS and VLFS, and lacking power to analyze the VLFS group separately, an additional analysis was run comparing FS with LFS (excluding VLFS). The results were similar, with one minor difference. In the latter model (data not shown), maternal education significantly predicted food security status, with one more year of school associated with almost a 15% lower risk of low food security (AOR = .86, 95% CI = [0.74-0.99]).

## **Discussion**

This study examined how shopping and resource management strategies and maternal characteristics are associated with HHFSS among low-income families. The findings provide support for the hypothesis that variations in maternal characteristics and behaviors are associated with food security status of households beyond their generally low-income status. Consistent with other literature on low-income households,<sup>6,8,9</sup> we found that low income mothers shopped relatively frequently and utilized a range of both informal and



formal strategies to feed their families. They also shopped most frequently at supermarkets and warehouse/discount stores, a finding that has also recently been reported nationally.<sup>18</sup> The current study also provided evidence that food security status was associated with some maternal characteristics and behaviors. Maternal age, number of children in the household and being a solely Spanish-speaking household are demographic characteristics that were associated with an elevated risk of FI. A greater number of informal sources of food, greater variety of shopping strategies, and a higher perceived inability to manage resources were associated with an elevated risk of FI, and in several cases, these differences were specific to households with VLFS. The cross-sectional nature of this study precludes our ability to confirm the direction of these associations.

Mothers reported shopping in a variety of stores, although most did the majority of their shopping at supermarkets or large warehouse/discount stores. This is noteworthy since these types of stores offer more choice, better prices and greater availability of healthy foods at affordable prices than the types of stores that are often considered most accessible to low-income populations (e.g., corner stores).<sup>2</sup> Mothers reported using a range of recommended strategies to support their food purchases; this included high percentages that reported they bought in bulk, shopped for sales and at different stores, and utilized shopping lists. We were encouraged to see that the majority of mothers reported buying less junk food as a shopping strategy, a finding which is consistent with a recent study which found that compared to high income families, low income families (< 130% poverty/income ratio), had a lower availability of salty snacks in the home.<sup>19</sup> The strategy that was least often reported was the reduction in the purchase of fresh fruits and vegetables. Taken together these findings provide support for the notion that mothers are making informed decisions when shopping, both in terms of managing their limited resources as well as trying to optimize the nutritional value of their purchases.

Despite this optimism, it is important to note that a little more than a quarter of mothers did endorse reducing their purchase of fruits and vegetables, and the most often reported strategy involved purchasing lower cost foods. While lower cost foods are by no means necessarily less healthy, it may also be that some of these families, when opting for lower cost foods may also be purchasing higher calorie, less nutrient dense foods; this has been reported elsewhere.<sup>20</sup> The fact that about half of the mothers also reported eating frequently at fast food restaurants is an additional cause for concern. Others have noted less frequent rates of eating out among low-income mothers, although the meals that were eaten out were almost always from fast food restaurants.<sup>6</sup> An additional concern is that mothers from food insecure households reported that they reduced their fruit and vegetable purchases to save money more often than food secure mothers, which may put the most vulnerable at greater risk of poor nutrition. We do not have any data about the baseline frequencies of these types of strategies and future research may want to examine how often mothers engage in these actual behaviors. It is impossible to estimate what role nutrition knowledge may have played in the mothers' purchasing behaviors. Many of the mothers in this study participated in WIC (61%) and SNAP (68%) and likely have received some nutrition education; unfortunately data were not collected on nutrition knowledge or exposure to nutrition education. Edin and colleagues found that most of the 90 participants in their qualitative study reported that they got helpful nutrition education at WIC but really no nutrition education from SNAP.<sup>9</sup> Thus,

it may be reasonable to expect that many of our mothers might have benefited from nutrition education provided by WIC.

Mothers reported wide use of federal assistance programs for food as well as for other types of programs for which they were eligible (i.e., heating assistance, health care, child care) but relative low utilization of the emergency food network (e.g., pantries and soup kitchens). Because most of the mothers were employed, they may have been more able to manage their food budgets without having to resort to emergency food sources. The data collection period coincided with a period of increased SNAP benefits as the result of the American Recovery and Reinvestment Act of 2009, so among households receiving SNAP, they may have experienced less need. It is important to note that two-thirds and over half of respondents were aware of local pantries and meal sites respectively, indicating that they had knowledge of and access to their services, although no data are available to know whether the hours of operation were consistent with those of these working families. These findings are consistent with others who noted high levels of participation in federal assistance programs but relatively low reporting of pantry utilization among similar low-income populations.<sup>6,8</sup> Other factors, including pride and embarrassment, may account for the fact that participants reported low utilization of the emergency food network.

It was not unexpected that households with fewer children, and higher levels of maternal education would be less likely to be food insecure and is in keeping with current data on food security.<sup>1</sup> Households in which only Spanish was spoken were more likely to be food insecure than non-Spanish speaking households, possibly reflecting factors related to language (i.e., information is less available and accessible in Spanish), income (i.e., employment opportunities favor non-immigrants), immigration status (i.e., barriers to federal food assistance for non-citizen individuals with limited residence in U.S.) and acculturation (i.e., lack of familiarity with processes related to food access) to name just a few.<sup>21</sup> Contrary to expectations, income was not significantly related to food security status. Most of the families were low-income and therefore variability was considerably reduced. Limitations in the measurement (i.e., maternal self-report, incomplete reporting on other sources of income to the household) likely also limited the ability to capture variation as precisely as needed.

Maternal food-acquisition behaviors were most strongly linked to food security status and in particular to VLFS. Those who were most food insecure (VLFS) were engaging in a variety of behaviors to maximize their purchasing power (e.g., shopping at various stores, following sales, and using coupons) and cope with the situation of food insecurity. The use of informal sources (borrowing, trading, pooling resources) as well as the use of shopping strategies (coupons, sales) by VLFS households is notable and in contrast to what others have reported. Edin et al found that the most food insecure households reported fewer strategies, and less planning, and that those who were less severely food insecure utilized more informal networks.<sup>9</sup> Differences between the two samples, with the Edin et al sample having much higher rates of VLFS, may account for some of this discrepancy.

Not surprisingly, mothers in all food insecure households also reported feeling less efficacious in being able to manage their resources in their households. This is consistent with Edin et al., however their findings were reports of actual behaviors not perceptions.<sup>9</sup>

They found that those least food secure were less likely to research the best prices on particular products, travel to multiple stores, capitalize on sales, and plan meals around their budgets.

One of the strengths of this study is that it is the first quantitative study that examines shopping patterns, food resource management, and maternal behaviors in relation to household food security status in a diverse low-income population. It provides important information on the prevalence of a variety of coping strategies in such a population while quantitatively examining how these differ under conditions of LFS and VLFS. This is important, given that these different levels of food security are thought to reflect different conditions of food availability. The fact that mothers reporting VLFS use a greater number of both informal food sources, and shopping behavior strategies than mothers in FS households provides support that mothers in households with insufficient resources use additional means to access food for their families. One of limitations of this study is that it is a cross-sectional study; therefore the temporal relationship between the independent and outcome variables cannot be established. However, it is a starting point from which future longitudinal research can be designed.

It is important to note that the mothers who participated in this study were predominantly low-income, with greater than 60% falling below \$18,000 annual income, and Hispanic, and results may not generalize beyond this population. However, the rates of food insecurity among our sample are comparable to national data (i.e., households below 185% FPL with young children report 41% FI)<sup>1</sup> indicating that our sample was similar to other low income populations with young children.

Although the interviewers were trained and the questions were worded to reduce any impact of social desirability on the responses, it is possible that some of the responses related to well-known healthy practices (e.g. fruit and vegetable consumption) were affected by social desirability bias. If this were the case, however, this would affect mean values, but unless the magnitude of the bias varied as a function of food security status it would not affect the association between these questions and risk of household food security status. Finally, participants were asked about a variety of behaviors over several different time periods: HHFSS is collected annually, general shopping patterns asked respondents to report over the past 30 days, and specific shopping behaviors asked about the week prior. Edin and colleagues reported variability in food security over time and noted that those who were more food insecure, had often experienced sudden and unexpected events. These findings reinforce the need for longitudinal research that incorporates changes over time as well as variability across time periods.

In summary, this study suggests that low-income mothers use many coping strategies to feed their families and that food insecure households use a greater number of shopping strategies and informal sources of food than food secure families. These findings imply that mothers are consciously attempting to balance their scarce resources in order to provide food for their families. The potential that some strategies may have negative consequences on dietary quality requires that providers and community nutrition educators serving these high risk

populations provide guidance as to the most cost-effective strategies to purchase a healthy diet.

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**Table 1**  
**Independent Variable Descriptions used to predict food security status in low income families from two urban Rhode Island communities**

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Grocery shopping

Major food shopping frequency (daily, weekly, monthly)

Shopping frequency at different stores during past week

Store types (n= 1-5): supermarket, convenience store, corner store/neighborhood market, specialty store, superstore/discount

Strategies used during past 30 days (n = 0-8): includes using coupons, buying in bulk, taking advantages of sales, purchasing lower cost foods, buying fewer vegetables or fruits, purchasing less “junk” food, shopping at multiple stores, using a shopping list

Alternative Food Sources

Federal Nutrition Assistance Program Participation over the past 30 days (Yes=1; No = 0)

Supplemental Nutrition Assistance Program (SNAP)

Special Supplemental Nutrition Program for Women, Infants and Children (WIC)

National School Lunch Program and School Breakfast Program (NLSBP)

Community Food Program Participation over the past 30 days (Yes= 1; No = 0)

Pantry Program

Soup Kitchen

Senior Meal Site

Informal Sources of Food, frequency over past 30 days (Never = 1; Often = 4)

Pooling resources to create a shared meal

Borrowing food

Exchanging/Trading foods

Store credit to purchase food

Total number of informal strategies used (0-4)

Restaurant (Fast food and/or Full Service) visits during past week

Perceived ability to manage resources

Strongly agree = 1; Strongly disagree = 5; Sum of Responses with Range: 4-20;

Note: Higher scores indicate lower ability.

Sticking to a budget

Cooking balanced meals

Managing household bills

Making money last throughout the month.

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**Table 2**  
**Participant Characteristics of low income mothers from two urban Rhode Island Communities**

<b>Demographic Characteristic (n=164)</b>	<b>n (%)</b>	<b>Mean (SD)</b>	<b>Range</b>
Maternal Age (years)		30.1 (7.2)	18-55
Household size (n)		4.0 (1.4)	2-9
Children (n)		2.2 (1.6)	1-6
Maternal education (years)		12.6 (3.3)	0-22 <sup>a</sup>
<b>Language spoken</b>			
English	120 (73)		
English & Spanish	6 (4)		
Spanish only	35 (21)		
Other	3 (2) <sup>b</sup>		
<b>Marital status</b>			
Single	95 (58)		
Married/Partnered	69 (42)		
<b>Maternal Race/ethnicity</b>			
Hispanic	90 (55)		
White, Non-Hispanic	21 (13)		
Black, Non-Hispanic	38 (23)		
Other	14 (9) <sup>c</sup>		
<b>Household Food Security Status</b>			
Food Secure (FS)	93(57)		
Low Food Security (LFS)	49(29)		
Very Low Food Security (VLFS)	22(13)		
<b>Household monthly income</b>			
\$1,500	99 (61)		
>\$1,500	65 (39)		

<sup>a</sup>One mother reported no schooling.

<sup>b</sup>Cambodian, Yorube, and non-specified.

<sup>c</sup>Included multiracial, Asian Pacific Islander, Native Americans and non-specified.

**Table 3**  
**Shopping locations and strategies used among low-income families from two urban Rhode Island communities (N=164)**

<b>Past week typical shopping locations</b>	<b><i>n</i> (%) shopping at each location<sup>a</sup></b>	<b><i>Mean times per week (SD)</i></b>
Supermarket	144 (88)	2.14 (1.67)
Warehouse/discount	50 (31)	0.44 (0.81)
Corner store/market	24 (15)	0.38 (1.37)
Specialty shop	19 (12)	0.22 (0.76)
Convenience store	16 (10)	0.22 (0.84)
<b>Total shopping frequency in any store in past week</b>		<b>3.40 (2.39)</b>
<b>Amount spent on food in past week (\$)</b>		<b>121.12 (102)</b>

  

<b>Past month shopping strategies</b>	<b>Sometimes/often <i>n</i> (%)</b>
Lower cost food	136 (83)
Sales	121 (74)
Less junk food	119 (73)
Multiple stores	106 (65)
Bulk	104 (63)
Shopping list	98 (60)
Coupons	67 (41)
Fewer fruits/vegetables	51 (31)

<sup>a</sup>Percentages exceed 100 since respondents reported shopping at more than one location



**Table 4**  
**Alternative food sources used by low income families in two urban Rhode Island communities (N=164)**

<b>Nutrition assistance programs</b>	<b><i>n</i> (%) participation</b>
Child Care/Head Start	119 (73)
SNAP	111 (68)
WIC	101 (61)
National School Lunch Program	79 (48)
School Breakfast Program	74 (45)
None	10 (6)
<b>Community food programs</b>	<b><i>n</i> (%) any use</b>
Pantry	26 (15)
Soup Kitchen	6 (3)
<b>Informal sources of food</b>	<b><i>n</i> (%) sometime/often use</b>
Pooling resources	58 (35)
Exchange/trading	20 (12)
Store credit	14 (9)
Borrowing	12 (7)
<b>Restaurants</b>	<b><i>n</i> (%) prior week use</b>
<b>Full service</b>	
Never	120 (73)
One	30 (18)
Two or more times	6 (4)
<b>Fast food</b>	
Never	69 (42)
One or two times	75 (46)
Three or more	18 (11)

Abbreviations: SNAP, Supplemental Nutrition Assistance Program; NSLP, National School Lunch Program; SBP, School Breakfast Program; WIC, Special Supplemental Nutrition Program for Women Infants and Children.

**Table 5**  
**Bivariate association between demographics and household food security status<sup>a,b</sup> in low income families from two urban Rhode Island communities in (N=164)**

	# of children	Maternal age	Maternal education
	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>
FS	2.0 <sup>a</sup> (0.12)	28.9 <sup>a</sup> (0.77)	13.1 (0.34)
LFS	2.2 <sup>a</sup> (0.17)	31.2 <sup>ab</sup> (1.07)	11.7 (0.47)
VLFS	2.8 <sup>b</sup> (0.26)	32.8 <sup>b</sup> (1.64)	12.7 (0.72)
<i>F</i> -value	4.2 <sup>**</sup>	3.07 <sup>*</sup>	2.71

Abbreviation: FS, Food secure; LFS, Low food security; VLFS, Very low food security.

<sup>a</sup>Means with different superscripts are significantly different from each other at the level of significance using the following notation:

\*  
 $p < .05$ ,

\*\*  
 $p < .01$ ,

\*\*\*  
 $p < .001$

<sup>b</sup>*General Linear Model ANOVA* with differences in means tested using Duncan test.

**Table 6**  
**Bivariate association between informal food sources of food, shopping strategies, and ability to manage resources and household food security status in low income families in two urban Rhode Island communities (N=164)<sup>a,b</sup>**

	Informal Sources <i>M (SE)</i>			Shopping Strategies <i>M (SE)</i>	Perceived inability to budget <i>M (SE)</i>
	Borrow	Pool Resources	Exchange/trade	Store credit	
FS	1.09 <sup>a</sup> (0.07)	1.82 <sup>a</sup> (0.11)	1.23 <sup>a</sup> (0.08)	1.17 <sup>a</sup> (0.07)	6.90 <sup>a</sup> (0.27)
LFS	1.42 <sup>b</sup> (0.09)	1.75 <sup>a</sup> (0.15)	1.38 <sup>a</sup> (0.11)	1.188 <sup>a</sup> (0.10)	9.23 <sup>b</sup> (0.27)
VLFS	1.73 <sup>c</sup> (0.13)	2.59 <sup>b</sup> (0.23)	2.00 <sup>b</sup> (0.17)	1.64 <sup>b</sup> (0.15)	10.09 <sup>b</sup> (0.55)
<i>F</i> -value	11.09 <sup>***</sup>	5.42 <sup>**</sup>	8.75 <sup>***</sup>	4.36 <sup>**</sup>	20.10 <sup>***</sup>

Abbreviation: FS, Food secure; LFS, Low food security; VLFS, Very low food security.

<sup>a</sup> Means with different superscripts are significantly different from each other at the level of significance using the following notation:

\* *P*<.05,

\*\* *P*<.01,

\*\*\* *P*<.001

<sup>b</sup> *General Linear Model ANOVA* Differences in means tested using Duncan test.

**Table 7**  
**The association between informal sources of food, maternal behaviors and family demographics and risk of Household Food Insecurity <sup>a</sup> in low income families in two urban Rhode Island communities (N=152)**

	Adjusted Odds Ratio [95% Confidence Interval]	P value
Family Demographics		
Number of children in the household	1.28 [0.87-1.91]	.29
Maternal age (years)	1.10 [1.03-1.17]	< .006
Maternal education (years)	0.89 [0.77-1.03]	.135
Spanish only spoken in the household <sup>b</sup>	3.57 [1.25-10.18]	<.02
Number of informal sources of food (i.e. borrowing, pooling, trading)	1.98 [1.28-3.07]	< .03
Food Shopping Strategies (number)	1.17 [0.92-1.49]	.102
Perceived inability to manage resources	1.60 [1.30-1.98]	<.000

<sup>a</sup>Results based on a Multivariate Logistic regression, controlling for all variables listed in the table.

<sup>b</sup>Spanish only vs English and English/Spanish combined

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