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# Do Free and Reduced-Price Meals Improve Attendance? Evidence from West Zone Baltimore County High Schools

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Tiivistelmä - Referat - Abstract

*Objectives.* The purpose of this study is to answer the question on whether the 2021 updated income requirements for Free and Reduced Meals (FARMS) improved attendance of High School students in the BCPS West Zone.

*Methods.* The research design will be based on a two-period, two-group quasi-experimental Difference in Differences method which is based on the aggregated school groupings. The sample setting is based on aggregated data on attendance of Baltimore County Public School (BCPS) West Zone high school students grouped by race, gender and FARM status from the 2020-2021 pre policy period as well as the 2021 - 2022 policy implementation period.

*Results and conclusions.* The school attendance rates for FARMS eligible students increased by 2.4% and students who are ineligible for FARMS attendance rate grew by 0.8%. Both genders and all racial groups increased attendance and the gap between variables narrowed and in the case of case became non-existent. It can be concluded that the expansion of the eligibility for FARMS can increase student attendance rates and reduce inequities between groups at schools and it promotes stability and inclusion which in turn can support and improve the outcomes of students.



Keywords
Free and Reduced-Price Meals, School Attendance, Education Policy, Socioeconomic Status, Baltimore County Public Schools, Quantitative Analysis, Universal Schools Meals, Equity in Education, Social Reproduction Theory, Student Outcomes

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# 1 Introduction

According to the United States Department of Education chronic absenteeism can be described as the missing of at least 10% or more of the school year (U.S. Department of Education, 2025). When students are chronically absent it is often a sign that they may be experiencing challenges pertaining to their physical or mental health. It cannot be ruled out that other issues such as transportation or even work can play a role in contributing to their absence (Jordan & Miller, 2023). It must be noted that this absence from school can affect students' long-term success.

During the COVID-19 pandemic the United States Department of Agriculture (USDA, 2021) updated the income eligibility requirements for free and reduced school meals for the 2021-2022 school year. Due to the adjustment in federal regulations Baltimore County Public Schools (BCPS) located in the state of Maryland followed suit and updated its policy. This was in response to the federal mandate.

In this study, it will be determined, the impact of the updated 2021-2022 Free and Reduced-Price School Meals income eligibility requirements on West Zone High School Students of BCPS. Data sourced directly from the Department of Research, Accountability and Assessment (DRAA) of BCPS for the academic years 2020-2021 as well as 2021-2022 on Attendance Rates as well as the Free and Reduced Meal Status of the students will be used to complete the research study.

A quasi-experimental research design is used through the implementation of the Difference in Difference approach to establish the causal relationship between the updated policy and student attendance. The sub-groups of race and gender are also analysed in the thesis to ensure robustness (reliability of findings). This is carried out through the side-by-side use of the cluster-robust statistical method.

The analysis of these sub-groups delves into the varying impact of the expansion of access to free and reduced school meals on school attendance

The results will be used to make recommendations to school district policy makers regarding resource allocation pertaining to the expansion of this program; to boost school attendance, access and equity. This will ensure that priorities are more tailored to the needs of the local community. Therefore, it will promote equity, efficiency and sustainable financial decisions.

# 2 Theoretical background

This thesis is based on Pierre Bourdieu's social reproduction theory which involves the analysis of extremely sophisticated mechanism by which the school system contributes to reproducing the structure of the distribution of cultural capital and through it, the social structure to the ahistorical view that society reproduces itself mechanically (Bourdieu & Passeron, 1990). This theory proposes that policies regarding school meals can perpetuate the inequalities that exist educationally as well as socially. Bourdieu claims that institutions such as schools directly and indirectly continue the classism of society through policies that are implemented. Therefore, the utilization of this theory aims to determine if this update to the income requirements will improve the attendance rate of students.

## 2.1 Social Reproduction and Educational Equity

Social reproduction theory by Pierre Bourdieu (1971) argues the belief system that schools serve as a catalyst for social reform and equality but rather operate as an agent for perpetuating the biased system of the social classes. The concept of habitus is proposed to describe the unspoken engrained habits which unconsciously impact the educational settings (Nash, 1990). The term cultural capital is also utilized to describe these social norms of values, language as well as expectations which is given preference by the dominant group which is the upper and middle classes. This in turn gives the students belonging to this class an unfair advantage while those of the low classes who lack the necessary resources are born into a systemic disadvantage (Bourdieu & Passeron, 1990).

Emile Durkheim stated that education is healthy when people are healthy (Vejar, 2021). Bourdieu believed that lower working-class children do not bring the academic rigor and work ethic nor the keenness of other middle-class children. He goes on to explain that the cultural capital of upper-class children versus that of the lower classes is incomparable. Often misunderstood as well as their needs not being met, the low socioeconomic children would adopt a behaviour of

withdrawal which can upset teachers. Additionally, with Bourdieu's theories it is suggested that schools ignore the habits of children belonging to the non-dominant classes, which in turn is claimed to be the primary underlying factor contributing to low academic attainment for working class students (Nash, 1990).

Lack of access to food is not limited to simply a personal issue but rather a microorganism of a larger malfunction of the system which then affects education (Fanzo et al., 2022). These students lacking access to meal have a compromised ability with their schooling to concentrate, engage and attend (Raskind et al., 2019). The United States Center for Disease Control and Prevention (CDC) recognizes chronic absenteeism as early warning of academic issue regarding failure. This issue is prominent amongst those of low-socioeconomic backgrounds (Basch, 2011). A study by Balfanz and Byrnes (2012) even revealed that in the state of Maryland in 2012, there was a rate 30.8% chronic absenteeism amongst high school students eligible for the free or reduced priced meals versus 11.8% for those who ineligible.

It can be deduced that meal programs at schools serve a greater purpose than simply nutrition. These programs form part of a supportive system to assist students dealing with their economic shortcomings. This provision aids and encourages their participation with the institution. Gundersen and Ziliak (2015) goes on to mention that lack of access to school also affects the academic and increases absenteeism. Therefore, an intervention via a policy update is a step in the direction towards improving equity in education.

The COVID-19 pandemic triggered a period of disruption. The USDA updated its income eligibility requirements and in so doing increased access to historically marginalized groups. As a result, researchers are provided with the unique opportunity to examine the impact of this policy on reducing inequity. Spill et al. (2021) states that meal programs have great benefits to students; therefore, suggesting that engagement can be improved if we address this issue.
Bourdieu's framework states that school meals are more than just a nutritional source but rather can impact a students' educational future. This theory provides a solid foundation for analysing the historically marginalization of certain groups

and what expanding income eligibility requirements can do. In this thesis we aim to analyze if school meals play a role in improving the engagement of students in school in the district of Baltimore County Public Schools.

### 2.1.1 Structural Inequality and the Hidden Curriculum

The concept of the hidden curriculum is used to describe the way in which educational institutions have low-key ways to perpetuate inequity through its structure. These unspoken expectations, messages and values are mirrored by the middle class and supported by members of this group. It must be noted that the hidden curriculum in no way is officially incorporated in the curriculum, yet it shapes the experiences of all students. In turn affecting their perception of ability and their worth (Giroux, 1983).

A factor outside of the schooling environment that students entering from a socio-disadvantaged often face is the situation where their basic needs such as food security is not met is not discussed nor acknowledged. The reality however contributing to the poor ability, is that these students are functioning under extreme stress and hardship. (Basch, 2011; Gundersen & Ziliak, 2015) The result of this deduction is a mislabelling of student behaviour as well as the false interpretation of the underlying reasons contributing the high truancy rates such as structural inequity.

The USDA 2021-2022 income eligibility revision serves as a possible disrupter to the hidden curriculum. This is almost a confession to the role the systemic structure has and continues to play in addressing the hidden curriculum. As Spill et al. (2021) stated, the adjustment and expansion of access to these types of services can impact attendance of students historically excluded. Therefore, the recognition of these conscious and unconscious structural barriers can address the social reproduction of exclusion through the hidden curriculum.

Until it is accepted that the hidden curriculum reveals the underlying reasons for the appearance of student disengagement which is the students' lack of their basic needs being met; then stakeholders in education can being moving past

pedagogical adjustments and instead develop more structural intervention. Beginning with the expansion of school meals is a key tool in supporting this movement.

### 2.1.2 Critical Policy Analysis and Institution Access

According to Apple (2004) critical policy analysis is necessary for the understanding of the connection between education and the relations of dominance and subordination in the larger society as well as the movements that are trying to interrupt these relations. In regards to the update of the eligibility requirements for school meals; using this framework can provide guidance for understanding how these institutions though on the surface may seem to be neutral; are instead reproducing social stratification where it decides who is provided support and on its terms.

In the United States, strict guidelines for free or reduced school meals as well as the complexity of accessibility has affected disproportionately those hailing from low-income backgrounds (Gordanier et al. 2020). The Healthy Hunger Free Kids Act of 2010, was introduced to provide free food to students without an individual application. This policy change led to an increase in meal participation amongst students who were historically marginalized from eligibility (Leos-Urbel, 2015).

Gordanier et al. (2020) also stated that the engagement with the Community Eligibility Provision (CEP) also positively impacted other factors in the school such as climate outcomes such as through less suspensions and expulsion. His research suggested a relationship between expansive and inclusive food access policies and engagement. Therefore, this further supports the idea that school meals can be a factor contributing to the reduction of inequity in education.

Using the critical policy lens, one is left wondering what can happen when students who once were excluded due to an archaic income threshold; now have access? A question such as what will the impact on their attendance and how are these policy updates disrupting the institutions which unconsciously serve as mechanisms for inequity.

## 2.2 Research on School Meals and Attendance Outcomes

In 1946, the National School Lunch Act (United States Congress, 2024) established that schools participating in the National School Lunch Program (NSLP) would serve lunches for free or at a reduced cost to students who were determined by school officials to be "unable to pay the full cost of a lunch" (Billings, Landers, Minter, 2021). The USDA, during COVID-19 pandemic, expanded students' access to free and reduced-price meals. According to a study conducted by the Annenberg Institute at Brown University, "Food insecurity has influenced both the immediate and broader contexts of students, potentially worsening attendance through a large set of factors such as illness, worsened school engagement, and behavioural issues (Alaimo, Olson et al., 2015). It must be noted that previous data has shown that while chronic absenteeism is deeply detrimental to educational success, just missing more than a week of school can have consequences. (Balfanz & Byrnes, 2012) Therefore, when researching the impact of this policy change would aid the further expansion of this policy.

Many studies have shown that there is a connection between free and reduced meal access and boosted health, behavioural and scholastic engagement. (Cohen et al., 2021) Attendance to school has become a crucial factor to lowering hurdles to providing a more secure in equitable schooling environment for low socio-economic households.

Spill et al. (2021) makes it clear that the modest positive relationship between Universal Free Meals and attendance is likely driven by students who would otherwise not qualify for free meals through the traditional school meal programs. Also, a Balfanz and Byrnes (2012) study revealed that students living in poverty had a chronic absenteeism rate of 30.8% versus 11.8% for those that are ineligible. This stark contrast further affirms the difference between food security and insecurity. The same also holds for another study that revealed that it impacted concentration and behaviour (Basch, 2011; Gundersen & Ziliak, 2015). Issues pertaining to psychological, physical and emotional stressors as such, can

result in higher truancy rates amongst students directly as well as promote disengagement.

International evidence by Hinrichs (2010) reported that in the nation of India, the incorporation of a national school feeding program for lunch increased attendance for girls. This research revealing again that school meals is not limited to only hunger but also subtle and unspoken barriers to engagement. It triggers evidence of an intersectionality between access to food and much larger issues regarding equity.

However, it must be noted that despite results that reveal a positive impact of expanded meal access to students; there remains limitations. In the United States, most literature on this issue is at the elementary level where existing literature indicates that access to free and reduced meals improves attendance amongst low-income students (Bartfeld et al., 2019b Unfortunately, there remains very little to no evidence that the positive impact can be translated to the high school setting.

Additionally, previous research found that eligibility for the Community Eligibility Participation (CEP) increases the rate of student participation in school breakfast and lunch but had no effect on attendance rates (Schwartz & Rothbart, 2019). Going further, a study published in 2013 revealed a school meal income eligibility update resulted in a .5% increase in attendance for Black and Asian students' attendance which translates to approximately one more day of attendance per year (Urbel, Schwartz, Weinstein, Corcoran, 2013).

Therefore, this study seeks to contribute to this field of research since at the moment limited studies have been completed on meal programs and its impact on attendance at the high school level. Therefore, by applying the quasi-experimental difference in differences (DiD) research approach to evaluate the impact of the USDA's and BCPS' 2021-2022 income eligibility policy expansion. This analysis seeks to evaluate the data across two academic years to measure the improvement in attendance rates in a suburban school with diverse races and income levels.

It must be noted that this policy's implementation during the COVID-19 pandemic also provides insight into how emergency reform can have long term effects on equity in the educational system.

# 3 Research task and research questions

In this thesis, the research task at hand is to investigate whether the 2021-2022 updated income eligibility requirements for Free and Reduced-Price School Meals (FARMS) had an impact on the attendance of West Zond high school students at Baltimore County Public Schools. The foundation of this study is social reproduction theory which claims that a policy update can serve as a catalyst for structural disruption. The conscious and unconscious system of inequality which has historically marginalized low socioeconomic groups may now be addressing a root cause of issues rather than misinterpreted as well as mislabelled factors.

The quasi-experimental Difference in Differences research method will be utilized to determine if the access to these meals had a positive result for those students who now qualified for FARMS because of the reformed guidelines. Aggregated data from the years 2020-2021 (pre-policy) and 2021-2022) post-policy were sourced directly from the Department of Research, Accountability and Assessment at Baltimore County Public Schools on gender, race and FARMS status to determine the adjustments in attendance. It must be noted that due to this data being gathered during the COVID-19 pandemic and to avoid any questioning of causal effects; a cluster robust standard error method will be used to correct any non-independence in any of the grouped data.

For this study the research questions are:

1. What was the impact of the 2021 - 2022 updated income eligibility for Free and Reduced Meals on the attendance of High School students in the BCPS West Zone?

2. Did the income eligibility adjustment distinctively affect the attendance for eligible FARM status students?

3. Were there observational differences amongst the gender and racial eligibility of FARM students?

These research questions will be explored in the current literature and research in the United States that primarily focused on the primary level. Therefore, this study's focus at the high school level at a suburban mix income as well as ethnically diverse learning environment will close this gap.

# 4 Research work

## 4.1 Research Strategy

In this study, quantitative research approach is used in order to determine the result of the updated policy on high school student attendance. Statistical model as well as quantitative data facilitates an objective analysis of the updated eligibility requirements for Free and Reduced Meals (FARMS) before and after implementation. This strategy ensures the execution of the research purpose which is to determine the causal relationship between both variables.

## 4.2 Research Design

A quasi-experimental research design which uses the Difference in Differences (DiD) method is implemented in this study. The role of this approach is to determine the causal impact in leave of random assignment due to the policy change. A comparison of the change in attendance will be conducted between those eligible for FARMS and those who are ineligible. Using the Difference in Differences method would provide isolated findings for the impact of the policy change. The need for this strategy is due to the reality that the policy change affected a particular subgroup of students. Therefore, the treated and non-treated groups can be compared before and after the change in policy.

## 4.3 Study Subjects and Setting

The subjects of this study are high school students belonging to the West Zone of Baltimore County Public Schools. The setting is one which is economically diverse, cultural and ethnically varied as well as suburban. The students have been separated between Free and Reduced Meal Priced eligible and ineligible students from differing racial, gender status. It must also be factored in that the motivation for choosing these study subjects and setting is due to my employment as a public school teacher at this location as well as the access to reliable data from the district.

### 4.4 Data Acquisition

The data was acquired directly from the Department of Research and Accountability and Assessment at BCPS. It includes data from the 2020-2021 school year (pre-policy) and the 2021-2022 (post-policy). It incorporates disaggregated data on the students' gender, FARM status as well as race for high school students at Baltimore County Public Schools' West Zone. The data was provided via a spreadsheet and individual student data was not provided thus privacy and ethical standards were uncompromised.

However, it must be noted that though the aggregated data does not provide individual variables such as household background or academic achievement prior or post the policy update; the data still allows the researcher to perform a general examination of the policy update on the attendance rates amongst the subgroups.

### 4.5 Methods of Analysis

A quasi-experimental research strategy of the Difference in Differences (DiD) regression analysis method is implemented with the following formula:

$$\textbf{Attendance Rate} = \beta_0 + \beta_1 \cdot \textbf{Post} + \beta_2 \cdot \textbf{FARMS} + \beta_3 \cdot (\textbf{Post} \times \textbf{FARMS}) + \varepsilon$$

- Attendance Rates is the dependent variable in this regression model. It refers to the average daily attendance for a particular student subgroup. This is important as it allows the researcher to follow the change across time periods as well as amongst sub-groups. Therefore, we are able to assess the impact of the policy.

- Post is a binary variable which can have a value of 1 or 0. 0 represents the academic year of 2020-2021 which is pre-policy implementation. On the other hand, 1 stands for the academic year 2021-2022 which is after

the policy update was adjusted. This is critical as it allows the isolation of the time period to determine changes in attendance rate between these periods for students eligible as well as those ineligible.

- FARMS which stands for Free and Reduced Price Meal Status is also a binary variable which can have a value of 1 or 0. 1 represents students who are eligible for the free and reduced-price meals while 0 stands for those who are ineligible. This is important since it allows the researcher to decipher the attendance rates of students pre and post policy as well as FARMS eligible and FARMS ineligible.

- POST x FARMS is the time treatment effect between time and FARM status. This is what allows the researcher to determine the Difference in Differences (DiD) effect. 1 represents FARMS eligible after the update (2021-2022) and 0 for pre-policy and non FARMS status students. With this one can measure the causal effect of how the policy update impacted the attendance rate of FARMS eligible students through the comparison of their rate change to the non-FARMS (control group).

- ε is an error term in the regression analysis. This factors in all issues that may impact the reasons for a change in attendance which are not considered in this model such as the COVID-19 pandemic, weather, health and so on. It is critical to include this through the usage of the cluster robust standard error approach to maintain the validity of the findings.

### 4.6 Sensitivity Analyses

Sensitivity Analyses were carried out through the exclude all to ensure that no group is overrepresented. Additionally, weighting is used to ensure that there is no unequal influence from smaller subgroups. This will ensure that the results are consistent across all the areas of analysis.

# 5 Research results and their interpretation

## 5.1 Descriptive Statistics and Pre-Policy Baseline Trends

The following box graph is a comparison of the attendance rates before and after the Updated Income Eligibility Requirements for Free and Reduced Priced Meals:

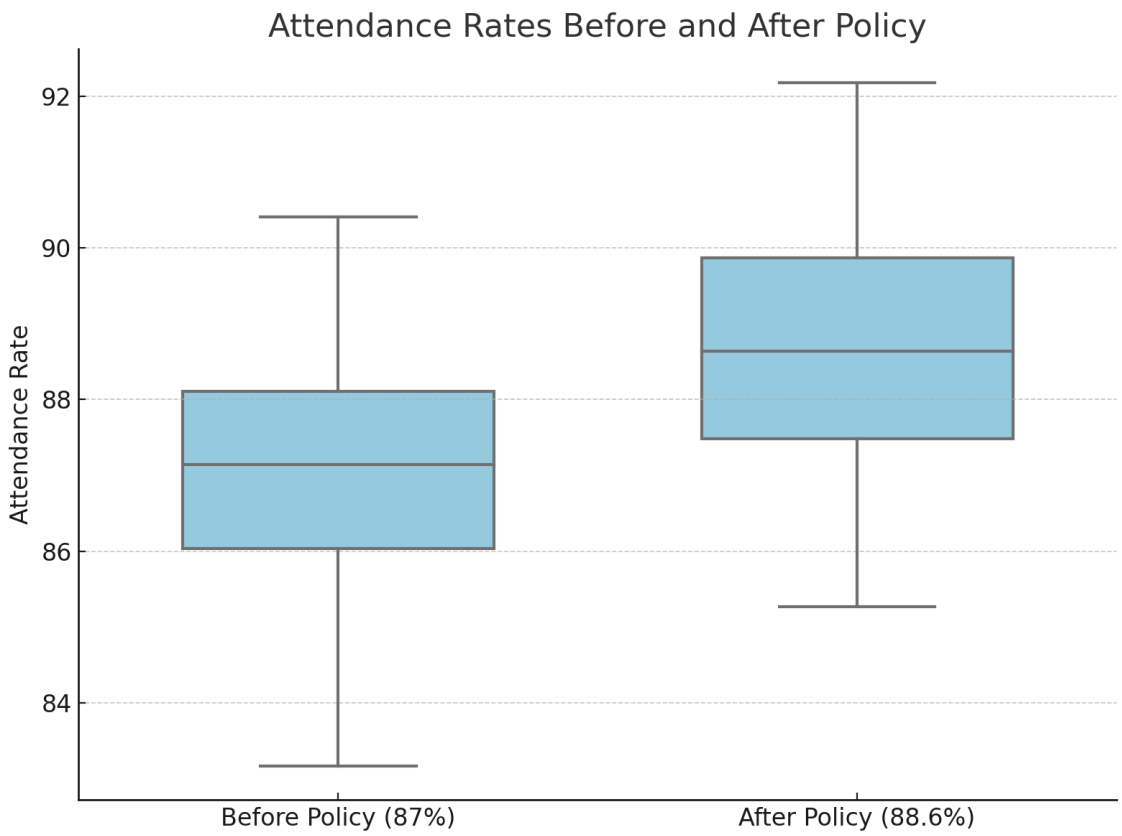


*Figure 1: Box Graph showing the Attendance Rates Before and After Policy Implementation*

The first research question of this thesis is an exploration into the impact of the updated policy on the overall attendance of students. The average attendance rates before and after the policy change were compared to determine any change.

Based on the results, it revealed that the attendance rates of students increased after the update of the policy. In the 2020-2021 school year the average attendance rate was 87% with a wide range of variability in showing up to school. This inconsistency reflects a reality that some learners were showing up almost every day while others had significantly high rates of absence. In the 2021-2022 school year the median attendance rate increased to 88.6%. The spread was much narrower thus suggesting growth in not only attendance but stabilization in consistency.

The findings from this study measures up to previous research which had revealed small yet positive effects of the universal free school meals on engagement. The study from Gordanier et al. (2020) acknowledged that they have growth in behaviour, particularly that of attendance when CEP was adopted. The same was purported by Spill et al. (2019) when he claimed that students who may not have been able to access free meal can increase attendance when a policy change is implemented.

These early results are providing evidence that the expansion of the income eligibility requirements has a positive impact on student attendance.

A Difference in Differences regression analysis was carried out in order to determine if the implementation of the policy had an impact on the attendance rates of low-income students. The causal effect was deduced from this method through the comparison of attendance between those that qualified for the Free and Reduced Meals and the students who were ineligible before and after the policy update.

The regression model is:

$$\textbf{Attendance Rate} = \beta_0 + \beta_1 \cdot \textbf{Post} + \beta_2 \cdot \textbf{FARMS} + \beta_3 \cdot (\textbf{Post} \times \textbf{FARMS}) + \varepsilon$$

*Table 1 Showing the results from the DiD model*

| Predictor | Estimate | Std. Error | t | p |
|---|---|---|---|---|
| Intercept | 89.7443 | 1.2474 | 71.947 | < .001*** |
| Treated | -5.84 | 1.764 | -3.311 | .003** |
| Post | 0.7614 | 1.764 | 0.432 | .670 |
| Interaction | 1.5886 | 2.4947 | 0.637 | .530 |

Note. $R^2$ = .43, Adjusted $R^2$ = .36, F(3, 24) = 6.11, p = .003. Residual standard error = 3.3.
**p** < .01**, ***p** < .001***

The intercept of $\beta_0$ = 89.74 signifies the median rate of attendance for students ineligible for Free and Reduced Meals before the policy was implemented. It must also be noted that the treated coefficient $\beta_1$ = -5.84, p < 0.01. It revealed that students who were apart of the FARMS program prior to the policy update had a 5.84% lower rate of attendance than those who not in the program. Additionally, the post coefficient was $\beta_2$ = 0.76, p = 0.67 which showed very little and insignificant improvement in the attendance of the control group post policy implementation. Finally, the $\beta_3$ = 1.59, p = 0.53 represents the difference in differences estimate which shows the approximate effect that the policy update had on the FARMS students' showing up at school. Despite the positive value increase of 1.59% for treated students in comparison to the control group post-policy; the statistical significant still remains at p>0.05.

Therefore, it can be said that although there was a clear and observable movement in the attendance rates for FARMS students after the policy updated, the high p-value reveals that the results are not strong enough to firmly state that it was the result of the policy.

## 5.2 Differences by School-Level FARMS Eligibility

The high schools of the West Zone at Baltimore County Public Schools were grouped in the categories of High and Low distribution of students who were eligible for FARMS. This strategy ensured that an unbiased and equitable analysis was conducted since the effect of this policy at schools with high concentration of FARMS students was examined along with schools with low concentration. In so doing, the research was able to have multiple level perspective of the policy update.

*Table 2 showing the Average Attendance by FARMS Level and Policy Period.*

| FARMS Concentration | Policy Period | Average Attendance Rate (%) | n |
|---|---|---|---|
| High | Pre-policy | 86.7 | 11 |
| High | Post-policy | 88.2 | 10 |
| Low | Pre-policy | 86.9 | 10 |
| Low | Post-policy | 88.6 | 11 |

Note. n = number of schools in each category.

The findings revealed that in both schools with high and low concentrations of FARMS there was slight growth in attendance post policy implementation. Pre-policy amongst high concentration FARMS schools, there was an attendance rate of 86.7%. Remarkably, post policy implementation the rate adjusted to 88.2%. This was 1.5% increase.

At schools with a low concentration of students with a FARM status, pre-policy there was a rate of attendance of 86.9%. Similarly to the high concentration schools of FARMS there was an increase in attendance to 88.6%. This represented a 1.7% increase. The variance in both categorizations of schools is very small.

Based on these findings, it can be said that the implementation of the policy had a positive impact on school attendance no matter the concentration of FARMS. There was no stark difference to say that one group benefited more than the other pre and post policy. This reflects equity across the varied groups since the policy held a similar effect. However, it must be noted that due to the small difference in results as well as the lack of individual data sets; further analysis is needed to state with surety that there is a statistically significance.

## 5.3 Equity Effects: Attendance Gaps Between Groups

In this section we sought to evaluate and analyse any gaps in the attendance rates between the low-income FARMS students and those are not low income and not eligible for the program. It allows us to further affirm the equity in the policy implementation results.

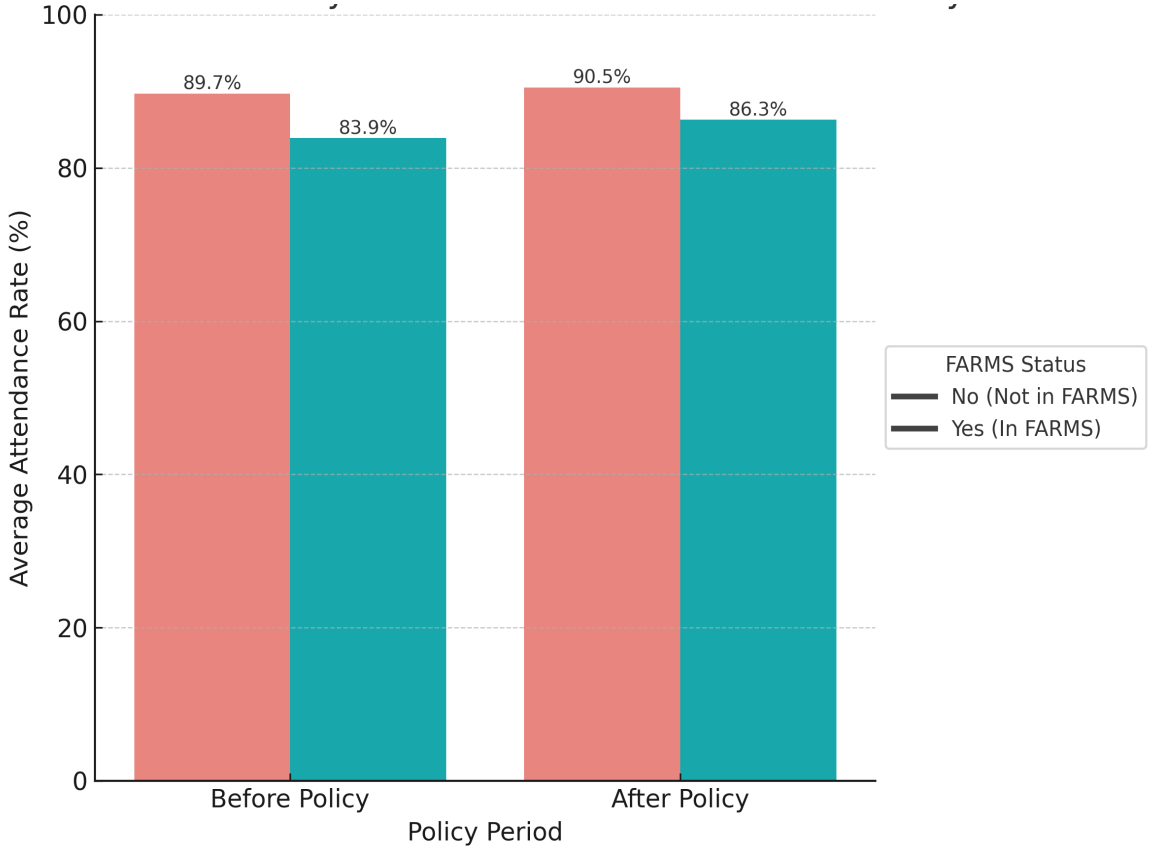

*Figure 2 showing Attendance Rates according to FARM Status before and after policy. N= No Y = Yes*

Based on the findings, it can be said that before policy there was a gap between students who eligible for FARMS and those who were ineligible. After the implementation of the policy, there was an increase in attendance however, the disparity was reduced.

In the school year 2020-2021, those students were who were ineligible for FARMS had an attendance rate of 89.7%. Students who qualified for FARMS had an attendance rate of 83.9%. Therefore, there was a 5.8% discrepancy between both groups. A significant gap in equity can be noted.

However, during the period of implementation of the policy change there was a rise in the rates of attendance. After the roll out of policy, there was an increase from the 89.7% to 90.5% attendance for students who were ineligible for FARMS. On the other hand, there was an increase from the previous year's 83.9% to 86.3% amongst FARM students. The gap between both groups now was at 4.2%.

Therefore, it can be said that the policy change had a positive impact on all groups of students. Additionally, the inequity gap in attendance rates was now 1.6%. This represented a slight reduction within the first year of implementation. This early evidence of impact shows the need for long term study as well as other targeted support for increasing attendance.

## 5.4 Gender and Racial Differences Among FARM-Eligible Students

### 5.4.1 Attendance by Gender Among FARM Students

The attendance rates of students according to their gender clarification was also explored to further measure the level of equity triggered by this policy change.

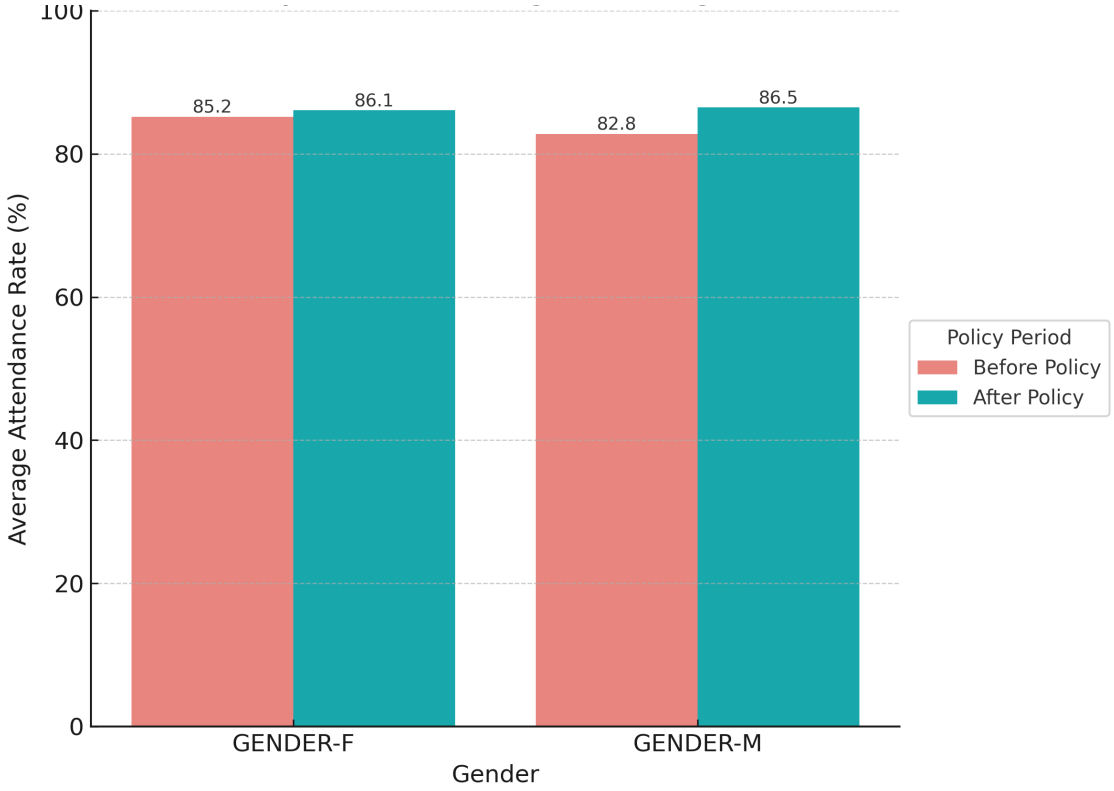


*Figure 3 showing Attendance Rates according to Gender of FARM Status before and after policy.*

Pre-policy, females had an attendance rate of 85.2% while males had an attendance rate of 82.8%. However, post policy implementation there was a stark contrast in growth between groups. Females increased from 85.2% to 86.1% while males from 82.8% to 86.5%. There was a slight increase amongst male students with growth of 3.7% in comparison to the female students which grew only by 0.9%.

Therefore, it can be stated that there was greater impact of the policy on male students' attendance rates versus the females. Additionally, the gap in attendance rates was now non-existent between these genders post policy. Thus, suggesting that the policy addressed subtle hurdles which affected male attendance to schools.

### 5.4.2 Attendance by Race Among FARM Students

The attendance rates amongst students of varying races were disaggregated identify the change between pre policy and post policy implementation.

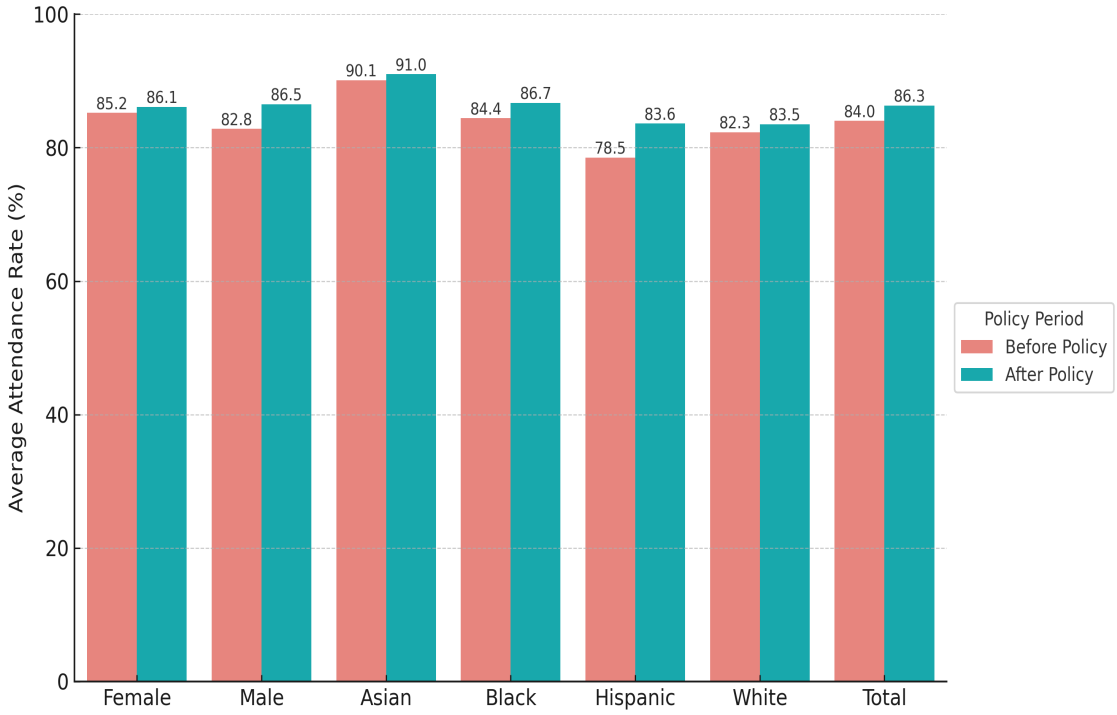


*Figure 4 showing Attendance Rates according to Race of FARM Status before and after policy.*

The findings revealed that Asian student's pre-policy had an attendance rate of 90.1% and post policy it increased to 91%. The high levels of attendance sustained its high rates within this community.

Black students' pre-policy had an attendance of 84.4% which then increased to 86.7% post policy implementation. There was a 2.3% increase in this group's rate. This suggests that policy may have played a role in this positive change.

White students had a rate of 82.3% attendance before the policy and 83.5% after the policy. This was a very modest increase in attendance amongst all demographics recorded.

Hispanic students had the highest increase in attendance rates. Pre-policy this

group had the lowest attendance with 78.5%. However, with the policy change, it increased to 83.6%. This revealed that this policy change had a significant benefit to this group.

Overall, there was increase in attendance rates amongst all races and the gap between them also lowered. Therefore, it can be suggested the policy closed the gap to an extent thus promoting equity.

## 5.5 Summary of Key Findings

The impact of the 2021-2022 updated income eligibility policy was measured with the Difference in Differences (DiD) approach (Section 5.1) which revealed an increase in the median attendance rate for students post implementation of the revised income eligibility requirements for Free and Reduced Priced Meals (FARMS). The improvement was by 1.6%; which though modest align with the similar results. Therefore, this suggests that the school meal access expansion could have been a factor which triggered better student attendance. It must be noted that the inspection trends in Section 5.2 revealed a similar pattern pre-policy therefore, the use of the DiD for causal inference was affirmed.

Disaggregation of the data in Sections 5.3 and Section 5.4 revealed that the students eligible for FARMS had significant improvement from the policy change. Schools with higher densities of FARM eligible students had similar rate of increase of 1.5% where it changed from 86.7% to 88.2%. While schools with lower densities had an increase of 1.7% which was from 86.9% to 88.6%. This similar growth rate indicates that the effect of the policy was spread out and there was not much of a difference between the concentration rates of FARM eligible students at the school.

Students who were FARMS eligible post policy implementation had an increase in their attendance rates from 83.9% to 86.3%. This was a stark contrast to those

who were ineligible. Therefore, it revealed that students who are a part of the program had higher rates of attendance post policy implementation.

In Section 5.5 the intersectionality of race and gender was explored. The findings revealed that male students experienced higher growth (3.7%) than their female counterparts who registered a 0.9% increase. Therefore, it can be stated that the policy improved and supported male student attendance. Additionally, regarding race, Black and Hispanic Students had the highest rate of increase in attendance. Black students improved from 84.4% to 86.7% and Hispanic Students grew from 78.5% to 83.6%. This closed the gap on attendance rates with the Asian which had the highest attendance rate pre and post policy of 90.1% and 91% as well as White students who had a rate go from 82.3% to 83.5% post policy implementation.

Therefore, the results suggested that the update to the income eligibility requirements for FARMS for students had a modest impact on the overall attendance rates of program eligible students. However, it increased significantly the rate particularly amongst Male Black students as well as the male and female Hispanic students. Despite there not being a huge gap in the attendance rates between high FARMS concentrated schools and low FARMS concentrated schools; equity improved and the gap between the racial and gender groups also narrowed.

# 6 Validity

The validity of the research's results is necessary to ensure that internal as well as external contributors to the results were considered. In Section 6 we will evaluate the validity, generalizations and limitations of the research.

## 6.1 Internal Validity

The Difference in Differences (DiD) research strategy was utilized in order to measure the causal effect of the policy on the student attendance. When the rates of attendance from the 2020-2021 school year was compared with that of the 2021-2022 school year, the DiD model was able to isolate the impact of the policy.

The parallel trends assumption requires that with the absence of treatment, the difference between the treatment and the control group remains the same over time. Though the findings revealed consistency, due to the small sample size it affected the possibility of pursuing more robust testing.

Additionally, there is not known to be any other interventions addressing attendance that were implemented at the same time-period as the updated meal plans in the West Zone of Baltimore County Public High Schools. However, it does not discredit the impact of the COVID-19 pandemic on student engagement.

Finally, the FARM status and group categories of students remained stable however, any change in enrollment of students could have affected the results. However, the usage of aggregate group levels sort to address this issue.

## 6.2 External Validity

The research study is based only on High Schools located at West Zone Baltimore County Public Schools. It must be noted that the results may not be able to be translated to the elementary and middle schools nor other zones of the district. Finally, the demographics of BCPS may be quite the contrast to other

suburban, urban and rural schooling environments across the United States of America.

The limitation of the data is triggered by the need for more years of pre-policy data as well as the results, post-policy intervention. As a result, the findings of this study are based on short term results rather than it being a gathering of long-term results. Additionally, though the results which is based on broad data sets show growth in attendance but the lack of data more on the individual level prevents the research from determining the quality of the attendance such as engagement, tardiness, behaviour as well as academic achievement.

## 6.3 Construct Validity

Construct validity refers to the extent to which the test measures the concept it aims to evaluate. In this study all variables were defined and applied consistently. The data on attendance rates were provided directly by the research department at BCPS and the FARM status of students were organized according to the legal requirements. Other variables in the study were categorized by the norms of research and affirmed through descriptive check.

## 6.4 Limitations

The study was limited exclusively to High School students based at West Zone Baltimore County Public Schools. As a result, one is unaware of how the results would have manifested itself as this geographic area has one of the highest concentrations of wealth in the county. Additionally, the provision of aggregated data prevented the researcher from analysing other factors such as grades or health status of students. Finally, we remain unaware how elementary and middle school students would respond to such policy changes and international comparisons can be made due to the complexity of the cultural, ethnic and wealth diversity of the West Zone at Baltimore County Public Schools.

Despite the reality that the study uses a legitimate analytical strategy and has internal validity, the aggregated data limits results and exclusive geographic

area. This pattern provided valid insight into the effect on equity this policy change had as well as the change in attendance which occurred post policy intervention.

# 7 Discussion

In this research a regression analysis Difference in Differences (DiD) approach was used to determine whether the income eligibility adjustment distinctively affected the attendance for eligible FARMS students. In addition to this, observational differences in attendance level post policy implementation amongst the gender and racial eligible FARMS students was also investigated.

The results revealed that there were modest increases in the rate of attendance after the policy implementation. For example, in the 2020-2021 school year, the rate of attendance, which was 87% increased to 88.6%, suggesting that through the updated policy barriers such as food security and stigma were addressed. These issues were two important areas identified in research conducted in the past. (Basch, 2011; Gundersen & Ziliak, 2015; Spill et. al., 2021) Though the running of the Difference in Differences (DiD) model revealed a positive interaction effect, which revealed that students who were members of the Free and Reduced Meals programs did improve in their attendance after the policy was implemented.

In 2020-2021 there was a gap in the attendance rates between FARM and Non-FARM students. The rate of attendance for eligible FARM students was he descriptive statistics in Section 5.1 revealed a gap in the attendance rates between FARMS and non-FARMS students in the academic year 2020-2021. Post policy implementation the gap between the groups narrowed; therefore, showing that improvement was happening in equity, which supports literature that stress the role school meals play in addressing social justice. (Balfanz & Byrnes, 2012; Billings, Landers, & Minter, 2021). In Section 5.4 it was further affirmed when the difference of attendance rate between FARMS eligible and ineligible had its gap reduced by 27.6% within one academic year. These findings further affirm the validity of the policy update as well as the claims by Bourdieu (1971) which is that the focus on material needs can result in improved academic outcomes. Additionally, it aligns with his other theories that hurdles of the structure instead of individual shortcomings are the main forces affecting educational inequality. (Bourdieu & Passeron, 1990)

It must be noted that such an expansion on the eligibility requirements unconsciously acknowledged the systemic hurdles which resulted in an increase in attendance. Despite the modest growth it still opened a slight opportunity of disruption. Therefore, it served as a rare opportunity to challenge the hidden curriculum in which Giroux (1983) shared consciously and unconsciously reproduces the dominant culture failing to tackle the issues regarding marginalized students.

In Section 5.3 the attendance rates at high concentration and low concentration FARMS student high schools there was improvement in both locations. It must be noted that the growth was higher at the schools with lower level of FARM status students which increased from 86.9% to 88.6% post policy treatment. On the other hand, growth also occurred in the high concentration instead with a change from 86.7% to 88.2%. This revealed that the impact of the policy was not limited to one type of school but extended broadly. However, based on the similar results it remains to be questioned if the resources were distributed and allocated in the most efficient manner based on the needs of each school category. Meaning that schools with higher levels of FARMS students may have been provided with the same level of resources as the low concentrated FARM status school thus being a factor to the result difference. This is critical as it reaffirmed the concerns of Apple (2004) who shared that policies which are labelled as neutral can socially reproduce inequity when it fails to contextualize.

The levels of equity amongst the varying races and gender were also explored. It is quite remarkable that males and females both increased their attendance post policy implementation. However, amongst males there were higher levels of attendance. Pre-policy the attendance rate for females was 85.2% versus 82.8% for male students. However, post policy implementation the rate for females increased to 86.1% and for males it grew to 86.5%. It is indeed a contrast to previous research by Hinrichs (2010) which was conducted in India where the rate of attendance of girls had improved significantly. This reaffirms the importance of contextuality and the value of these tailored made research projects on specific areas to avoid generalizations that may not translate to similar

results in complex environments. Additionally, these findings were important since it not only revealed that males benefited more but that the gap between the genders who were FARMS eligible had become non-existent. This signified a radical step towards addressing equity.

Additionally, among the races who were FARM eligible, Asian students maintained the highest rate of attendance before and after the policy implementation with rates of 90.1% and 91% respectively. The consistency was noted as well as the modest increase. One must wonder what contributes to such a significant rate of attendance amongst these ethnic groups in comparison to all others. Similarly, white students had modest growth from 82.3% to 83.5% but in no way one of the ethnic groups with the highest rates of attendance.

The highest rate of improvement, however, was among the Hispanic and Black ethnic backgrounds particularly, the Hispanic background students. Pre-policy Hispanic students had an attendance rate of 78.5% while Black students had rates of 84.4%. Post-policy however, the rate for Hispanic students increased the most, standing at 83.6% while the rate for Black students stood at 86.7%. The rate increase among the Hispanic community was truly remarkable and one can only fathom what more long-term data access and research on this group would uncover regarding improving the attendance rates. This aligns with the current research (Alaimo, Olson & Frongillo, 2001; Ashiabi, 2005; Canbolat et al., 2023) which found that a connection exists between inconsistent access to food and absenteeism. Therefore, according to this research when targeted solutions or as this case policies are made, it results in positive improvement.

These findings reaffirm the reality that when dealing with issues in education an intersectional strategy must be adopted where factors such as gender, race and economic status influence student engagement. As noted by Fanzo et al. (2022), lack of access to food is not limited to simply a personal issue but rather a symptom of a larger malfunction of the system which then affects education. Additionally, one must not mistake the modest growth in attendance as insignificant because when translated to school day attendance it converts to much more than just days but much more time in which students who were

chronically absent now present at school. Balfanz and Brynes (2012) also warned that one week of students missing school can incredibly affect their academic outcomes. Additionally, as stated in research by Gundersen and Zilliak (2015), school meals are not primarily for nutrition but instead a strategic tool for re-engagement for marginalized communities. The results of this policy reveal how a change to policy tailored to address the material need of the low socioeconomic child can lead to improved engagement.

The results show that the implementation of this policy led to the removal of hurdles such as hunger and even stigma which historically plagued low-income students.

## 7.1 Conclusion

This findings from this thesis seeks to contribute to current education research which examines the relationship between equity, student outcomes and education finance. The conducting of this research which focused on the update of the income eligibility policy revealed that the design of policies that can have impact on issues of structural inequity in the United States public schools.

This study suggested that by extending access to free and reduced priced school meals, the inequity surrounding student attendance as well as the gaps in attendance between the FARMS students and those who are Non - FARMS students can be addressed. Despite the harsh yet unfortunate reality that robust data or longer periods after the policy implementation would have been necessary to better validate the causality, the improvement in attendance as well as the narrowing of gaps further affirms the need for meal access to improve equity.

Additionally, it was highlighted that granular subgroup analysis is critical in the analysis of issues in education. If the disaggregation according to race and gender had not occurred underlying disparities can be ignored. Therefore, the

importance of the intersectionality frameworks was furthered compounded by this study.

In conclusion, it can be suggested by this study that fiscal interventions which are well designed can have a significant impact on equity in educational spaces. Additionally, this research calls for the need to expand this study beyond simply attendance but to other factors such as behaviour, economic outcomes as well as academic achievement and graduation rates.

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# 9 Appendix

## Appendix A: Data Tables and Figures

Full Raw Data Set Provided by BCPS for Attendance and FARM Status Rates (2020-2021 & 2021-2022)

| SY | Student Group | FARMS Status | Unique Student Count | % of Total Student Count | Attendance Rate |
|---|---|---|---|---|---|
| 2020-2021 | TOTAL | ALL | 9598 | 100 | 86.73 |
| 2020-2021 | TOTAL | Y | 5397 | 56.23 | 83.96 |
| 2020-2021 | TOTAL | N | 4201 | 43.77 | 90.33 |
| 2020-2021 | GENDER-F | ALL | 4646 | 100 | 87.84 |
| 2020-2021 | GENDER-F | Y | 2550 | 54.89 | 85.19 |
| 2020-2021 | GENDER-F | N | 2096 | 45.11 | 91.1 |
| 2020-2021 | GENDER-M | ALL | 4952 | 100 | 85.68 |
| 2020-2021 | GENDER-M | Y | 2847 | 57.49 | 82.85 |
| 2020-2021 | GENDER-M | N | 2105 | 42.51 | 89.55 |
| 2020-2021 | RACE-AS | ALL | 672 | 100 | 91.3 |
| 2020-2021 | RACE-AS | Y | 404 | 60.12 | 90.12 |
| 2020-2021 | RACE-AS | N | 268 | 39.88 | 93.12 |
| 2020-2021 | RACE-BL | ALL | 5988 | 100 | 86.41 |
| 2020-2021 | RACE-BL | Y | 3717 | 62.07 | 84.4 |

| | | | | | |
|---|---|---|---|---|---|
| 2020-2021 | RACE-BL | N | 2271 | 37.93 | 89.73 |
| 2020-2021 | RACE-HI | ALL | 949 | 100 | 79.4 |
| 2020-2021 | RACE-HI | Y | 570 | 60.06 | 78.5 |
| 2020-2021 | RACE-HI | N | 379 | 39.94 | 80.87 |
| 2020-2021 | RACE-WH | ALL | 1661 | 100 | 90.04 |
| 2020-2021 | RACE-WH | Y | 523 | 31.49 | 82.31 |
| 2020-2021 | RACE-WH | N | 1138 | 68.51 | 93.51 |
| 2021-2022 | TOTAL | ALL | 9973 | 100 | 88.42 |
| 2021-2022 | TOTAL | Y | 5573 | 55.88 | 86.3 |
| 2021-2022 | TOTAL | N | 4400 | 44.12 | 91.09 |
| 2021-2022 | GENDER-F | ALL | 4841 | 100 | 88.15 |
| 2021-2022 | GENDER-F | Y | 2670 | 55.15 | 86.14 |
| 2021-2022 | GENDER-F | N | 2171 | 44.85 | 90.62 |
| 2021-2022 | GENDER-M | ALL | 5132 | 100 | 88.68 |
| 2021-2022 | GENDER-M | Y | 2903 | 56.57 | 86.46 |
| 2021-2022 | GENDER-M | N | 2229 | 43.43 | 91.56 |
| 2021-2022 | RACE-AS | ALL | 644 | 100 | 91.38 |
| 2021-2022 | RACE-AS | Y | 365 | 56.68 | 91.02 |
| 2021-2022 | RACE-AS | N | 279 | 43.32 | 91.89 |

| | | | | | |
|---|---|---|---|---|---|
| 2021-2022 | RACE-BL | ALL | 6184 | 100 | 88.58 |
| 2021-2022 | RACE-BL | Y | 3842 | 62.13 | 86.71 |
| 2021-2022 | RACE-BL | N | 2342 | 37.87 | 91.6 |
| 2021-2022 | RACE-HI | ALL | 1137 | 100 | 83.97 |
| 2021-2022 | RACE-HI | Y | 654 | 57.52 | 83.63 |
| 2021-2022 | RACE-HI | N | 483 | 42.48 | 84.48 |
| 2021-2022 | RACE-WH | ALL | 1650 | 100 | 89.74 |
| 2021-2022 | RACE-WH | Y | 507 | 30.73 | 83.52 |
| 2021-2022 | RACE-WH | N | 1143 | 69.27 | 92.3 |

## Appendix B: Policy Documents or Guidelines

### Appendix B.1

The USDA 2021-2022 Updated Income Eligibility Requirements

INCOME ELIGIBILITY GUIDELINES

Effective from July 1, 2021 to June 30, 2022

| HOUSEHOLD SIZE | FEDERAL POVERTY GUIDELINES | REDUCED PRICE MEALS - 185 % | | | | FREE MEALS - 130 % | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ANNUAL | ANNUAL | MONTHLY | TWICE PER MONTH | EVERY TWO WEEKS | WEEKLY | ANNUAL | MONTHLY | TWICE PER MONTH | EVERY TWO WEEKS | WEEKLY |
| **48 CONTIGUOUS STATES, DISTRICT OF COLUMBIA, GUAM, AND TERRITORIES** | | | | | | | | | | | |
| 1 ..... | 12,880 | 23,828 | 1,986 | 993 | 917 | 459 | 16,744 | 1,396 | 698 | 644 | 322 |
| 2 ..... | 17,420 | 32,227 | 2,686 | 1,343 | 1,240 | 620 | 22,646 | 1,888 | 944 | 871 | 436 |
| 3 ..... | 21,960 | 40,626 | 3,386 | 1,693 | 1,563 | 782 | 28,548 | 2,379 | 1,190 | 1,098 | 549 |
| 4 ..... | 26,500 | 49,025 | 4,086 | 2,043 | 1,886 | 943 | 34,450 | 2,871 | 1,436 | 1,325 | 663 |
| 5 ..... | 31,040 | 57,424 | 4,786 | 2,393 | 2,209 | 1,105 | 40,352 | 3,363 | 1,682 | 1,552 | 776 |
| 6 ..... | 35,580 | 65,823 | 5,486 | 2,743 | 2,532 | 1,266 | 46,254 | 3,855 | 1,928 | 1,779 | 890 |
| 7 ..... | 40,120 | 74,222 | 6,186 | 3,093 | 2,855 | 1,428 | 52,156 | 4,347 | 2,174 | 2,006 | 1,003 |
| 8 ..... | 44,660 | 82,621 | 6,886 | 3,443 | 3,178 | 1,589 | 58,058 | 4,839 | 2,420 | 2,233 | 1,117 |
| For each add'l family member, add | 4,540 | 8,399 | 700 | 350 | 324 | 162 | 5,902 | 492 | 246 | 227 | 114 |
| **ALASKA** | | | | | | | | | | | |
| 1 ..... | 16,090 | 29,767 | 2,481 | 1,241 | 1,145 | 573 | 20,917 | 1,744 | 872 | 805 | 403 |
| 2 ..... | 21,770 | 40,275 | 3,357 | 1,679 | 1,550 | 775 | 28,301 | 2,359 | 1,180 | 1,089 | 545 |
| 3 ..... | 27,450 | 50,783 | 4,232 | 2,116 | 1,954 | 977 | 35,685 | 2,974 | 1,487 | 1,373 | 687 |
| 4 ..... | 33,130 | 61,291 | 5,108 | 2,554 | 2,358 | 1,179 | 43,069 | 3,590 | 1,795 | 1,657 | 829 |
| 5 ..... | 38,810 | 71,799 | 5,984 | 2,992 | 2,762 | 1,381 | 50,453 | 4,205 | 2,103 | 1,941 | 971 |
| 6 ..... | 44,490 | 82,307 | 6,859 | 3,430 | 3,166 | 1,583 | 57,837 | 4,820 | 2,410 | 2,225 | 1,113 |
| 7 ..... | 50,170 | 92,815 | 7,735 | 3,868 | 3,570 | 1,785 | 65,221 | 5,436 | 2,718 | 2,509 | 1,255 |
| 8 ..... | 55,850 | 103,323 | 8,611 | 4,306 | 3,974 | 1,987 | 72,605 | 6,051 | 3,026 | 2,793 | 1,397 |
| For each add'l family member, add | 5,680 | 10,508 | 876 | 438 | 405 | 203 | 7,384 | 616 | 308 | 284 | 142 |
| **HAWAII** | | | | | | | | | | | |
| 1 ..... | 14,820 | 27,417 | 2,285 | 1,143 | 1,055 | 528 | 19,266 | 1,606 | 803 | 741 | 371 |
| 2 ..... | 20,040 | 37,074 | 3,090 | 1,545 | 1,426 | 713 | 26,052 | 2,171 | 1,086 | 1,002 | 501 |
| 3 ..... | 25,260 | 46,731 | 3,895 | 1,948 | 1,798 | 899 | 32,838 | 2,737 | 1,369 | 1,263 | 632 |
| 4 ..... | 30,480 | 56,388 | 4,699 | 2,350 | 2,169 | 1,085 | 39,624 | 3,302 | 1,651 | 1,524 | 762 |
| 5 ..... | 35,700 | 66,045 | 5,504 | 2,752 | 2,541 | 1,271 | 46,410 | 3,868 | 1,934 | 1,785 | 893 |
| 6 ..... | 40,920 | 75,702 | 6,309 | 3,155 | 2,912 | 1,456 | 53,196 | 4,433 | 2,217 | 2,046 | 1,023 |
| 7 ..... | 46,140 | 85,359 | 7,114 | 3,557 | 3,284 | 1,642 | 59,982 | 4,999 | 2,500 | 2,307 | 1,154 |
| 8 ..... | 51,360 | 95,016 | 7,918 | 3,959 | 3,655 | 1,828 | 66,768 | 5,564 | 2,782 | 2,568 | 1,284 |
| For each add'l family member, add | 5,220 | 9,657 | 805 | 403 | 372 | 186 | 6,786 | 566 | 283 | 261 | 131 |

## Appendix B.2

Maryland State Department of Education Income Eligibility Guidelines
(Effective July 1, 2020 through June 30, 2021)

| Household Size | Free Meals | | | | | Reduced Price Meals | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Yearly | Monthly | Twice per month | Every Two Weeks | Weekly | Yearly | Monthly | Twice per month | Every Two Weeks | Weekly |
| 1 | $16,588 | $1,383 | $692 | $638 | $319 | $23,606 | $1,968 | $984 | $908 | $454 |
| 2 | 22,412 | 1,868 | 934 | 862 | 431 | 31,894 | 2,658 | 1,329 | 1,227 | 614 |
| 3 | 28,236 | 2,353 | 1,177 | 1,086 | 543 | 40,182 | 3,349 | 1,675 | 1,546 | 773 |
| 4 | 34,060 | 2,839 | 1,420 | 1,310 | 655 | 48,470 | 4,040 | 2,020 | 1,865 | 933 |
| 5 | 39,884 | 3,324 | 1,662 | 1,534 | 767 | 56,758 | 4,730 | 2,365 | 2,183 | 1,092 |
| 6 | 45,708 | 3,809 | 1,905 | 1,758 | 879 | 65,046 | 5,421 | 2,711 | 2,502 | 1,251 |
| 7 | 51,532 | 4,295 | 2,148 | 1,982 | 991 | 73,334 | 6,112 | 3,056 | 2,821 | 1,411 |
| 8 | 57,356 | 4,780 | 2,390 | 2,206 | 1,103 | 81,622 | 6,802 | 3,401 | 3,140 | 1,570 |
| For each additional family member add | $5,824 | $486 | $243 | $224 | $112 | $8,288 | $691 | $346 | $319 | $160 |

## Appendix B.3

Maryland State Department of Education Income Eligibility Guidelines
(Effective July 1, 2021 through June 30, 2022)

**INCOME ELIGIBILITY GUIDELINES**
**(Effective July 1, 2021 through June 30, 2022)**

| Household Size | Free Meals | | | | | Reduced-Price Meals | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Yearly | Monthly | Twice per month | Every Two Weeks | Weekly | Yearly | Monthly | Twice per month | Every Two Weeks | Weekly |
| 1 | $16,744 | $1,396 | $698 | $644 | $322 | $23,828 | $1,986 | $993 | $917 | $459 |
| 2 | 22,646 | 1,888 | 944 | 871 | 436 | 32,227 | 2,686 | 1,343 | 1,240 | 620 |
| 3 | 28,548 | 2,379 | 1,190 | 1,098 | 549 | 40,626 | 3,386 | 1,693 | 1,563 | 782 |
| 4 | 34,450 | 2,871 | 1,436 | 1,325 | 663 | 49,025 | 4,086 | 2,043 | 1,886 | 943 |
| 5 | 40,352 | 3,363 | 1,682 | 1,552 | 776 | 57,424 | 4,786 | 2,393 | 2,209 | 1,105 |
| 6 | 46,254 | 3,855 | 1,928 | 1,779 | 890 | 65,823 | 5,486 | 2,743 | 2,532 | 1,266 |
| 7 | 52,156 | 4,347 | 2,174 | 2,006 | 1,003 | 74,222 | 6,186 | 3,093 | 2,855 | 1,428 |
| 8 | 58,058 | 4,839 | 2,420 | 2,233 | 1,117 | 82,621 | 6,886 | 3,443 | 3,178 | 1,589 |
| For each additional family member add . . . | $5,902 | $492 | $246 | $227 | $114 | $8,399 | $700 | $350 | $324 | $162 |

**Appendix C: Code Book**

| Variable Name | Description |
|---|---|
| SY | School Year (2020-2021 or 2021-2022) |
| Student Group | Sub-group Classification (Male, Female, Hispanic, Black, Asian, White) |
| FARM Status | FARMS Eligibility (Y = Yes, N = No) |
| Unique Student | The number of students in a subgroup |
| Percent Total | The percentage of the subgroup in the population |
| Attendance Rate | The median attendance rate for a subgroup (%) |
| Post | Period of Policy Implementation:<br>0= Pre-Policy (2020-2021) |
| FARMS Concentration | Variable categorised by High or Low according to the average FARM % |

## APPENDIX D: R Code Used For Quantitative Analysis

### DATA LOADING

```
library(readxl)
data <- read_excel("AttendanceData.xlsx")
```

### FARM STATUS ANALYSIS

```
library(dplyr) farm_summary <- data %>% group_by(FARMS_Status, Post) %>% summarise(Avg_Attendance = mean(Avg_Attendance, na.rm = TRUE), n = n())
```

### VISUALIZATION FOR FARM IMPACT

```
library(ggplot2) ggplot(farm_summary, aes(x = FARMS_Status, y = Avg_Attendance, fill = as.factor(Post))) + geom_bar(stat = "identity", position = "dodge") + labs(title = "Average Attendance by FARM Status & Policy Period", x = "FARMS Eligibility", y = "Average Attendance Rate", fill = "Policy Period") + theme_minimal()
```

### GENDER ATTENDANCE

```
gender_avg_attendance <- data %>% filter(FARMS_Status == "Y") %>% group_by(Gender) %>% summarise(Avg_Attendance = mean(Avg_Attendance, na.rm = TRUE))

ggplot(gender_avg_attendance, aes(x = Gender, y = Avg_Attendance, fill = Gender)) + geom_bar(stat = "identity") + geom_text(aes(label = paste0(round(Avg_Attendance, 1), "%")), vjust = -0.5) + labs(title = "Average Attendance by Gender (FARM-Eligible)", y = "Attendance Rate (%)") + theme_minimal()
```

## RACE ATTENDANCE

```
race_avg_attendance <- data %>% filter(FARMS_Status == "Y") %>%
group_by(Race)       %>%       summarise(Avg_Attendance       =
mean(Avg_Attendance, na.rm = TRUE))

ggplot(race_avg_attendance, aes(x = Race, y = Avg_Attendance, fill
= Race)) + geom_bar(stat = "identity") + geom_text(aes(label =
paste0(round(Avg_Attendance, 1), "%")), vjust = -0.5) + labs(title
= "Average Attendance by Race (FARM-Eligible)", y = "Attendance
Rate (%)") + theme_minimal()
```

## APPENDIX E

## Approval Letter From Baltimore County Public Schools To Conduct Research (*Personal address removed for privacy)*

BALTIMORE COUNTY PUBLIC SCHOOLS

Dr. Myriam Yarbrough ♦ Superintendent ♦ 6901 North Charles Street ♦ Towson, MD ♦ 21204

July 7, 2023

Mr. Jonathan Frederick
[redacted]

Dear Mr. Frederick:

The Baltimore County Public Schools Institutional Review Board (BCPS IRB) has received your request to conduct a research study in BCPS. The proposal, *The impact of the 2021-2022 Updated Income Eligibility Guidelines For Free And Reduced-Price School Meals On High School Attendance in the Baltimore County Public Schools West Zone* (RP 2576), has been approved. The approval is applicable for the 2022–2023 academic year. Any changes to the research protocol or deviation in timeline must be submitted to the BCPS IRB for approval.

**Upon completion of the study, you agree to share any results with BCPS** through the BCPS IRB at Research-IRB@bcps.org or 9611 Pulaski Park Drive, Suite 305, Baltimore, Maryland 21220.

We wish you good luck in your research endeavors.

Sincerely,

Christine W. Koth, Ph.D.
Director, Office of Research
Chair, BCPS IRB
Department of Research, Accountability, and Assessment

Copies to: Dr. Myriam Yarbrough, Superintendent
Dr. Jennifer Mullenax, Acting Chief of Schools
Dr. Jess Grim, Chief Operating Officer
Mr. Kevin Connelly, Executive Director, Department of Research, Accountability, and Assessment
File

*Engage. Empower. Excel.*

**APPENDIX F:**

**SUMMARY Of Difference in Differences (DiD) model**

Table showing the results of the linear regression model:

```
Residuals:
    Min      1Q  Median      3Q     Max
-8.8743 -0.4093  0.3307  1.3032  6.2157

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  89.7443     1.2474  71.947  < 2e-16 ***
treated      -5.8400     1.7640  -3.311  0.00294 **
post          0.7614     1.7640   0.432  0.66986
interaction   1.5886     2.4947   0.637  0.53030
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.3 on 24 degrees of freedom
Multiple R-squared:  0.4329,    Adjusted R-squared:  0.3621
F-statistic: 6.108 on 3 and 24 DF,  p-value: 0.003072
```

**APPENDIX G:**

Table showing the median attendance of students according to their FARM status Pre and Post – Policy Implementation.

| | FARMS_Status | Post | Avg_Attendance | n |
|---|---|---|---|---|
| | <chr> | <dbl> | <dbl> | <int> |
| 1 | N | 0 | 89.7 | 7 |
| 2 | N | 1 | 90.5 | 7 |
| 3 | Y | 0 | 83.9 | 7 |
| 4 | Y | 1 | 86.3 | 7 |