

Alpenglow: Binghamton University Undergraduate Journal of Research and Creative Activity

Volume 8
Number 1 *Alpenglow: Binghamton University Undergraduate Journal*

Article 3

October 2022

Food Insecurity in Broome County and its Effect on Adolescent Academic Performance

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Recommended Citation

Gajewski, A. J. (2022). Food Insecurity in Broome County and its Effect on Adolescent Academic Performance. *Alpenglow: Binghamton University Undergraduate Journal of Research and Creative Activity*, 8(1). Retrieved from <https://orb.binghamton.edu/alpenglowjournal/vol8/iss1/3>

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Food Insecurity in Broome County and its Effect on Adolescent Academic Performance

Cover Page Footnote

Special thanks to Valerie Imbruce for her continued support on the project. Thank you to the staff of Calvin Coolidge and Tioga Hills for participating in interviews.

Abstract

Food insecurity is a growing concern among children within the U.S., as the number of households who are food insecure has grown in the wake of the COVID-19 pandemic. Food insecurity in children can lead to a multitude of cognitive complications. My research investigates the relationship between food insecurity and academic performance in elementary schools in a New York county. To uncover how food insecurity and academic performance are linked, interviews were conducted with school staff (teachers, administrators, a food service manager), the area's socioeconomic status was analyzed, standardized testing scores were compiled, and the food offerings in the area were explored. The results indicate that a place with higher food insecurity and higher poverty could result in lower academic performance, as observed through test scores and observations of the school staff. The results could also highlight that an area with lower food insecurity results in higher academic performance. This demonstrates the need to provide supplementary food and expanded free meals for children in schools to maximize their ability to succeed academically. Free meals for students through the National School Lunch Program should be provided into the future and supplementary programs should be accessible to all, not just those in areas with high food insecurity, to ensure schools give their students the resources they need to succeed.

Keywords: food insecurity, academic performance, supplementary food

Introduction and Background

Food insecurity "...as measured in the United States, refers to the social and economic problem of lack of food due to resource or other constraints, not voluntary fasting or dieting, or because of illness, or for other reasons" (Wunderlich & Norwood, 2006, p. 4). Food insecurity across the world is a growing concern that has only become worse due to the outbreak of COVID-19. According to the United Nations, 1 in 9 individuals worldwide go to sleep hungry every night, highlighting that food insecurity is a large-scale and widespread issue, yet there is more than enough food on the planet to feed everyone (Cometti et al., 2018). There is an issue of distribution and access to food, which is essential to an individual's well-being in multiple facets of their lives.

In the United States, the problem of food insecurity is widespread, as, in 2016, about 12.3% of households were food insecure, which amounts to about 41.2 million people, with

7.4% of households with low food security and 4.9% of households with extremely low food security (Cometti et al., 2018). This number is expected to increase, as *Feeding America* reported that there were 42 million people that experience some form of food insecurity in 2020 (Hake et al., 2020). The COVID-19 pandemic has had significant and lasting economic effects, which has resulted in significant job loss and disruptions for many individuals, which is a direct cause for the rise in food insecure individuals in 2020 and beyond. Also, directly after the pandemic hit, it was difficult for some households to receive resources from food banks, churches, etc, as these organizations in some cases had to reduce their operations for health concerns. The government worked quickly after the pandemic to provide several relief programs, such as stimulus checks and extended widespread unemployment benefits, but these programs did not reach everyone, as many groups of people were excluded from several or all of the benefits.

The reasons for food insecurity vary, with income being a large determining factor. The median household income, poverty rate, and the area's unemployment rate can be good proxy indicators of food security within the community. By measuring the median household income of the area and determining if it is lower than the state average, this could be an indicator of households' food security. If the poverty rate is high, it can also be an indication of food insecurity (Tingay et al., 2003).

Previously, it was believed that living in a food desert also held significant weight in determining food insecurity, but recent studies have challenged this notion. A food desert, as defined by the United States Department of Agriculture (USDA), looks at a combination of the income of families as well as the distance to a full service supermarket (Wright, 2021). A common issue in places defined as food deserts is the lack of quality food, but recent studies have shown that adding a large/full-service grocery store into these areas does not have an effect

on access to more variety, or healthier and less expensive foods (Ghosh-Dastidar, et al., 2017). Individuals in these areas use food pantries, small grocers, and convenience stores to access their food instead of utilizing larger grocery stores. It is clear that income and systemic inequalities that adversely affect specific groups of people more than others in the US are much greater causes of food insecurity.

Food Insecurity in Children

Both poverty and hunger can negatively affect a child's development and academic abilities. Children, who require proper nutrition for necessary development, need a steady and healthy supply of food, and they are not immune to this growing issue either. In the U.S., 1 in 6 children may not have access to sufficient and nutritious food, which amounts to about 13 million children across the country (Map the Meal Gap, 2018). In the area of study, 8,100 children were food insecure, amounting to 21.3% of children within the county, an alarmingly high percentage (Map the Meal Gap, 2018).

According to an interview conducted with a school counselor, food insecurity within schools in the area has also become a more pressing issue. They recall the percentage of students enrolled in free and reduced school lunch programs has more than doubled within the past ten years at their school (Ruhm, personal communication, November 23, 2020). The problem is not just getting food, but it is also the quality of the children's food. According to a special education teacher at another school, the students are getting enough food from school meals. Still, they cannot gain the proper nutrients because they are not getting enough vitamins, protein, fiber, etc., leading to a plethora of new problems (Mellander, personal communication, February 15, 2021).

In exploring these relationships and past studies, the objective of this study is to examine Tioga Hills elementary school, which services a largely suburban and rural area, and Calvin

Coolidge elementary school, which services a largely urban and suburban area. I hope to determine how food insecurity affects children in their academic performance through the lens of teachers and administrators, how each school assesses their academic performance, and analyzing what is being done in the school to supplement the food insecurity. The names of the schools and specific towns have been eliminated for confidentiality.

Methods

To investigate the issue of food insecurity in the county, two elementary schools were selected, Tioga Hills elementary school, part of Vestal Central School District, and Calvin Coolidge elementary school, part of Binghamton City School District. Tioga Hills serves part of two separate towns, Vestal and Apalachin. Calvin Coolidge services a portion of the city Binghamton.

Tioga Hills and Calvin Coolidge were selected because they have similar student-to-teacher ratios, comparable enrollment sizes, and similar spending per student. Tioga Hills has approximately an 11 to 1 student-to-teacher ratio, while Calvin Coolidge has a 9 to 1 student-to-teacher ratio. Tioga Hills has approximately 260 students, while Calvin Coolidge has 280 enrolled students. Per spending per student at Tioga Hills is approximately \$13,813 and at Calvin Coolidge, it is about \$15,067 (Digger, 2021).

They are different in several other ways, as a way to establish a contrast between areas with differing levels of food security, differing socioeconomic statuses, and differing geographical constraints.

I crafted my study to conduct interviews with teachers, administrators, counselors, psychologists, and a food director from the schools. It would be valuable to follow up with interviews or surveys with students, but that would require more time than my research timeline

allowed to obtain permission to engage with minors. My interviews included the following elements:

1. I inquired about the environment of the school.
2. The service area of the school and the food offerings in the area were explored. Questions such as "Can you tell me where the service area is for the school and which areas are more child dense in comparison to others?" and "Can you briefly describe the restaurant offerings and grocery store offerings in the area and if you think they are sufficient for the needs of the school?" were asked. The supplementary food programs in the school were also explored, and questions related to the school lunch program were also asked.
3. Questions about how the school values academics and how they measure academic success were asked.
4. The observed relationship between academic performance and food insecurity was explored.

In addition to collecting qualitative data on the topic, quantitative data was collected and analyzed from standardized testing scores for English/Language Arts and Mathematics. The scores for grades 3, 4, and 5 were collected for each school and averaged from 2010-2019. There was no data for 2020 due to the COVID-19 pandemic and there was low participation in standardized testing during the 2020-2021 school year so those scores were also excluded. The results were then compared to the New York State average scores and analyzed for comparative purposes.

The socioeconomic status of each service area (Vestal and Binghamton) was analyzed by looking at the poverty rate, unemployment rate, and median household income. These are good proxy indicators of food security within a community. An increase in unemployment by 1

percent increases the likelihood of food insecurity by 0.24 percent. An increase in poverty by 1 percent leads to an increase in food insecurity of 0.20 percent, highlighting a correlation between these factors (Abubakari, 2017). Using this as a guide helped distinguish and better understand the food insecurity within each service area. These factors were all considered to make a conclusion on whether the area was likely to be a place with food insecure residents.

Permission of the use of names of employees was obtained during the interview process and all data related to the schools and respective towns is publicly available.

Results

1. Food Insecurity and Socioeconomic Status

My findings indicate that a relationship exists between food insecurity and academic performance in adolescents.

Firstly, the socioeconomic status of Binghamton (which services Calvin Coolidge) and Vestal (which services Tioga Hills) is quite different, as evidenced by Figures 1 and 2, which highlight the median household income of each sending area (the zones determined by the school district for distinguishing which students go to each school based on geography) and the poverty rates, respectively, in comparison with the NY State averages as of 2019, prior to the COVID-19 pandemic.

Median Household Income in Binghamton (Calvin Coolidge), Vestal (Tioga Hills), and New York State (2015-2019 average)

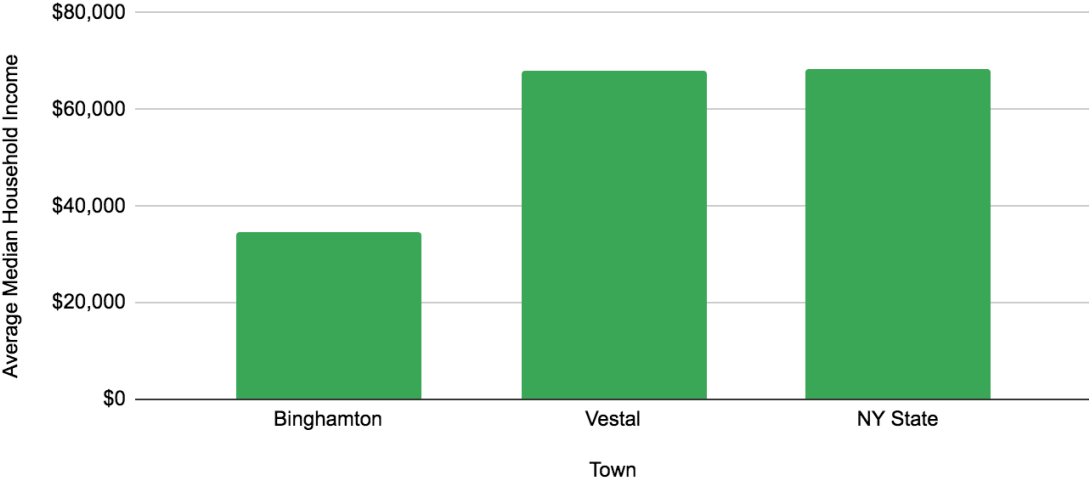


Figure 1: A comparison of the median household income in Binghamton (servicing Calvin Coolidge), Vestal (Tioga Hills) and New York State in 2019. Binghamton had a median household income of \$34,487. Vestal had a median household income of \$67,910. NY State had an average household income of \$68,486. The Vestal median household income is \$33,423 more than the Binghamton median household income. Binghamton has a median household income that is \$33,999 lower than the state average. Vestal has an average household income just \$576 under the average. These numbers were calculated as of July 2021. Source of Graph Data: *U.S. Census Bureau*

Comparison of the Socioeconomic Status in Binghamton (Calvin Coolidge) and Vestal (Tioga Hills)

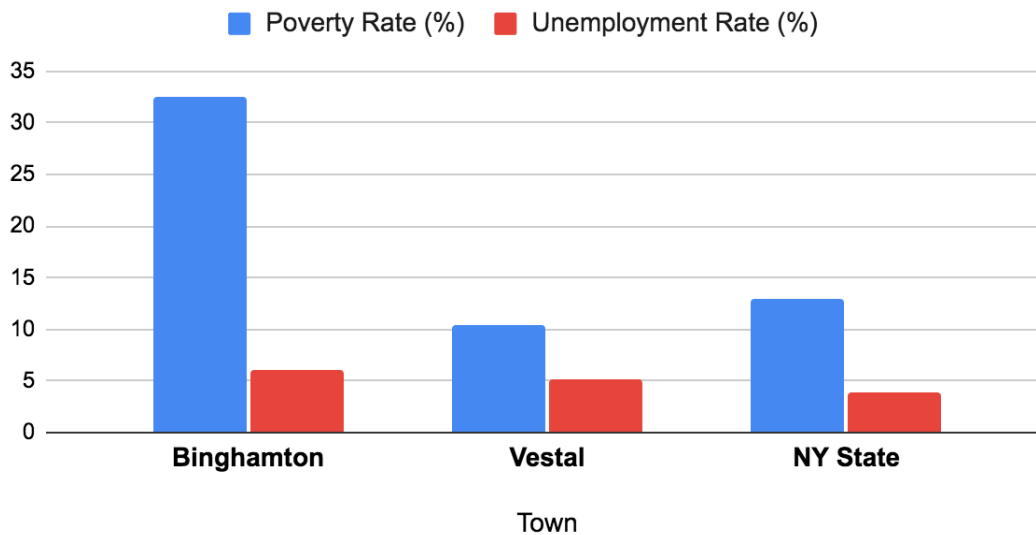


Figure 2: Binghamton had a higher poverty rate than Vestal or the NY State average, at 32.6%, compared to Vestal’s 10.4% and NY State’s 13%. The unemployment rate for both Binghamton and Vestal is higher than the NY State average, at 6% and 5.1%, respectively. Source of Graph Data: U.S. Census Bureau and interview data

Demonstrated Need for Assistance with Food at School (Free/Reduced Lunch and Supplementary Programs)

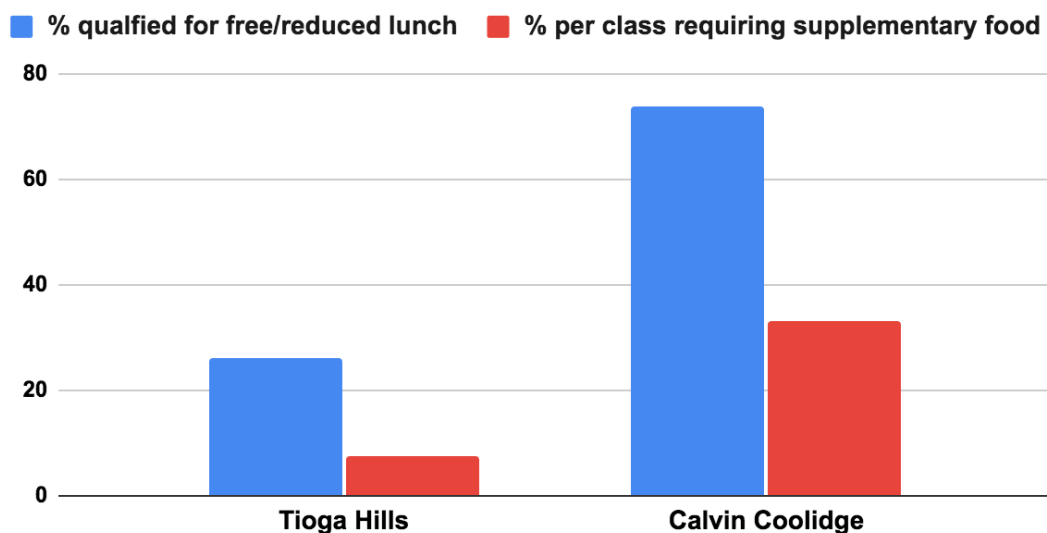


Figure 3: In Tioga Hills, as of 2021, 25.94% of the students qualify for free/reduced lunch. About 7.5% of students demonstrated interest in supplementary programs. In Calvin Coolidge, as of 2021, 73.9% of students qualify for

free/reduced lunch (all students have the option) and about 33% have shown interest in supplementary programs.

Source of Graph Data: National Center for Education Statistics and interview data

The most recent data available on free and reduced lunch participation for the state of New York is from the 2016-2017 school year, and during that school year, 52.9% of students participated. Excluding New York City, 40.9% of students participated in the program. Tioga Hills falls below this average, while Calvin Coolidge is above. Between the two schools, the need for supplementary programs greatly differed, as only about 0-3 students per class on average required supplementary food, while in Calvin Coolidge, this figure was between 5-9 students. Both areas were under the New York State household income (Vestal just slightly), but the difference in poverty rates was noticeable, as there was a 22.2% difference between the two. The results showed overall Binghamton (Calvin Coolidge) had a lower socioeconomic status than Vestal (Tioga Hills) by a sizable percentage. Despite these differences, both areas (a low socioeconomic status and an average socioeconomic status) had some students that needed additional food from the school beyond what their households were able to afford or provide.

2. Standardized Testing Scores

Looking at the standardized testing scores from 2010-2019 in both English/Language Arts and Mathematics, it was clear that Tioga Hills Elementary School performed better than Calvin Coolidge in each year. It performed higher than the New York State Average, with lower enrollment in the National School Lunch Program than the state average (as seen in figures 3 and 4). While standardized testing scores are a controversial measure of academic achievement, they provide an initial basis for comparison across schools. In 2013, the Common Core standards were changed and rolled out, which resulted in a decline in scores for all three observed groups. Data collection started in 2010 because Calvin Coolidge transitioned to free breakfast, lunch, and

snacks for all students in the 2011-2012 school year, which could have corresponded with an increase in scores. The scoring guidelines were changed the following year, which nullified the potential comparison. In Tioga Hills, they have never transitioned to free meals or snacks for students, as too few students qualify for those programs. After the change in scoring guidelines, however, the scores on both the Mathematics and English/Language Arts exams did increase over time. The collected scores did not reflect that increases in supplementary programs or meal accessibility led to increased standardized testing scores. The interview data suggested otherwise, hinting that there has been increased measured academic success since supplementary programs have been expanded and meal accessibility improved, as students have been receptive and performed better within the classroom. While academic success in the classroom may have improved, it is unlikely that the increase in the availability of food led to higher standardized test scores, as Tioga Hills has seen an increase in scores since 2013, but they didn't have expanded meal programs. The data does show that since the Common Core Standards changed, the scores in all 3 groups have increased, although not consistently for Calvin Coolidge.

Standardized Testing Scores in Mathematics (Grades 3-5) from 2010-2019 in Tioga Hills, Calvin Coolidge, and the NY State Average

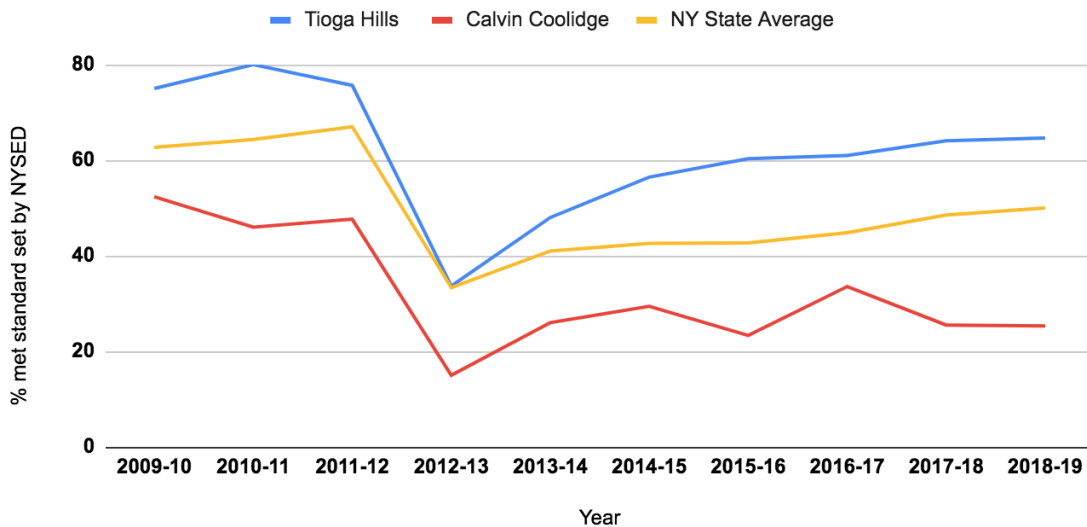


Figure 4: This graph shows data on the averages for mathematics to highlight the differences between the testing scores for Tioga Hills, Calvin Coolidge, and the New York State Average. Tioga Hills is consistently above the NY State Average, while Calvin Coolidge is consistently below the NY State Average. The scores from the 2019-2020 school year are not included as there is no available data. In the 2020-2021 school year, only 40% of students participated, so this data was not included as it is not representative of the schools as a whole. There was a drop in all scores in the 2012-2013 as a “...result of the shift in the assessments to measure the Common Core Standards, which more accurately reflect students' progress toward college and career readiness” (*State Education Department Releases Grades 3-8, 2013*). Source of Graph Data: Calvin Coolidge School Digger, Tioga Hills School Digger

Standardized Testing Scores in English/Language Arts (Grades 3-5) from 2010-2019 in Tioga Hills, Calvin Coolidge, and the NY State Average

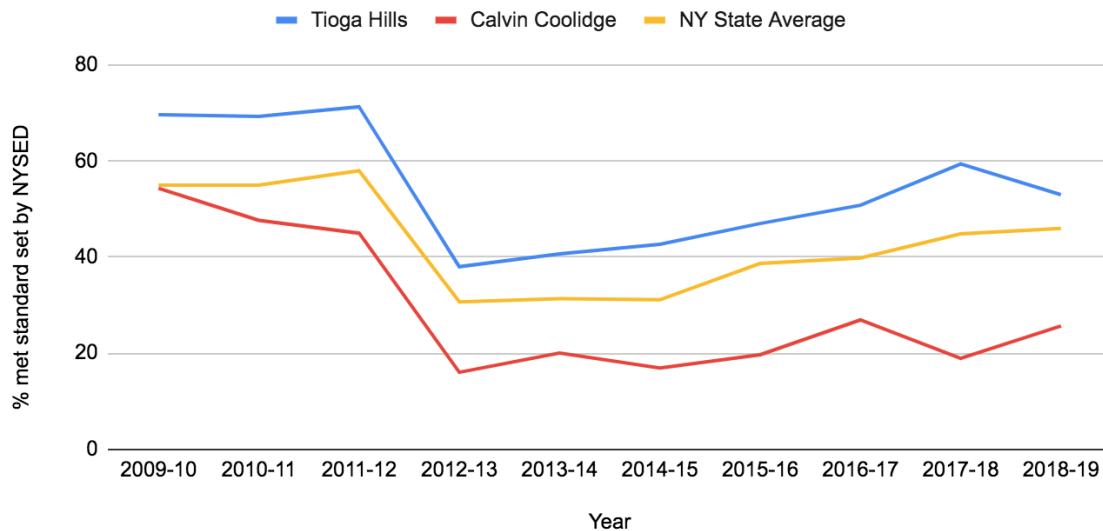


Figure 5: This graph shows data on the averages for English/Language Arts to highlight the differences between the testing scores for Tioga Hills, Calvin Coolidge, and the New York State Average. Tioga Hills is consistently above the NY State Average, while Calvin Coolidge is consistently below the NY State Average. The scores from the 2019-2020 school year are not included as there is no available data. In the 2020-2021 school year, only 40% of students participated, so this data was not included as it is not representative of the schools as a whole. There was a drop in all scores in the 2012-2013 as a “...result of the shift in the assessments to measure the Common Core Standards, which more accurately reflect students' progress toward college and career readiness” (*State Education Department Releases Grades 3-8, 2013*). Source of Graph Data: Calvin Coolidge School Digger, Tioga Hills School Digger

3. Interview Data

Based on the data obtained from the interviews, it is apparent that increased investment in the nutritional guidelines from the National School Lunch program and the expansion of supplementary programs are vital to increased student engagement and success. Both districts, Vestal Central and Binghamton City, have the same food director, who services the entirety of Broome County, meaning that schools have overlap in their offerings, but follow different

guidelines based on availability and funding from the state, depending on the demonstrated need for free and reduced lunch.

In 2012, the National School Lunch (NSLP) program released new guidelines, which mandated more diversity in the food they offered to ensure the inclusion of more fruits, vegetables, and whole grains in the meals they were providing. In both Tioga Hills and Calvin Coolidge, the school implemented these changes earlier than the guidelines:

“We started serving milk at 1% or less starting in 2008, but that didn't become law until 2011. We started using more whole grains again starting in 2008, that didn't become law until 2011. We started using less sodium during 2007-2008. We had a staggered approach to reducing sodium in 2011. We eliminated trans fats in 2008. That became law in 2011. We lowered saturated fats and there became a threshold of 10% or less starting in 2011. We were ahead of the curve and we also started to serve more fresh fruits and vegetables in 2008 and they started encouraging more fresh fruits and vegetables starting in 2011. We started a lot of those healthier meals before it became law. It certainly had an impact, a positive impact. These changes had a more beneficial effect on health. It also had a spillover effect on academics, as excess sugars and fats result in slower cognitive functioning and reduce memory capacities and concentration. Reducing sugars and fats lessens the likelihood of this occurrence and helps improve engagement” (Bordeau, M. personal communication, March 11, 2021).

Increasing supplementary programs within both schools have led to increased student and family engagement with the school. According to the interviews with both school counselors, when students receive a complimentary breakfast, lunch, and a snack, they feel nurtured. The expansion of supplementary programs also ensures that students have access to more food if needed. With this, parents and guardians of the students feel like the school is caring for their students, which leads to increased involvement and connection with the school, as they can trust the school as a reliable food source. The increased engagement has led to a measurable increase in academic performance within the school. Students can concentrate better because they are not hungry, but it is also due to a psychological factor, as the prospect of being fed helps students

feel better about coming to school, which helps increase student performance (Doherty, personal communication, February 17 2021; Ruhm, personal communication, November 23, 2020).

An experimental program was also discovered through interviewing. When the resources are available, several schools within Broome County have begun to serve breakfast in the homeroom period with the teacher. "This new experimental model has proven to be effective in increasing student participation. Also, there is better attendance at school. It's been proven there are less referrals to the principal office. There are also fewer trips to the nurse's office during the day." (Bordeau, M. personal communication, March 11, 2021). These results indicate that the program is effective in helping students' physical health, concentration, and academic performance. The program was effective in helping to ensure all students had eaten breakfast and that no student was hungry. Students can similarly participate and concentrate in the classroom. Tioga Hills and Calvin Coolidge did not implement breakfast during homeroom in either observed school. Tioga Hills does not have the funding or resources, as too few students qualify for free breakfast, but Calvin Coolidge has the ability to utilize the program, but has chosen not to at this time (Bordeau, M. personal communication, March 11, 2021). The reason for not implementing the program was not disclosed during the interview. Still, this finding further strengthens the notion that there is a relationship between food insecurity and academic performance.

Discussion and Conclusion

The findings of this study suggest that food insecurity is connected to academic performance in some capacity. However, there are several other domestic factors that affect academic performance, too. For example, the physical facilities available to a student are important. The presence of a separate room and allocated study space has been shown to affect

student's performance. Additionally, the adult peers that a student is surrounded by has influence on their academic performance (Khan, F. N., 2019).

The availability of supplementary food or free meal options in schools in this case, and likely in many others, has a generally positive impact on students. With this finding, it is essential to expand the accessibility of supplemental nutrition programs for students who have a demonstrated need. In the schools observed, these programs do not have the funding or staff to reach all students who require them.

Part of the onus lies on the school to fund these programs, but it also requires community involvement through donations and volunteering. Backpack programs, which both schools have, are a good starting point, as they give students essential foods to help ensure they have food to hold them over during the weekend, but these are not sufficient. Schools have been adding dedicated space for pantries, allowing students and their families to choose what foods they would like to take, something the backpack program does not allow. In Binghamton City School District, a different elementary school, Ben Franklin, opened a food pantry. They have observed good engagement since its opening and plan to expand the program to other schools.

Having a pantry makes the program less taboo, as currently, many families are unaware of these additional resources as a method to ensure only a certain number of families receive the backpacks each week. Nonetheless, the backpack programs are still effective in giving students food and helping them feel comfortable. Establishing trust with the school increases engagement and academic performance, which is a strong rationale for why schools should expand supplementary programs.

This also highlights the importance of supplementary programs in most districts, not just in neighborhoods with a lower socioeconomic status. In this study, which focused on just two

schools, there was a wide range in the socioeconomic status, but there was still a demonstrated need by some of the population in the school with a higher socioeconomic status area. Expanding supplemental food programs allows students access to food in all areas. This is especially important in areas that may be food deserts with higher socioeconomic statuses. For example, Tioga Hills was considered a food desert, but only about 2% of families did not have adequate transportation. While this is significantly lower than East Binghamton, with over 28% of the population without adequate transportation, there are still families who struggle to get access to food in the Tioga Hills service area (Food Desert Atlas, 2019). If supplementary options were only present for Calvin Coolidge students, this would exclude and ignore the students and their families that need additional support at Tioga Hills simply because the majority of students do not require additional support. Implementing these programs in all types of schools helps eliminate inequality.

These findings help support the argument that school lunch programs should continue to provide a free option for all students and eliminate the application process. For the 2021-2022 school year, all students received free meals through the school lunch program because of the disruption that COVID-19 has caused (Blasi, 2021). This extension, put in place originally for the 2020-2021 school year was extended until September 2022, but will not be continued for the 2022-2023 school year. With this sudden change, schools must now reassess how they provide supplementary options and will need to return to applications in order to serve students who need these meals the most for a reduced cost.

Eliminating this application process permanently going forward could help eliminate potential pride, a language barrier, or other potential barring factors that would prevent a family who qualifies from receiving free meals. This would be instrumental in reducing food insecurity

and eliminating inequality overall, as it allows all students to receive adequate and nutritional meals. These programs will also help them perform better in school. This change to a permanently free option would require additional funding, but that is a small cost compared to the difference it could make in a child's future.

In order for these programs to be successful, the offerings need to be revised to provide healthier options for the students. While it is important that the NSLP provides ample quantities of food for its students, the quality of the food is equally as important. Providing largely processed foods high in fats and sugars is not adequate for the child's health and development (Khan, Naiman et al., 2014). Even if the student has an adequate amount of calories, if they are not coming from the correct sources, the same problems related to an inability to concentrate may persist. This would also need to be true for the pantries and supplementary programs. If largely processed foods comprise these backpack programs, the same problems will occur. While pantries are a great vehicle for combating food insecurity, there have been instances where they actually contribute to adverse health effects, such as obesity. “Long term pantry users with very low food security had significantly greater odds of having obesity than short term users with higher food security” (Cooksey et al., 2020, 3). If schools are to continue implementing supplementary programs, they need to also ensure they are regulating what is being served to their students and families.

For children in schools, the federal government can support a program which allows all students to have equal access to meals by making the National School Lunch Program free for all students moving into the future. Although the need in Binghamton is higher than in Vestal/Apalachin, this does not mean the students in Tioga Hills deserve to be ignored and neglected because the majority of students do not require supplementary food. Both schools have

populations that are food insecure, which means the school has a responsibility to take action and help solve the problem. It is problematic to utilize food deserts as a means of determining who does and does not get free meals, as this prevents and makes it more challenging for students in non-food desert areas (as defined by the USDA) to get the extra support they need and deserve. Despite the fact there may be several grocers within reach, it does not mean that a household is immediately food secure.

Just as the federal government has a responsibility to feed students, the schools and districts themselves have a partial responsibility to provide, fund, and promote supplementary programs and work in unison with the local community, local pantries, and the school lunch program, in order to provide extra food for the students who need it. These programs should not be hidden or limited to a certain number of students, but rather accessible to all. Most importantly, these programs should be present in most districts, not just in specific locations where food insecurity is higher. Schools have the opportunity to eliminate inequalities related to socioeconomic status by implementing supplemental food programs and ensuring all students have access to free meals.

There were some limitations to my research, as I was unable to directly talk to any students themselves and also it was difficult as I could not travel to the school to try and see how these food programs were run due to COVID-19. Also, I only looked at two schools, so in order to gain a more comprehensive understanding of the issue of food insecurity and to learn how academic performance and food insecurity are related, I would need to investigate more schools.

If school meals and supplementary programs are done correctly, they can have a positive impact on students' academic success and improve their overall quality of life. The primary goal of a public school is to educate its students and prepare them for the future. It is not enough,

however, for schools to solely focus on academic success. If schools are nourishing their students properly, it will set them up for academic success going forward.

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