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## EXAMINING MOTIVATIONS AND BARRIERS FOR ONLINE GROCERY SHOPPING AMONG URBAN AND RURAL POPULATIONS OF KENTUCKY, NORTH CAROLINA, AND MARYLAND

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EXAMINING MOTIVATIONS AND BARRIERS FOR ONLINE GROCERY  
SHOPPING AMONG URBAN AND RURAL POPULATIONS OF KENTUCKY,  
NORTH CAROLINA, AND MARYLAND

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THESIS

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A thesis submitted in partial fulfillment of the  
requirements for the degree of Master of Science in Nutrition and Food Systems  
in the  
College of Agriculture, Food and Environment  
at the University of Kentucky

By

J.B. Pitts

Lexington, Kentucky

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2022

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## ABSTRACT OF THESIS

### EXAMINING MOTIVATIONS AND BARRIERS FOR ONLINE GROCERY SHOPPING AMONG URBAN AND RURAL POPULATIONS OF KENTUCKY, NORTH CAROLINA, AND MARYLAND

The online grocery industry grew exponentially alongside the COVID-19 pandemic in the U.S. With the implications of this growth still unclear, this study aimed to identify key influences and barriers towards the adoption of online grocery shopping, and to understand how online grocery shopping may affect food security and dietary intake. Across seven counties in Kentucky, North Carolina, and Maryland, 183 participants were surveyed about their usage of online grocery shopping before and after COVID-19, their opinions about online grocery shopping, their dietary intake, and food security. Survey answers were stratified between SNAP and non-SNAP recipients and urban and rural residents, and multivariate and logistic regressions determined the relationship between online grocery shopping and outcomes of interest. Results of the analysis showed that while SNAP and non-SNAP participants utilized online shopping at about the same rate, rural participants shopped for groceries online significantly less than urban participants both before and after the beginning of the pandemic, suggesting a need for online retailers to adopt policies to accommodate rural consumers. Significant barriers to online grocery shopping in rural communities were identified as a lack of delivery services and difficulty using the grocery website. No association was found between online grocery shopping and dietary intake or food security.

#### KEYWORDS:

ONLINE GROCERY SHOPPING, RURAL COMMUNITIES, FOOD DESERTS, SHOPPING BEHAVIOR, ONLINE MARKETING

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J.B. Pitts

15 April 2022

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## **Introduction**

In 2017, market research firm Euromonitor International predicted Internet retailing to be the fastest growing global market through 2022, with the food and drink category leading the way at a growth rate of 80% (BusinessWire, 2017). Although the United States had been slow in adopting this trend, with only 9% of U.S. adults buying groceries online the year of the Euromonitor report (Gallup, 2017), the market has experienced a sudden acceleration in light of the COVID-19 pandemic. During March 2020, the first month of the global pandemic's impact on the U.S., 31% of Americans reported using online grocery services for either in-store pickup or at-home delivery, and the total number of online orders increased by 33% over the following month (Brick Meets Click, 2020). With the pandemic still ongoing, this upward trend is expected to continue. Online maturation of a market is said to occur once 70% of consumers are engaged in the online marketplace; some business forecast models were predicting the online grocery market to achieve maturation by 2025 even prior to the pandemic (Nielsen, 2018).

The consequences of this unexpected acceleration in online shopping on the retail grocery market are still unclear, as shoppers in online spaces are typically influenced by factors that differ from shoppers in traditional brick-and-mortar stores. Because grocery shopping in the U.S. has been slow to adopt the online marketplace, grocery manufacturers and retailers have historically focused their marketing strategies on notions of assurance, prioritizing aspects of the shopping experience such as confidentiality and customer service (Rajamma et al., 2007). Within the grocery industry specifically, reducing consumer search costs also tends to be an important consideration, as a product's shelf location and allocation have shown to have a significant effect on product demand (Brown & Lee, 1996).

In contrast, online shopping is considered a more impersonal experience, with potential advantages including convenience and a larger selection available to the consumer (Rajamma et al., 2007). Some early research findings have suggested that expanded online grocery shopping may be able to improve dietary intake and reduce food insecurity (Huyghe et al., 2017; Jilcott Pitts et al., 2018). However, others have suggested that targeted advertising and larger areas of service may have unintended effects that



further increase disparities in the food environment if efforts aren't taken to mitigate the risks involved (Olzenak et al., 2020). While online grocery shopping may not necessarily overtake the market share of traditional in-store shopping, the expansion of online platforms promises to influence the future of grocery marketing.

### **Behavioral Theories Behind Online Grocery Shopping**

Across industries, there are inherent differences in selling products between traditional brick-and-mortar and online environments that require an understanding of shoppers' motivations and limitations for using the respective platforms. Much of the research in this area has been rooted in motivation theory (McGuire, 1974), which posits that human motives are primarily derived through the lenses of individual gratification and satisfaction. According to an analysis by Rohm and Swaminathan (2004), individual grocery shopper motivations include considerations such as overall convenience and time savings, the recreational experience of shopping, social interaction, information seeking, variety of options, and desirability of immediate possession. Their study found that of these dimensions, increased availability of information and increased variety of products were the most important considerations for shoppers who preferred the online environment, suggesting that the ability to compare products while shopping online increases consumers' variety seeking behavior.

Somewhat surprisingly, the analysis by Rohm and Swaminathan (2004) did not find saving time to be a relevant concern for online shoppers, which they suggest could be due to the time lapse between a customer ordering a product and receiving it. This is echoed by other studies that have suggested that greater consumer control – the ability for a consumer to see, touch, and feel products before purchasing them – has long been a major advantage of brick-and-mortar stores (Menon & Kahn, 1995; Hoffman et al., 2000). It is also why in-store marketing strategies are generally centered on psychological constructs of consumer comfort, leveraging factors such as store layout and ambiance to impact the consumer's perception of value (Ainsworth & Foster, 2017).

However, the sensory distance from products that is inherent to online shopping establishes the potential for online grocery shopping to reduce the number of impulse purchases made by consumers. Cognitively regulating responses to vice choices is often

challenging for consumers because they tend to be automatic responses to strong emotions (Shiv & Fedorikhin, 1999). This relates to the theory of planned behavior, which has shown to be well suited to predicting online grocery shopping behaviors (Hansen et al., 2004; Hansen, 2008). The theory of planned behavior states that individual decision making is shaped by three components: their attitude about adopting the behavior, the subjective norm, and perceived behavioral control over the action (Ajzen, 1985). It further implies that grocery shopping is affected by cognitive, emotional, cultural, and social factors, not just a direct economic exchange of money for nutritional value. Behavioral economic research by the USDA found that self-control issues over choosing food arise when consumers are stimulated by a visceral factor such as hunger (Just et al., 2007). As such, the sensory distance of products in the online environment may reduce the importance of immediate gratification in the decision-making process (Huyghe et al., 2017).

It has been pointed out that the adoption of online grocery shopping is often triggered by circumstances perceived to be outside of an individual consumer's control, and adoption is discontinued when the initiating trigger ceases (Hand et al., 2009). This could certainly become the case for many shoppers in the context of the COVID-19 pandemic; however, the continued development of online platforms could still have a multi-channel impact. As Internet usage has become increasingly ingrained in American society, it has become generally agreed that consumers switch between channels, choosing where to make their purchases based on the channel that is best suited to satisfy their current motives (Schröder & Zaharia, 2008). Consumer uncertainty has shown to be a powerful motivational factor, and the increased availability of information online is widely considered to be one of the strengths of web-based services (Rohm & Swaminathan, 2004; Rajamma et al., 2007). Webrooming, where an online information search is conducted before purchasing a product in the physical store, has become a common behavior among consumers, allowing them to create individualized information that increases their perception of control over the decision (Zhang et al., 2010), and thus make that decision with a higher degree of confidence (Flavián et al., 2019). As such, multi-channel strategies for grocery retailers, such as the ability to make lists with specific product locations in store or the ability to leave product reviews, could increase

consumer confidence in the online experience and attract new customers (Orús et al., 2019).

### **Influence of Marketing on Online Grocery Shopping Behavior**

Online grocery shopping options include online ordering for pickup or delivery by traditional brick-and-mortar stores, purely online grocery retailers, and subscription services. For the purpose of the current study, online ordering from traditional stores will be the primary focus. Two of the largest challenges in establishing online grocery shopping have been eBusiness quality and product quality. An early analysis of online grocery shopping platforms by Ellis (2003) identified three essential marketing considerations for online retailers. The first being that stores operating online need to provide an interface that is easily understandable, with transactions as simple and transparent as possible, as customers' first orders took an average of 75 minutes. The second was a need to convince customers that the products they are getting online are of comparable quality to what they select in store, as they are giving up the ability to self-select items. Although this analysis also found evidence that produce and meat delivered to homes are fresh and sometimes even fresher than those in stores, it noted that this concern was greatest for consumers regarding fresh items, meaning there is an additional need for retailers to educate consumers that products delivered to the home are equally fresh as those bought in-store. Finally, the analysis noted that a substitution strategy is necessary for out-of-stock products, especially since grocery stores typically run tight margins and must carefully manage inventory.

Although there is no physical shelf space to be allocated in an online platform, it has also been shown that a product's choice probability increases when presented on the first screen or near focal items, so "shelf sequence" still plays an important role in marketing products online (Breugelmans et al., 2007). Benn et al. (2015) utilized eye-tracking technology to determine user search habits online and examine the possible implications of shelf sequencing. They found that the most common way for online shoppers to find products was by navigating to virtual department pages rather than using the search function. Their analysis also revealed that pictures and titles were the most frequently viewed types of information, with one-third of participants never looking at

nutrition information at all. These findings further suggest that developing an easily understandable website is essential for online grocery retailers, as customers may be more reliant upon the interactivity of the website to find products than their own planning.

### **Dietary Intake in Urban and Rural Areas**

Approximately 20% of the U.S. population reside in rural areas, and studies have consistently reported a higher prevalence of obesity in rural areas compared to urban areas (Patterson et al., 2004; Befort et al., 2012; Trivedi et al., 2015). This trend is not limited to the adult population, with children in rural areas also found to be significantly more likely to be classified as obese as children in urban areas (Johnson III & Johnson, 2015). While there are likely to be a variety of sociocultural factors at play in these disparities, differences in dietary intake almost certainly play a role. A review of data from the National Health and Nutrition Examination Survey (NHANES) by Trivedi et al. (2015) found that rural adults consumed a higher proportion of sugar-sweetened beverages and a lower proportion of fruit and fiber in their diet than urban adults. Their review also found that rural adults were more likely to skip breakfast than urban adults. A comparative study of adolescent health behaviors also found that adolescents in urban areas consumed more whole grains than those in rural areas, although they also found that those in urban areas consumed higher amounts of added sugar (Euler et al., 2019). Dietary patterns high in added sugar and low in fiber are associated with higher body-mass index and waist circumference in adults (Newby et al., 2003) and likely contribute to the increased risk of obesity in rural areas. Rural adults have also shown to be less physically active than urban adults (Trivedi et al., 2015), suggest that this risk is a multi-faceted issue.

### **Impact of Online Grocery Shopping on Purchasing and Dietary Intake**

Supermarkets have generally been regarded as healthy elements of community food environments, with areas limited in their access to supermarkets and grocery stores being considered “food deserts” (Morton et al., 2005). It has in fact been frequently hypothesized that distance to the nearest supermarket may be an underlying cause of

food-related health disparities such as obesity and heart disease (Moore et al., 2008; Bodor et al., 2010; Walker et al., 2010); however, there is no general consensus on the distance from a supermarket that qualifies an area as a food desert. A review by Morton and Blanchard (2007) identified 418 U.S. counties as food deserts where all residents lived 10 miles or more from the nearest supermarket, with 98% of these counties being nonmetropolitan areas with 10,000 or fewer residents. Studies of low food access in urban environments have often considered much smaller areas, however, with studies such as Ghosh-Dastidar et al. (2014) even focusing on individual neighborhoods. This study found a positive association between distance to the nearest major grocery store and obesity in two Pittsburgh neighborhoods, however, when distance and price were jointly modeled, they found that only price had a significant association, with higher grocery prices predicting a lower likelihood of obesity. As food deserts are often in lower income areas, they note that increasing healthy food access may be less important than offering better prices for healthy food. Their findings were echoed by a study suggesting that it is necessary to both increase food access and lower food costs to improve food security in the rural U.S. (Morris et al., 1992).

Online grocery delivery could potentially increase the number of healthy food options in low access areas, especially for those without access to reliable transportation, and studies of online grocery shopping have generally found it to be a feasible method to increasing food access (Jilcott Pitts et al., 2018). Lagisetty et al. (2017) found that Baltimore's Virtual Supermarket Program improved food purchasing behaviors in low-income neighborhoods, while Appelhans et al. (2013) saw a large proportion of fruits and vegetables purchased in their pilot study of an online grocery service in a Chicago food desert. Lennon et al. (2009) noted that rural consumers may also be more likely to choose online grocery delivery in order to avoid long commutes. Expanded online shopping could also reduce the price of groceries, as product prices in the online market in other industries have been found to be lower than those in the traditional market (Brynjolfsson and Smith, 2000), although in the case of food this possibility could be mitigated by other factors. A study that interviewed participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) found a perception that it was more difficult to find good deals online than in-store (Jilcott Pitts et al., 2020), while other

research has suggested that online shoppers may also be less price sensitive. A comparative study of shoppers who used both in-store and online grocery shopping found that participants spent 44% more in online transactions, although they also noted a significant reduction in sugar-added, impulse-sensitive foods in online purchases (Zatz et al., 2021).

### **Barriers to Online Shopping**

Despite the potential for online grocery shopping to address transportation barriers and improve food availability in low access area, the ability for grocery retailers to process SNAP benefits online has been a major barrier to online grocery adoption in low-income areas (Appelhans et al., 2013; Lagisetty et al., 2017). While many major grocery retailers have begun accepting SNAP benefits online following the onset of the COVID-19 pandemic, income has still been positively associated with likelihood of shopping online (Zatz et al., 2021), as perceptions among SNAP recipients that online shopping is too expensive and that perishable items purchased online may be of lower quality likely persist to some degree (Martinez et al., 2018, Rogus et al., 2019).

Similarly, while online grocery shopping has the potential to improve food availability in rural areas, it is likely that adoption is being limited by a lack of delivery coverage. As convenience has been one of the mostly commonly identified benefits of online grocery shopping (Jilcott Pitts et al., 2018), being required to make a long commute to the store after ordering likely makes online grocery services less attractive to rural consumers. While this could be viewed as a potential market opportunity, barriers exist to developing online delivery for retailers. Lower population densities mean that delivery costs to rural areas can be as much as six times higher than in urban areas (Hu, 2018), while bulk and niche products that come with high inventory holding costs are considered to be the most likely products to be in demand for rural consumers online (Sousa et al., 2020). These additional costs could make it difficult to increase online grocery adoption in rural areas even if delivery services were offered.

## **Purpose of Current Study**

There is currently a limited understanding overall of how online grocery shopping affects consumer purchasing decisions in comparison to shopping in a traditional brick-and-mortar store. Online grocery shopping may increase food availability in low access areas while reducing the importance of instant gratification in decision-making, leading consumers to purchase more healthy foods and fewer unhealthy impulse products. This was the case in Huyghe et al. (2017), which conducted three randomized controlled trials and an analysis of a real-world supermarket chain and found fewer vice products in both settings. However, online grocery shopping could also increase food environment disparities by providing increased access to unhealthy options. A recent report by the Center for Science in the Public Interest (2020) concluded that more than half of popular retailers' home page promotions were for unhealthy products, and that more than three-quarters of promotional emails sent to customers were for unhealthy products.

Elucidating the characteristics of shoppers that are most likely to adopt online grocery shopping, as well as the barriers keeping others from adoption, will allow future strategies to be optimized to promote healthy behaviors. This study aims to contribute to this understanding by examining key influences and barriers towards adoption of online grocery shopping, determining the association between dietary intake and consumer behavior towards online grocery shopping, and determining the association between food security and consumer behavior towards online grocery shopping. The results will then inform an online grocery shopping intervention utilizing the same participants, providing further evidence for the potential effects of online grocery shopping on urban and rural food environments.

## **Methods**

### *Study Area*

Adults aged 21 and older who are the primary shoppers in their household were asked to participate in the survey as part of a larger online grocery shopping intervention study. Seven counties in the United States were selected for the study based on the rural-urban continuum with the aim of representing both rural and urban settings; grocery stores offering online ordering and buy-in from Cooperative Extension offices for

recruitment were also considered. Fayette County, Kentucky, Durham County, North Carolina, and Baltimore County, Maryland were selected as the urban population, while Northampton County, North Carolina and Lawrence County, Perry County, and Martin County, Kentucky represented the rural population.

### *Recruitment and Enrollment*

Due to a surge in COVID-19 cases in early 2021, the initial recruitment for the study was conducted entirely via Facebook. Cooperative Extension agents in participating counties posted a Facebook ad to residents to text the key word “Grocery20” to the study team phone number, which was set up through the EZText service. Once residents texted the number, they received a link to the e-informed consent via REDCap. Recruitment was tested prior to the study within a Fayette County Facebook group page; 38 individuals responded to the EZText number and 9 of those respondents filled out the consent form. Residents who filled out this form were then enrolled in the study and contacted via EZText to reserve a time to complete their survey via phone call. Participants were informed that they would receive a \$50 MasterCard gift card via the Western Union – University of Kentucky pilot program after completing their survey. After a five-month online recruitment window, two Cooperative Extension agents conducted in-person recruitment over one day at the Food Lion grocery store in Martin County, Kentucky. In total, 475 individuals responded to the EZText number, and 183 participants completed the e-consent form.

### *Survey Design and Administration*

The survey (Appendix 1.1) was developed by the research team at the University of Kentucky in conjunction with non-profit organization Share Our Strength and the United States Department of Agriculture’s Hatch Fund. General demographic information was collected in addition to questions on shopping preferences, meal planning, food security, and food and beverage intake. The demographic portion also included questions about participation in SNAP and WIC and online grocery shopping frequency before and after COVID-19. The shopping preference component consisted of 20 items that asked participants to rate statements such as “I am satisfied with the quality



of fruits and vegetables I receive” on a scale from strongly disagree to strongly agree. This component was developed as part of an iterative process between the study’s funders and researchers that was informed by the qualitative findings in Rogus et al. (2020). The meal planning component consisted of 12 items regarding use of shopping lists, frequency of meal planning, and attitudes towards meal planning. The questions were derived from a combination of the University of Minnesota EAT study and Cooperative Extension SNAP-Ed materials. The food security component was modified from the 6-item USDA Food Security Scale (USDA, 2012), which measures food security over the previous 30 days, with two questions added to address children’s food intake in consideration of the most severe range of food insecurity. The 19-item dietary intake component was drawn from the National Cancer Institute dietary screener evaluated in the Eating at America’s Table Study (Subar et al., 2001), which consists of frequency and portion size questions that ask about consumption (of fruits, lettuce salad, fried potatoes, etc.) over the past month. The beverage intake component was a modified version of the BEVQ-19 (Hedrick et al., 2012), which consists of frequency and intake amount questions that ask about consumption of specific beverages over the past month. Modifications included removing the alcoholic beverage categories, adding a nut milk category, and differentiating between bottled water and tap water. Study participants who joined through the online recruitment window completed surveys over the phone as conducted by graduate research assistants, while the Martin County participants who signed up during the in-person recruitment completed their surveys at the time of recruitment. Survey data was entered directly into REDCap.

### *Data Analysis*

Comprehensive survey data was downloaded from REDCap for analysis using Stata software. Descriptive statistics were run on the study participants’ demographics, online shopping usage before and after COVID-19, opinions about in-store and online shopping options, dietary intake, and food security. The categories about online shopping usage were then recoded in Stata, where answers of “never (1)” were recoded to a zero (0) to signify those who have not used online grocery shopping, while any amount of usage of online shopping was recoded to a one (1) to signify those likely to use online

grocery shopping. Blank answers (6) were removed from the analyses. Survey results were then stratified between urban and rural participants and SNAP and non-SNAP participants, and a chi-square between groups test and Fisher's exact test were used to compare answers between these stratifications. A p-value of less than .05 was considered a statistically significant difference between the groups.

Regression models were then run between online shopping usage and dietary intake categories, and online shopping usage categories and food security. A multivariate regression was run for the dietary intake model, with the results stratified by age, SNAP participation, and rural/urban classification. Beta coefficients were reported for the change in dietary intake between non-online shoppers and online shoppers. The food security model was a bivariate logistic regression using food security classifications from the USDA's six-item U.S. Household Food Security Module (2012). Study participants classified as a 0 or 1 in the USDA module were coded as a "0" designating food secure, while participants classified as 2, 3, or 4 in the module were coded as a "1" designating low food security. None of the participants in the sample population scored a 5 or 6 in the module, which would designate very low food security. Odds ratios from that model were recorded to compare participants experiencing moderate food insecurity to participants who were considered food secure. In both models, results with a p-value of less than .05 were considered significant.

## **Results**

The population demographics of the study sample (n=183) are shown in Table 1. The majority of the study participants were white (78%), female (91%), and in their early middle age (mean: 41.8 years). More than two-thirds of study participants had lived in their current county for at least 10 years, with half of the sample living in the three urban counties and half in the four rural counties. Over three-quarters of the population had attended college at some point, more than half had a household income below \$50,000 and 30% were receiving SNAP benefits at the time of the survey.

Table 2 shows the sample proportion who shopped for groceries online before and after the COVID-19 pandemic, along with the results of the chi-square and Fisher's exact tests for SNAP and non-SNAP participants and urban and rural participants. After the

onset of the pandemic, there was an increase in the prevalence of online grocery shopping for fresh groceries, shelf stable groceries, and grocery pickup across all groups measured, with significant differences in the usage of these tools between the rural and urban groups in every category. Urban participants were more likely than rural participants to frequently shop online in general (59% urban vs. 41% rural,  $p=.045$ ), and over half of urban participants had utilized food delivery, shelf stable food delivery, and online grocery pickup since the onset of the COVID-19 pandemic. While online grocery shopping also increased among rural participants after the beginning of the pandemic, all three forms were still being utilized by less than a third of this population and experienced slower growth after the pandemic than among the urban population. While the number of urban participants using online platforms post-COVID-19 grew by 48.1% for shelf stable delivery and 93.8% for fresh delivery and grocery pickup services, the number of rural participants grew by 10.7% for shelf stable delivery and 61.5% for fresh delivery and grocery pickup. SNAP-enrolled participants using online platforms grew by 81.1% for shelf stable delivery and 155% for fresh delivery and grocery pickup, compared to 20.5% and 57.7%, respectively, for non-SNAP participants.

Table 3a and Table 3b shows study participants' opinions about online grocery shopping, split into two sections: positive attributes of shopping online and potential barriers to doing so. Most participants agreed that online groceries are affordable and that shopping online saved time, but urban participants were significantly more likely than rural participants to agree that there was a delivery option when shopping online (88% urban vs. 13% rural,  $p< .001$ ). Rural participants were also significantly more likely to agree that the user difficulty of the grocery site was a barrier to online shopping (17% rural vs. 5% urban,  $p= .034$ ), although delivery fees were identified as the most common potential barrier for both groups. No differences were measured between SNAP and non-SNAP participants among the study sample.

Results of the multivariate regression model examining a potential correlation between online grocery shopping and daily dietary intake are shown in Table 4a and Table 4b. Although rural participants in the sample consumed significantly more sugar-sweetened beverages than urban participants, there was not enough evidence in this

analysis to suggest that the prevalence of online grocery shopping influenced dietary intake among the study population.

Finally, Table 5a and 5b show the results of the binary logistic regression between online grocery shopping and food security. Among the study sample, rural participants were significantly less likely than urban participants to be experiencing food insecurity within the month prior to the survey (36% rural vs. 55% urban,  $p = .012$ ). The regression model suggests that those experiencing moderate food insecurity are 2.26 times more likely to shop online in general than those classified as food secure, but the model did not find that food security status influenced any type of online grocery shopping either before or after the onset of the COVID-19 pandemic.

Table 1. Demographics of study participants.

<b>Gender</b>	
Female	91%
Male	9%
<b>Age (Mean years)</b>	41.8
<b>Race</b>	
White	78%
Black or African American	17%
Asian	2%
Other	2%
<b>Urban/Rural</b>	
Urban	50%
Rural	50%
<b>Length of Residence</b>	
1-3 years	12%
4-7 years	13%
8-10 years	7%
10-20 years	18%
20 years or more	51%
<b>Education</b>	
Less than HS	3%
High School	18%
Some College	26%
College Graduate	54%
<b>Household Income</b>	
less than 20,000 (31)	18%
21-49,000 (64)	36%
50-69,999 (39)	22%
70-99,999 (14)	8%
more than 100,000 (28)	16%
<b>Supplemental Nutrition Assistance Program (SNAP)</b>	
yes (55)	30%
No (127)	70%

Table 2. Sample population differences in online shopping usage before and after COVID-19. \*signifies significant difference

	Baseline	SNAP	Non-SNAP		Urban	Rural	
<b>Online Shopping in General</b>	n=167	n=53	n=114	p= .409	n=91	n=76	<b>p= .045*</b>
>1/week	52%	47%	54%		59%	43%	
<1/week	48%	53%	46%		41%	57%	
<b>Pre-COVID Fresh Delivery</b>	n=158	n=49	n=109	p= .549	n=91	n=67	<b>p= .008*</b>
Yes	24%	20%	26%		32%	13%	
No	76%	80%	74%		68%	87%	
<b>Post-COVID Fresh Delivery</b>	n=158	n= 49	n=109	p= .300	n=91	n=67	<b>p&lt; .001*</b>
Yes	44%	51%	41%		62%	21%	
No	56%	49%	59%		38%	79%	
<b>Pre-COVID Shelf Stable Delivery</b>	n=157	n=48	n=109	p= .486	n=90	n=67	<b>p= .003*</b>
Yes	42%	37%	44%		52%	28%	
No	58%	63%	56%		48%	72%	
<b>Post-COVID Shelf Stable Delivery</b>	n=158	n=49	n=109	p= .118	n=91	n=67	<b>p&lt; .001*</b>
Yes	58%	67%	53%		77%	31%	
No	42%	33%	47%		23%	69%	
<b>Pre-COVID Pickup</b>	n=158	n=49	n= 109	p= .549	n=91	n=67	<b>p= .008*</b>
Yes	24%	20%	26%		32%	13%	
No	76%	80%	74%		68%	87%	
<b>Post-COVID Pickup</b>	n=158	n=49	n= 109	p= .300	n=91	n=67	<b>p&lt; .001*</b>
Yes	44%	51%	41%		62%	21%	
No	56%	49%	59%		38%	79%	

Table 3a. Online shopping preferences of sample population. \*signifies significant difference

<i>Positive Attributes to Online Shopping</i>							
	<b>Baseline</b>	<b>SNAP Yes</b>	<b>SNAP No</b>		<b>Urban</b>	<b>Rural</b>	
<b>Prices are affordable online</b>		<i>n=40</i>	<i>n=86</i>	p= .506	<i>n=84</i>	<i>n=42</i>	p= .067
Agree/Strongly Agree	72%	80%	67%		79%	60%	
Disagree/Strongly Disagree	14%	10%	15%		10%	21%	
Unsure	14%	10%	16%		11%	19%	
<b>Quality of food is good online</b>		<i>n=38</i>	<i>n=82</i>	p= .464	<i>n=82</i>	<i>n=38</i>	p= .236
Agree/Strongly Agree	74%	82%	71%		74%	74%	
Disagree/Strongly Disagree	10%	8%	11%		7%	16%	
Unsure	16%	11%	18%		18%	11%	
<b>Food items I like are available online</b>		<i>n=40</i>	<i>n=89</i>	p= .679	<i>n=86</i>	<i>n=43</i>	p= .194
Agree/Strongly Agree	68%	69%	68%		67%	74%	
Disagree/Strongly Disagree	14%	12%	18%		13%	16%	
Unsure	18%	19%	15%		22%	9%	
<b>Option for delivery is available to me</b>		<i>n=40</i>	<i>n=83</i>	p= 1.0	<i>n=85</i>	<i>n=38</i>	p< .001*
Agree/Strongly Agree	65%	65%	65%		88%	13%	
Disagree/Strongly Disagree	28%	28%	28%		7%	74%	
Unsure	7%	8%	8%		5%	13%	
<b>Saves times</b>		<i>n=43</i>	<i>n=88</i>	p= .593	<i>n=87</i>	<i>n=44</i>	p= .771
Agree/Strongly Agree	82%	84%	81%		83%	80%	
Disagree/Strongly Disagree	8%	9%	7%		8%	7%	
Unsure	11%	7%	13%		9%	14%	

Table 3b. Online shopping barriers for sample population. \*signifies significant difference

<i>Barriers to Online Shopping</i>							
	Baseline	SNAP Yes	SNAP No		Urban	Rural	
<b>I have access to reliable internet</b>		<i>n</i> =42	<i>n</i> =93	p= 1.0	<i>n</i> =87	<i>n</i> =48	p= 1.0
Agree/Strongly Agree	98%	100%	97%		98%	98%	
Disagree/Strongly Disagree	1%	0%	1%		1%	0%	
Unsure	1%	0%	2%		1%	2%	
<b>Online site difficult to use</b>		<i>n</i> =41	<i>n</i> =91	p= .598	<i>n</i> =85	<i>n</i> =47	p= .034*
Agree/Strongly Agree	9%	5%	11%		5%	17%	
Disagree/Strongly Disagree	81%	85%	79%		87%	70%	
Unsure	10%	10%	10%		8%	13%	
<b>Search for labels takes too long</b>		<i>n</i> =41	<i>n</i> =91	p= .923	<i>n</i> =86	<i>n</i> =46	p= .521
Agree/Strongly Agree	20%	22%	20%		20%	22%	
Disagree/Strongly Disagree	66%	66%	66%		64%	70%	
Unsure	14%	12%	14%		16%	9%	
<b>Pick up times are inconvenient</b>		<i>n</i> =41	<i>n</i> =82	p= .263	<i>n</i> =84	<i>n</i> =39	p= .209
Agree/Strongly Agree	21%	29%	17%		18%	28%	
Disagree/Strongly Disagree	63%	54%	67%		68%	52%	
Unsure	16%	17%	16%		14%	21%	
<b>Delivery fees make me less likely to order</b>		<i>n</i> =40	<i>n</i> =85	p= 1.0	<i>n</i> =85	<i>n</i> =40	p= .077
Agree/Strongly Agree	57%	58%	56%		64%	43%	
Disagree/Strongly Disagree	33%	33%	33%		28%	43%	
Unsure	10%	10%	10%		8%	15%	
<b>Minimum purchase makes me less likely to order</b>		<i>n</i> =42	<i>n</i> =89	p= .408	<i>n</i> =86	<i>n</i> =45	p= .527
Agree/Strongly Agree	37%	38%	37%		41%	31%	
Disagree/Strongly Disagree	53%	57%	51%		50%	58%	
Unsure	10%	5%	12%		9%	11%	



Table 4a. Sample population differences in dietary intake. \*signifies significant result

	<b>Baseline (n=183)</b>	<b>SNAP (n=54)</b>	<b>Non-SNAP (n=126)</b>	<b>Difference</b>	<b>Urban (n=91)</b>	<b>Rural (n=90)</b>	<b>Difference</b>
<b>Water G</b>							
Mean	128.16	127.3	127.86	-0.56 (-50.71,	125.78	130.56	-4.78 (-50.53,
Std				49.59)			40.96)
Dev	11.559	18.131	14.704		13.165	19.135	
<b>Total Bev Cal</b>							
Mean	915.29	939.53	907.64	31.89 (-139.75,	841.59	988.19	-146.6 (-302.13,
Std				203.52)			8.94)
Dev	39.679	74.481	47.292		41.436	66.83	
<b>Total Bev G</b>							
Mean	2166.81	2077.02	2207.65	-130.63 (-518.71,	2036.85	2295.36	-258.51 (-611.41,
Std				257.45)			94.39)
Dev	89.69	167.147	107.299		87.682	155.294	
<b>Total SSB Cal</b>							
Mean	117.03	156.39	101.02	55.37 (-6.88,	85.81	148.6	<b>-62.79 (-119.31,</b>
Std				117.62)			<b>-6.27)*</b>
Dev	14.472	31.412	15.678		14.804	24.606	
<b>Total SSB G</b>							
Mean	307.88	401.02	270.27	130.75 (-30.51,	221.47	395.25	<b>-173.77 (-319.7,</b>
Std				292)			<b>-27.85)*</b>
Dev	37.436	81.307	40.636		36.582	64.508	
<b>Total Milk Cal</b>							
Mean	779.67	780.46	781.49	-1.03 (-145.91,	732.3	827.56	-95.25 (-226.69,
Std				143.85)			36.18)
Dev	33.399	62.129	40.016		40.59	52.928	
<b>Total Milk G</b>							
Mean	1432.41	1346.97	1473.75	-126.78 (-384.14,	1438.02	1426.71	11.33 (-224.2,
Std				130.57)			246.87)
Dev	59.515	106.138	72.24		71.366	95.909	
<b>Total F/V</b>							
Mean	5.5	4.86	5.79	-0.93 (-3.02, 1.15)	5.16	5.83	-0.67 (-2.58,
Std							1.24)
Dev	0.483	0.448	0.667		0.369	0.89	

Table 4b. Association between online shopping and dietary intake, stratified by SNAP and rural. \*signifies significant result

Table 4a Sample Population Differences in Dietary Intake							
	Baseline (n=183)	SNAP (n=54)	Non-SNAP (n=126)	Difference	Urban (n=91)	Rural (n=90)	Difference
<b>Water G</b>							
Mean	128.16	127.3	127.86	-0.56 (-50.71, 49.59)	125.78	130.56	-4.78 (-50.53, 40.96)
Std Dev	11.559	18.131	14.704		13.165	19.135	
<b>Total Bev Cal</b>							
Mean	915.29	939.53	907.64	31.89 (-139.75, 203.52)	841.59	988.19	-146.6 (-302.13, 8.94)
Std Dev	39.679	74.481	47.292		41.436	66.83	
<b>Total Bev G</b>							
Mean	2166.81	2077.02	2207.65	-130.63 (-518.71, 257.45)	2036.85	2295.36	-258.51 (-611.41, 94.39)
Std Dev	89.69	167.147	107.299		87.682	155.294	
<b>Total SSB Cal</b>							
Mean	117.03	156.39	101.02	55.37 (-6.88, 117.62)	85.81	148.6	<b>-62.79 (-119.31, -6.27)*</b>
Std Dev	14.472	31.412	15.678		14.804	24.606	
<b>Total SSB G</b>							
Mean	307.88	401.02	270.27	130.75 (-30.51, 292)	221.47	395.25	<b>-173.77 (-319.7, -27.85)*</b>
Std Dev	37.436	81.307	40.636		36.582	64.508	
<b>Total Milk Cal</b>							
Mean	779.67	780.46	781.49	-1.03 (-145.91, 143.85)	732.3	827.56	-95.25 (-226.69, 36.18)
Std Dev	33.399	62.129	40.016		40.59	52.928	
<b>Total Milk G</b>							
Mean	1432.41	1346.97	1473.75	-126.78 (-384.14, 130.57)	1438.02	1426.71	11.33 (-224.2, 246.87)
Std Dev	59.515	106.138	72.24		71.366	95.909	
<b>Total F/V</b>							
Mean	5.5	4.86	5.79	-0.93 (-3.02, 1.15)	5.16	5.83	-0.67 (-2.58, 1.24)
Std Dev	0.483	0.448	0.667		0.369	0.89	

Table 5a. Sample population differences in food security. \*signifies significant result

	SNAP Yes (n=55)	SNAP No (n=127)	p= .627	Urban (n=91)	Rural (n=92)	p= .012*
Food Secure	51%	56%		45%	64%	
Food Insecure	49%	44%		55%	36%	

Table 5b. Association between online shopping and food security, stratified by SNAP and rural. \*signifies significant result

	General Online Shopping	Pre-COVID Fresh Delivery	Post-COVID Fresh Delivery	Pre-COVID Shelf Stable Delivery	Post-COVID Shelf Stable Delivery	Pre-COVID Pickup	Post-COVID Pickup
<b>Food Security</b>	<b>OR: 2.26 (1.19, 4.28)*</b>	OR: 1.49 (0.70, 3.19)	OR: 1.52 (0.76, 3.04)	OR: 1.34 (0.70, 2.60)	OR: 1.79 (0.88, 3.69)	OR: 1.49 (0.70, 3.19)	OR: 1.52 (0.76, 3.04)

## Discussion

The results of the current study align with market data that online grocery shopping in the U.S. has experienced a drastic expansion since the onset of the COVID-19 pandemic in March 2020 (Redman, 2020), however, the stratification of these results suggest that online platforms continue to lag behind in accommodating rural consumers. With market pressures already compromising healthy food access and putting rural areas at an increasing risk of becoming food deserts (Morton & Blanchard, 2007), expanding the online options for rural consumers is a potential avenue for expanding online grocers' market share and improving the food environment in local communities. According to our findings, the two most prevalent barriers to online grocery adoption in rural areas are a lack of delivery options and difficult-to-understand website interfaces. While most rural consumers in the sample population did not find online food quality to be an issue, they were 6.5 times more likely than urban consumers in the sample to say that delivery services were unavailable. A lack of delivery services means that rural consumers will still have to make long commutes to receive their food, despite this being a reason rural residents may be more likely to desire online shopping (Lennon et al., 2009). Rural participants were also significantly more likely to find online grocery websites difficult to use, which was identified by Ellis (2003) as being the largest challenge to increasing online grocery adoption. This is despite this study's recruiting being conducted almost entirely online, which could have resulted in study participants being more comfortable with Internet platforms than the average citizen in their community and suggests that

online grocers in these areas have not yet optimized their sites to accommodate these rural communities.

This study's findings on SNAP recipients' use of online grocery shopping provides evidence that making changes to accommodate rural users online should be considered beneficial for grocery retailers. Online processing of SNAP benefits has long been identified as a major barrier to the adoption of online grocery shopping for SNAP recipients, despite the potential for online platforms to address transportation barriers and healthy food availability for these consumers (Appelhans et al., 2013; Lagisetty et al., 2017). In Martinez et al.'s (2018) study examining the first online grocer to accept EBT benefits, few participants made purchases with SNAP online even when incentivized to do so. This study identified perceptions that online shopping was too expensive, a lack of control over the purchasing process, and skepticism about the quality of perishable items as barriers to adoption among SNAP recipients. A focus group study in Las Cruces, New Mexico, similarly found that online fees and a lack of trust in employees to pick their food items were the most common perceptions against the adoption of online grocery shopping for SNAP recipients (Rogus et al., 2019). Following the onset of COVID-19 in the U.S., two of these barriers were largely removed for SNAP recipients, as many major grocery retailers began accepting EBT benefits online and waived delivery fees for all shoppers. SNAP-enrolled participants experienced the largest growth in adoption of online shopping of any group measured by this study, and the survey results indicate that these measures were largely effective at changing some of the negative perceptions around online grocery shopping, as SNAP participants in the study held similar opinions of online shopping as non-SNAP participants.

Expanding the online grocery market into rural communities could prove more challenging, as delivery costs for retailers can be far higher in rural areas than in urban areas (Hu, 2018). However, it stands to reason that moving to accommodate rural consumers could provide willing retailers with first-mover-advantage opportunities for growth in rural areas more so than they could in urban markets. Sousa et al. (2020) developed an operational model for online grocery retailers to efficiently service rural markets, with recommendations including reducing the selection of perishable products in favor of more products that aren't locally available, targeting delivery to a few days

during the week, and using dynamic delivery fees (rather than a flat rate) to discourage smaller orders. Strategies such as these, if effectively implemented, could make delivery to rural areas more feasible and attract more rural consumers to online grocery shopping.

This type of market adaptation would naturally require retailers to collect user geolocation data, which opens the possibility of tracking purchase data to generate targeted advertising. This could prove counterintuitive to studies such as Huyghe et al. (2017) that have suggested that the sensory distance created by online purchasing may be effective in reducing impulse purchases. Whereas a physical store has limited space for manufacturers to market their products, there are many opportunities for customers to be reached online. Online shoppers have shown to be more likely to purchase prominently displayed products (Breugelmans et al., 2007; Benn et al., 2015). One study into recommendation algorithms for online groceries found that they can reach a hit rate of over 25% (Yuan et al., 2016), so utilizing these tools on online grocery websites carries the risk of reinforcing unhealthy impulse purchases in the future.

However, knowing these risks allows for efforts to be taken to mitigate them. The Center for Science in the Public Interest (2020) recommends that the USDA develop policies for online SNAP retailers to highlight healthy food and drinks in their promotions, and that retailers should disclose sponsorships so customers can distinguish advertisements from general search results. Other research has suggested that making nutrition facts and ingredient statements universally available online, as well as creating the option to filter search results by nutrition attributes, may encourage consumers to make more informed decisions (Olzenak et al., 2020). Promotion of healthier food choices online could provide as much as a positive impact, if not an even greater one, on food environments as the ability of online platforms to increase food access (Ghosh-Dastidar, 2014).

This study did not provide conclusive evidence into what impact online grocery shopping has on study participants' food choices, as online grocery shopping was not shown to influence either dietary intake or food security. Participants experiencing moderate food insecurity were more likely to shop online for products in general, but online grocery shopping in and of itself was not associated with any health or socioeconomic effects. However, this analysis was limited by its reliance upon dietary

recall data, which can be subject to incomplete reporting due to subjects not remembering what they've consumed, inaccurately estimating portion sizes, and accidentally or purposefully failing to record specific items (Grandjean, 2012). This is especially notable considering that study participants in this case were asked to recall their dietary intake over the previous 30 days, rather than 24 hours as is often the case in dietary intake studies. Comparing consumer purchases online and in traditional stores may be a more accurate way to determine what impact online platforms are having on consumer food choices, and the results of this survey will be used to inform a grocery shopping intervention study utilizing the same participants. The participants are to shop either in a traditional store, online without shopping tips, or online with curated shopping tips on how to maximize the nutritional value of their money. Receipt data will be collected over the course of eight weeks and compared to see how these online shopping methods influenced participants' food choices in contrast to the traditional in-store environment.

## **Conclusion**

Online grocery shopping has experienced exponential growth in the U.S. since the beginning of the COVID-19 pandemic, and it is expected that online grocery retail will continue to be a significant market even as its growth rate slows. Online shopping offers consumer benefits such as increased information access and time savings, and online grocery shopping specifically may be able to increase healthy food access and reduce impulse purchasing due to the sensory distance it provides from products. The expansion of SNAP benefits to allow online purchasing during the pandemic serves as an example of how the platform can be tailored to meet the needs of specific stakeholders and allow them to access the potential benefits of online grocery shopping, as shown by SNAP participants in this study adopting online grocery shopping in a greater proportion than any other group measured. But this study also suggests that online retailers have been slow to accommodate the desires of rural consumers, particularly in terms of offering delivery services and an easily understandable user interface. Although strategic measures must be taken to mitigate the risks for both retailers expanding into rural areas and for the communities gaining access to online grocery shopping, the results of this

study suggest that there is a desire for increased online grocery options in rural communities.

## Appendices

### Appendix 1. Survey

We are conducting a research study to learn more about how your community and your habits may influence how you grocery shop and your dietary intake. We are asking you to take part in a 30-minute survey about your dietary and shopping habits, and some general information about yourself. You have previously agreed to participate in this survey by signing a consent form. It is funded by the United States Department of Agriculture Hatch Fund and Share Our Strength. If at any time you do not wish to participate in this survey, you may stop. You may also skip questions that you are uncomfortable with answering. None of this information will be shared with your family members or friends. All information is kept private among study staff. You will be compensated for your time: all participants will receive a gift card for each survey they participate in over the 8-week study intervention period.

#### Questions About You

Name: \_\_\_\_\_  
Address: \_\_\_\_\_ City: \_\_\_\_\_  
Zip Code: \_\_\_\_\_ Phone Number: \_\_\_\_\_  
Email: \_\_\_\_\_

If unable to reach you at the number listed above, is there another number we can contact to get in touch with you (a family member or friend)?

Option 1: \_\_\_\_\_ Name: \_\_\_\_\_

Option 2: \_\_\_\_\_ Name: \_\_\_\_\_

Height: \_\_\_\_\_ feet \_\_\_\_\_ inches                      Weight: \_\_\_\_\_ pounds

#### Please select one answer for the questions below.

What is your preferred language?

- English
- Spanish
- Other \_\_\_\_\_

What is your gender?

- Male
- Female
- Transgender male to female
- Transgender female to male

What is your age in years? \_\_\_\_\_

How long have you been a resident in the current county?

- 1-3 years
- 4-7 years
- 8-10 years
- 10-20 years
- More than 20 years

Do you plan on moving to another county or out of the state in the next three years?

- Yes
- No
- Unsure

What is the highest grade of school you completed?

- 6<sup>th</sup> grade or below
- 7<sup>th</sup>-8<sup>th</sup> grade
- 9<sup>th</sup>-11<sup>th</sup> grade
- High school graduate or GED
- Some college
- College graduate

What is your race?

- American Indian
- Asian
- Black or African American
- Hispanic or Latino
- White
- Unknown
- Other



What is your annual **household** income before COVID-19?

- Less than \$20,000
- \$21,000-\$49,999
- \$50,000-\$69,999
- \$70,000-\$99,999
- More than \$100,000

What is your household income currently?

- Less than \$20,000
- \$21,000-\$49,999
- \$50,000-\$69,999
- \$70,000-\$99,999
- More than \$100,000

How many members of your household, including yourself, are over the age of 18? \_\_\_\_\_

How many children less than 18 years of age live in your household? \_\_\_\_\_

Number of children ages 0-5 living in household: \_\_\_\_\_

Number of children 6-17 living in household: \_\_\_\_\_

Have you been diagnosed with a health concern in the last year that influenced your diet?

- Yes
- No

In the past month, did you or any member of your household receive SNAP (Supplemental Nutrition Assistance Program) benefits or food stamps?

- Yes
- No

If yes, did you participate in SNAP before COVID-19?

- Yes
- No

In the past month, did you or any member of your household receive WIC (Women, Infants and Children), food from your child/children's school, Pandemic EBT benefits, unemployment benefits, or other services that provide financial or food support? *[Select all that apply]*

- WIC
- Food from school (meals eaten at school, meals delivered/picked up from school, or groceries from school )
- Pandemic EBT (SNAP benefits that were newly provided during the pandemic to families whose children qualified for free or reduced-price meals)
- Unemployment benefits
- Other: \_\_\_\_\_

If yes, did you or your child/children participate in WIC or receive free/reduced price meals from school before COVID-19?

- Yes
- No

Have you received any other food assistance not listed above in the past month (i.e. food basket distribution programs, drive through food drops, food pantries, or food banks)?

- Yes
- No

If yes, did you receive this type of food assistance before COVID-19?

- Yes
- No

If yes, when getting your foods at the food pantry, do you usually:

- Select your own foods
- Have someone select your foods for you
- Receive a pre-packaged bag, but are able to replace items
- Receive a pre-packaged bag, but are not able to replace items

How often do you use Facebook?

- Never
- 1-2 times per month
- 1-2 times per week
- Daily

In general, how often do you currently shop online for goods and products using the internet?

- Never
- Rarely (1-3 times/month)
- Sometimes (4-5 times/month)
- Often (1-3 times/week)
- Always (4+ times/week)

Before the COVID-19 pandemic, had you ever purchased **fresh food (fruit, vegetables, meat, dairy) items** online to be delivered to your home? i.e. grocery click list such as Kroger, Target, Amazon Fresh, other food delivery service etc.

- Never
- Rarely (1-3 times/month)
- Sometimes (4-5 times/month)
- Often (1-3 times/week)
- Always (4+ times/week)

Since and during the COVID-19 pandemic, have you ever purchased **fresh food (fruit, vegetables, meat, dairy) items** online to be delivered to your home? i.e. grocery click list such as Kroger, Target, Amazon Fresh, other food delivery service etc.

- Never
- Rarely (1-3 times/month)
- Sometimes (4-5 times/month)
- Often (1-3 times/week)
- Always (4+ times/week)

Before the COVID-19 pandemic, had you ever purchased **shelf-stable food items** online to be delivered to your home? i.e. grocery click list such as Kroger, Target, Amazon Fresh, other food delivery service etc.

- Never
- Rarely (1-3 times/month)
- Sometimes (4-5 times/month)
- Often (1-3 times/week)
- Always (4+ times/week)

Since and during the COVID-19 pandemic, have you ever purchased **shelf-stable food items** online to be delivered to your home? i.e. grocery click list such as Kroger, Target, Amazon Fresh, other food delivery service etc.

- Never
- Rarely (1-3 times/month)
- Sometimes (4-5 times/month)
- Often (1-3 times/week)
- Always (4+ times/week)

Before the COVID-19 pandemic, had you ever shopped online for groceries for **pick up at a grocery store** that included fresh and shelf-stable food items? i.e. Kroger, Food City, Walmart

- Never
- Rarely (1-3 times/month)
- Sometimes (4-5 times/month)
- Often (1-3 times/week)
- Always (4+ times/week)

Since and during the COVID-19 pandemic, have you ever shopped online for groceries for **pick up at a grocery store** that included fresh and shelf-stable food items? i.e. Kroger, Food City, Walmart

- Never
- Rarely (1-3 times/month)
- Sometimes (4-5 times/month)
- Often (1-3 times/week)
- Always (4+ times/week)

Do you have a cell phone that receives text messages?

- Yes
- No

If your cell phone receives text messages, how comfortable are you texting?

- Very uncomfortable
- Uncomfortable
- Neutral
- Comfortable
- Very comfortable

The next two questions ask about the meals you and your family eat during a typical week (including the weekend). Select the answer below that most applies to you.

3. Thinking about a typical week (including the weekend), about **how many times** does your family eat a **home-prepared meal for dinner**? For example, a meal made from scratch using fresh, canned, or frozen ingredients (not including fully prepared food items such as frozen meals; frozen pizza; rotisserie chicken) or leftovers from another home-prepared meal. Please do not include frozen or boxed meals, which only require heating up to serve.

- 0 times per week
- 1 time per week
- 2 times per week
- 3 times per week
- 4 times per week
- 5 times per week
- 6 times per week
- 7 times per week

4. Thinking about a typical week (including the weekend), about **how many times** does your family eat a **frozen or boxed meal for dinner**? For example, frozen pizza, mac-n-cheese, or microwave meals.

- 0 times per week
- 1 time per week
- 2 times per week
- 3 times per week
- 4 times per week
- 5 times per week
- 6 times per week
- 7 times per week

**Food Purchasing and Preparation**

The next few questions are going to ask about purchasing habits and food preparation.

What is the main reason you shop at this grocery store? Is it because of *[select up to two that apply]*:

- Price
- Location
- Quality of products
- Variety of products
- Accept EBT card/SNAP benefits
- Other

The following question is **about in-store grocery shopping**. Please mark how much you agree or disagree with the following statements about the **in-store grocery shopping** options that are available to you at the store you **conduct most of your in-person shopping using your EBT card**:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The food prices are affordable					
I am satisfied with the quality of the fruits and vegetables					
The food items I want/need are available					
It is easy for me to get to the grocery store when I need to					
I feel comfortable using my EBT card at the grocery store					

The following question is **about online grocery shopping preferences and habits**. Please mark how much you agree or disagree with the following statements about **online options where you currently shop online**.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not applicable
The food prices are affordable						
I am satisfied with the quality of the fruits and vegetables						
The food items I want/need are available online						
I have access to a reliable internet connection that allows me to purchase groceries online						
The online grocery sites are difficult for me to use						
It takes too long to search for specific products or labels online						
The website makes it easy for me to identify the groceries						

that are eligible to be purchased with my SNAP benefits						
I have the option to have my groceries delivered to me						
Delivery or pick-up (curbside or in-store) times are not convenient						
Delivery fees make me less likely to order groceries online						
Minimum purchasing requirements make me less likely to order groceries online						
Ordering online saves time						
I have a credit or debit card to cover any additional expenses that my SNAP benefits don't cover						
I feel comfortable using my EBT card online						
I feel my privacy and confidentiality are protected if I use my SNAP benefits online						

**On a scale of 1-5 with 1 being 'I definitely cannot' and 5 being 'I definitely can', please respond to the following question:** Thinking about all the places you shop in-person or online, how much would you say you can get the groceries you need and want right now?

- 1 – I definitely cannot get the groceries I need and want
- 2 – I sometimes do not get the groceries I need and want
- 3 – Neutral
- 4 – I usually can get the groceries I need and want
- 5 – I definitely can get the groceries I need and want

**The next two questions ask about grocery shopping. Select the answer below that most applies to you.**

How often do you **plan meals** before you go grocery shopping?

- Never
- Rarely
- Sometimes
- Often
- Always

How often do you **use a shopping list** when you go grocery shopping?

- Never
- Rarely
- Sometimes
- Often
- Always

**The next five questions ask about meal planning. Please select the answer that most applies to how much you personally disagree or agree with the following statement. (added to post-survey)**

Are you the person who usually prepares the meals in your household?

- Yes
- No
- I split it with other household member(s)

**Planning meals before I go grocery shopping takes too much time.**

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

I am **confident** that I can **plan meals before** I go grocery shopping.

- Strongly disagree

- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

How often do you plan your meals before you shop for groceries?

- Never
- Rarely (about 20% of the time)
- Sometimes (about 40% of the time)
- Often (about 60% of the time)
- Usually (about 80% of the time)
- Always

How often do you look in the refrigerator or cupboard to see what you need before you go grocery shopping?

- Never
- Rarely (about 20% of the time)
- Sometimes (about 40% of the time)
- Often (about 60% of the time)
- Usually (about 80% of the time)
- Always

How often do you make a list before you go grocery shopping?

- Never
- Rarely (about 20% of the time)
- Sometimes (about 40% of the time)
- Often (about 60% of the time)
- Usually (about 80% of the time)
- Always

It is **important** to me to **plan meals before** I go grocery shopping.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

**Planning meals before** I go grocery shopping would help me/my family cook meals at home.

- Strongly disagree
- Disagree
- Neither disagree nor agree
- Agree
- Strongly agree

Thinking back over the last week (seven days), did you purchase any: fast food, carry-out, delivery food, or prepared food from a deli? *Prepared foods from a deli include ready-to-eat foods from a grocery store deli department, such as rotisserie chicken, pizza, sandwiches, and salads from a salad bar.*

- Yes
- No

How many times in the last week (seven days), did you purchase fast food, carry-out, delivery food, or prepared food from a deli?

- None
- 1-3 times
- 4-6 times
- 7 or more times

In the last 30 days, which of these statements best describes the food eaten in your household?

- Enough of the kinds of food I/we wanted to eat
- Enough, but not always the kinds of food I/we wanted to eat
- Sometimes not enough to eat
- Often not enough to eat

“The food that I/we bought just didn’t last, and I didn’t have money to get more.” Was that often, sometimes, or never true for you/your household in the last 30 days?

- Often true
- Sometimes true
- Never true
- Don’t know or refused

“I/we couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for you/your household in the last 30 days?

- Often true
- Sometimes true
- Never true
- Don’t know or refused

In the last 30 days, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn’t enough money or food?

- Yes
- No
- Don’t know

If yes to the last question, how often did this happen?

- Almost every week
- Some weeks but not every week
- Only 1 or 2 days
- Don’t know

In the last 30 days, did you ever eat less than you felt you should because there wasn’t enough money for food?

- Yes
- No
- Don’t know

In the last 30 days, were you ever hungry but didn’t eat because there wasn’t enough money for food?

- Yes
- No
- Don’t know

“(I/We) couldn’t provide (my/our) child/the children a balanced meal, because (I/we) couldn’t afford that. Was that often, sometimes, or never true for (you/your household) in the last 30 days?

- Often true
- Sometimes true
- Never true
- DK or Refused

“(My/Our child was/The children were) not eating enough because (I/we) just couldn’t afford enough food.” Was that often, sometimes, or never true for (you/your household) in the last 30 days?

- Often true
- Sometimes true
- Never true
- DK or Refused

**Fruits and Vegetables**

The following questions ask about how often you eat fruits and vegetables.

Think about all the fruits and vegetables that you ate last month. Include those that were: raw and cooked, eaten as snacks and at meals, eaten at home and away from home (restaurants, friends, take-out), and eaten alone and mixed with other foods.

Choose the **best** answer for each question. Mark only one response for each question.

1. Over the last month, how many times did you drink **100% juice** such as orange, apple, grape or grapefruit juice? Include juice you drank at all mealtimes and between meals.

**DO NOT COUNT** fruit drinks like Kool-Aid, Hi-C, lemonade, Sunny-D, or cranberry juice drink.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Never (Go to Question 2)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

1a. Each time you drank **100% juice**, how much did you usually drink?

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Less than ¼ cup (less than 6 ounces)	¾ cup to 1 ¼ cup (6 to 10 ounces)	1 ¼ to 2 cups (10 to 16 ounces)	More than 2 cups (more than 16 ounces)

2. Over the last month, how many times did you eat **fruit**? Count any kind of fruit – fresh, canned, and frozen. **DO NOT COUNT** juices. Include fruit you ate at mealtimes and for snacks.

<input type="radio"/> Never (Go to Question 3)	<input type="radio"/> 1-3 times last month	<input type="radio"/> 1-2 times per week	<input type="radio"/> 3-4 times per week	<input type="radio"/> 5-6 times per week	<input type="radio"/> 1 time per day	<input type="radio"/> 2 times per day	<input type="radio"/> 3 times per day	<input type="radio"/> 4 times per day	<input type="radio"/> 5 or more times per day
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- 2a. Each time you ate **fruit**, how much did you usually eat?

<input type="radio"/> Less than 1 medium fruit (Less than ½ cup)	<input type="radio"/> 1 medium fruit (About ½ cup)	<input type="radio"/> 2 medium fruits (About 1 cup)	<input type="radio"/> More than 2 medium fruits (More than 1 cup)
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3. Over the last month, how often did you eat **lettuce salad (with or without other vegetables)**?

<input type="radio"/> Never (Go to Question 4)	<input type="radio"/> 1-3 times last month	<input type="radio"/> 1-2 times per week	<input type="radio"/> 3-4 times per week	<input type="radio"/> 5-6 times per week	<input type="radio"/> 1 time per day	<input type="radio"/> 2 times per day	<input type="radio"/> 3 times per day	<input type="radio"/> 4 times per day	<input type="radio"/> 5 or more times per day
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- 3a. Each time you ate **lettuce salad**, how much did you usually eat?

<input type="radio"/> About ½ cup	<input type="radio"/> About 1 cup	<input type="radio"/> About 2 cups	<input type="radio"/> More than 2 cups
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4. Over the last month, how often did you eat **French fries or fried potatoes**?

<input type="radio"/> Never (Go to Question 5)	<input type="radio"/> 1-3 times last month	<input type="radio"/> 1-2 times per week	<input type="radio"/> 3-4 times per week	<input type="radio"/> 5-6 times per week	<input type="radio"/> 1 time per day	<input type="radio"/> 2 times per day	<input type="radio"/> 3 times per day	<input type="radio"/> 4 times per day	<input type="radio"/> 5 or more times per day
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- 4a. Each time you ate **French fries or fried potatoes**, how much did you usually eat?

<input type="radio"/> Small order or less (About 1 cup or less)	<input type="radio"/> Medium order (About 1 ½ cups)	<input type="radio"/> Large order (About 2 cups)	<input type="radio"/> Super Size order or more (About 3 cups or more)
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5. Over the last month, how often did you eat **other potatoes**? Count **baked, boiled and mashed potatoes, potato salad, and white potatoes that were not fried.**

<input type="radio"/> Never (Go to Question 6)	<input type="radio"/> 1-3 times last month	<input type="radio"/> 1-2 times per week	<input type="radio"/> 3-4 times per week	<input type="radio"/> 5-6 times per week	<input type="radio"/> 1 time per day	<input type="radio"/> 2 times per day	<input type="radio"/> 3 times per day	<input type="radio"/> 4 times per day	<input type="radio"/> 5 or more times per day
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- 5a. Each time you had these **potatoes**, how much did you usually eat?

<input type="radio"/> 1 small potato or less (About ½ cup or less)	<input type="radio"/> 1 medium potato (½ to 1 cup)	<input type="radio"/> 1 large potato (1 to 1 ½ cups)	<input type="radio"/> 2 medium potatoes or more (1 ½ cups or more)
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6. Over the last month, how often did you eat **cooked dry beans**? Count **baked beans, bean soup, refried beans, pork and beans, and other bean dishes.**

<input type="radio"/> Never (Go to Question 7)	<input type="radio"/> 1-3 times last month	<input type="radio"/> 1-2 times per week	<input type="radio"/> 3-4 times per week	<input type="radio"/> 5-6 times per week	<input type="radio"/> 1 time per day	<input type="radio"/> 2 times per day	<input type="radio"/> 3 times per day	<input type="radio"/> 4 times per day	<input type="radio"/> 5 or more times per day
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6a. Each time you ate **these beans**, how much did you usually eat?

<input type="radio"/> Less than ½ cup	<input type="radio"/> ½ to 1 cup	<input type="radio"/> 1 to 1 ½ cups	<input type="radio"/> More than 1 ½ cups
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7. Over the last month, how often did you eat **other vegetables**?

**DO NOT COUNT:** lettuce salads, white potatoes, cooked dried beans, vegetables in mixtures, such as on sandwiches, in omelets, casseroles, stews, stir-fry, soups, etc. or rice

**COUNT:** all other vegetables – raw, cooked, canned, and frozen – examples include cabbage, carrots, broccoli, cauliflower, cucumber, tomatoes, etc.

<input type="radio"/> Never (Go to Question 8)	<input type="radio"/> 1-3 times last month	<input type="radio"/> 1-2 times per week	<input type="radio"/> 3-4 times per week	<input type="radio"/> 5-6 times per week	<input type="radio"/> 1 time per day	<input type="radio"/> 2 times per day	<input type="radio"/> 3 times per day	<input type="radio"/> 4 times per day	<input type="radio"/> 5 or more times per day
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7a. Each time you ate **other vegetables**, how much did you usually eat?

<input type="radio"/> Less than ½ cup	<input type="radio"/> ½ to 1 cup	<input type="radio"/> 1 to 2 cups	<input type="radio"/> More than 2 cups
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8. Over the last month, how often did you eat **tomato sauce**? Include tomato sauce on pasta or macaroni, rice, pizza, and other dishes.

<input type="radio"/> Never (Go to Question 9)	<input type="radio"/> 1-3 times last month	<input type="radio"/> 1-2 times per week	<input type="radio"/> 3-4 times per week	<input type="radio"/> 5-6 times per week	<input type="radio"/> 1 time per day	<input type="radio"/> 2 times per day	<input type="radio"/> 3 times per day	<input type="radio"/> 4 times per day	<input type="radio"/> 5 or more times per day
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8a. Each time you ate **tomato sauce**, how much did you usually eat?

<input type="radio"/> Less than ¼ cup	<input type="radio"/> About ½ cup	<input type="radio"/> About 1 cup	<input type="radio"/> More than 1 cup
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9. Over the last month, how often did you eat **vegetable soups**? Include tomato soup, beef with vegetable soup, or other soups made with vegetables.

<input type="radio"/> Never (Go to Question 10)	<input type="radio"/> 1-3 times last month	<input type="radio"/> 1-2 times per week	<input type="radio"/> 3-4 times per week	<input type="radio"/> 5-6 times per week	<input type="radio"/> 1 time per day	<input type="radio"/> 2 times per day	<input type="radio"/> 3 times per day	<input type="radio"/> 4 times per day	<input type="radio"/> 5 or more times per day
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9a. Each time you ate **vegetable soup**, how much did you usually eat?

<input type="radio"/> Less than 1 cup	<input type="radio"/> 1 to 2 cups	<input type="radio"/> 2 to 3 cups	<input type="radio"/> More than 3 cups
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10. Over the last month, how often did you eat **mixtures that included vegetables**? Count foods such as sandwiches, casseroles, stews, omelets, and tacos.

<input type="radio"/> Never	<input type="radio"/> 1-3 times last month	<input type="radio"/> 1-2 times per week	<input type="radio"/> 3-4 times per week	<input type="radio"/> 5-6 times per week	<input type="radio"/> 1 time per day	<input type="radio"/> 2 times per day	<input type="radio"/> 3 times per day	<input type="radio"/> 4 times per day	<input type="radio"/> 5 or more times per day
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In a usual week, do you feel that you eat as many fruits and vegetables as you need?

- Yes, I definitely do
- Yes, I think so



- c. I'm not sure
- d. No, I don't think so
- e. No, I definitely do not

**Beverage Questionnaire**

In the past month, please indicate your response for each beverage type by marking an "X" in the box for "how often" and "how much each time"

1. Indicate how often you drank the following beverages, for example, you drank 5 glasses of water per week, therefore mark 4-6 times per week
2. Indicate the approximate amount of beverage you drank each time, for example, you drank 1 cup of water 2 times per day, therefore mark 1 cup under "how much each time"

		HOW OFTEN (MARK ONE)			HOW MUCH EACH TIME (MARK ONE)			HOW MUCH EACH TIME (MARK ONE)					
Type of beverage	Never (skip to next)	Times per Week			Times per Day								
		1 time per week	2-3 times per week	4-6 times per week	1 time daily	2 times per day	3+ times per day	Less than 6 fl. ounces (¼ cup)	8 fl. ounces (1 cup)	12 fl. ounces (½ cups)	16 fl. ounces (2 cups)	20 fl. ounces or more (2 ½ cups)	
Bottled water													
Tap water													
100% fruit juice (apple, orange, grape)													
Sweetened juice (lemonade, Sunny-D, Kool-Aid, Hi-C)													
100% vegetable juice (tomato, V8)													
Whole milk													
Reduced fat milk (2%)													
Low-fat/fat-free milk (1%, skim, buttermilk)													
		HOW OFTEN (MARK ONE)			HOW MUCH EACH TIME (MARK ONE)			HOW MUCH EACH TIME (MARK ONE)					
Type of beverage	Never (skip to next)	Times per Week			Times per Day								
		1 time weekly	2-3 times weekly	4-6 times weekly	1 time daily	2 times daily	3+ times daily	Less than 6 fl. ounces (¼ cup)	8 fl. ounces (1 cup)	12 fl. ounces (½ cups)	16 fl. ounces (2 cups)	20 fl. ounces or more (2 ½ cups)	
Milk alternatives (almond, soy, coconut milk)													

<b>Soft drinks, regular</b>													
<b>Diet soft drinks</b>													
<b>Sweet tea</b>													
<b>Unsweet tea</b>													
<b>Coffee, with cream and/or sugar</b>													
<b>Coffee, without cream and/or sugar</b>													
<b>Meal replacement shakes/protein drinks (Slimfast, Spark, Shakeology)</b>													
<b>Artificially sweetened drinks (Crystal Light)</b>													
<b>Energy drinks (Red Bull, Rockstar, Monster, etc.)</b>													

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## Vita

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