Virginia Tech

A NUTRIENT ANALYSIS OF COVID-19 MEALS AND STANDARD MEALS IN ONE ELEMENTARY SCHOOL PARTICIPATING IN THE NATIONAL SCHOOL LUNCH PROGRAM

Major Project/ Report submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of Online Master of Agricultural and Life Sciences In Applied Nutrition and Physical Activity

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Abstract

To date, there has been limited research about the nutritional quality of school lunches during the COVID-19 pandemic. This analysis compared the nutritional profile of grab-and-go take-home lunches compared to standard lunches provided during in-person class instruction once normal schedules and school meals resumed at one elementary school. The study included two school lunch menus: 1) – one menu for take-home school lunches retained from January 2021 (COVID-19 lunches); and one lunch menu the school system's standard food distributor from January 2023 (standard lunches). The nutritional content of the COVID-19 meals was analyzed using Food Processor nutrition software. Both lunch menus were analyzed for macronutrients – carbohydrates, cholesterol, fats, fiber, protein, and sugar along with micronutrients- calcium, potassium, sodium, iron, and vitamin D. A Mann Whitney U tests were used to compare differences between two independent groups – COVID-19 lunches and standard lunches. The Bonferroni adjustment was a post hoc adjustment used to decrease type I error. The COVID-19 meal entrees contained more iron than the standard lunch. For standard meals, the fruit groups contained more iron. The COVID-19 meal's milk group contained significantly more total fat and vitamin D than the standard lunches. In the total meals, the only significant difference was a higher level of calcium in the COVID-19 take-home meals compared to standard meals. This analysis indicates school meals served during COVID-19 were nutritionally equivalent to standard meals, in spite of limitations with packaging lunches, supply side issues, etc. Additional research is warranted with larger sample sizes to provide broader insight into USDA school meals during COVID-19 and potential impacts on youth benefiting from these meals.

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Introduction

Background and setting

The National School Lunch Program (NSLP) provided 4.9 billion lunches to United States children prior to the COVID-19 pandemic. The closure of schools during the COVID-19 pandemic caused a disruption to operations, which shifted how school meals could continue to be offered to participating youth. The United States Department of Agriculture (USDA) addressed that need in the form of nationwide government waivers, take-home or delivered school meals, and pandemic electronic benefit transfer (P-EBT) for families with children (U.S. Department of Agriculture, 2022). During 2020, the NSLP was able to provide 2.2 billion meals (U.S. Department of Agriculture, 2022).

School is a setting where a critical source of nutrition occurs for millions of children in the form of school lunches. The NSLP and School Breakfast Program can provide up to half of students' daily calories (Yon et al., 2016). The composition of lunches includes an entrée, grain, vegetable, fruit, and milk. These components provide students with key macronutrients and micronutrients for essential bodily functions. These lunches also align with the *Dietary Guidelines for Americans* (U.S. Department of Agriculture and U.S. Department of Health and Human Services, December 2020) with nutritional standards enhanced with the Healthy Hunger-Free Kids Act of 2010 (Congress, 2010).

In standard procedures, students make their own selections with regards to what items they consume for school lunches. Their choices are determined by preference, the portion size, and perceived health of the food items (Lee, 2019). Plate waste is the edible portion of lunch that is served to students but is not eaten and eventually thrown away. It is considered a waste of nutrients that students should have consumed (Lee, 2019). Approximately 10 to 20% of nutrients served are discarded as plate waste (An & Lee, 2002). A good predictor of school lunch satisfaction and dissatisfaction is plate waste as it is the portion of the lunch left on the plate by students.

The COVID-19 Pandemic impacted children in various different ways. Missed school time put youth at risk of food insecurity (Kinsey et al., 2020), as well as impacted children behaviorally and emotionally. School systems were innovative in addressing barriers to food access by creating grab-and-go pickups and summer food programs to increase food availability (Kinsey et al., 2020; USDA Food and Nutrition Service, 2021a). The grab and go or delivered options were expected to meet nutrition standards for school lunches. These waivers included a Seamless Summer Option for food pickup during the summer, allowed meals to be served in non-group settings to promote social distancing, allowed parents to pick up meals and bring them home to children, and allowed meals to be served outside of traditional times (USDA Food and Nutrition Service, 2021b). These waivers also gave states flexibility to serve meals that didn't meet specific meal pattern requirements, such as one serving per day being whole grain rich and low-fat milk being unflavored (USDA Food and Nutrition Service, 2021b).

A comparison of the COVID-19 meals and standard meals is needed to determine if the flexibilities and steps taken by schools during the pandemic resulted in changes to the nutritional analysis of school meals. With the flexibility in place for schools to provide meals while massive closures occurred, was there an impact to students' health in the form of macronutrients, micronutrients, and other nutrients? To date, there have been no published quantitative studies to determine if significant differences occur between the take-home meals and hot meals during lunchtime in schools.

Statement of the problem

There is no precedent for school lunch comparisons during COVID-19 Pandemic and post-COVID to determine if nutrient differences occurred. The nutritional information of the lunches served during COVID have not been studied. They have also not been compared to the nutritional standards set forth by the Dietary Guidelines and HHFKA of 2010. This study focuses on elementary school students in a city setting, who were offered multiple lunch entrée options, multiple vegetable options, multiple fruit options, and two milk options. They were also offered take-home or grab-and-go meals during the COVID-19 Pandemic by their school system. This analysis will determine what nutrients were significantly different between these meals and if school nutrition policy can benefit from this study.

Significance of the Problem

The school nutrition department, specifically the nutrition director, can use this information to improve any lunch plans for school closure periods where the students are not able to attend in-class sessions. This will better prepare the school system to provide the same level of nutrition to students even if they are unable to attend school physically. The project could have further implications for the school system – providing them with information to see if nutrition standards were still met during the COVID-19 pandemic. This could inform the development of any future take-home meal programs for students who consume school lunches.

Project Objectives

In the absence of recent data measuring changes in child diet during the pandemic, this study serves as an analysis providing estimates of nutritional impact. The purpose of this study is to determine if nutrient differences occurred during COVID-19 when compared to standard meals. In this investigation, how the COVID-19 pandemic impacted the macronutrient and micronutrient compositions of school meals will be explored.

Literature Review

According to the CDC, healthy eating in children is characterized by the consumption of vegetables, fruits, whole grains, and fat-free or low milk (Centers for Disease Control and Prevention, 2021). Other important foods to include are lean meats, poultry, beans, eggs, fish, and nuts. The CDC recommends limiting saturated fats, salt, added sugars, and trans fats (Centers for Disease Control and Prevention, 2021; Ukëhaxhaj, 2021). Starting healthy eating habits with children so they adopt them early on, is key so these habits continue into adulthood (van Kleef et al., 2020).

Dietary Guidelines for Americans

The *Dietary Guidelines for Americans* (DGAs) are based upon rigorous reviews of research on nutrients, dietary behavior, and health outcomes.. The DGAs provide guidance on what and how much foods and beverages to consume in order to follow a healthy diet. They were established to promote health and prevent diet-related diseases (U.S. Department of Agriculture and U.S. Department of Health and Human Services, December 2020). These guidelines are developed by the US Departments of Health and Human Services (DHHS) and Agriculture (USDA). These guidelines also help to establish the basis for nutrition standards for federal nutrition assistance programs and within nutrition education programs. The DGAs contain five major goals and 13 key recommendations. The first major recommendation is to limit added sugars to less than 10% of all calories consumed per day. The second is to limit the intake of saturated fats to less than 10% of calories per day. Sodium intake should be less than 2300 mg/d for adults and children aged 14 and older. For younger children, the sodium guideline should be in line with the age and sex appropriate Tolerable Upper Intake Levels (DeSalvo et al., 2016). In general, the tolerable upper intake level (UL) ranges from 1,500 mg to 2,200 mg of sodium for children aged 1 to 13. For elementary school children, the Institute of Medicine recommends 1,200 mg for children aged 4 to 8 and 1,500 mg for people aged 9 to 50 (Garriguet, 2007; Yon et al., 2016). Key recommendations include a variety of vegetables, whole fruits, at least half whole grains consumed, fat-free or low-fat dairy products, and a variety of protein products (DeSalvo et al., 2016).

Macronutrients and Micronutrient Standards

Macronutrients are the major components of tissues and make up a majority of our bodies' caloric intake. Our body uses these nutrients for energy – specifically carbohydrates, proteins, and lipids. Daily protein intake for children ranges from 0.86 g/kg body weight for ages 4 to 7 years and increases to 0.92 g/kg body weight for pre-pubertal children (Savarino et al., 2021). Fats provide essential fatty acids and for children older than two years. 10 to 35% of their total calories should come from fat (Rani, 2020). Saturated fatty acids should be consumed as less than 10% of total energy intake and trans fatty acids less than 1%. For carbohydrates, children should consume a range of 45 to 60% of total energy intake (Rani, 2020; Savarino et al., 2021).

Micronutrients are smaller components of our diet. However, they work as cofactors for vital bodily functions. Usually, they are needed in smaller quantities. In regards to micronutrients, calcium is necessary for bone health and approximately 600 to 800 mg/d is recommended for children (Rani, 2020). However, higher amounts of calcium intake benefit bone mass. Iron is beneficial for muscle mass and red blood cells. It should be consumed between 30 to 60 mg according to the World Health Organization (Savarino et al., 2021). Vitamin D is another important micronutrient that helps the body absorb calcium, muscles move and nerves carry signaling messages. The average amount needed for a child aged one to 13 is 15 mcg (National Institutes of Health, 2022). Potassium and sodium are electrolytes essential for normal body function which maintain fluid and blood volume within the body. Consuming too much sodium or too little potassium can increase a child’s blood pressure (Centers for Disease Control and Prevention, 2021). The average child should consume between 2,000 to 2,300 mg of potassium depending on their age (U.S. Department of Agriculture and U.S. Department of Health and Human Services, December 2020). Sodium should be consumed between 1,200 to 2,300 mg from age 2 to 18 (U.S. Department of Agriculture and U.S. Department of Health and Human Services, December 2020) .

School as a Source of Nutrition

Children spend a substantial part of their day at school. They spend up to eight hours a day and eat at least one meal at school (Johnson et al., 2015). Children may consume up to half of their daily energy while at school (Yon et al., 2016). According to Van Klee et al., this makes school the most suitable setting for health promotion (van Kleef et al., 2020). It is also a place where children develop social and emotional skills and behaviors that become positive health outcomes (Chaabane et al., 2021). It is hypothesized that habits that develop early on in childhood will continue into adolescence and adulthood (Birch & Ventura, 2009).

Nutrition education in schools could help to influence children's food decisions and give them the knowledge to make better nutrition decisions (Johnson et al., 2015). There are many programs and strategies used to help promote healthy eating in elementary schools. Teaching methods include enhanced curriculum, parental involvement, hands-on learning like community gardens, and literature to promote healthy behaviors. Others include game-based and web-based approaches using board games and technology to promote healthy choices (Dudley et al., 2015). These strategies produced better food consumption, fruit and vegetable consumption, increased nutritional knowledge and reduced sugar consumption (Dudley et al., 2015). Self-regulation of non-nutritious foods is important to encourage children to develop their own ability to regulate energy intake (Shanks et al., 2021).

National School Lunch Program

The National School Lunch Program (NSLP) (U.S. Department of Agriculture, 2022) provides nutritionally balanced meals to students every school day at full-price, low-cost, or free lunches (USDA Food and Nutrition Service, 2019). All students at a participating school can receive a NSLP lunch. Children from households with an income less than 130% of the federal poverty line can qualify for free meals and those from households with an income of less than 185% qualify for reduced price lunches. If the household is above 185 percent of the federal poverty line, the child can receive a full-priced lunch (U.S. Department of Agriculture, 2022).

The program is administered federally by the USDA Food and Nutrition Service (FNS) (Yon et al., 2016). It was created under the Richard B. Russell National School Lunch Act in 1946, which promoted the health of children and increased the consumption of domestic commodities (Izumi et al., 2018). The meals in the NSLP consist of an entree, grain, vegetable, fruit, and milk. The entree has to contain one or more of the following: a grain, meat or meat alternative, vegetable, and fruit. The student can select between a variety of fruits, vegetables, and non-fat or reduced-fat milk. The milk can be plain or flavored (Izumi et al., 2018). The NSLP provided 4.9 billion lunches during the 2019 fiscal year which totaled $14.2 billion (U.S. Department of Agriculture, 2022). In fiscal year 2020, the program provided about 3.2 billion lunches, with 76.9 % served at free or reduced price. In 2021, the NSLP provided 2.2 billion meals, with 98.9% at free or reduced price. These increases are attributed to the USDA issued waivers which allowed expanded coverage of the program (U.S. Department of Agriculture, 2022). The program has evolved with the times, recently shifting the focus from under-nutrition to over-nutrition as child obesity has increased in the United States (Izumi et al., 2018).

Research shows that students who participate in the NSLP have better nutrient intake/dietary quality during lunch than students who bring packed lunches from home (Kinsey et al., 2020; Smith et al., 2015; Yon et al., 2016). According to Farris et al. (2014), when comparing NSLP to packed lunches, energy, carbohydrates, fat, saturated fat, sugar, vitamin C, and iron were significantly higher; protein, sodium, fiber, vitamin A, and calcium were significantly lower for packed lunches when compared to school lunches. School lunches contained an average of 38 calories below energy recommendations and an average of 0.4 mg below iron recommendations (Farris et al., 2014). Fruits and vegetables seemed to be neglected more by lunch packers than school lunch participants. School lunch students consumed less sugar-sweetened beverages and were exposed to more fruits and vegetables (Farris et al., 2014).

The Community Eligibility Provision is a part of the NSLP (Food and Nutrition Service, 2023). It provides a non-pricing meal service option for schools in low-income areas. The schools who qualify can serve breakfast and lunch at no cost to all enrolled students. This is done without collecting household applications and income information. The schools are reimbursed using a formula based on how many students are eligible for free meals using other programs like Supplemental Nutrition Assistance Program (SNAP) (Food and Nutrition Service, 2023) .

Healthy, Hunger-Free Kids Act of 2010

The Healthy, Hunger-Free Kids Act (HHFKA) of 2010 was added as a provision to the nutrition standards of the National School Lunch Program and was designed to assist with child hunger and obesity. The main purpose of the HHFKA is to address dietary quality in school lunches by increasing healthy foods. The USDA added new nutrition standards for the NSLP in 2012 and 2013 in accordance with the HHFKA. These provisions focus on reducing sodium and saturated fats in lunches. The standards also increased whole grains and fiber while setting minimum amounts for protein, calcium, iron, and vitamins A and C (Zhao et al., 2019).

The HHFKA was designed to help standards align with the 2010 Dietary Guidelines for America (Kinderknecht et al., 2020).The changes to the program included requiring fruits and vegetables as two components of the lunch. The number of fruits and vegetables increased to 3.75 cups of vegetables plus 2.5 cups of fruit per week (Bergman, 2014). There was a limit placed on starchy vegetables weekly and an increase on whole-grains. At least half of the grains offered, eight to nine ounces weekly, must be whole-grain rice (Bergman, 2014). The milk offered could be fat-free or low fat whether it was flavored or unflavored (Johnson et al., 2016). Meat or meat alternatives increased to eight to nine ounces per week. A limit was placed on sodium levels and trans-fat was eliminated from meals (Farris et al., 2021). The targeted amount of sodium in lunches was at or below 640 mg per the new guidelines (Bergman, 2014). The whole-grain and sodium requirements were originally implemented in a stepwise fashion. The whole grain rule had only one phase where half of the grains offered were whole-grain rich (school year 2019-2020) (USDA Food and Nutrition Service, 2019). With sodium, the rule had two phases for sodium requirements where phase 1 levels were less than or equal to 1230 to

1420 mg (2022) and phase 2 was sodium levels at or below 1,110 to 1,280 mg (USDA Food and Nutrition Service, 2022).

The HHFKA also implemented a caloric restriction based on the recommended daily amount for each grade group. The caloric range for grades Kindergarten to 5th grade is a minimum of 550 calories to maximum of 650 calories (Bergman, 2014). In order to receive meal reimbursement, the student was required to select a fruit or vegetable.

Children who participated in the NSLP after the HHFKA was implemented had higher dietary quality in their school meal intake, as measured using a Healthy Eating Index (HEI-2010). The HEI-2010 compares the lunches to the 2010 Dietary Guidelines for Americans (U.S. Department of Agriculture and U.S. Department of Health and Human Services, December 2020). Participants had higher consumptions of greens, beans, whole grains and refined grains, as compared to nonparticipants (Kinderknecht et al., 2020). This improvement was due to an increase in variety, portion size, and numbers of fruits and vegetables (Johnson et al., 2016). There were also significant differences between the content of the selected food energy and percentage of calories from total and saturated fat as determined by Bergman (Bergman, 2014). Research by Johnson et al. (2016) indicates that it is caused by a significant improvement in the nutritional quality of foods selected by children (Johnson et al., 2016) as a result of the HHFKA. The study determined mean adequacy ratio of the foods selected by the students calculated by 6 nutrients per 1000 kcal of energy. Those six nutrients were protein 50 g, vitamin C 60 g, vitamin A 5000 IU, calcium 1000mg, iron 18 mg, and dietary fiber 25g. They also studied the energy density which was the available energy divided by the weight of the foods served (Johnson et al., 2016). Johnson et al. (2016) attributed this improvement to increased variety in foods, bigger portion size, and higher number of fruits and vegetable servings (Johnson et al., 2016).

There was also an unintended negative impact from the HHFKA that included a reduction in vitamin C and calcium in both selected and consumed meals (Bergman, 2014). Calcium was reduced from an average 27.1 mg for 2012 to an average 19.7 mg in 2013 for consumed meals. Even though this was a reduction, it is still an adequate amount of vitamin C. The reduced level of calcium may be due to the elimination of saturated fats within school meals. Products like cheese need to be selected when preparing meals to curb this unintended effect (Bergman, 2014).

Role of School Nutrition Directors

School Nutrition Directors are responsible for implementing policy changes within the school food environment and making healthy foods available to all students within their school system (Yon et al., 2016). They play a pivotal role in helping to prepare nutritionally balanced meals and promoting the school lunch program (Yon et al., 2016). The school nutrition directors administer new trainings to their staff when policy changes occur. They also look for more food products to offer that are in line with the dietary guidelines – such as whole grains and low-fat and low sodium options (Yon et al., 2016).

They monitor which menu items lead to drops in school lunch participation and make adjustments accordingly. The directors help to make fruits and vegetables more appealing through presentation – such as using salad or vegetable bars. There is a financial aspect to their role as well – setting meal prices as well as budgets for cafeteria staffing and equipment updates, to name a few (Yon et al., 2016).

Student Food Choices

Johnson et al. studied school lunch food choice among elementary school students and found that over half of the students selected pizza (90%), chicken nuggets (84%), hamburger (82%), omelets (76%), and pancakes (57%). These foods mimic those from fast food establishments and speak to the less nutrient dense selections (Johnson et al., 2015). The entrees selected least were the most nutritious according to the dietary guidelines – salads, sandwiches, yogurt, and fruit plates to name a few. The side items that were selected the most were French fries 64%, mandarin oranges 49%, tater tots 40%, breadsticks 39%, and cinnamon bread 39%. Research showed that there were between 2% and 33% of students that selected a healthier entrée compared to 60 to 90% that selected an unhealthy entrée option. Those that selected these unhealthy options consumed their preferred food items and discarded the healthy options, which created the nutritionally unbalanced meals (Johnson et al., 2015).

According to Smith & Cunningham-Sabo (2014), children selected an entrée to consume during their school lunch. However, less than half of elementary and middle schoolers selected a vegetable. They were more likely to select a fruit, with 60% taking at least one serving of fruit per lunch. For milk consumption, 96% of elementary schoolers and 82% middle-schoolers selected milks with their lunches (Smith & Cunningham-Sabo, 2014).

Student Food Preferences

Lee, when investigating why students ate half or more of the portions provided, found that the students reported the food tasted good, the portion size was appropriate for them, or because eating whole meals was good for their health (Lee, 2019). In addition, Smith et al. found that the top three reasons why students eat school lunch were "the menu offers healthy choices," "there is a variety of food choices," and "the food is properly cooked" (Smith et al., 2015).

Conversely, Lee's study concluded that students do not eat certain foods because they are "not tasty" or they are served foods in "larger portions that they do not like" (Lee, 2019). Another determining factor as to why students don't consume school lunches is they feel like the staff does not listen to their lunch suggestions (Smith et al., 2015). Food preference is a factor that influences eating school lunches (Lee, 2019; Smith et al., 2015). Some students who eat school lunches feel they cannot make their own food choices or portion sizes because the cafeteria staff plates their food. Others feel the food is poorly prepared or they cannot save leftovers which contributes to plate waste (Zhao et al., 2019).

A good indicator of student dissatisfaction with school lunches is plate waste. According to Lee, plate waste is the food remaining after a student completes their meal (Lee, 2019). Plate waste is a measure of the uneaten edible portion of food offered to the student. It can be used to measure specific nutrients or food groups that are available, whether consumed or wasted (Shanks et al., 2021). It is the waste of nutrients - especially fruits and vegetables. It also The age of the student impacts plate waste along with food neophobia, which is the fear of eating new foods (Shanks et al., 2021). Barriers in reducing plate waste amongst children aged 9 to 13 included not being able to share with others, school policy requiring disposal of uneaten foods, poor food preparation, lack of food choices, and inability to save leftovers (Zhao et al., 2019).

According to Lee (2019), school food service helps students develop good eating habits that hopefully carry into adulthood (Lee, 2019). Staff attentiveness is also ranked highest or above average as impacting school lunch participation (Smith et al., 2015). Student responses suggest that the quality of the experience (e.g., good service and friendly staff) may influence their decision to eat school lunches. Improving school policy could positively impact school lunch consumption such as increasing lunchtimes, allowing self-select foods, and allowing students to save foods (Zhao et al., 2019).

Impact of the COVID-19 Pandemic on Children

The impact of COVID-19 schools closures created various effects on child and adolescent health. Education is a determinant of health and with its disruption, it causes issues with students' well-being (Viner et al., 2021). With closures, children lost many activities which provide structure and a daily rhythm (Courtney et al., 2020). There was also an increased level of emotional symptoms like sadness and frustration reported. Parents reported an increase in their child's indiscipline and hyperactivity. There was also a worsening of children's ability to regulate their emotions, thoughts and behavior (Chaabane et al., 2021; Viner et al., 2021). The fear of contracting COVID-19 could have increased anxiety levels centered around certain phobias and obsessive – compulsive disorders that children suffer from (Courtney et al., 2020). Sleep issues due to worrying were reported by 25% of UK adolescents, ages 16 to 24 years old, who were polled (Viner et al., 2021). The isolation and home confinement caused the family environment to become a key influencer of children's mental health (Courtney et al., 2020).

The COVID-19 pandemic also impacted the health and well-being of children. For some children, the school meal is one of the two meals they receive in a day. If a child missed a school meal, that could result in a one to two kg weight loss over 43 days (Chaabane et al., 2021). According to a study by Patrick et al., 14% of parents surveyed, stated that their children had worsened behavioral health during this time. This resulted from abrupt changes to their daily routines (Patrick et al., 2020). The physical inactivity and sedentary behavior of children increased due to school closures and increased screen time (Chaabane et al., 2021). Another study reported that high school social media use for more than three hours increased during the weekday more than doubled from 31.9% to 77.2 % (Viner et al., 2021).

Food insecurity was at a prevalence of 10.54 percent in 2019 and 2020 (Economic Research Service United States Department of Agriculture). There was no change in food insecurity between these two years. However, in 2021 there was a food insecurity prevalence of 10.23 percent (Economic Research Service United States Department of Agriculture). For very low food security, 4.11 percent of households had very low food security in 2019 compared to 3.94 percent of households in 2020 (Economic Research Service United States Department of Agriculture). Schools attempted to mitigate food insecurity with food programs during the pandemic. Those that were eligible for free or reduced school lunches qualified them for free school-related programs during the COVID-19 pandemic.

Impact of School Closures on School Meals

The COVID-19 Pandemic impacted the NSLP because school lunches were not as readily available during school closures. A typical student participating in the NSLP receives up to half of their daily caloric intake from these meals (Hecht et al., 2022). Missed school lunches had a significant impact on children's health and nutrition as children had no access to free or reduced meals they needed for nutritional needs. Without access to school meals, risk of food insecurity increased (Kinsey et al., 2020). It is estimated that 1.15 billion school meals were missed as a result of school closures during the COVID-19 Pandemic (Kinsey et al., 2020). Several studies in various countries cited over-consumption in diets of children aged two to seven, particularly of unhealthy foods with a reduction of fruits and vegetables during the pandemic (Viner et al., 2021).

During the COVID-19 Pandemic, the schools served approximately 45% less school lunches than the year prior (Hecht et al., 2022). Waivers were also implemented that allowed multiple meals to be served at a time and allowed for relaxing of nutrition requirements for federal reimbursement of meals (USDA Food and Nutrition Service, 2021a). With schools closed, school systems had to develop an emergency system like grab-and-go pickups and home deliveries. Other school systems developed home delivery and expanded meal service to seven days a week (Kinsey et al., 2020). It is estimated that if a student did not receive a single school-prepared lunch, their caloric intake could have increased by 640 calories per week (Hecht et al., 2022). This same student's consumption of key nutrients such as calcium and vitamin D would be hypothesized to decrease as well (Hecht et al., 2022).

Impact of COVID-19 Pandemic on Child Nutrition

The impact of the COVID-19 virus adversely affected child nutrition as well. Food insecurity rose as a result of food supply chain issues and loss of household incomes (Akseer et al., 2020). Limited access of fresh produce resulted in families resorting to cheaper, more processed foods which created poor dietary intake (Akseer et al., 2020). With school closures came interrupted nutrition programming and education which negatively impacted child nutrition (Akseer et al., 2020). Limited care and restricted health services caused children to seek less routine care (Akseer et al., 2020). With these limited services available, higher disease incidence and longer sickness duration occurred amongst youth (Akseer et al., 2020). These economic, health, and food disruptions increased all forms of malnutrition (Akseer et al., 2020).

Grab and Go/Meal Delivery for Nutrition Assistance Programs

Grab and go meal options have been used for food assistance programs prior to the implementation of the take home lunches during COVID-19. One example is Project BreakFAST which was a pilot breakfast program to increase school breakfast participation (Larson et al., 2018). There was a grab-and-go style cart before school started and a second-chance breakfast line in a location where heavy traffic occurred. The participation in the school breakfast programs increased from 13.0% to 22.6% ($p=0.03$) (Larson et al., 2018). Another type of meal delivery for food assistance programs was the mobile food pantries implemented by organizations like Feeding America (Feeding America, 2023). They provide free food and groceries using a pantry truck that comes into the community. The pre-packed grocery boxes are full of meat, fruits, vegetables, dairy, bread, and other ingredients (Feeding America, 2023).

Project Methodology and Design

Study Design

This was a case study to compare take-home school lunches during the COVID-19 Pandemic to lunches provided on-campus in one elementary school in Virginia. The nutritional components were compared for take-home elementary school lunches administered in January 2021 (COVID-19 lunches) to the elementary school lunches administered in January 2023 (standard lunches) to determine if any nutrient discrepancies existed between the lunches offered at those timeframes. Macronutrients – cholesterol, fiber, fat, protein, sugar and carbohydrates, and micronutrients – calcium, potassium, sodium, iron, and vitamin D were compared for the total meal, entrée, vegetable, fruit, and milk.

Data Collection

School nutrition directors from two school systems were contacted to determine their interest in the study by phone. Follow-ups were done via phone and email if provided. One county was contacted first but declined to participate. The second school system agreed to participate , confirmed their approval. Data collection was completed by email correspondence.

The Food and Nutrition Department of the local food system is responsible for the entire school system's meal planning and nutrition education. The mission of this department is to "fuel students for success by providing high quality, nutritious meals to students" (School Messenger Presence, 2023). The Director of Food and Nutrition is responsible for this department and helps to determine the school's breakfast and lunch menus, manages its farm to school programs, and assists the school system with utilizing federal food programs. RCPS currently uses the COVID-19 pandemic electronic benefit transfer program and at-risk after school meals program (Presence, 2023).

The school lunch menus were collected from the school nutrition director of the local school system. The nutrition information for the standard school lunch was provided by the current food service management company, Southwest Foodservice Excellence (SFE) (SFE, Scottsdale, Arizona). SFE utilizes a software program which publishes the nutritional information of the school lunches on the menu – including entrée, grain, fruit, vegetable, and milk. This nutritional information was cataloged with the COVID-19 Pandemic information in Appendix Table 1.

The school lunch menu for COVID-19 Pandemic meals were sent in PDF format by email. The nutritional information was provided from the school nutrition director who obtained the information from a Food Service Management Company (Sodexo Magic, Gaithersburg, MD), which provided the food for the take-home lunches for the school system. Each lunch meal had a choice between two entrees, one fruit, a provided vegetable, and milk. An entrée was selected as a representative meal. If a grain was offered that was not included in the entrée, the nutrition software and nutrition information was collected separately. The nutritional information for the provided vegetable was also generated separately. For the fruit, a rotation of the fruits offered during standard school lunches was selected to mimic the fruit products available for students since the COVID-19 menu did not speficy which fruit was served. Milk options were either 1% low-fat plain milk or chocolate milk, which were rotated per meal.

The software used to analyze this data was The Food Processor (ESHA, Salem, OR*)*. The meals were entered into the software to determine the nutritional composition. The best approximations using the Food Processor software were chosen to match the items in the take-home lunches. Items were chosen first to match either the either Food and Nutrient Database for Dietary Studies (FNDSS) or USDA (U.S. Department of Agriculture) suggested item. If these options were not available, the top most suggested item was chosen. The nutrient information was cataloged along with the serving size. The serving size for the entrée was determined using the food processor software (ESHA, Salem, OR). For most entrées, serving size was one serving, one cup, or one slice. For others, the serving size had to be adjusted to match child intake. For example, one serving of mozzarella sticks was determined to be five sticks using online resources to determine child serving size in school lunches. The fruit and vegetable serving size was 0.5 cup or one each if the food group was standalone (example one banana). The milk serving size was one carton of either flavor. The system generated a recipe card which contained the macronutrients (cholesterol, fiber, fat, protein, sugar, and carbohydrates) and micronutrients (calcium, potassium, sodium, iron, and vitamin D) of this entrée.

Statistical Analysis

Statistical analyses were done using IBM SPSS statistical software (IBM, Armonk, New York). Descriptive statistics were used to summarize nutrient levels per meal. The Mann-Whitney U test was used to compare differences between two independent groups – COVID-19 lunches and standard lunches (Laerd Statistics, 2018). The Mann-Whitney U test was used to analyze the statistical differences between the COVID-19 lunches and standard lunches for the following variables: total calories, total carbohydrates, total fats, saturated fats, trans fats, total proteins, total cholesterol, total sodium, total dietary fiber, total calcium, total iron, total sugar, total vitamin D, and total potassium. The following variables were compared for the entrée group: calories, total fat, saturated fat, cholesterol, sodium, total carbohydrates, dietary fiber, protein, calcium, iron, sugar, vitamin D, potassium, and trans-fat. For the vegetable group of lunches, the tests were used to determine statistical differences between the following variables: calories, fat, saturated fat, cholesterol, sodium, total carbs, dietary fiber, protein, calcium, iron, sugar, vitamin D, potassium, and trans-fat. For the fruits, the following variables were tested for significance: calories, total fat, saturated fat, cholesterol, total carbohydrates, sodium, dietary fiber, protein, calcium, iron, sugar, vitamin D, potassium, and trans-fat. Finally, for the milk, the following variables were tested using the Mann-Whitney U tests: calories, total fat, saturated fat, cholesterol, sodium, total carbohydrates, dietary fiber, protein, calcium, iron, sugar, vitamin, potassium, and trans-fat.

A Bonferroni adjustment was used to adjust for an inflated type 1 error. The p-value 0.05 was divided by the number of tests to get a new p-value. There was no information for Vitamin A and C for any food groups of the COVID-19 meals: entrée, grain, vegetable, fruit, and milk from the food nutrition software so the entire categories of Vitamin A and C were removed. The grain food group category was removed due to the low number of data points to compare standard and COVID-19 meals, since most grains were included in the entrée. The number of data sets for each group were as follows: entrée 12, vegetable 10, fruit 10, milk 11, and total meal 14. The adjusted p-value for significance was determined to be 0.0008.

Results

The COVID-19 take-home meals were compared for macronutrient and micronutrient content. Total entrée was compared first. On average, the COVID-19 take-home meals contained more iron with regards to the entrée food group when compared to the standard school lunch (p<0.001, **Table 1**). The COVID-19 entrees had an average of 24.37 mg of iron while the standard meals had 12.08 mg.

Table 1: Comparison of the Entrée Macronutrients and Micronutrients between COVID-19 and standard meals in one elementary school.

	Covid-19 Meals	Standard Meals	Difference	P-value
Calories	16.33	18.42	2.09	0.544
Total Fat (g)	17.20	17.74	0.54	0.876
Saturated Fat (g)	17.07	17.84	0.77	0.821
Cholesterol (mg)	14.93	19.53	4.60	0.181
Sodium (mg)	18.00	17.11	0.89	0.795
Total Carbs (g)	17.33	17.63	0.30	0.931
Dietary Fiber (g)	14.57	19.82	5.25	0.125
Protein (g)	15.20	19.32	4.12	0.231
Calcium (mg)	23.33	12.89	10.44	0.002
Iron (mg)	24.37	12.08	**12.29**	**<0.001***
Sugar (g)	22.73	13.37	9.36	0.006
Trans-fat (g)	16.60	18.21	1.61	0.403

The data was compared using a Mann-Whitney U test. The take-home meals during COVID were found to contain an increased amount of iron averaging 24.37 mg compared to 12.08 mg (p<0.001). Numbers in bold show statistically significant differences.

The grain group was not compared in this data set because of the limited number of data sets. This was due to most grain groups being included in the entrée portion of the meal. For the vegetable group, when comparing the macro and micronutrients there was no significant difference between COVID-19 meals and standard meals (**Table 2**).

Table 2: Comparison of the Vegetable group for COVID-19 and standard meals in one elementary school.

	Covid-19 Meals	Standard Meals	Difference	P-value
Calories	18.07	17.05	1.02	0.768
Total Fat (g)	18.73	16.53	2.20	0.519
Saturated Fat (g)	20.10	15.45	4.65	0.092
Total Carbs (g)	18.67	16.58	2.09	0.543
Dietary Fiber (g)	17.97	17.13	0.84	0.804
Protein (g)	19.87	15.63	4.24	0.212
Calcium (mg)	16.40	18.37	1.97	0.566
Iron (mg)	13.20	20.89	7.69	0.024
Sugar (g)	17.53	15.59	1.94	0.548
Trans-fat (g)	16.50	18.29	1.79	0.202

The vegetable data was compared using a Mann-Whitney U test. There was no difference found in the vegetable group. Mann Whitney U cannot be performed on missing data so Cholesterol and Sodium were eliminated for comparison in this data set.

For fruits food group, the amount of iron on average was significantly higher for the standard meals than the COVID-19 meals (p<0.001). The standard meals contained 23.00 mg while the COVID-19 meals contained 10.53 mg (**Table 3)**.

Table 3: Comparison of the Fruit group for COVID-19 and Standard meals in one elementary school

	Covid-19 Meals	Standard Meals	Difference	P-value
Calories	16.77	18.08	1.31	0.702
Total Fat (g)	21.80	14.11	7.69	0.004
Saturated Fat (g)	17.00	17.89	0.89	0.374
Sodium (mg)	14.67	19.74	5.07	0.129
Total Carbs (g)	17.47	17.53	0.06	0.986
Dietary Fiber (g)	15.93	18.74	2.81	0.393
Protein (g)	17.47	17.53	0.06	0.985
Calcium (mg)	20.67	15.00	5.67	0.099
Iron (mg)	10.53	23.00	**12.47**	**<0.001***
Sugar (g)	17.60	17.42	0.18	0.958

A Mann-Whitney U test was used to compare the meals. Cholesterol and trans-fat were removed because this test cannot be performed on missing data. Numbers in bold show statistically significant differences at the p<0.001 level.

When comparing the milk group, both total fat and vitamin D were significantly greater for the COVID-19 take-home meals (p<0.001). For total fat, the COVID-19 meals contained on average 25.00 g while the standard meals contained 11.58 g. For Vitamin D, the COVID-19 meals contained 25.00 IU while the standard meals contained 11.58 (IU) (**Table 4)**.

Table 4: Comparison of the Milk group for COVID-19 and Standard meals in one elementary school

	Covid-19 Meals	Standard Meals	Difference	P-value
Calories	23.00	13.16	9.84	0.003
Total Fat (g)	25.00	11.58	**13.42**	**<0.001***
Saturated Fat (g)	18.43	16.76	1.67	0.594
Sodium (mg)	18.33	16.84	1.49	0.656
Total Carbs (g)	21.80	14.11	7.69	0.022
Dietary Fiber (g)	18.77	16.50	2.27	0.321
Protein (g)	20.47	15.16	5.31	0.046
Calcium (mg)	21.67	14.21	7.46	0.026
Iron (mg)	18.07	17.05	1.02	0.752
Sugar (g)	18.20	16.95	1.25	0.710
Vitamin D (IU)	25.00	11.58	**13.42**	**<0.001***

A Mann-Whitney U test was used to compare the meals. Cholesterol, Potassium, and Trans- fat was removed because this test cannot be performed on missing data. Numbers in bold show statistically significant differences at the p<0.001 level.

In total when comparing the complete macronutrient and micronutrient profiles of all the food groups, the only significant difference was the calcium level (p<0.001). On average, the COVID-19 take-home meals contained a higher amount with 24.07 mg while the standard meals contained 12.32 mg (**Table 5)**. The other micronutrients and macronutrients had no significant differences for the total meals.

Table 5: Comparison of the total food group nutrients of COVID and Standard Meals in one elementary school.				
	Covid-19 Meals	Standard Meals	Difference	P-value
Calories	17.40	17.58	0.18	0.959
Total Fat (g)	16.73	18.11	1.38	0.690
Saturated Fat (g)	17.63	17.39	0.24	0.945
Cholesterol (mg)	15.10	19.39	4.29	0.211
Sodium (mg)	19.80	15.68	4.12	0.231
Total Carbs (g)	15.07	19.42	4.35	0.205
Dietary Fiber (g)	13.13	20.95	7.82	0.023
Protein (g)	14.47	19.89	5.42	0.120
Calcium (mg)	24.07	12.32	**11.75**	**<0.001***
Iron (mg)	21.73	14.16	7.57	0.027
Sugar (g)	21.47	14.37	7.10	0.039
Vitamin D (IU)	14.03	20.24	6.21	0.061
Potassium (mg)	17.87	17.21	0.66	0.849
Trans-fat (g)	15.53	19.05	3.52	0.124

A Mann-Whitney U test was used to compare the total nutrients of COVID-19 and standard meals. Numbers in bold show statistically significant differences at the p<0.001 level. Numbers in bold show statistically significant differences.

Discussion

The analysis was designed to determine if any nutrient differences occurred between COVID-19 take-home meals and standard school lunches. Overall, there are very few differences in nutritional content between COVID-19 and standard lunches, showing the school system maintained the nutritional standards of the lunches despite switching from in-person meal service during the pandemic. Iron was significantly increased in the entrees in the COVID meals (24.37mg). The standard meals contained entrees that ranged from 0.7 mg of iron to 3.4 mg of iron. However, the COVID-19 meals, such as the taco hummus meal, had entrees that contained up to 5 mg of iron. The other entrees that contained high iron were cheese pizza, beef nachos, and ham and cheese sub. This difference could also be explained by the selection of the entrees using the nutrition software as the actual entrees consumed during COVID-19 were estimated. In contrast, iron was significantly increased in the fruit offerings in the standard meals (23.00 mg) compared to the COVID-19 meals. A study focusing on the nutritional content of conventional versus sustainable food menus showed that the amount of iron in the conventional lunch was 7.31 mg/1000 kcal (Kluczkovski et al., 2022), which is similar to the COVID-19 meals. Of all of the food groups, fruits are generally the lowest in iron (Danahy, 2019). The COVID-19 menu provided by the school system offered fruit for each day but did not state the exact product offered so the nutrition software was used to estimate the nutrition label that was generated.

Total fat (25.00 g) and Vitamin D (25.00 IU) were significantly increased in the dairy group of the COVID-19 meals compared to the standard meals (total fat 11.58 g and vitamin D 11.58 IU). Kluczkovski and Menezes et al observed that total fat in the conventional school menu offered an average of 37.58 g/1000 kcal (Kluczkovski et al., 2022). The chocolate milk inputted into the nutrition software was selected offered 3 mg of vitamin D and 5 g of total fat. The plain milk also contained 3 IU of vitamin D and 2.5 g of total fat. The milk served during school lunches varied as white milk had 2.9 IU of vitamin D, chocolate milk had 2 IU, and strawberry milk had 5 IU of vitamin D. The significant differences in vitamin D and total fat could be explained by the serving size of milk selected by the nutrition software as the actual milk consumed was not available for this analysis. There was a different brand of plain, chocolate, and strawberry milk offered during standard school lunches. The school system also simply served more milk during the COVID-19 pandemic to account for milks served during both the school breakfast and lunch programs.

When comparing the total nutrient differences in the entire meal between the COVID-19 meals and the standards meals, only the amount of calcium was significantly increased in the COVID-19 meals compared to the standard meals. The other macronutrients and micronutrients tested did not differ significantly. The COVID-19 meals had an increased amount of calcium with 24.07 mg compared to the standard meals at 12.32 mg ($p<0.001$). The COVID meals that contained the most calcium were the chicken and cheese sandwich, taco hummus, and mozzarella sticks with approximately 800 to 1100 mg of calcium. While the standard lunches had in the range of 200 to 700 mg of calcium. One study found that the total amount of calcium in a conventional elementary school lunch was 461.94 mg/1000 kcal (Kluczkovski et al., 2022). This amount of calcium was seen in the standard lunches however, the COVID meals contained double this amount of calcium.

The COVID-19 meals that contained the highest amounts of calcium were the chicken and cheese sandwich, taco hummus, and mozzarella sticks containing over 800 mg of calcium alone. The standard meals contained less calcium per meal ranging from 150 to 700 mg. According to John Hopkins' Hospital, children age 4 to 8 years old require 1,000 mg of calcium daily and those age 9 to 18 years require 1,300 mg daily (Johns Hopskins All Children's Hospital, 2023).

Plate waste is the portion of the meal that is discarded and not consumed from a school lunch. Entrees are the food group that are selected the most frequently and vegetables are the least selected (Haas et al., 2014). Vegetables make up the highest percentage of waste and entrées make up the lowest according to Haas et al. (Haas et al., 2014). Similarly, a majority of students had at least 10% of plate waste in each food category (Haas et al., 2014). Food waste can indicate that not all the foods selected by students are consumed, which means that although the COVID-19 lunches were nutritionally equivalent to school lunches, students may not have consumed all the foods provided in the COVID-19 lunches. The amount of nutrients discarded in the meals as food waste can negatively impact the nutrient quality of the school meals whether take-home or standard. Measuring consumption and plate waste was beyond the scope of this study.

The findings indicate that the school system was able to effectively provide the same level of nutrition to students using the take home meals during the COVID-19 Pandemic. The only significant difference in the total meal, was the amount of calcium. School lunches provide necessary amounts of macronutrients and micronutrients to students' diets; however, additional studies are needed to determine consumption of all food groups and plate waste.

Limitations of study

There were several limitations to this study. The COVID-19 data were estimated based off the menu, which provided foods offered but not the quantities or specific brands of foods. There was an approximation determined using the food items available in the nutrition software. This study also eliminated the grain group data from analysis due to the low number of offerings in both the COVID-19 meals and the standard meals, since grains were mostly included in the entrée. In addition, there were not vitamin A or vitamin C data for the total meal, entrée, vegetable, fruit, or milk groups using the nutrition software for the COVID-19 meals, so these micronutrients could not be compared to the standard meals. Last, the sample size of this analysis was small, which could cause issues when attempting to extrapolate any broad conclusions. Any future analysis needs to contain a larger sample size.

Implications

The outcomes support the conclusion that the school system effectively navigated the nutritional needs during the COVID-19 pandemic. The school system was able to provide similar nutritional standards in the take-home meals that were offered in the school served standard meals.

Recommendations for future projects include increasing the sample size to more lunches in the same district of the analysis so more data can be collected. Another would be to expand data collection to other districts in the state to see how they compared. Revisions to this analysis would include gathering more grain data so that food group could be included in the research. Additional research questions include: What portions of school lunches are consumed the most or least? What nutritional impact do school lunches have on children's diets?

Dissemination

School nutrition professionals could benefit from the findings in this analysis. The administration of school systems could use this analysis as a way to formulate future food emergency situations that force lengthy school closures like the COVID-19 Pandemic. Other food assistance programs could use the format the school system implemented for their take-home meals to help assist those in rural areas.

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Appendix

Standard Lunch Menu 2023			
Meal 1 Entree 01/04/2023 Finger Potato Bowl w/ Roll (1 serving) Veg: Garbanzo Beans (0.5 cups, drained/heated) Fruit: Juicy mandarin oranges (0.5 cups) Milk: 1% Low Fat White Milk Local (8 oz)	Meal 6 Entrée 01/11/2023 Ultimate Grilled cheese w/ tomato soup (1 sandwich, 1 cup soup) Veg: Steamed Baby Carrots (0.5 cups) Fruit: Juicy Pineapple Tidbits (0.5 cups) Milk: Fat Free Strawberry Milk Local (8 oz)	Meal 11 Entree 01/19/2023 Rotini marinara w/ meatballs (1 serving) Veg: fresh broccoli florets (0.5 cups) Fruit: fresh orange slices (0.5 cup) Milk: 1% low fat white milk local	Meal 16 Entree 01/26/2023 Aimee's pulled chicken spaghetti casserole (1 5x5 piece) Veg: Steamed corn (0.5 cups) Fruit: Juicy pineapple tidbits (0.5 cups) Milk: Fat free chocolate milk (8 oz)
Meal 2 Entree 01/05/2023 Creamy Macaroni & Cheese (1 cup) Veg: Fresh cut cucumber slices (0.5 cups) Fruit: sweet diced peaches (0.5 cups) Milk: Fat free chocolate milk local (8 oz)	Meal 7 Entree 01/12/2023 Pulled Chicken Pot Pie w/ Biscuit (1 cup) Veg: Seasoned roasted vegetables (0.5cups) Fruit: fresh orange slices (0.5 cups) Milk: 1% low fat white milk Local (8 oz)	Meal 12 Entree 01/20/2023 Sun butter & Jelly sandwich w/ string cheese (1 sandwich, 1 string cheese) Veg: Seasoned oven roasted cauliflower (0.5 cups) Fruit: Juicy mandarin oranges (0.5 cups) Milk: fat free chocolate milk local (8 oz)	Meal 17 Entree 01/27/2023 Chicken Caesar salad /crackers (1 salad) Veg: Macaroni & garbanzo bean salad (0.5 cups) Fruit: fresh apple (1 apple) Milk: 1% low fat white milk local (8 oz)
Meal 3 Entree 01/06/2023 Turkey Sausage Pizza (1 lice, 10 cut) Veg: Italian Veggie Blend Fruit: Unsweetened Applesauce Milk: Fat Free Strawberry Milk Local	Meal 8 Entree 01/13/2023 Delicious Cheese Pizza (1 slice) Veg: Italian Veggie Blend (0.5 cups) Fruit: Baked Pears (0.5 cups) Milk: Fat Free Chocolate Milk Local (8 oz)	Meal 13 Entree 01/23/2023 Cheese Quesadilla Grain: Traditional Spanish brown rice (1 cup) Veg: Charros beans without jalapenos (0.5 cup) Fruit: fresh apple (1 apple) Milk: 1% low fat white milk local (8 oz)	Meal 18 Entree 01/30/2023 Toasted Pesto Turkey Panini Veg: peppered broccoli florets Fruit: Unsweetened applesauce Milk: 1% low fat white milk local (8 oz)
Meal 4 Entree 01/09/2023 Cheesy Diced Chicken Nachos (serving size 1) Grain: Traditional Spanish Brown Rice (0.5 cups) Veg: Fresh Lettuce & Spinach Mix (1 cup) Fruit: Fresh Banana (serving size 1) Milk: 1% Low Fat White Milk Local (8 oz)	Meal 9 Entree 01/17/2023 Grande Chicken Nachos (1 serving) Veg: classic refried beans (0.5 cups) Fruit: fresh banana (1 each) Milk: 1% low fat white milk local	Meal 14 Entree 01/24/2023 Beef tater tot casserole w/ WG roll (5x10 cut slice + 1 roll) Veg: Fresh-cut cucumber slices (0.5 cups) Fruit: Cinnamon applesauce (0.5 cups) Milk: Fat free chocolate milk local (8 oz)	Meal 19 Entree 01/31/2023 Chicken noodle soup with saltines (1serving) Grain: Traditional Spanish brown rice (1 cup) Veg: fresh lettuce & spinach mix (1 cup) Fruit: fresh apple (1 apple) Milk: Fat free chocolate milk local (8 oz)
Meal 5 Entree 01/10/2023 Crispy Beefy Tacos (2 tacos) Grain: Traditional Spanish Brown Rice (0.5 cups) Veg: Seasoned Mexican Black Beans (0.5 cups) Fruit: Cinnamon spiced apples (0.5 cups)	Meal 10 Entree 01/18/2023 Chicken Teriyaki w/ Rice and Vegs (1 cup + 1 cup rice) Veg: fresh lettuce and spinach mix (1 cup) Fruit: Cinnamon spiced apples (0.5 cups)	Meal 15 Entree 01/25/2023 Cheesy Broccoli baked potato w/biscuit Veg: Zingy crinkle fries (0.5 cups) Fruit: fresh banana (1 each)	

Milk: Fat Free Chocolate Milk Local (8 oz)	Milk: Fat free chocolate milk local (8 oz)	Milk: 1% low fat white milk local (8 oz)	

COVID-19 Lunch Menu 2021			
Meal 1: 01/04/2021 Entree: popcorn chicken w/ breadstick Fruit: apple (1 serving) Veg: steamed carrots (0.5 cup) Milk: low fat white milk	Meal 5: 01/11/2021 Entree: Mini corn dog nuggets (15 pieces) Fruit: Baked Pears (0.5 cups) Veg: steamed corn (0.5 cups) Milk: low fat chocolate milk	Meal 9: 01/19/2021 Entree: Chicken Patty Sandwich Fruit: Cinnamon spiced apples (0.5 cups) Veg: green beans Milk: low fat chocolate milk	Meal 13: 01/26/2021 Entree: Mac & Cheese w/Breadstick Fruit: Juicy Pineapple Tidbits (0.5 cups) Veg: green beans (0.5 cups) Milk: low fat chocolate milk
Meal 2: 01/05/2021 Entree: Cheeseburger Fruit: banana (1 serving) Veg: green peas (0.5 cup) Milk: low fat chocolate milk	Meal 6: 01/12/2021 Entree: Cheese pizza Fruit: Juicy mandarin oranges (0.5 cups) Veg: green beans Milk: low fat white milk	Meal 10: 01/20/2021 Entree: Italian Sub Fruit: Juicy mandarin oranges (0.5 cups) Veg: steamed broccoli (0.5 cups) Milk: low fat white milk	Meal 14: 01/27/2021 Entree: Mozzarella Sticks w/ marinara sauce Fruit: fresh orange slices (0.5 cups) Veg: steamed corn (0.5 cups) Milk: low fat white milk
Meal 3: 01/06/2021 Entree: Mac & Cheese w/ Breadstick Grain: Breadstick Fruit: Juicy Pineapple Tidbits (0.5 cups) Veg: steamed broccoli (0.5 cups) Milk: low fat white milk	Meal 7: 01/13/2021 Entree: taco hummus, string cheese, Tostito Fruit: sweet diced peaches (0.5 cups) Veg: steamed carrots (0.5 cup) Milk: low fat chocolate milk	Meal 11: 01/21/2021 Entree: Beef nachos Fruit: Juicy mandarin oranges (0.5 cups) Veg: steamed corn (0.5 cup) Milk: low fat chocolate milk	Meal 15: 01/28/2021 Entree: Mini corn dog nuggets Fruit: Baked Pears (0.5 cups) Veg: steamed broccoli Milk: low fat chocolate milk
Meal 4: 01/07/2021 Entree: Chick n' & Cheese Sandwich Fruit: fresh orange slices (0.5 cups) Veg: baked beans Milk: low fat white milk	Meal 8: 01/14/2021 Entree: PBJ w/ string cheese Fruit: Unsweetened Applesauce Veg: steamed broccoli (0.5 cups) Milk: low fat white milk	Meal 12: 01/25/2021 Entree: Ham & Cheese Sub Fruit: banana (1 serving) Veg: baked beans (0.5 cups) Milk: low fat white milk	