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The Impact of COVID-19 on the Nutritional Patterns of School-Aged U.S. Children

Abigail Prendergast

HONORS PROJECT

Submitted to the Honors College at Bowling Green State University in partial fulfillment of the requirements for graduation with

UNIVERSITY HONORS APRIL 23, 2021

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ABSTRACT

This study aims to evaluate the nutritional impact the COVID-19 pandemic has had on children within the U.S. by assessing how children's nutritional patterns have changed due to the COVID-19 pandemic, determining how these changes are impacted by participation in school federal nutrition assistance programs, and exploring additional food-related barriers the COVID-19 pandemic has created for families.

A cross-sectional survey of American parents was used to evaluate changes to their children's nutritional patterns. Data was collected through an electronic survey administered through the Qualtrics platform. Participants were recruited through Facebook advertisements and the distribution of electronic survey links.

The COVID-19 pandemic did not cause a significant shift in intake of foods from the major food groups. It did result in increased snacking, particularly on processed foods. There were no correlations between nutritional patterns and participation in school nutrition assistance programs, although many parents now perceive these programs as more important. The COVID-19 pandemic also impacted shopping patterns, leading families to make less grocery store trips and purchase more shelf-stable foods.

The increase in snacking on processed foods raises concerns about childhood obesity and other health issues. School nutrition programs are being perceived as increasingly important, and officials should ensure that all children can access these programs. The economic fallout from the COVID-19 pandemic has hampered many families' food purchasing patterns. Health officials and policy makers should consider the lasting impacts these changes may have on children's lives as they implement strategies to combat the effects of the COVID-19 pandemic.

INTRODUCTION

The COVID-19 pandemic has swept over the world throughout 2020, affecting countless numbers of families across the globe. Many people have lost their lives, sources of income, connections to others, and more. This interdisciplinary project combines aspects of nutrition and dietetic research with sociology and public health disciplines to evaluate the nutritional impact the COVID-19 pandemic has had on children and families within the United States.

The project is guided by three primary research questions. The first question the project aims to assess is: in what ways have school-aged children's nutritional patterns changed as a result of the COVID-19 pandemic? The project then specifically gauges the nutritional effects of the COVID-19 pandemic on families who qualify for federal nutrition assistance programs. This is done in an attempt to answer the project's second primary question – to what extent are changes in school-aged children's nutritional patterns during the COVID-19 pandemic impacted by their participation in the National School Lunch Program, School Breakfast Program, or both? Finally, the project explores potential reasonings for any observed changes in school-aged children's nutritional patterns by examining a third primary question. What are the food-related barriers and obstacles the COVID-19 pandemic has created or strengthened for families of school-aged children?

Literature Review

Before conducting the project, it was essential to perform background research and conduct a literature review to examine the available information regarding the COVID-19 pandemic and children's nutritional patterns. In late 2019, a novel coronavirus known as SARS-CoV-2 emerged in China. A recent article in *Emerging Infectious Diseases* explains that coronaviruses are enveloped, positive stranded RNA viruses that have been in existence for years; however, the SARS-CoV-2 virus is differentiated from other coronavirus and is

responsible for infection with the coronavirus infection 2019, commonly referred to as COVID-19. The novel coronavirus quickly spread from its origination site in China, infecting millions of people across the globe and rapidly reaching pandemic status.

The Centers for Disease Control and Prevention (CDC) confirmed the first case in the United States on January 20, 2020, and since that time COVID-19 has spread to every part of the United States (U.S.) (Martines et al., 2020). As COVID-19 continued to rage throughout the U.S. in the first few months of 2020, both state and federal governments began to take more serious action. Donald Trump, the acting president during the onset of the pandemic, issued a proclamation on March 13, 2020 declaring a national emergency in response to the COVID-19 pandemic, effective March 1, 2020 (H. Doc. 116-108, 2020). The declaration of a national emergency spurred many state governments to issue statewide lockdowns, shutting down businesses and schools, while urging Americans to only leave home for essentials.

Lockdowns had a severe impact on the U.S. economy. According to a recent article in the *Journal of Pure and Applied Microbiology* discussing the crippling economic effects of COVID-19, GDP predictions for the U.S. have fallen to 1.9% growth for 2020, compared to the 2.3% growth the nation experienced in 2019 (Sanchez-Duque et al., 2020). The lockdowns and ensuing economic impacts will likely affect the U.S. for years to come. The business, workplace, and school closures that occurred as a result of the COVID-19 pandemic have affected nearly every American, including children who rely on school meals.

Many children in the United States receive school meals as part of federally funded programs, such as the National School Lunch Program (NSLP) and School Breakfast Program (SBP). According to the United States Department of Agriculture, or USDA, the NSLP was created in 1946 under Harry Truman as a means to provide nutritionally balanced meals to kids

at school each day. In its first year, the program served 7.1 million children and by 2016 there were over 30.4 million children participating in the program (National School Lunch Program Fact Sheet, 2019). Like the NSLP, the SBP is also a federally funded nutrition assistance program that aims to provide children with meals at school. The SBP serves children a school breakfast, and in 2016 there were over 14.57 million children participating in the program (SBP Fact Sheet, 2017).

Both the NSLP and SBP serve as resources for children of low-income families, as children can qualify for either free or reduced-price school meals. The Academy of Nutrition and Dietetics (2020), formerly known as the American Dietetic Association, promotes school meal programs as a safety net for at-risk kids. Participation in these programs can help to ensure children have access to a nutritious food supply that will promote their health, growth, and development. A 2017 study in *Preventive Medicine Reports* confirmed the role of these programs as a safety net by assessing the contribution of school meals to children's daily dietary intakes. Using data from the National Health and Nutrition Examination Survey (NHANES) collected between 2007 and 2012, the researchers evaluated the contributions of school meals to children's daily diets. They found that meals served through school breakfast and lunch programs provided children in the sample with up to 47% of their daily caloric intake, along with 41% of their daily vegetable intake and 77% of their daily milk intake (Cullen & Chen, 2017). This study reveals the importance of school meal programs for many students who rely on such programs for a significant portion of their daily dietary needs.

During the COVID-19 pandemic, school meal programs have been significantly disrupted across the United States. Many schools have moved to a virtual learning format in an attempt to protect both students and staff from COVID-19. The USDA, the federal agency

responsible for school meals programs such as the NSLP and SBP, has not mandated that schools continue to serve meals while closed or during periods of extended dismissal; however, the agency has strongly encouraged schools to do so in an effort to protect at-risk students. The USDA is currently encouraging schools with students engaging in remote learning to offer meals through the styles of the Seamless Summer Option or Summer Food Service Program. These design of these programs allows schools to hand out meals to students outside of the school building and continue to provide nutrition assistance for at risk students by providing children with up to two meals or one meal and one snack per day (USDA, 2020). Unfortunately, a recent article in the prestigious *New England Journal of Medicine* discussing feeding children during the pandemic reveals that many schools lack experience with summer feeding programs, making successful program implementation difficult. The article goes on to state that summer feeding programs traditionally only reach one out of seven children who would normally be receiving free or reduced-price school meals during a typical school year (Dunn et al., 2020).

Schools that have been attempting to continue providing students with meals during COVID-19 related closures or dismissals are realizing the difficulty of connecting children with the food. Cory Turner (2020) writes in his recent NPR article that even when schools are able to provide students with meals, many families cannot get to them. Some families lack transportation to meal pick-up sites. Other parents are not able to leave their jobs to get meals at designated pick-up times during the workday. Children who are missing out on their usual school meals may be left hungry during the COVID-19 pandemic, as the pandemic has only worsened many families' struggles with food insecurity.

According to the *Journal of Urban Health*, food insecurity is a term that refers to an individual or group having limited or uncertain access to enough food to support an active and

healthy lifestyle (Kinsey et al., 2020). A recent Feeding America briefing reveals that more than 35 million people across the United States were dealing with food insecurity before the COVID-19 pandemic, which has only caused more families to struggle with food insecurity than ever before. Based upon current projected unemployment and poverty rates across the United States, Feeding America predicts that 1 in 6 Americans will experience food insecurity in 2020, including approximately 1 in 4 children. This reflects an increase of 13.2 million total Americans, including an increase of 5.8 million children, who will experience food insecurity in 2020 compared to 2018 (Feeding America, 2020). One likely reason for this significant rise in food insecurity is the changing economic situations of millions of Americans caused by the COVID-19 pandemic.

The lockdowns and closures due to the pandemic have had a crippling effect on the economy, causing many businesses to make cuts to their staff or close their doors entirely. As a result, the U.S. unemployment rate has skyrocketed, reaching 14.7% in April 2020 according to a U.S. Bureau of Labor Statistics report (U.S. Bureau of Labor Statistics, 2020). The loss of a job often creates or strengthens financial challenges, which may impact a family's food security status. A 2020 study in *Obesity* took a closer look at changes in families' food security status during the COVID-19 pandemic, along with assessing changes to the home food environment and parental feeding practices. The results of the study demonstrated a 17% decrease in the overall percentage of families who reported being food-secure and a 20% increase in the percentage of families who reported very low food security (Adams et al., 2020). These significant changes reveal the impact the COVID-19 pandemic has had on families' abilities to put food on the table.

In addition to the financial burden the COVID-19 pandemic has generated for millions of Americans, many low-income families have also seen the creation of other challenges that make it harder for them to provide food for their households. A recent study in *Preventing Chronic Disease* specifically evaluates concerns related to the COVID-19 pandemic among low-income families. The results of the study show that 69.4% of respondents are concerned about food availability and 93.5% of respondents report being food insecure. Participant responses also indicated concerns relating to financial means to purchase food, spikes in food prices, and limited food availability (Sharma et al., 2020). A recent article in the *Journal of Urban Health* discusses how the COVID-19 pandemic has disrupted many of the strategic grocery shopping patterns used by financially insecure families. All of these factors can contribute to families' struggles with food insecurity. Limitations of the number of items able to be purchased at one time may prevent multiple families from using one person's membership at stores such as Costco. The confined spaces of public transportation may increase exposure risk for families who rely on public transit to reach grocery stores, and food shortages may disrupt typical shopping patterns (Kinsey et al., 2020). These examples are just a few of the various ways the COVID-19 pandemic is impacting the food security status of American families.

The COVID-19 pandemic has also had a significant impact on the nutritional patterns of people around the world. Both children of families affected by food insecurity and those who identify as food-secure are at risk for changes in nutritional patterns. A 2020 article in *Maternal and Child Nutrition* discusses how COVID-19 related disruptions to food production and distribution systems have caused food shortages and limited availability of a multitude of foods, particularly staple foods and fresh produce. These shortages are causing many Americans to increase their purchasing and consumption of highly processed foods and beverages (Pérez-

Escamilla et al., 2020). Increased time at home due to lockdowns and closures may also be impacting children's nutritional patterns. A study in *Nutrients* assessed the effects of mandatory lockdowns on adults' physical activity levels and eating habits around the world. The results of the online survey tool used by the researchers revealed that physical activity levels significantly decreased during home confinement, with participants reporting more than a 28% increase in the amount of time spent sitting per day. The survey also revealed that participants demonstrated significant changes in eating patterns during confinement, such as reporting consuming more unhealthy foods and increasing snacking between meals and late at night (Anmar et al., 2020). Changes in nutritional patterns during the COVID-19 pandemic have the potential to lead to long-term effects that could pose several serious health risks.

A major public health concern surrounding changes in children's nutritional patterns during the COVID-19 pandemic is the increase of the prevalence of childhood obesity. A recent article in *Childhood Obesity*, a peer-reviewed journal with the goal of providing actionable, real-world obesity prevention and weight management strategies for children and adolescents, discusses how changes in food purchasing and eating behaviors may lead to an increased consumption of processed foods by children, which could contribute to a rise in childhood obesity (Ribeiro et al., 2020). Another recently published article in *Obesity* adds further evidence in support of this concern, noting that many families are increasing their purchasing of shelf-stable food items as a means of minimizing exposure and trips outside the home. The article goes on to state that many children are anticipated to consume higher-calorie diets during the course of the pandemic (Rundle et al., 2020). This is likely to result in an increase in the number of children who are considered to be overweight or obese.

Obesity has been a major public health concern for a number of years; however, the COVID-19 pandemic has significantly increased the health-related risks associated with obesity today. A recent article in *Brain, Behavior, and Immunity* discusses how a poor diet contributes to the development of obesity and type 2 diabetes, both of which can significantly increase the risks of COVID-19. The article goes on to explain that obesity can contribute to long-term health problems in patients who have recovered from COVID-19, as it can compound peripheral inflammation resulting from COVID-19 infection and lead to the development of chronic medical conditions like dementia (Butler & Barrientos, 2020).

Additionally, obesity has been shown to decrease vaccine efficacy, which could mean that obese children may not receive adequate protection from the currently available and future COVID-19 vaccines. A 2013 *PLOS ONE* study looked at how different biological factors impact vaccine efficacy. The results of the study revealed that while age, use of contraception, and time between vaccine administration and antibody measurement produced no significant effects on vaccine efficacy, BMI did appear to make a difference. The researchers behind the study revealed that a BMI over 30 kg/m² appeared to be associated with vaccine non-responsiveness. While this study did not specifically look at how BMI impacts COVID-19 vaccines, the implications of the findings suggest that obesity could prevent children from being adequately protected if and when a vaccine is approved (Young et al., 2013).

In addition to generating a multitude of health concerns, the COVID-19 pandemic and its effect on children's nutritional patterns has the potential to significantly widen numerous health and socioeconomic disparities. Children who rely on federally funded food assistance programs such as NSLP and SBP, many of whom are from low-income families, are already at a disadvantage compared to their peers who do not rely on such programs. A 2017 study in *The*

American Journal of Clinical Nutrition used NHANES data to evaluate children's dietary quality trends between 1999 and 2012. The researchers observed a slight positive increase in the overall dietary quality of all children; however, results revealed that children who participated in the NSLP, SBP, or both consistently had lower dietary quality than non-participants (Gu & Tucker, 2017). This study highlights the nutritional disparities between participants in federally funded school meal programs and non-participants that have been in existence long before the arrival of the COVID-19 pandemic. The pandemic has the potential to further disadvantage children who rely on these programs, as discussed in a recent article in the *New England Journal of Medicine*. The article describes both the short-term and long-term health effects that can afflict children who experience even brief periods of food insecurity, including decreased immune response and significant impacts on development (Dunn et al., 2020). The lasting effects of the COVID-19 pandemic on children's nutritional patterns may substantially widen health and socioeconomic disparities for years to come.

METHODS

The significance of these potential adverse effects calls for a more in depth look at how the COVID-19 pandemic is impacting the nutritional patterns of children within the United States. This project employed a cross-sectional study of American parents to evaluate the ways that school-aged children's nutritional patterns have changed during the COVID-19 pandemic and determine to what extent changes in children's nutritional patterns are impacted by participation in the NSLP and SBP. The study also assessed parental conceptions of food-related obstacles created or strengthened by the COVID-19 pandemic that may impact children's nutritional patterns. The study was approved by the Institutional Review Board of Bowling Green State University (Appendix A). Data was collected through the administration of an online

survey through the Qualtrics platform to parents of school-aged children within the United States (Appendix B). As there were minimal risks involved with participation, respondents indicated their consent by proceeding with the study after reviewing an informational letter at the beginning of the survey (Appendix C). The survey was opened on February 22, 2021 and data collection ended on March 15, 2021. Parents were primarily recruited for the study through the use of Facebook advertisements. These advertisements specifically targeted people whose Facebook activity suggested that they were parents and had school-aged children.

Advertisements included recruitment text that informed individuals that they had the option to be entered into a drawing to win a \$50 Amazon electronic gift card upon completion of the survey. Additional study participants were recruited through the snowball technique by emailing an electronic link to the survey to various contacts across a variety of fields and posting a link to the survey on various personal Facebook pages with a message requesting for viewers to share the link with others.

Respondents who clicked on the electronic link were directed to the Qualtrics platform to complete the survey. The survey tool employed in the project included multiple question sets. Various questions were taken from validated resources such as the Household Pulse Survey (U.S. Census Bureau, 2021). The survey included demographic and geographical questions to establish respondent's background and location. It also included questions designed to assess changes in children's nutritional patterns during the COVID-19 pandemic, participation in the NSLP and SBP, and perceived challenges or obstacles related to food that have arisen during the COVID-19 pandemic. The full survey took approximately 15 minutes to complete. At the end of the survey, parents had the option to input their email to be entered into a drawing for a chance to

win one of 4 \$50 Amazon electronic gift cards. Once data collection had ended, winners were randomly chosen and compensated with one of the 4 \$50 gift cards.

Once data collection was complete, the data download and cleansing processes began. Low quality responses and IP addresses were reviewed, and incomplete and duplicate responses were eliminated from the data set. Survey responses were then analyzed by the primary investigator and project advisors. Quantitative descriptive statistics were determined using Excel and qualitative comments were evaluated for themes, with the goal of determining the impacts of the COVID-19 pandemic on children's nutritional patterns, how participation in the NSLP and SBP relates to these changes, and perceived parental obstacles relating to food during the COVID-19 pandemic.

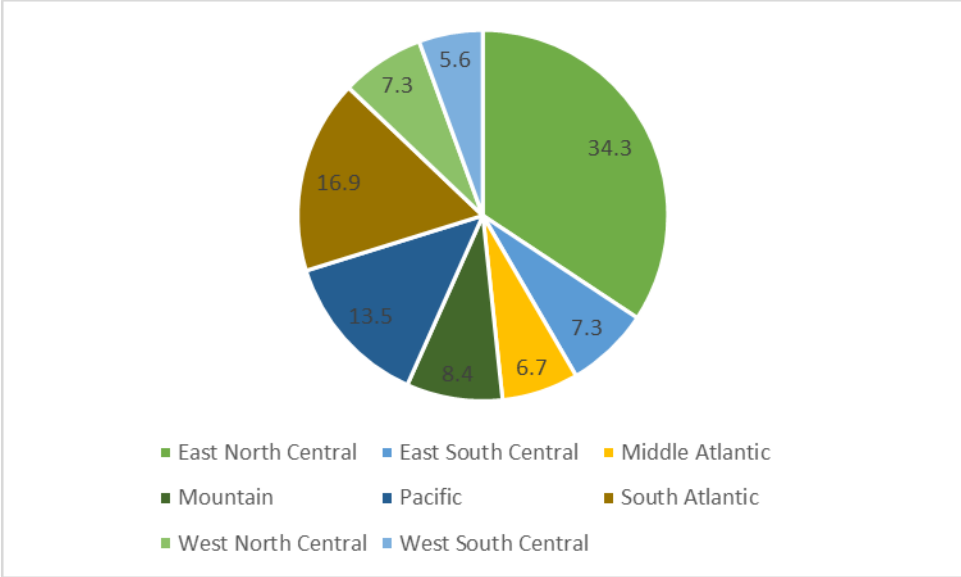
RESULTS

Demographics

The survey received 272 responses. Out of these responses, 77 were deemed invalid and excluded, resulting in a final sample size of 195. All 195 valid respondents were parents over the age of 18 with at least one child between the ages of 5 and 18 who has been enrolled in school since March 13, 2020. The sample included respondents from a multitude of regions across the United States. A slight majority of respondents resided in the East North Central region (34.3%), while other respondents' regions of residence can be seen in Figure 1.

Figure 1

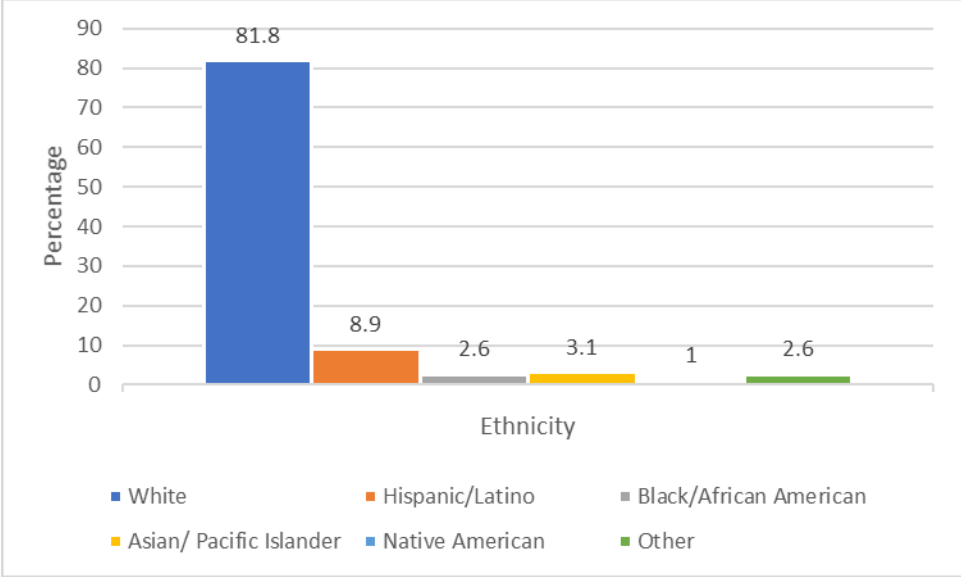
Region of Respondent Residence



Parental age varied, with the majority of respondents reporting being between 41-50 years old (48.2%). There were also responses from parents between the ages of 18-25 (1%), 26-30 (5.2%), 31-40 (34.7%), and 50+ (10.9%). Most parents were white (81.8%), but a number of respondents identified with other ethnicities, as can be seen in Figure 2.

Figure 2

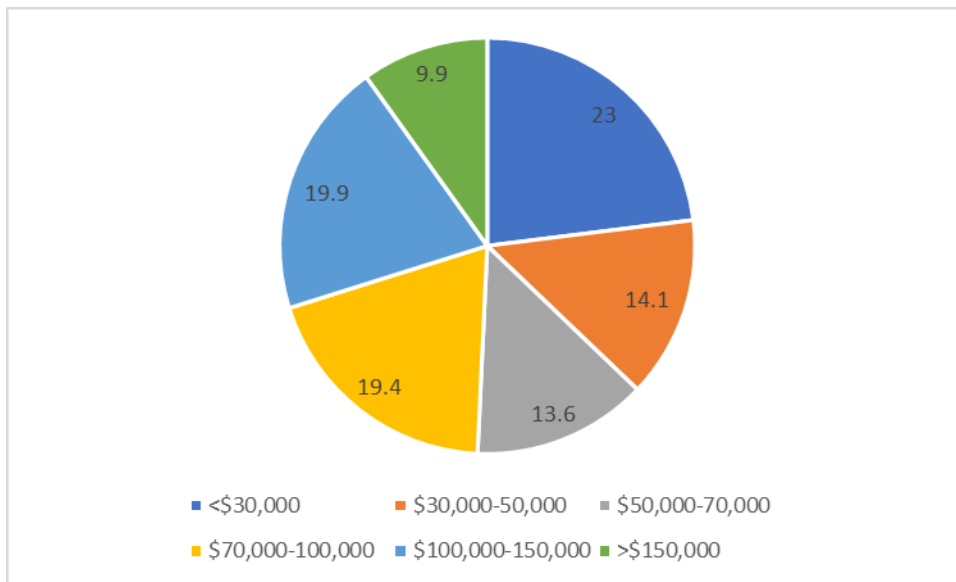
Respondent's Indicated Ethnicity



There was a relatively even distribution of annual household income among respondents, with 23% of respondents reporting an annual household income below \$30,000 and 9.9% of respondents reporting an annual household income above \$150,000. Figure 3 displays the distribution of annual household income across survey respondents.

Figure 3

Annual Household Income of Respondents



Parents were asked to indicate the age and grade level for each child between the ages of 5 and 18. The sample included parents who reported on children ages 5-7 (23.2%), 8-10 (31.3%), 11-13 (23.4%), 14-16 (16.6%), and 17-18 (5.4%). Parents also indicated that during the 2020-2021 school year, their children were in grades Pre-Kindergarten-1st (21.2%), 2nd-5th (37.9%), 6th-8th (22.6%), and 9th-12th (18.3%).

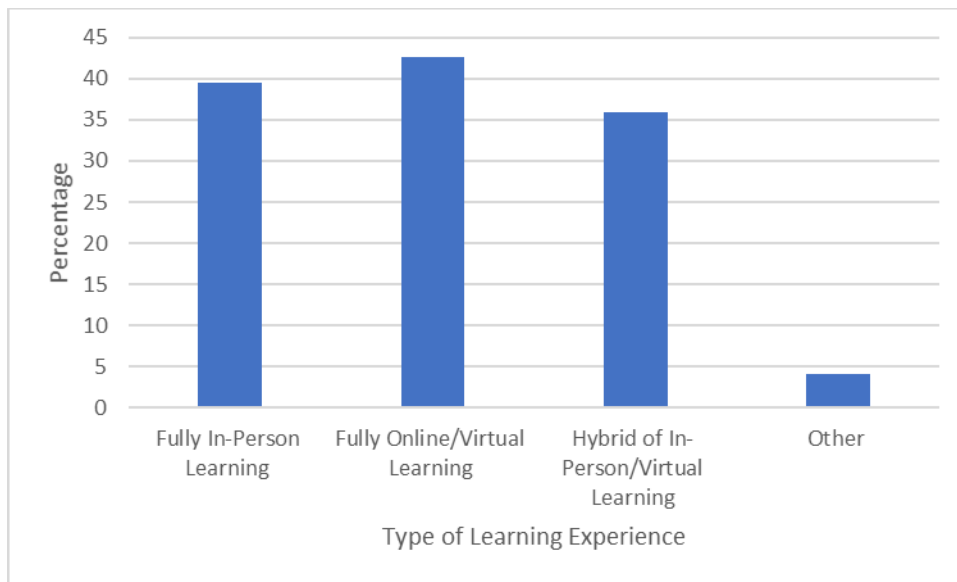
Educational Situation of Children

Parents were also asked to provide information about the educational situation their children participated in during the 2020-2021 school year. The majority of children reported on attended public school (85.1%), while 7.7% attended private school, 12.8% were homeschooled,

and 3.6% participated in some other form of education. Qualitative comments revealed that many of the respondents who indicated that their children participated in some other form of education were parents of children who attended virtual or cyber schools. In addition to reporting what type of educational institution their children attended, parents were also asked to indicate the type of learning experience their children had participated in during the 2020-2021 school year. Parents reported that their children participated in fully in-person (39.5%), fully online/virtual (42.6%), and hybrid (35.9%) learning experiences. Figure 4 illustrates learning experience participation of respondent's children during the 2020-2021 school year.

Figure 4

Learning Experience for Children of Respondents During 2020-2021 School Year



Children's Nutritional Patterns

During the COVID-19 pandemic, the majority of parents reported that their children's consumption of food from major food groups including vegetables, fruits, whole grains, protein, and dairy was about the same as before the pandemic. An overview of changes in children's food consumption for these groups is provided in Table 1.

Table 1

Children's Consumption of Foods from Major Food Groups

| Type of Food | Much more (%) | Somewhat more (%) | About the same (%) | Somewhat less (%) | Much less (%) |
|--------------|---------------|-------------------|--------------------|-------------------|---------------|
| Vegetables | 5.6 | 11.3 | 60 | 16.9 | 6.2 |
| Fruits | 6.2 | 21.6 | 53.6 | 12.9 | 5.7 |
| Whole Grains | 5.6 | 16.4 | 59 | 14.4 | 4.6 |
| Protein | 4.1 | 17.9 | 65.6 | 10.3 | 2.1 |
| Dairy | 7.7 | 22.6 | 51.8 | 12.8 | 5.1 |

Parents also reported changes in the number of meals their children consumed each day during the COVID-19 pandemic as compared to before the pandemic. During the COVID-19 pandemic, only 69.2% of children consumed three meals per day, compared to 83.6% of children who regularly consumed three meals per day before the pandemic. There was an increase in the number of children who ate two meals per day during the COVID-19 pandemic (10.7% from 5.1% before the pandemic). There was also a rise in the percentage of children who ate more than 3 meals a day, with parents reporting that during the COVID-19 pandemic, their children consumed an average of 4 (9.2%), 5 (4.6%), 6 (3.1%) or 7+ (2%) meals per day. Children's snacking habits were also affected by the COVID-19 pandemic. The majority of parents (69.2%) reported that their children were snacking more or somewhat more on foods from a bag or box. While there was a significant increase in snacking from a bag or a box, the majority of respondents indicated that their children's snacking on fresh fruits and vegetables was about the same (48.2%). The results depicted in Figures 5 and 6 provide a more detailed overview of changes in children's snacking habits during the COVID-19 pandemic.

Figure 5

Changes in Snacking from a Bag or Box

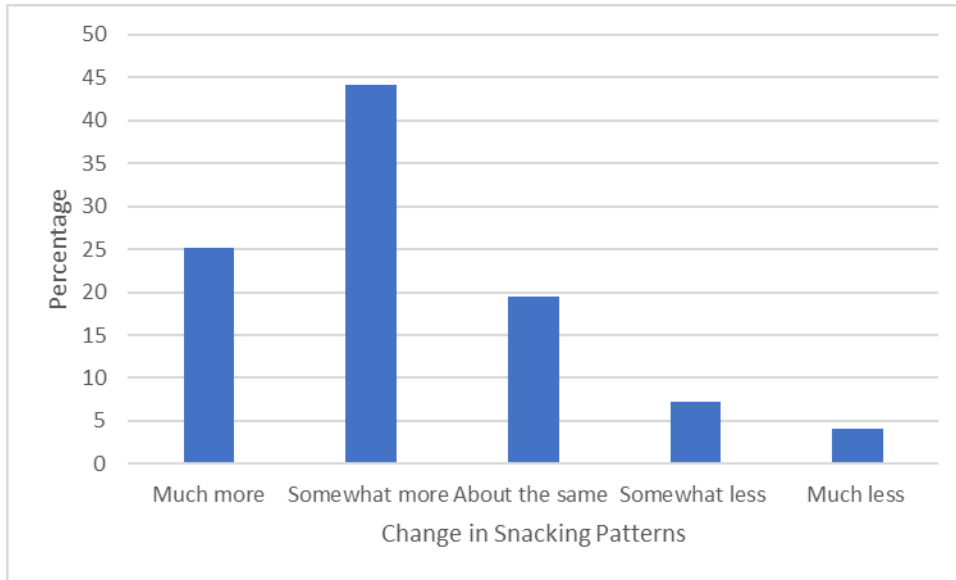
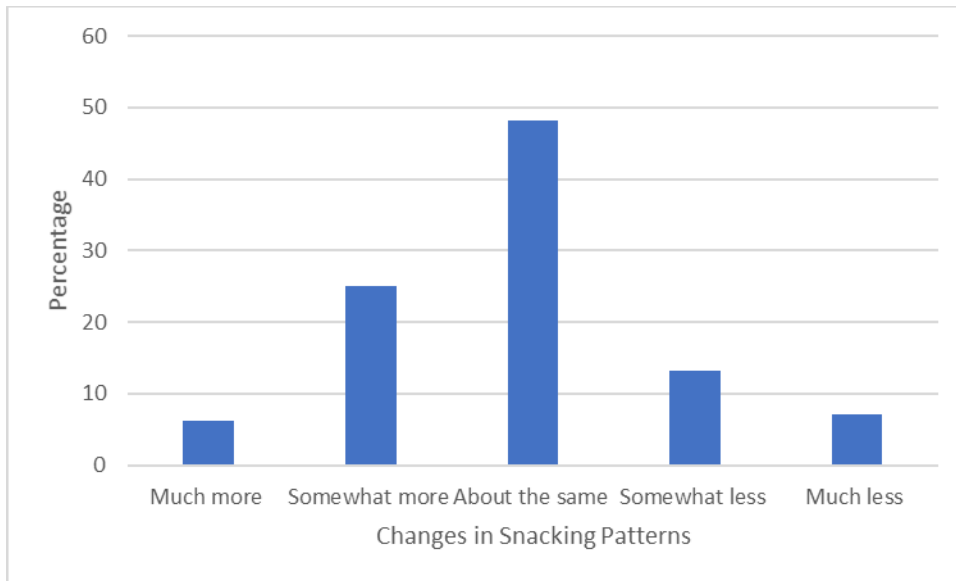


Figure 6

Changes in Snacking on Fresh Fruits and Vegetables



School Nutrition Assistance Program Participation

Compared to before the COVID-19 pandemic, parents reported an increase in their children’s participation in a variety of school nutrition assistance programs. Participation in school lunch, school breakfast, and before or after school snack increased during COVID-19, as can be seen in Table 2.

Table 2

Participation in School Meal Programs During COVID-19

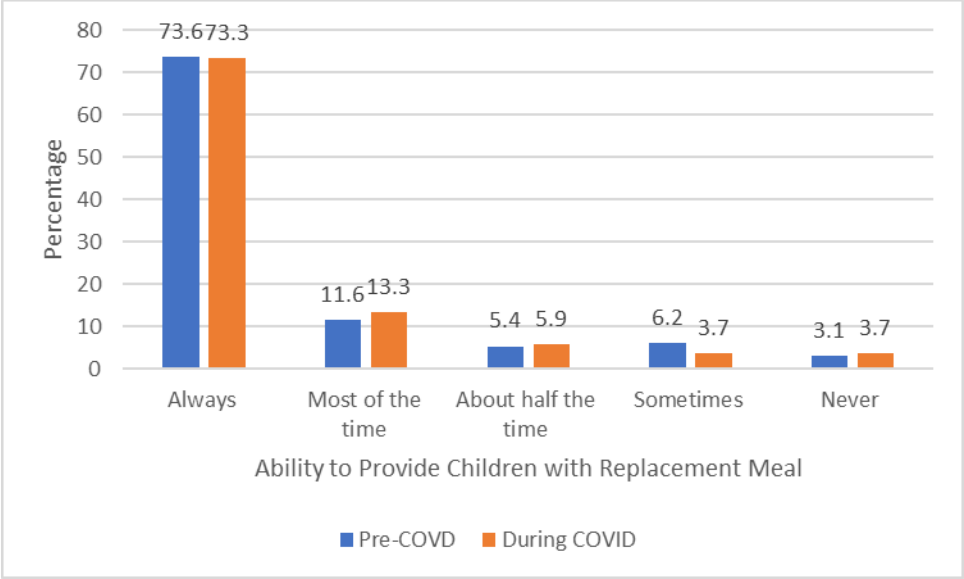
| Participation in Program | School Lunch (%) | School Breakfast (%) | Before or After School Snack (%) |
|--------------------------|------------------|----------------------|----------------------------------|
| Before COVID-19 Pandemic | 63.6 | 34.4 | 8.7 |
| During COVID-19 Pandemic | 66.7 | 40 | 10.3 |

There was also an increase in the number of children who received free or reduced-price school meals during the COVID-19 pandemic. Parents reported that 93.4% of children received free or reduced-price school meals during the COVID-19 pandemic, while only 59.2% of children had received free or reduced-price meals before COVID-19. Additionally, there was evidence that most educational institutions continued to offer free and reduced-price meals during the COVID-19 pandemic, with 89.2% of parents reporting that their children’s school continued to provide free or reduced-price meals. Only 4.6% of parents indicated that their children’s school did not offer free or reduced-price meals during the pandemic and 6.2% of parents were unsure.

Respondents were asked to indicate their level of ability to provide their children with a replacement meal in the event that a school meal was missed before and during the COVID-19 pandemic. Most parents’ abilities to provide their children with a replacement meal were similar both before and during the COVID-19 pandemic, as can be seen in Figure 7.

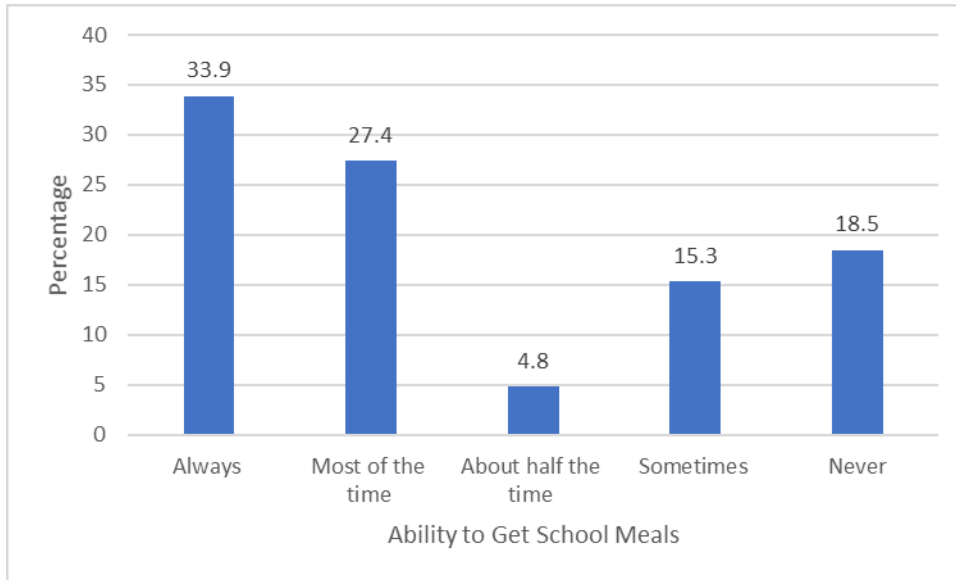
Figure 7

Parental Ability to Provide Children with Replacement Meal Before and During COVID-19



Respondents were also asked to provide information about the style of school meals that were available to their children during the COVID-19 pandemic. A slight majority of parents reported that their children’s school utilized meal pick-up options (49.2%), with many parents also reporting that their children’s school offered onsite school meals as part of the school day (44.1%). The majority of parents who reported that their children’s school utilized meal pick-up options indicated that the school had a designated time and place to pick up meals during the COVID-19 pandemic (82%). Only 8.3% of parents said their children’s school did not have a designated time and place to get meals, and 9.8% were unsure. Results were more mixed when parents were asked about their ability to get school meals at the designated time and place, as can be seen in Figure 8.

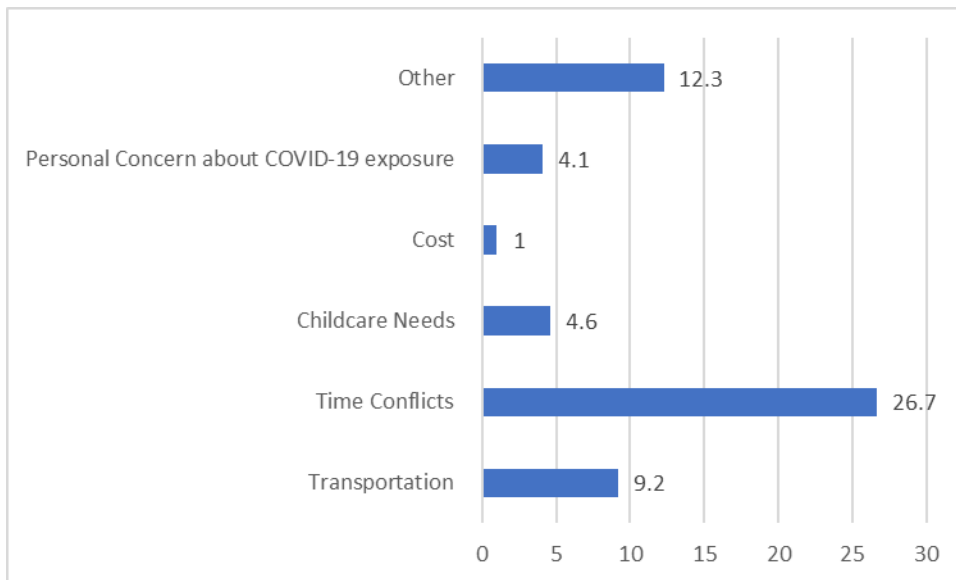
Figure 8
Respondent Ability to Get School Meals at Designated Time and Place



Parents cited numerous obstacles that prevented them from picking up school meals for their children at the designated time and place. Time conflicts appeared to be the biggest barrier, with 26.7% of respondents reporting that time conflicts interfered with their ability to pick up school meals during the COVID-19 pandemic. Additional reported obstacles can be seen in Figure 9.

Figure 9

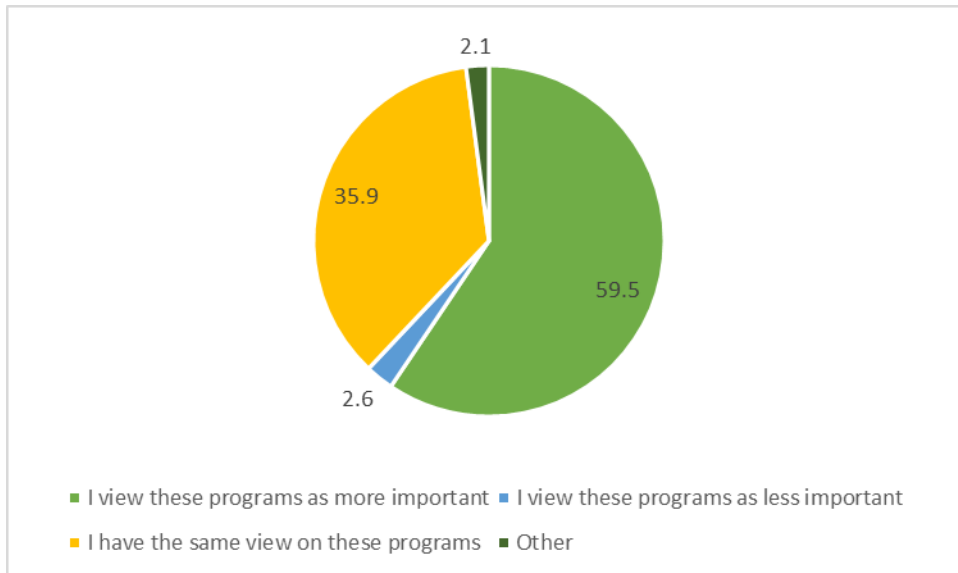
Obstacles Preventing Meal Pick Up



Additionally, it is important to note that parental perception of school nutrition assistance programs improved during the COVID-19 pandemic, with the majority of parents reporting that they now view these programs as more important (59.5%). Additional parental opinions on these programs can be seen in Figure 10.

Figure 10

Respondent Perception of School Nutrition Assistance Programs

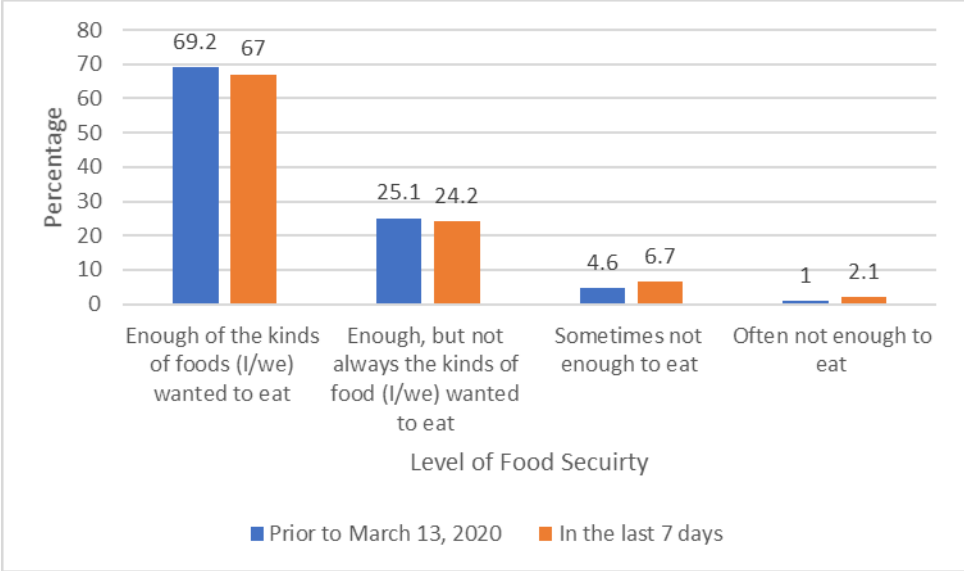


Food-Related Obstacles and Barriers

Responses indicated a slight increase in food insecurity among households of respondents during the COVID-19 pandemic. As can be seen in Figure 11, there was a decrease in the number of respondents who reported having “enough of the kinds of foods (I/we) wanted to eat” and an increase in the number of respondents who reported having “sometimes not enough to eat” or “often not enough to eat”.

Figure 11

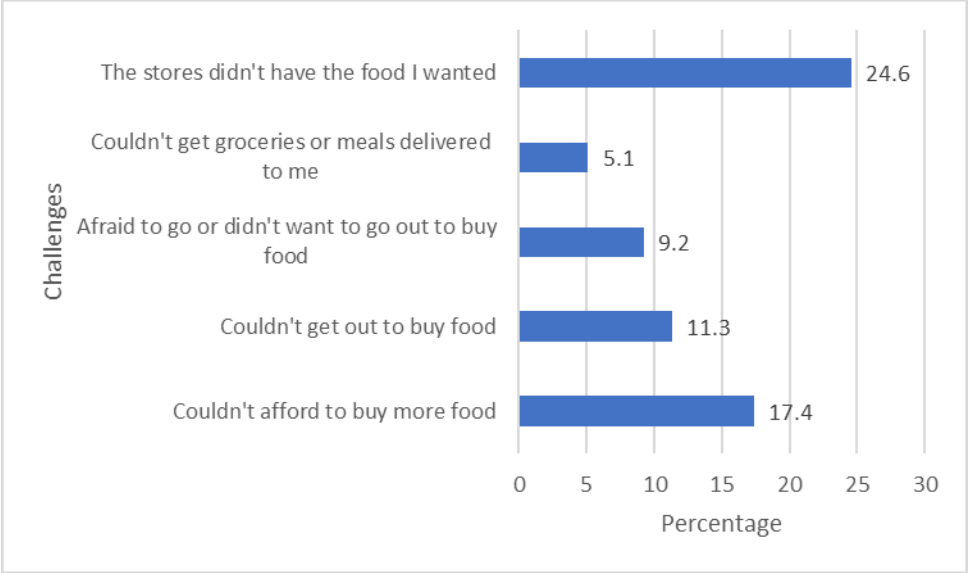
Household Food Security Screener



There were relatively low levels of childhood food insecurity among the sample, with 85.1% of respondents reporting that the statement “the children were not eating enough because we just couldn’t afford enough food” was never true. While most children were food secure, 11.3% of respondents indicated that this statement was sometimes true and 3.6% of those surveyed reported that this statement was often true. When asked why there was not enough food or not always the kinds of food desired available in their household, parents indicated numerous challenges that effected the amount and types of food in their home. Additional information regarding these challenges can be seen in Figure 12.

Figure 12

Challenges that Prevented Respondents from Having Enough Desired Food

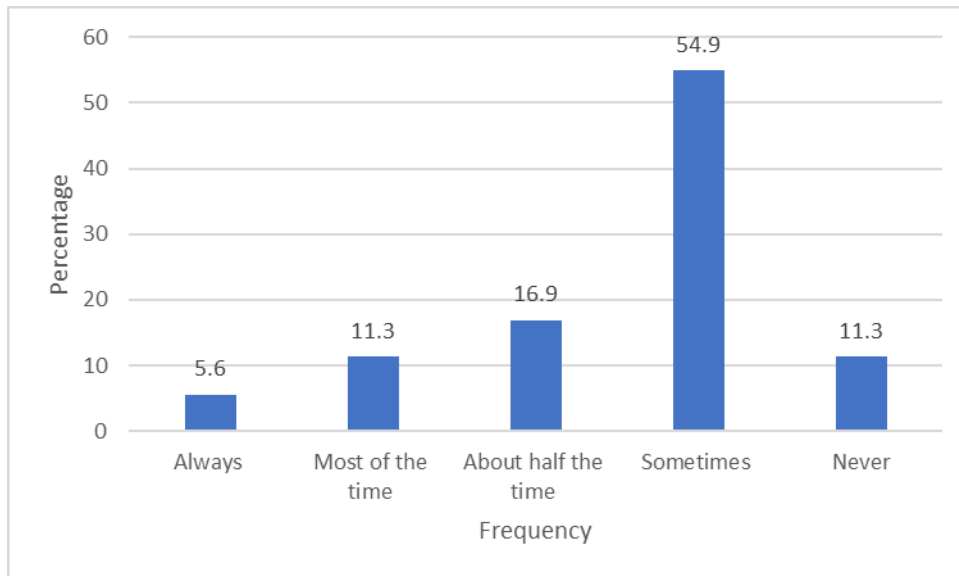


Responses also revealed the significant financial impact of the COVID-19 pandemic, with 33.8% of respondents reporting that they are in a worse financial situation now as compared to before the COVID-19 pandemic. There was also evidence that respondents' financial situation impacted their ability to purchase nutritious food for their household. From those surveyed, 21% of respondents reported that their financial situation limited them from purchasing nutritious food for their household at least half of the time.

Additionally, the data revealed numerous changes in food purchasing patterns as a result of the COVID-19 pandemic. Most respondents reported having to adjust food purchases during the pandemic because items were out of stock. The frequencies of these adjustments varied and can be seen in Figure 13.

Figure 13

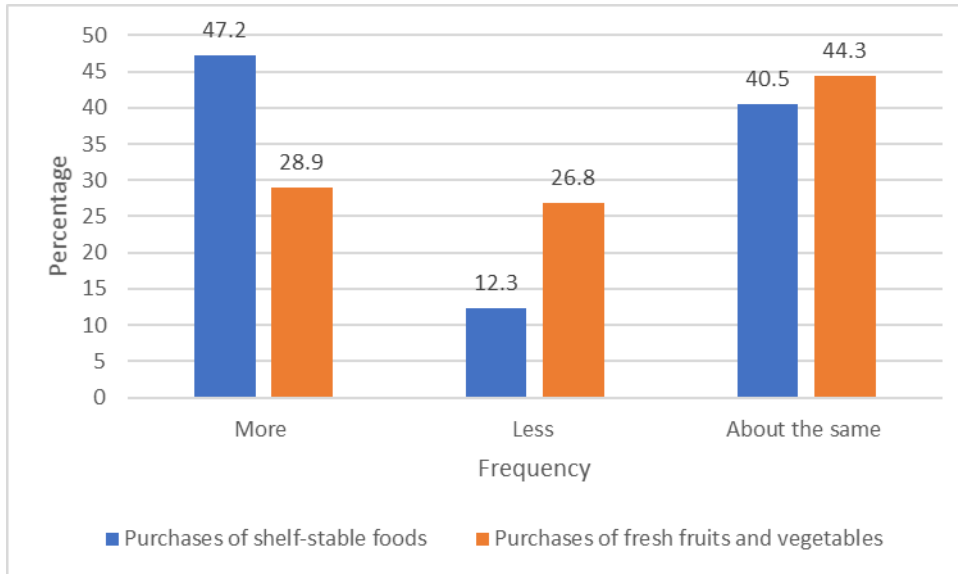
Frequency of Purchasing Adjustments Due to Items Being Out of Stock



Responses also revealed adjustments in the types of food parents regularly purchased during the COVID-19 pandemic. Purchases of shelf-stable foods increased, with 47.2% of respondents reporting that they purchased more shelf-stable foods during the COVID-19 pandemic. There were far less parents who reported increasing their purchases of fresh fruits and vegetables (28.9%) during the pandemic. The majority of parents reported purchasing about the same amount of fresh fruits and vegetables (44.3%), but there were also a number of respondents who reported purchasing less fresh fruits and vegetables (26.8%) during this time period, as can be seen in Figure 14.

Figure 14

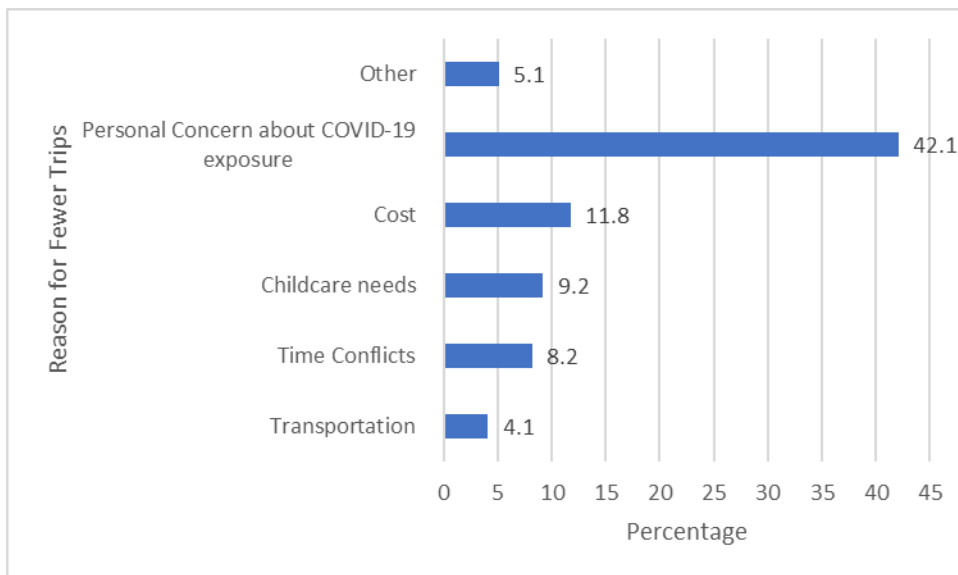
Adjustments in Frequency of Purchasing Certain Types of Foods



In addition to the observed changes in food purchasing patterns, many respondents also reported taking fewer trips to the store than they normally would due to the COVID-19 pandemic (52.3%). Reasons cited for making less frequent trips included personal concern about COVID-19 exposure (42.1%), cost (11.8%), and childcare needs (9.2%), among others which can be seen in Figure 15.

Figure 15

Reasons for Decreased Frequency of Grocery Store Trips During COVID-19



DISCUSSION

In what ways have school-aged children's nutritional patterns changed as a result of the COVID-19 pandemic?

The COVID-19 pandemic has disrupted the lives of school-aged children across the United States. One of the many areas of children's lives significantly impacted by the COVID-19 pandemic has been their nutritional patterns. During the course of the COVID-19 pandemic, many children across the country have increased the frequency with which they consume snacks. Furthermore, results from this study suggest that children are more likely to reach for snacks from a bag or a box, which are often heavily processed and less nutritious than fresh fruits and vegetables. The increase in children's snacking behaviors is likely connected to their increased time at home during COVID-19 related shutdowns. Many parents commented on how they noticed their children consuming more snacks while at home, noting "My children snack much more frequently when doing remote learning" and "Being at home, they will eat out of boredom". The rise of frequent snacking behaviors is cause for concern, as children's increased caloric intake could put them at greater risk for developing childhood obesity. Parents are already beginning to see impacts to their children's health, with one parent sharing, "My child eats constantly because she is home all day. She now overeats and has gained 30 pounds in six months". Childhood obesity is just one of the many adverse health effects that children may experience as a result of this shift in their nutritional patterns. Other parents have noted that their children's increased consumption of processed foods has caused dental problems. One parent notes, "When [my] kids weren't in school, they are more candy and sugary snacks; [this] led to more cavities being discovered". These changes are significant, because the snacking habits that children develop when they are young can significantly impact their health and lifestyle for years

to come. A 2018 article in *The Journal of Nutrition* discusses the impact the dietary patterns children form during early childhood can have on their eating habits later in life. The article stresses the role that proper nutrition during childhood can play in promoting optimal long-term health and disease prevention (Au et al., 2018). The snacking and eating patterns that children establish in their youth may have considerable long-term impacts on their future health and wellness, which is one of the main reasons the observed increase in snacking frequency may be cause for concern.

In addition to changes in snacking patterns, many children also experienced a shift in the average number of meals they consume each day during the COVID-19 pandemic, as compared to their typical meal patterns before the COVID-19 pandemic. The number of children eating three meals a day decreased as a result of the COVID-19 pandemic. Interestingly, there was an increase in both the number of children eating an average of two meals per day and the number of children eating more than three meals per day. This may reflect the numerous effects of the COVID-19 pandemic on children's lives. Many children spent more time at home, which may have led to the increase in the average number of meals eaten per day by some children. Other children may have been impacted by familial struggles with food access and security during the COVID-19 pandemic, which could contribute to the drop in the average number of meals eaten per day by these children. While there are multiple different factors that combine to impact how many meals a child consumes per day, it is clear that the effects of the COVID-19 pandemic are some of the main elements that have contributed to the disruption of many children's typical nutritional patterns.

To what extent are changes in school-aged children's nutritional patterns during the COVID-19 pandemic impacted by their participation in the National School Lunch Program, School Breakfast Program, or both?

While the COVID-19 pandemic did impact some aspects of children's nutritional patterns, these impacts did not appear to be affected by children's participation in school federal nutrition assistance programs. There were no significant correlations found between changes in children's food intake and federal nutrition assistance program participation. There was widespread increased participation in free or reduced-price school meals during the COVID-19 pandemic. This was likely the result of many schools offering free meals to all students, regardless of their family's financial situation. For instance, Ohio was one of many states to authorize the expansion of free school breakfast and lunch to all students attending schools participating in the NSLP for the entire 2020-2021 school year (Ohio Department of Education, 2020). The increased participation in free and reduced-price school meals may have served as a protective measure for many children who would have otherwise been at risk for decreased food intake during the COVID-19 pandemic. In addition to increased program participation, parental perception of school nutrition assistance programs also improved during the COVID-19 pandemic. Many parents reported that they now view these programs as more important. This demonstrates school nutrition assistance programs' increasingly important roles in communities across the United States and underscores their position as safety nets for at-risk families and children.

What are the food-related barriers and obstacles the COVID-19 pandemic has created or strengthened for families of school-aged children?

The COVID-19 pandemic has impacted seemingly every aspect of children's and families' lives. One area it has significantly influenced for many families of school-aged children is their financial situation. Many survey respondents reported that their family is now in a worse financial situation than they were before the COVID-19 pandemic. While there were many reasons for this change, one of the most common themes among respondent's qualitative comments was job loss due to COVID-19. Many parents left comments such as, "I lost my job due to COVID" or "[I experienced] months off due to COVID closures and less well-paying gigs since the re-openings". Additionally, a common theme that emerged was that many parents had to leave the workforce and lose a source of income to provide care for their children during school shutdowns. One parent shares, "[I] had to quit [my] job to facilitate virtual school and provide childcare". Losing a source of income has a major impact on families' financial stabilities, and unfortunately the economic fallout from the COVID-19 pandemic will likely lead to a lasting negative impact on many families' finances.

Families who have been financially impacted by the COVID-19 pandemic may find it more difficult to purchase nutritious food for their household. Multiple survey respondents indicated that their financial situation made it more difficult for them to purchase nutritious food during the COVID-19 pandemic. A lack of nutritious food in the home food environment can significantly impact children's nutritional patterns. Multiple studies, such as a 2003 *Health Education & Behavior* study, have found that the availability and accessibility of fruits, vegetables, and juice in the home considerably influence child dietary behavior (Cullen et al., 2003). The results of the current study provide evidence for this conclusion, as parents who reported that their current financial situation made it more difficult for them to purchase nutritious food were more likely to report that their children ate less vegetables and less fruits

during the COVID-19 pandemic, with correlation values of $r = -.256$, $p = .001$ and $r = -.215$, $p = .003$, respectively. Parents whose financial situation made it more difficult for them to purchase nutritious food were also less likely to have children who snacked on fresh fruits and vegetables, with a correlation value of $r = -.207$, $p = .004$. The financial barriers created by the COVID-19 pandemic affect many families' abilities to purchase nutritious foods, which in turn impacts their children's nutritional patterns and ability to make healthy food choices.

The COVID-19 pandemic has also changed the food purchasing patterns of many families across the United States. It has created a greater desire to purchase more shelf-stable foods, as many families are taking fewer trips to the store and stocking up on non-perishable items. Personal concern about COVID-19 exposure was cited as the most common reason respondents have been making fewer trips to the grocery store. Many families choosing to make less frequent trips to the store to cut down on COVID-19 exposure are purchasing more shelf-stable foods to meet their dietary needs in the time between grocery store trips. As more shelf-stable foods, which are typically more heavily processed and less nutritious than fresher options, become available in the home, children's nutritional patterns may be impacted. Increased parental purchases of shelf-stable foods is associated with an increase in the frequency of children's snacking on food from a bag or a box, with a correlation value of $r = .169$, $p = .018$. Additionally, many parents reported having to adjust their food purchases during the COVID-19 pandemic due to items being out of stock. Increased parental adjustments of food purchases due to out of stock items was associated with children eating less vegetables and fruits, with correlation values of $r = -.169$, $p = .018$ and $r = -.154$, $p = .032$, respectively. The home food environment clearly has an impact on children's nutritional patterns, and the COVID-19

pandemic has made it increasingly difficult for many families to give their children access to nutritious, fresh foods.

LIMITATIONS

It is important to note that this study is not without limitations and challenges. The project employed an electronic survey for data collection, which limited responses to parents with access to the internet and technology. Recruitment for the study was primarily done through the use of social media advertisements on Facebook, which limited responses from parents who do not have a Facebook account and do not actively use social media. Despite this potential challenge, evidence suggests that electronic survey tools are effective. Multiple studies, such as the recent Nutrients study mentioned in the literature review section of this paper, have had success with the use of online survey tools. Additionally, a 2019 article reviewing a recently conducted Pew Research Center survey discusses how Facebook has remained one of the most widely used social media sites among U.S. adults since its launch over 15 years ago. The article goes on to review data from the study about Facebook use among different demographics, revealing widespread use across most groups. A total of 69% of respondents with a reported household income below \$30,000 report using the site, indicating its accessibility (Perrin & Anderson, 2019).

Additional limitations of the study include how parents were required to provide a proxy report about their child's nutritional patterns during the COVID-19 pandemic and participation in the NSLP and SBP. Proxy reports can be subject to error and potential bias. Limitations also include the use of one item to assess children's nutritional intake. Using only one item to assess intake allowed the survey to remain relatively short but restricted the obtainment of more in-

depth knowledge about children's nutritional patterns, information that may have been more easily accessible with the use of other, more in-depth nutritional assessment measures.

IMPLICATIONS

The COVID-19 pandemic has affected children and families across the globe. This study provides a glimpse into the nutritional impact the COVID-19 pandemic has had on school-aged children in the United States and explores some of the factors that have influenced children's nutritional patterns since the COVID-19 pandemic's outbreak in early 2020. The increase in children's snacking frequencies during the COVID-19 pandemic raises serious concerns about the rise of adverse health problems for children, both now and later in their lives. It is critical that parents, health care providers, educators, and policy makers begin to look for ways to reduce the frequency with which children snack, particularly on processed foods, in an effort to protect their health.

The COVID-19 pandemic has also helped to reinforce the importance of school nutrition assistance programs. As more families rely on these programs and realize their value, officials should continue to ensure that all at-risk children have access to these protective programs. It is also crucial that schools work with families to provide every eligible child with the opportunity to receive these needed meals, should similar shutdown events occur in the future. While many parents reported that their children had regular access to school meals, others indicated things such as pick-up time conflicts prevented them from obtaining these resources from their children. Schools should reevaluate nutrition assistance programs and make the necessary adjustments to ensure all children have access to these valuable resources.

Finally, health officials and policy makers must be aware of the ways in which the economic fallout from the COVID-19 pandemic has impacted the food families are bringing into

their households and the effect this has on children's nutritional patterns. It is imperative that officials consider the lasting impacts these changes may have on children's lives as they implement strategies to combat the effects of the COVID-19 pandemic. More policies and programs should be implemented that aim to protect children's health and ensure all children have access to a safe, adequate, and nutritious diet, both during the COVID-19 pandemic and for years to come.

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Appendix A



DATE: February 9, 2021

TO: Abigail Prendergast
FROM: Bowling Green State University Institutional Review Board

PROJECT TITLE: [1693891-1] The Impact of COVID-19 on the Nutritional Patterns of School-Aged U.S. Children
SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: February 4, 2021

REVIEW CATEGORY: Exemption category # 2

Thank you for your submission of New Project materials for this project. The Bowling Green State University Institutional Review Board has determined this project is exempt from IRB review according to federal regulations AND that the proposed research has met the principles outlined in the Belmont Report. You may now begin the research activities.

As an Exempt review, changes may be made to the study without IRB approval. However, amendments or modifications to Exempt studies that *substantively changes or alters* the criteria used to make the initial Exempt determination must be submitted to the IRB for approval.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the Office of Research Compliance at 419-372-7716 or orc@bgsu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Bowling Green State University Institutional Review Board's records.

Appendix B

Q1 Are you the parent of a child(ren) between the ages of 5-18?

- Yes
- No

Q2 At anytime since March 13, 2020, have you had your school-aged child(ren) enrolled in school (includes public, private, homeschool, etc.)?

- Yes
- No

Q3 What type of educational institution does your child(ren) attend? Select all that apply.

- Public School
- Private School
- Homeschool
- Other (Please describe) _____

Q4 Please indicate your SCHOOL child(ren)'s age in the space below - including ONLY children ages 5-18.

- Child 1 _____
- Child 2 _____
- Child 3 _____
- Child 4 _____
- Child 5 _____
- Child 6 _____

- o Child 7 _____
- o Child 8 _____
- o If more than 8 children in school, please enter the remainder of ages for your children in the box. Separate each child's age with a comma.

Q5 What grade level is your child(ren) enrolled in during the 2020-2021 school year? Select all that apply.

- Preschool or Pre-Kindergarten
- Kindergarten
- 1st Grade
- 2nd Grade
- 3rd Grade
- 4th Grade
- 5th Grade
- 6th Grade
- 7th Grade
- 8th Grade
- 9th Grade
- 10th Grade
- 11th Grade
- 12th Grade
- Other (Please describe) _____

Q6 Please indicate the type of learning experience your child(ren) is participating in during the 2020-2021 school year.

Select all that apply.

- Fully In-Person Learning
- Fully Online/Virtual Learning
- Hybrid of In-Person/Virtual Learning
- Other (Please describe) _____

Q7 The following questions are meant to assess your child(ren)'s nutritional patterns during the COVID-19 pandemic compared to before the pandemic.

Q8 Compared to before the COVID-19 pandemic, my child(ren)'s vegetable (examples: broccoli, carrots, string beans) consumption during the COVID-19 pandemic is now:

- Much more
- Somewhat more
- About the same
- Somewhat less
- Much less

Q9 Compared to before the COVID-19 pandemic, my child(ren)'s fruit (examples: apples, bananas, pears, kiwi, berries; not including fruit juice) consumption during the COVID-19 pandemic is now:

- Much more
- Somewhat more
- About the same
- Somewhat less

- Much less

Q10 Compared to before the COVID-19 pandemic, my child(ren)'s whole grain (examples: whole-wheat bread, brown rice, oatmeal) consumption during the COVID-19 pandemic is now:

- Much more
- Somewhat more
- About the same
- Somewhat less
- Much less

Q11 Compared to before the COVID-19 pandemic, my child(ren)'s protein (examples: chicken, meat, fish, beans) consumption during the COVID-19 pandemic is now:

- Much more
- Somewhat more
- About the same
- Somewhat less
- Much less

Q12 Compared to before the COVID-19 pandemic, my child(ren)'s dairy (examples: milk, yogurt, cheese) consumption during the COVID-19 pandemic is now:

- Much more
- Somewhat more
- About the same
- Somewhat less

- Much less

Q13 Before the COVID-19 pandemic, on average how many meals a day did your child(ren) consume?

Q14 During the COVID-19 pandemic, on average how many meals a day does your child(ren) consume?

Q15 Compared to before the COVID-19 outbreak in the United States, how has your child(ren)'s incidence of snacking on foods from a bag, sack, or box changed during this time (i.e. chips, crackers, cookies)?

- Much more
- Somewhat more
- About the same
- Somewhat less
- Much less

Q16 Compared to before the COVID-19 outbreak in the United States, how has your child(ren)'s incidence of snacking on fresh fruits and vegetables changed during this time?

- Much more
- Somewhat more
- About the same
- Somewhat less
- Much less

Q17 Which school nutrition programs, if any, did your child(ren) participate in BEFORE the COVID-19 pandemic?

Select all that apply.

- School lunch
- School breakfast
- Before or after school snack
- My child(ren) did not participate in any program

Q18 Earlier you indicated your child(ren) participated in the school meal/snack programs BEFORE COVID-19.

Did your child(ren) receive free or reduced meals or snacks at school BEFORE COVID-19?

- Yes
- No

Q19 Does your child(ren)'s school continue to offer free or reduced-price meals to students during the COVID-19 pandemic?

- Yes
- No
- Unsure

Q20 BEFORE the COVID-19 pandemic, how many meals per day did your child(ren) eat at school?

- 0
- 1
- 2

- 3+

Q21 BEFORE the COVID-19 pandemic, how many snacks per day did your child(ren) eat at school?

- 0
- 1
- 2
- 3+

Q22 BEFORE the COVID-19 pandemic, if your child(ren) missed a school meal, how often were you able to provide them with a replacement meal?

- Always
- Most of the time
- About half the time
- Sometimes
- Never

Q23 Please indicate which school nutrition programs, if any, your child(ren) have participated in DURING the COVID-19 pandemic.

Select all that apply.

- School lunch
- School breakfast
- Before or after school snack
- My child(ren) have not participated in any school meal or snack programs DURING COVID-19

Q24 At any time since the start of the COVID-19 pandemic, has your child(ren) received any free or reduced-price meals or snacks provided from the school?

- Yes
- No

Q25 During the COVID-19 pandemic, how many meals per day does your child(ren) eat at school?

- 0
- 1
- 2
- 3+

Q26 During the COVID-19 pandemic, how many snacks per day does your child(ren) eat at school?

- 0
- 1
- 2
- 3+

Q27 During the COVID-19 pandemic, if your child(ren) does not receive a school meal, how often are you able to provide them with a replacement meal?

- Always
- Most of the time
- About half the time

- Sometimes
- Never

Q28 Which of the following does your child(ren)'s school offer during the COVID-19 pandemic in regards to school meals? Check all that apply.

- Onsite meals as part of the school day
- Meal pick up
- No meals offered
- Other (Please describe) _____

Q29 Does your child(ren)'s school have a designated time and pick-up place to get school meals during the COVID-19 pandemic?

- Yes
- No
- Unsure

Q30 How often are you able to get your child(ren)'s school meals at the designated time and pick-up place?

- Always
- Most of the time
- About half the time
- Sometimes
- Never

Q31 Please indicate which of the following reasons prevent you from picking up your child(ren)'s school meals during the COVID-19 pandemic. Check all that apply.

- Transportation
- Time Conflicts
- Childcare Needs
- Cost
- Personal Concern about COVID-19 exposure
- None of the above
- Other (if you select other, please describe in the box)

Q32 How has your perception of the importance of school nutrition programs at your child(ren)'s school changed as a result of the COVID-19 pandemic?

- I view these programs as more important
- I view these programs as less important
- I have the same view on these program
- Other (Please describe) _____

Q33 Which of these statements best describes the food eaten in your household before March 13, 2020? Select only one answer.

- Enough of the kinds of foods (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

Q34 In the last 7 days, which of these statements best describes the food eaten in your household? Select only one answer.

- Enough of the kinds of foods (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

Q35 Please indicate whether the next statement was often true, sometimes true, or never true in the last 7 days for the children living in your household who are under 18 years old.

“The children were not eating enough because we just couldn’t afford enough food.”

- Often true
- Sometimes true
- Never true

Q36 Why did you not have enough to eat (or not what you wanted to eat)? Select all that apply.

- Couldn't afford to buy more food
- Couldn't get out to buy food (for example, didn't have transportation or had mobility and health problems that prevented you from getting out)
- Afraid to go or didn't want to go out to buy food
- Couldn't get groceries or meals delivered to me
- The stores didn't have the food I wanted

Q37 How has your financial situation been impacted by the COVID-19 pandemic?

- I am in the same financial situation as I was before the COVID-19 pandemic
 - I am in a better financial situation than I was before the COVID-19 pandemic
 - I am in a worse financial situation than I was before the COVID-19 pandemic (if yes, please describe: is this COVID related, job loss due to COVID, etc. in the box)
-

Q38 In the last 7 days, how difficult has it been for your household to pay for usual household expenses, including but not limited to food, rent or mortgage, car payments, medical expenses, student loans, and so on? Select only one answer.

- Not at all difficult
- A little difficult
- Somewhat difficult
- Very difficult

Q39 How often have you felt that your current financial situation has limited you from purchasing nutritious food for your household during the COVID-19 pandemic?

- Always
- Most of the time
- About half the time
- Sometimes
- Never

Q40 How often have you had to adjust your food purchases because items were out of stock during the COVID-19 pandemic?

- Always
- Most of the time
- About half the time
- Sometimes
- Never

Q41 Compared to what you usually buy, have you bought more, less, or about the same of shelf-stable foods (such as rice, dried or canned beans, or other canned or frozen goods) during the COVID pandemic?

- More
- Less
- About the same

Q42 Compared to what you usually buy, have you bought more, less, or about the same amount of fresh fruits and vegetables during the COVID pandemic?

- More
- Less
- About the same

Q43 In the last 7 days, have you taken fewer trips to stores than you normally would have because of the coronavirus pandemic? Curbside pick-ups should be counted as trips to stores. Select only one answer.

- Yes
- No

Q44 Please indicate why you have taken fewer trips to the store. Check all that apply.

- Transportation
- Time Conflicts
- Childcare needs
- Cost
- Personal Concern about COVID-19 exposure
- Other (Please describe) _____

Q45 Please use the box below to make other comments on the impact of COVID-19 on your child(ren)'s nutritional patterns, school meal programs, or your ability to provide your child(ren) with adequate, nutritious food.

Q46 Last Section: The following questions are intended to provide the researchers with some general demographic information.

Q47 Please indicate your age.

- 18-25
- 26-30
- 31-40
- 41-50
- 50+

Q48 Which of the following best describes yourself?

- White
- Hispanic/Latino
- Black/African American
- Asian/Pacific Islander
- Native American
- Other

Q49 Please select the response that best describes your annual household income.

- <\$30,000
- \$30,000-50,000
- \$50,000-70,000
- \$70,000-100,000
- \$100,000-150,000
- >\$150,000

Q50 Please enter your residential ZIP code into the box below.

Q51 OPTIONAL: If you would like to be entered into a drawing to win one of four \$50 Amazon gift cards, please enter your email into the box below. The winners will be notified after data collection has ended. No duplicate entries.

If you do not wish to be entered into the drawing, please skip this item and hit the arrow to submit your response.

Appendix C

INFORMED CONSENT FOR: The Impact of COVID-19 on the Nutritional Patterns of School-Aged U.S. Children

INTRODUCTION OF THE RESEARCHER: My name is Abigail Prendergast, and I am an undergraduate student studying nutrition science at Bowling Green State University. I am working with Dr. Kerri Knippen, an Assistant Professor in the Department of Public & Allied Health at Bowling Green State University, and Dr. Kelly Stamper Balistreri, an Associate Professor in the Department of Sociology at Bowling Green State University to conduct research on COVID-19 and the nutritional patterns of school-aged children. You have been asked to voluntarily participate in this study because you are the parent of a school-aged child. You must be at least 18 years old to participate in this study.

PURPOSE: The purpose of this study is to better understand how the nutritional patterns of school-aged U.S. children have been affected because of COVID-19. This research is important in the process of determining how, if at all, children's nutritional patterns have shifted as a result of the pandemic and identifying how children who participate in federally funded school nutrition assistance programs have been impacted. The general benefits of this study are that it will help nutrition and dietetic researchers better understand how children's nutritional patterns have been impacted by COVID-19 and will allow social scientists to gain a deeper understanding of how children who participate in school nutrition assistance programs are affected. There are no direct benefits to you. Upon the completion of the survey, you will have the opportunity to input your email address to be entered into a drawing to win one of four \$50 Amazon electronic

gift cards, redeemable at <https://www.amazon.com>. Your chances of winning are approximately 1 in 50.

PROCEDURE: If you agree to participate in this study, you will be given an electronic survey that asks about your child(ren)'s nutritional patterns during the COVID-19 pandemic. You will be asked questions about changes in your child(ren)'s diet, participation in federally funded nutrition assistance programs through your child(ren)'s school, and the home food environment available to your child(ren) during COVID-19. We believe the electronic survey will take you around 10 minutes to complete. IP addresses will be collected to prevent duplicate survey entries. You will also be invited to share the electronic link to the study with other parents of school-aged children.

VOLUNTARY NATURE: Your participation is completely voluntary. You are free to withdraw at any time. You may decide to skip questions or discontinue participation at any time without explanation or penalty. Your decision whether to participate will not affect your relationship with Bowling Green State University.

CONFIDENTIALITY PROTECTION: Your responses to the survey will be kept confidential. Survey responses will be kept on password-protected computers of the primary investigator (Abigail Prendergast) and faculty advisors (Dr. Knippen and Dr. Balistreri). Identifying information, such as the voluntary input of your email address to be entered into the drawing for a gift card, will be stored separately. Your email will only be used for the purposes of the drawing. You may choose to opt out of the drawing. IP addresses will only be used to prevent duplicate entries. We will keep the data for five years, and then destroy the data. Some employers use tracking data, so you may want to complete the survey on a personal computer.

You should not leave the survey open if you are using a public computer or a computer that others may have access to. You should also clear your browser cache and page history after completing the survey.

RISKS: The risk of participation is no greater than that experienced in daily life. The primary risk to you is breach of data. The steps outlined above minimize this risk by keeping your survey responses confidential.

CONTACT INFORMATION: If you have any questions about the research or your participation in the research, please contact me at aprende@bgsu.edu. You may also contact Dr. Knippen at kknippe@bgsu.edu or Dr. Balistreri at kellyba@bgsu.edu. You may also contact the Chair of the Bowling Green State University Institutional Review Board, at 419-372-7716 or orc@bgsu.edu, if you have any questions about your rights as a participant in this research. Thank you for your time.

INFORMED CONSENT: I have been informed of the purposes, procedures, risks and benefits of this study. I have had the opportunity to have all my questions answered and I have been informed that my participation is completely voluntary. I agree to participate in this research. By clicking the arrow button at the bottom of this page, you are consenting to participate in this study.

