ACROSS THE SPECTRUM OF SOCIOECONOMICS

Insights from global research network striving to find solutions to world issues through innovative studies

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Editors Note

The International Socioeconomics Laboratory is proud to present its fourth issue of the *Across the Spectrum of Socioeconomics* journal. In 2017, we realized that the socioeconomic issues and conflicts present on the international scale needed to be addressed. Involvement in and a deep understanding of the socioeconomic field is vital, and thus the institution that has grown to become the global research network known as the International Socioeconomics Laboratory was founded. Our success is contingent upon cultivating the unique triumphs of individuals, communities, and countries as we work with a diverse set of legislators and scholars ranging from local leaders in Myanmar to United States Senators. Since 2017, our research has had immense translational effects, which include numerous bills in policy introduced by our institute, as well as our data backed developmental projects for underserved communities that are valued over $150 million USD.

We understand that legislative action and expansional ventures around the world with a goal as audacious as supporting human-rights, healthcare growth, and education revitalization is an immense undertaking. However, our institution believes that by focusing on socioeconomics, we can best address the most pressing issues around the world. The relevance of our work has been reinforced in the twenty-first century, as we face social and public health challenges that cannot be ignored. Reliable data is more important than ever before in guiding decision-making on all fronts of social and economic issues.

The research in this issue has been produced by fellows of the laboratory with the guidance of their Principal Investigators. We thank all of the principal investigators from universities all across the country. We also thank all of our advisors from Harvard University, London School of Economics, Fordham University, Duke University, Yale University, University of Cambridge, and Stanford University. Without you, our work would not have been possible.

As we grow as an institution, we will continue to strive to bring light to the bridge between the fields of social science and economics. We will keep expanding and improving our network of researchers in order to cultivate a society of individuals who will go beyond passive advocacy and make substantive change to create a sustainable future. That is the importance and vitality of the field of socioeconomics.

As the International Socioeconomics Laboratory continues to develop, we will continue to provide the world with extensive, non-partisan research to better your understanding of these prevalent issues and for the advancement of society.

Sincerely,

Mahmoud Abdellatif, Chief Operating Officer, *Across the Spectrum of Socioeconomics*
Sarah Derkach, President, *Across the Spectrum of Socioeconomics*
Maya Dunayer, Editor in Chief, *Across the Spectrum of Socioeconomics*

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Suitability of Unemployment Benefits in NYC

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Abstract

The state of New York reported the second-largest rate of percent decline in employment compared to October 2020, being down 10.4%, which translates to 1 million fewer jobs. This puts New York at the second place based on the highest total number of jobs lost over the year of any state, behind the 1.37 million lost by California. This spike in unemployment is correlated to the various stay-at-home orders implemented due to the COVID-19 pandemic and other pandemic-related factors.

In this study, we will observe unemployment rates across U.S cities over the past decade and specifically analyze the factors influencing unemployment in New York City compared to cities with lower unemployment rates and better handling of the COVID-19 pandemic. We will also analyze how residents of New York City varied in their ideal maximum unemployment benefit amount depending on their borough, economic status, and other factors. Our primary research method will be to conduct a survey of 75 New York City residents to identify trends based on our variables that include borough, the number of people who are unemployed in the participant's immediate community and the amount that they perceive to be reasonable maximum unemployment benefit amount. We will also observe unemployment benefit policies and how they have affected the unemployment rate in cities before and after implementation, to understand whether it is frictional, structural, or cyclical unemployment that is prevalent in New York.
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Categories: New York, Unemployment, Welfare
Keywords: Unemployment Benefits, COVID-19, New York City

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Background Research

Unemployment has been a relevant statistic in America for decades. It is important to consider the effects of the coronavirus on unemployment, as well as the overall economic health of America. Many people who have been unemployed for a long time, lack the skills to rejoin the workforce. The unemployment rate also fails to recognize discouraged workers, who have given up the search for a job. The addiction to various narcotics affects many workers across all income levels. Current works all seem to point out the fluctuations that occur with unemployment rates, but the overall number has risen to a whole new level. The project at hand focuses on the changes of unemployment rates within New York City while relating it to other large domains; observing the patterns helps one learn about the static, dynamic, and questionable types of movements that take place. In response to factors such as significant fluctuations in stock prices, intriguing presidential debates, employer shortages, etc. within the last decade, unemployment rates have unsurprisingly been quite variable.

The research question at hand dives deep into the complexities of all industries and fields of works. With nearly 11.5% of NYC workers being left unemployed in December 2020, it becomes clear that even in a time where most of the population has adjusted to COVID-19, some people have been left stranded. Previous works have developed theories and ideas tied to unemployment, its factors, and its root causes; this paper will seek the possible reasons for fluctuations in unemployment patterns along with the hard-hitting impact of COVID-19.

To better understand the topic, there should be emphasis on the four main types of unemployment: Frictional Unemployment – This type of unemployment is based almost entirely on the circumstances of the individual. Frictional unemployment arises when a person is seeking or transitioning to a new job and includes individuals new to the workforce (i.e graduates). This type of unemployment is the most common and unlike other types, does not fluctuate during an economic recession. Structural Unemployment - This type of unemployment is the situation in which there is a mismatch between the skills offered and the skills demanded of individuals. Structural unemployment is often caused by technological advances that render several skills obsolete or inadequate. Cyclical unemployment refers to the effect of economic cycles on unemployment. As proven by history, every eight to ten years unemployment rises during economic downturn and decreases during periods of prosperity. There isn't much that can be done to prevent this job loss, but it sometimes has a particular effect on a specific sector. This was exemplified in 2008-2009 when the housing market collapsed after banks gave out high risk loans for a short-term profit. Unsurprisingly, the financial service industry was impacted heaviest. Whether an individual was a banker, business manager, or anything related to money, their job was left under high scrutiny and horrible results due to the recession. Workers affected by seasonal unemployment are not able to get regular unemployment benefits. A good example of this would be snow maintenance workers. When snowfall is quite unlikely to occur during the summer, there is no need to clean the roads or pour salt and thus these maintenance workers are not paid. Often, they need to find a second job.

When looking at unemployment benefits, it is crucial to note that unemployment insurance benefits only apply to those who are not unemployed at their own fault. This includes bankruptcy

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of a company, unreasonable employment release, natural disasters, pandemics, etc. Currently, NYC unemployment benefits are maximum $504 per week. Typically, the range for NYC unemployment benefits is between $100-$500 per week and can be extended for up to 20 extra weeks through Extended Benefits (EB) programs, as stated by Access NYC Government website. However, there is an eligibility requirement for those who receive unemployment benefits. Every state has their own requirements for the number of hours worked, needed to receive the benefits. At Careeronestop, there is a clear outline in which one can search for information regarding their state and receive detailed guidelines on the respective state government website, regarding eligibility. In NYC, "self-employed, independent contractors, farmers, workers with limited work history, and others" are not eligible for unemployment benefits. Eligibility also does not apply to teleworkers and those receiving paid sick leave or other paid benefits.

Those receiving unemployment benefits are also required to be searching for a job. As the article "Unemployment Job Search and Work Requirements", The Balance Careers, outlines, those receiving unemployment benefits are typically asked to report on job search activity to their state unemployment department. This allows the state to regulate who is in need of the benefits, and use the government aid, and those who are not actively searching for jobs.

The boroughs of NYC are distinctive by several factors pertaining to the way of living. Tied to the proposal of unemployment, we have chosen to review in detail the cost of housing within the five boroughs in order to understand the actual level of rent/mortgages. Starting off in Manhattan, the part of the city that was significantly impacted by the 9/11 attacks in 2001, the beginning of the 21st century saw a drastic boom in house prices. Average rent per month in the 2000's came out to about $3,800 per month, which is more than double the $1,800 per month that rent cost in the 1980's. Obviously, several fluctuations impacted the average cost of housing in this decade, including the terrorist attacks, the financial market meltdown, and the housing boom. The start of the next decade (2010's) actually saw a drop in average rent price by $300, coming out to $3,500 per month and taking into account factors like Quick Rebound and Tax Credit. Now, however, the price of renting an apartment in Manhattan is just over $4,300 indicating continuation of the significant increase in prices that occurred before the 2010's. With the median apartment price of over a million dollars, it seems safe to assume that Manhattan is a very expensive area. The Bronx, being another important borough, has also experienced changes and shifted its former housing prices. From the years ranging between 2000 and 2019, a total 135.24% appreciation was observed along with a 4.21% increase in average annual rates. A quick couple facts for you: the average cost of a home in the Bronx in the year 2000 was $236,000, the average rose to $330,000 in the year 2010, and rose heavily once again to $450,000 in the year 2019. This quite simply shows a drastic increase in housing pricing, even in what is regarded as the "poorest" borough, with an average income shy of $35,000 annually. Brooklyn, however, saw an even greater rise in prices from 2000 to 2010 to 2019. From 2010 to 2019 alone, the median house cost saw a $340,000 increase, indicating negative effects to house buyers, yet positive for infiltrating more and more money. Brooklyn is indeed one of the bigger attractions, with sports giants in the Brooklyn Nets and Brooklyn Dodgers. Queens used to be the second cheapest area to buy a home within the main boroughs, apart from the Bronx. However, its emphatic rise from $345,000 to $600,000 as the median price makes it clear that its prices saw a significant increase. Ultimately, Queens transformed from the second cheapest to the third most expensive, which out of a list of

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five doesn't seem like much, but definitely does matter when considering outside factors. Reaching the final borough, Staten Island comes into the conversation. Not conventionally known as the best locational borough to reside in, Staten Island still boasts several attractive features and one of them is the median house cost of around $550,000. When considering the rest of NYC's boroughs costs, only the Bronx has a lower current cost. The importance of housing costs and its tie to unemployment is clear; shelter is crucial to life and in order to get shelter you most likely need a sustainable source of income. If left unemployed, unemployment money will unfortunately probably not be able to cover even a fraction of the cost to continue living in a New York area home. Thus, it becomes evident that the saying "NYC is one expensive place to live in" is accurate. Research and studies done in the past suggest a national increase in unemployment since as early as 2007. However, each study concludes different causes and examines varying forms of unemployment. A study called, "Disentangling policy effects using proxy data: Which shutdown policies affected unemployment during the COVID-19 pandemic?" reviewed the COVID-19 pandemic as a major cause of unemployment in the US.

The impact it has had on unemployment rates in the past year are seen is the following research, "We find that between March 14 and 28, restaurant and bar limitations and non-essential business closures can explain 6.0% and 6.4% of UI claims respectively, while the other NPIs did not directly increase own-state UI claims." (Kong, Prinz 2020) The study identified the closing of non-essential businesses and limitations on dining, including bars and restaurants, having substantially increased unemployment rates. The COVID-19 pandemic has proven to drive business to bankruptcy beyond the US, however. This would be seen as cyclical unemployment, caused by a worldwide detriment to the economy. Specifically, in the study titled, "Do Extended Unemployment Benefits Lengthen Unemployment Spells?", data is collected specifically for long term unemployment. Ideally, unemployment for a longer duration of time occurs only due to frictional unemployment and difficulty finding an occupation. However, staggering data reveals that the increase in unemployment benefits could heavily impact the increased time of unemployment. As written, "Despite these small estimates, extended benefits can account for a substantial share of the increase in long-term unemployment." (Farber, Valletta 2014) This research paper explores the possibility that long-term unemployment rates have increased across the nation due to leniency in unemployment benefits. The paper studies outside the scope of general unemployment, but rather finds trends in government unemployment effects.

Cornell University performed a study titled, "The Increase in Unemployment Since 2007: Is It Cyclical or Structural?". In this research paper, data is collected on different industries between 2007 and 2012. The paper argues, "The unemployment rate greatly increased after the onset of the latest recession in December 2007, when it measured 5.0%. The rate peaked at 10.0% in October 2009, four months after the recession's official end in June 2009. More than three years into the recovery,

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Figure 1. Change in the Number of Jobs by Industry, 2007-2010

Industries

	Change in number of jobs (thousands)	Industry
-2,355		Manufacturing
-2,104		Construction
-1,254		Professional and business services
-1,106.1		Retail trade
-559.2		Wholesale trade
-440.7		Finance and insurance
-357.4		Transportation and warehousing
-321		Information
-238.6		Food services and drinking places
-230.2		Real estate and rental and leasing
-130		Other services
-112.7		U.S. postal service
-107.8		Accommodation
-60.6		Arts, entertainment, and recreation
-10.6		Logging
-7.9		Mining
-1.5		Utilities
10		Local government
20		State government
190.9		Social assistance
208.2		Educational services
347		Federal government (excluding U.S. postal service)
843.4		Health care

Change in number of jobs *(thousands)*

Source: Created by CRS from the total number of nonfarm jobs in 2007 and 2010, according to U.S. Bureau of Labor Statistics data from the Current Employment Statistics program.

Based on our data collection, if we find that NYC unemployment rates have been increasing in the past decade, we will cross reference the data regarding dates of unemployment and cause. This will help set a trend for the type of unemployment. As seen from the Cornell study, the number of jobs available or opportunities for employees vary across different industries. This is characteristic of structural unemployment. However, if our data were to point to cyclical unemployment, then we are addressing a systemic economic issue of varying degrees. Seen in other research done over the previous decades, regarding the unemployment rate averaged 8.1% in 2012." (Levine 2013) Cornell University's study has shown that unemployment rates across the nation have been rising since 2007. The question at hand is whether it is cyclical or structural unemployment.

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Across the Spectrum of Socioeconomics
Volume 1 Issue 4
DOI: 10.5281/zenodo.4743294

Figure 3. Percentage Point Change in the Hiring Rate by Industry, 2007-2010
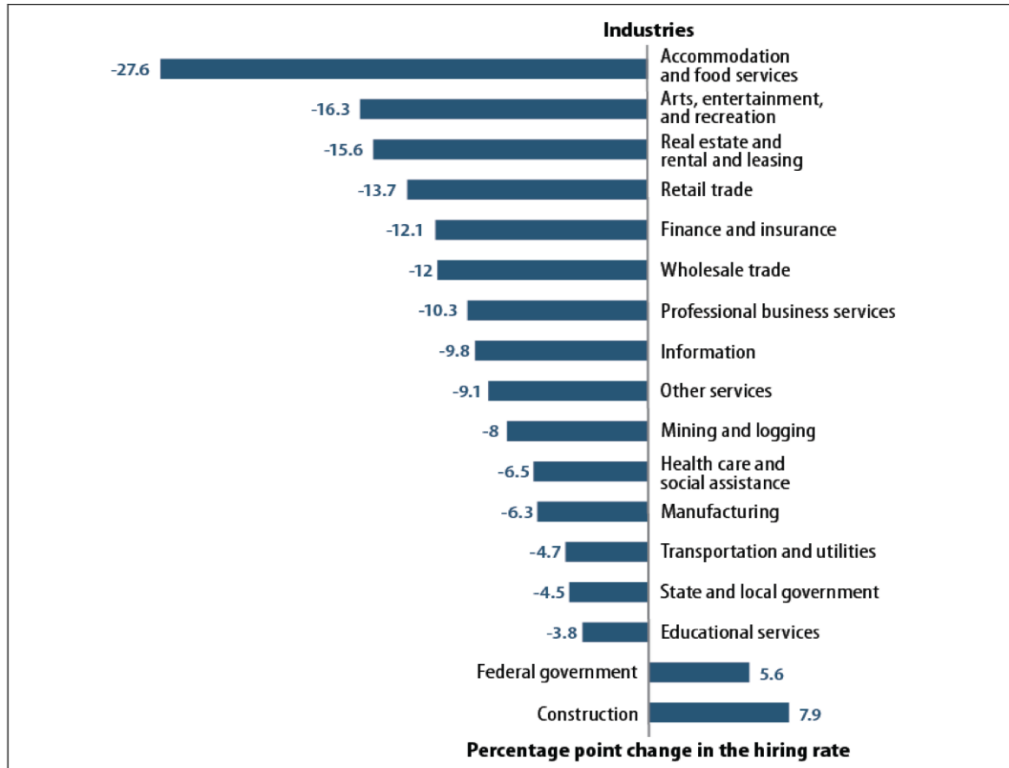
Source: Created by CRS from the hiring rate in 2007 and 2010 according to U.S. Bureau of Labor Statistics data from the Job Openings and Labor Turnover Survey.

Notes: The hiring rate is the number of hires during the entire year as a percent of annual average nonfarm employment.

Unemployment on a national scale, it is likely that our data will reveal a combination of frictional and cyclical unemployment, mostly due to COVID-19. The paper aims to create graphs displaying data collected by the survey, for each question. This includes years unemployed, status of employment, cause of initial unemployment. The data collected about the years of unemployment would display the possibility, similar to that in Cornell University's study, of increased unemployment benefits impacting the increase in long-term unemployment. The graph displaying data regarding the status of employment aims to reveal the difficulty finding a new job. This will set a standard for the hiring rates of different industries in NYC. The cause of initial unemployment will display trends occurring over the past decade, in hopes of preventing economic recessions in the future. The new laws created make the first $10,200 of benefits tax-free for people with less than $150,000 and only applies to 2020 only. Both benefits programs, the Pandemic Unemployment Assistance and Pandemic Emergency Unemployment will extend to Sept. 6.

Specific Aims

New Yorkers were more likely than adults nationwide to live in a household that lost employment

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income since the start of the COVID-19 pandemic. An average family of four living in New York City has an estimated monthly cost of $4,943.96 without rent. Although the current maximum unemployment amount of $504 is set to relieve these issues, there is still debate behind what the ideal amount should be set to. Depending on socioeconomic status and location of residence, there is bound to be differences among residents on the ideal amount. We seek to confirm this theory and understand the unemployment crisis and how New Yorker's believe it can be addressed through the maximum unemployment amount.

The study intends to understand how New Yorkers today think about the unemployment benefits in New York City. If they are dissatisfied with the result, we intend to evaluate how much is enough for them considering living expenses. We hypothesize that most unemployed New Yorkers are dissatisfied with the results and expect at least may sway the opinions of most people on whether the unemployment benefits are sufficient, some people may say that unemployment benefits may be enough/more than enough due to the stimulus check and how much they already receive from the stimulus check. However, the unemployment benefits are still very low, with the maximum amount per week a little less than $500. The CARES Act bumps the benefits to $600. Other stimulus check laws bump up the unemployment benefits; regardless, these may sway the general population to better unemployment benefits. $800 in terms of unemployment benefits. We also hypothesize that the prolonged unemployment rate is due to numerous factors. One major factor is the coronavirus pandemic's impact and how companies must furlough employees to maintain their business. Another factor is structural unemployment, which is caused when the unemployed workers' skill sets do not match the demanded skills; this is important due to the rapid pace in technological advantages today. A third factor is frictional unemployment where the employee is either unemployed or is undergoing job changes. A final factor is cyclical unemployment, which is when periods of unemployment occur every couple of years. We will examine these rates by surveying unemployed graduates and small businesses in New York City. After conducting this survey, we will analyze the data we have received and use it to evaluate the patterns of employment in New York City. Afterward, we will use preceding surveys in other U.S. cities and their rate of unemployment to compare them with that of New York City. Finally, we will use all the information gathered to evaluate our hypothesis and use it to help create better unemployment rates. We also want to understand the correlation between unemployment insurance benefits and unemployment rates. A popular debate that currently consumes Congress today as they debate over Biden's proposed 1.9T stimulus bill is: how much unemployment insurance is best? We guess that some number of benefits helps workers get back to work because it provides them with the funds for their daily.

Materials and Methods

For this study we are analyzing and determining the causes and effects of unemployment benefits. We will be looking for qualitative data, asking NYC residents about the current amount of unemployment benefits. We will be creating a survey for NYC residents, asking about unemployment, and if they are comfortable, the reason for it. In the study – The independent variables are : Borough (in New York City), "Have you (or anyone you know) ever been unemployed in the past 20 years (pre-Covid)?". Boroughs are being used to narrow down this data to certain areas of New York City, as well as for background information. In the google

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form, the "Have you(or anyone you know) ever been unemployed in the past 20 years (pre-Covid), is going to be used as background as well. This question is vital to the ethos of this study and portrays proper data in which people have first-hand experience on the issue at hand. For this question, we decided to have 2 answers choices - yes and no. The dependent variable in the study is: "The maximum unemployment benefit in NYC today is $504 a week, do you believe that is 1, 2, or 3?". The response for this question is meant to give people a perspective on unemployment benefits and be able to share needs so they can focus on finding new jobs. However, at the same time we recognize that too much insurance could possibly discourage people from returning to work because they can live more comfortably by remaining unemployed. To answer this question, we hope to isolate the changing unemployment rates in New York and understand how much of their deviation can be attributed to the simultaneously changing amount of unemployment benefits offered by the state. their thoughts. We placed 3 possible answer choices - (1) Not enough to live comfortably, (2) right amount, and (3)more than enough to live comfortably. The substance of this question lies beneath the realization of how unemployment benefits affect people in various communities. Through giving people a ballpark estimate of the amount unemployed individuals receives through benefits, we are trying to figure out whether or not the quantity should be altered.

We also aim to review the data collected by the Bureau of Labor Statistics on the unemployment services offered by New York. We will create a line graph depicting the different amounts of unemployment benefits offered at a certain time and chart a line of linear regression on top to understand at what times the state deviated the most from the mean. Then, we will compare this data to our chart on unemployment rates in New York and describe any correlations that we find. At the same time, we will research extensively the time periods where we find the deviations to ensure that our data can be isolated from other world events that may be associated with the changing unemployment rate more so than the changing amount of unemployment benefits.

Data

Descriptive Statistics:
Figure 1:

	Have you (or anyone you personally know) been unemployed within the past 20 years (pre-Covid)?
Valid	71
Missing	8
Mean	1.423

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Std. Deviation	0.497
Minimum	1.000
Maximum	2.000

Figure 1 is a descriptive model that demonstrates the breakdown of the responses to the question, "Have you (or anyone you personally know) been unemployed within the past 20 years (pre-Covid)?". In the table, 1 represents those who answered "Yes" and 2 those who answered "No".

Frequency Tables:

Figure 2.1:

Frequencies for Have you (or anyone you personally know) been unemployed within the past 20 years (pre-Covid)?

Have you (or anyone you personally know) been unemployed within the past 20 years (pre-Covid)?	Frequency	Percent	Valid Percent	Cumulative Percent
1	41	51.899	57.746	57.746
2	30	37.975	42.254	100.000
Missing	8	10.127		
Total	79	100.000		

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Figure 2.1 is a frequency table of the question, "Have you (or anyone you personally) been unemployed within the past 20 years (pre-Covid)?". In this model, 1 represents those who answered "Yes" and 2 those who answered "No". 41 out of 71 participants answered that they have, or know someone who has been, unemployed in the past 20 years. 30 of the 71 participants selected that they have not, or do not know anyone who has been, unemployed in the past 20 years. This is 57.75% and 42.25% respectively.
Figure 2.2:

Frequencies for Borough

Borough	Frequency	Percent	Valid Percent	Cumulative Percent
Bronx	10	12.658	14.085	14.085
Brooklyn	6	7.595	8.451	22.535
Manhattan	12	15.190	16.901	39.437
Queens	35	44.304	49.296	88.732
Staten Island	8	10.127	11.268	100.000
Missing	8	10.127		
Total	79	100.000		

Figure 2.2 displays the frequencies for the varying boroughs of the participants. In this table, 10 people responded from the Bronx, 6 from Brooklyn, 12 from Manhattan, 35 from Queens, and 8 from Staten Island, for a total of 71 participants. This can also be represented as 14.09%, 8.45%, 16.9%, 49.3%, and 11.27% respectively.

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ANOVA:

Figure 3.1:

ANOVA - The maximum unemployment benefit in NYC today is $504 a week, do you believe that is

Cases	Sum of Squares	df	Mean Square	F	p
Have you (or anyone you personally know) been unemployed within the past 20 years (pre-Covid)?	**1.347**	**1**	**1.347**	**4.301**	**0.042**
Residuals	**21.611**	**69**	**0.313**		

Figure 3.1 is an ANOVA test comparing responses to the questions, "Have you (or anyone you personally know) been unemployed within the past 20 years (pre-COVID)?" and "The maximum unemployment benefit in NYC today is $504 a week, do you believe that is 1, 2, or 3?" in which 1 represents those who believe the current maximum benefits are not enough to live comfortably, 2 is for those who believe that it is enough, and 3 for those believe it is more than enough to live comfortably. Question 1, regarding having been, or knowing anyone who has been, unemployed, is the independent variable. Question 2, regarding opinions on the current maximum unemployment benefit, is the dependent variable. The p-value for the ANOVA test is 0.042, > 0.05.

Figure 3.2:

ANOVA - The maximum unemployment benefit in NYC today is $504 a week, do you believe that is

Cases	Sum of Squares	df	Mean Square	F	p
Borough	**2.122**	**4**	**0.531**	**1.680**	**0.165**
Residuals	**20.836**	**66**	**0.316**		

Figure 3.2 is an ANOVA test that compares the boroughs of the participants with responses to the question "The maximum unemployment benefit in NYC today is $504 a week, do you believe that is 1,

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2, or 3?". The p-value for the ANOVA test is 0.165, < 0.5.

Linear Regressions:
Figure 4.1:

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	1.352	1	1.352	4.732	0.035
	Residual	13.424	47	0.286		
	Total	14.776	48			

Note: The intercept model is omitted, as no meaningful information can be shown.

Figure 4.1 is the ANOVA test in a linear regression between the questions, "The maximum unemployment benefit in NYC today is $504 a week, do you believe that is 1, 2, or 3?" and "What would you set the maximum unemployment benefit to (realistically considering NYC living expenses) ? (write only the number)". In this regression test, the dependent variable remains the same, and the question asking participants to set their own maximum unemployment rate, serves as the covariates. The p-value for this ANOVA test is 0.035, > 0.05.

Figure 4.2:

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	1.327	0.079		16.737	$\leq$ .001
H_1	(Intercept)	1.549	0.128		12.128	$\leq$ .001

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	What would you set the maximum unemployment benefit to (realistically considering NYC living expenses) ? (write only the number)	-2.219e -4	1.020e -4	-0.302	-2.175	0.035

Figure 4.2 provides the coefficients for the regression test. The standard and unstandardized error are displayed for each value, as well as their respective p-values.

Data Analysis

The relationship between participants' experience with unemployment, and their opinion on the current maximum unemployment benefits in NYC is significant. With a p-value of 0.042, the data can be considered correlational. Considering the data, it is evident that those who have experienced, or know someone who has experience, unemployment is inclined to believe that the current maximum benefits in NYC are not sufficient, to support their living expenses. The relationship between the borough of the participants and their evaluation of the current maximum benefits proved insignificant, with a p-value of 0.165. However, this indicates that there are people in the same borough who find that the current maximum benefits in NYC would and would not accommodate their living expenses. The study can be redesigned to evaluate the opinions, regarding the maximum unemployment benefits in NYC, based on specific neighborhoods. This would provide more accurate information concerning the maximum benefits' support for living expenses, based on location.

The data shows that Queen's residents are more likely to know someone who is unemployed, considering this, unemployment policies would probably focus on queens over other boroughs. This poses the question of why unemployment is so unevenly distributed. Considering Queens has such a low cost of living, in most neighborhoods, it may be manageable for people to live solely off of unemployment. In one of the borough's various housing projects, an applicant can rent a three-bedroom apartment for $500/month. People on unemployment benefits are given that much in a week. In combination with food stamps, there is no need to look for a job

Conclusion

When it comes to unemployment, the questions are endless; one could be asked about the skilled vs. unskilled, specific distribution of benefits, how a larger population may react to unemployment, etc. In seeking for those answers, we have observed other policies that have been employed in an effort to see what NYC could potentially utilize. First off, can jobs be provided to everyone? One would think that the most optimal solution would simply be to create an area in which everyone is employed, but this simply is not viable, nor would it allow a society to

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properly function. Rather, the goal should be to form job openings in which true workers can show their passion.

According to a study conducted by UMass Amherst, building mass transit is frankly the most cost-effective solution to unemployment. The formation creates approximately 20,000 job openings and costs about 1 billion dollars to create. This solution may be broad but reaches a scope that NYC has already shown to take decent advantage of. Several other ideas could be utilized in order to create job openings and other regulatory factors. One main objective could eventually shift into getting homeless off the streets. 1 out of every 106 people in NYC is homeless, totally out to near 80,000. These large numbers could be a turning factor in terms of employment, unemployment, benefits, etc. Compared to its neighboring state, New Jersey, NYC's problem of homelessness is quite severe. New Jersey boasts diverse populations, high incomes, and low unemployment rate (around 3% in 2019). The sheer skill of laborers excels those of many other states and policies in the works look to further impact the area.

Regarding unemployment benefits, it can be observed that a dollar of benefits eventually translates into 1 dollar and 64 cents of Gross Domestic Product (GDP). This is caused by a ripple effect. If one were to purchase an apple for one dollar at the grocery store, this apple is for eating, while the dollar you pay gets infiltrated into paying for the store employees' salaries: the transporter of the apple's salary, the farmer who planted the apple's salary, etc. It becomes evident that unemployment benefits are indeed improving the economy bit by bit, but as seen in the data, the value can be considered too high or too low, to accommodate living expenses. A solution, as utilized in several states around the world, is to enforce stricter requirements in order to gain benefits. If the cost of living is exceeded by the benefits an unemployed individual would not be inclined to search for a new job. By enforcing stricter regulations, benefit amounts can be regulated more evenly. Several other ideas such as funding for education, forming a maximum hour limit, etc. have been suggested as policies, but no immediate results have been displayed.

After analyzing this study's results, there is a clear relation between NYC resident's experience with unemployment and their opinions on the suitability of the current maximum benefits. We initially believed this to be the case as typically those with lower income and higher living expenses will prefer a higher benefit amount especially if they have been unemployed. Our survey and data pointed to this as well as our ANOVA test pointed towards a strong correlation between the borough of the participant and whether they believed the current unemployment benefit amount of 504$ was not enough to live comfortably or enough comfortably from a scale of 1-3. Although there are factors limiting our study, specifically only 75 participants and a strong skew towards Queens's residents, we still believe a larger sample will reflect this trend. Unemployment has always been prevalent across NYC and as living expenses and financial instability occur throughout NYC; we can only expect a greater demand for higher unemployment benefit amounts. Although we can neither confirm nor deny the effectiveness of higher or lower unemployment benefits with this paper, it is important to note the difference in need across varying communities. These results only highlight the income disparity and severe effects unemployment has had across NYC. More importantly, we believe the results of our study can provide insight into what New Yorker's expect the government to provide and how New

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Yorker's perceptions towards unemployment policy and benefit amounts are affected by their unique circumstances.

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The Case for a Green Economy

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Abstract

In recent years, it has become clear that how we produce energy determines the future of our economic and environmental prosperity; affordable, reliable, and decarbonized energy systems are critical to preserving this future. This has prompted many people, including us, to take a closer look at the broad concept of a "Green Economy," what it entails, and how we can best transition to it. This study investigated the viability and appeal of the green economy and analyzed homeowner response data to better understand which factors influenced the decision to switch to solar and why the homeowners made the switch. A sample of 159 homeowners from the United States and a few foreign countries completed a Google form with multiple choice, multiple selection, and open-ended questions. The questions were used to assess the relationship between our independent variables: income bracket, location, and solar panel ownership, and the dependent variables: attitude toward solar panels (motivation to switch, hesitations, willingness to spend and convictions). The results indicated that the main drawbacks of switching to solar are (a) the cost; solar energy is expensive/overpriced and out of reach for the average American, with nearly 90% of respondents saying they will not spend more than $7500, despite the fact that the average initial cost runs up to $13,320. (b) Lack of information; there is insufficient information about solar energy. (c) Excess regulations, which vary by town, make the process of installing solar panels tedious and confusing (d) Strict regulations make local electricians unable to install solar, causing prices to be high because installation companies charge a premium. Contrary to our initial hypothesis, income is not correlated to propensity of an individual to install solar panels, in fact the establishment of a correlation between these two variables is due to chance 9.7% of the time. Implications of this study can inspire policy change and reduce regulations to ease panel installation while also increasing pollution monitoring enforcement and implementing systems to incentivize corporations to go greener. This research will also provide a better understanding of solar energy and the importance of transitioning to a green economy.

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Categories: Environment, Economy
Key Words: Solar Energy, Green Economy

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Introduction

In the United States and several other countries around the globe, fossil fuels are the most important sources of energy production. Today, the combustion of fossil fuels such as oil, coal, and gas provide approximately 80% of our energy needs and as the population and economy grow rapidly, we can easily predict that this percentage will increase. While this growth is beneficial economically, it has unavoidable negative externalities such as threats to the environment and our lives. The combustion of fossil fuels emits gases and chemicals into the atmosphere, and in an especially destructive feedback loop, air pollution not only contributes to but also exacerbates climate change. According to a 2014 EPA study, carbon dioxide accounted for 81% of total greenhouse gas emissions in the United States, with methane accounting for 11% (Mackenzie,2016), both of which are byproducts of the combustion of fossil fuels. This brings up a long-running debate: "Do you compromise the economy to save the environment, or do you compromise the environment to save the economy?" Such discussions, in particular, emphasize the significance of transitioning to a green economy.

A green economy is one that promotes both sustainability and economic growth. It is a viable alternative to today's dominant economic model, which exacerbates inequalities, promotes waste, causes resource scarcity, and poses widespread threats to the environment and human health.

The transition to a green economy can be accomplished in a variety of ways, but we have focused on one that is most critical: the power sector. Cleaner energy resources such as solar energy produce negligible or no greenhouse gas emissions, switching to them as our main source of energy, would reduce pollution and greenhouse gas emissions, which fossil fuels are primarily responsible for. Furthermore, solar panels have been widely available for mass consumption since 1963, and the benefits of this renewable energy on the environment, economy, and people's daily lives have been widely accepted by the majority of environmental scientists, green engineers, and economists.

Despite all of this data to support the transition to solar energy, only 6% of American homeowners claim to have installed solar panels on their properties as of 2019 (Kennedy & Thigpen, 2019). There is clearly a problem, and research in this area appears to be lacking. This provides an opportunity to conduct research and analyze response data from homeowners both nationally and overseas, to better understand the socioeconomic status of individuals purchasing solar panels and what factors influenced their decision to switch. This research aims to provide insight to the feasibility and appeal of a green economy and aid the local and state to put more effort into making this transition a reality.

Background Information

Environmental Incentives:

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The contribution of solar energy to the global and United States electricity supply is moderate but growing at a rapid pace—a consequence of steep reductions in the cost of solar energy, and in the United States, a host of policy measures at the state and federal level. At the federal level, the United States has invested in various programs that provide direct financial assistance to solar power projects, such as the investment tax credit. In addition, the federal government has designed a targeted research program called the SunShot Initiative in an ambitious attempt to bring in new and revamped solar technologies to market and to reduce the overall costs of deploying existing technologies. One of the central goals of this initiative is to reduce the total installation cost of utility solar photovoltaics to $1 per Wdc by 2021, as well as other concomitant reductions in the cost of solar replacements and applications. In the long run, these initiatives aim to strengthen the role of solar as a low-cost source of energy and motivate higher levels of electricity supply through the use of solar.

Achieving the aforementioned cost reductions would drive profound and long-lasting implications for the solar industry, the electricity sector as a whole, end-use electricity consumer, and the environment. Considerable progress has already been made in meeting the intended cost goals, though success by 2021. The Department of Energy recently released the SunShot Vision Study to provide an in-depth assessment of the great potential of solar technologies and to evaluate the environmental implications of reaching the SunShot cost objectives. The study explicitly recommends that the overall solar electricity penetrations of annual U.S. electricity demand be at 14% by 2020 and 27% by 2030 (DOE, 2012). While these estimates are detailed and time-sensitive, they do not comprehensively quantify the significant environmental and health advantages associated with achieving such levels of solar penetration.

The environmental and public health benefits of solar energy stem from averting the harmful usage of combustion-based electricity generation. Depending on the fuel and technology type, combustion-based electricity generation emits greenhouse gases into the atmosphere and releases nitrogen oxides. These pollutants contribute to ozone air pollution. Breathing elevation concentrations of ozone can dramatically reduce lung function, making it more difficult to breathe deeply and vigorously.

Global Energy Resources:

Current global energy consumption is 4.1×10 J annually. Projected population and economic growth are predicted to more than double this consumption rate by 2040 and more than triple it by 2100. Ergo, in order to adequately boost global primary energy supply, a prospective energy resource must be utilized that can provide a minimum of 1-10 TW of power for an extended period of time. Moreover, the existential threat of climate change creates an extra requirement on prospective energy resources: they must generate energy without emitting any form of greenhouse gases. Fortunately, solar energy meets both of these requirements.

It is important to note that solar energy is diffuse and intermittent, so it must be harnessed in a system of effective storage and distribution. This is imperative to matching supply with demand.

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Specific Aims and Objectives

Renewable energy sources play a vital role in securing sustainable energy with lower emissions1. Renewable energy technologies significantly cover electricity demand and most importantly, guarantee a sustainable path for the future. This research paper seeks to double down on the overall appeal of a Green Economy transition, as well as the unique benefits of using renewable energy sources like solar.

Most importantly, this investigation aims to discern whether or not the average American resident should make the switch to solar. "Do the benefits outweigh the concerns?" We believe so.

Additionally, we conducted several tests to evaluate and analyze our collected data. This includes ANOVA tests, frequency tables, and a descriptive diagram. These tests will allow us to turn our units of data into quantifiable information that can then be used to deduce the appeal of a Green Economy. Through this, we hope to provide insight into the feasibility of a Green Economy transition, and hopefully aid local and state politicians in putting more effort into making this transition a reality.

Materials & Methods

Our research study was taken in the form of a google form and specifically qualitative data was used. The Google form had 4 sections and nearly 12 questions that the participants had to answer. The questions came in the form of multiple-choice, multiple selections, and open-ended. The initial target for the form was only residents living in New York, but through later research, it was found that a majority of residents living in New York do not have any control over the use of solar panels wherever they are living. That is our research group expanded the form to the United States as a whole, and a few foreign locations which gave our research a wider perspective and enhanced its reliability. The plan was to have more than 100 responses like that will be able to further our study and show the reason as to why the subjects are not using solar panels, and what can the government or private companies do to help in their own opinions. The total number of responses was 159, which exceeded our research group's expectations. The people who were answering the questions were targeted to be homeowners, as they have the say whether they are going to install the solar panels or not. The main aim for the google form was to determine what motivated people to switch to solar energy, and why the homeowners switched. Our research study wanted to look at the changing factors and variables. We wanted to see if that could be enhanced and do it country-wide to make solar energy accessible to further save the environment. They were many different categorical questions asked in the survey to further analyze the public opinion towards a green life.

The independent variables are the income brackets, and whether they have solar panels installed and their location. The dependent variables are their motivation to switch to solar, their hesitations to switch to solar, and what would convince them to solar, and if you were to switch to solar how much would the subjects spend. As stated early the questions were divided up into mainly 3 different sections. In the first section, the first question that was asked was the town that the subject lives in. This question is important because depending on where they live, it is

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questionable whether they can install solar panels or not. For example, in New York, it is highly unlikely that residents can set up their solar panels. While in Edison New Jersey it is easier to set up solar panels as many residents are homeowners. The next question would be the income bracket, and our research group made this optional even though the form was unanimous. The income bracket is significant because if the subject had a low income, that could be their reason as to why they do not want to switch to solar. If the subject fits into the high-income bracket, then, the reason as to why they have not switched to solar is different and evidently, that is what the entire research study is about. The third question was an opinionated question on whether the subjects care about the negative health effects that fossil fuel creates. The options were strongly disagree, disagree, neutral, agree, and strongly agree. Several questions were given the same options, and these options were used to show the audience real opinion and would be used for the main research aim. The fourth question is whether the subjects care about the negative environmental effects that fossil fuels produce. Again, they were given the same options: strongly disagree, disagree, neutral, agree, and strongly agree. This question showed whether the audience cared about the environment at all, and how did that correlate towards opinion on solar panels. The fifth question was a rating question, and it was how would you rate the use of solar panels in your town from 1-5. This question was asked to give our group an idea of how solar panels are used in their town in the first place. The 6th question is whether the subject already has solar panels. This question is crucial to the study, if the subject said yes then the rest of the questions would be aimed towards why the subject switched to solar, and if the subject said no the question would be why not? The second section is for mainly people who said yes. The 7th question was would you recommend getting solar based on your experience. The options were yes and no, and we were wondering what the answers from those who would be already have solar. The 8th question was a rating question from extremely diffusion to extremely easy and the question was how easy it is to maintain solar panels. Although solar panels do provide the same amount of electricity the normal fossil fuel provider does it does cost a lot to maintain.

The third and final section was aimed at the people who do not have solar panels and do not use solar energy. The 9th question was an open-ended question listing all the reasons as to why you are hesitating to switch solar. Our group used open-ended as a form of answering the question because we felt that the response would vary as the circumstances would vary. We decided to break it down into 2 sections so it would be easier for the data analysis. The 10th question was if any family or friends had any solar panels, and this was used to determine if the environment of the subject was solar and if it was how that is going to affect them. The 11th question is a select all apply question was it was what would motivate you to switch over to solar energy. The options were learning more about the benefits of solar energy, tax benefits, I would not like to switch, and others. Depending on the subject's responses we could enhance and scale into reality, by actually doing it. The final question of the form is how much you would be willing to speed on solar energy. This question is important because depending on the number of tax benefits, and incentives could help the increased use of solar energy.

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Results / Data Analysis

Frequency Tables ▼

Frequencies for Which town do you live in? (If you live in a larger city, please state the specific neighborhood) ▼

Which town do you live in? (If you live in a larger city, please state the specific neighborhood)	Frequency	Percent	Valid Percent	Cumulative Percent
Austin, TX	1	0.629	0.741	0.741
Bedford Park, NJ	1	0.629	0.741	1.481
Bridgewater, NJ	1	0.629	0.741	2.222
Bronx, NY	6	3.774	4.444	6.667
Brooklyn, NY	5	3.145	3.704	10.370
Brooklyn, NY	3	1.887	2.222	12.593
Charlotte, NC	9	5.660	6.667	19.259
Dhaka, Bangladesh	1	0.629	0.741	20.000
East Windsor, NJ	1	0.629	0.741	20.741
Edison, NJ	19	11.950	14.074	34.815
Edison, NJ	1	0.629	0.741	35.556
Fort Lauderdale, FL	1	0.629	0.741	36.296
Franklin Park, NJ	1	0.629	0.741	37.037
Hagerstown, MD	1	0.629	0.741	37.778
Houston, TX	1	0.629	0.741	38.519
Hyderabad, Telengana	7	4.403	5.185	43.704
Iselin, NJ	1	0.629	0.741	44.444
Kendall Park, NJ	1	0.629	0.741	45.185
Lagos, Nigeria	1	0.629	0.741	45.926
Lake Hiawatha, NJ	1	0.629	0.741	46.667
Loma Linda, CA	1	0.629	0.741	47.407
Long Island, NY	2	1.258	1.481	48.889
Manhattan, NY	5	3.145	3.704	52.593
Maple Ridge, BC, Canada	1	0.629	0.741	53.333
Middlesex, NJ	1	0.629	0.741	54.074
Milpitas, CA	1	0.629	0.741	54.815
Monroe, NJ	6	3.774	4.444	59.259
Montgomery, NJ	1	0.629	0.741	60.000
Parsippany, NJ	1	0.629	0.741	60.741
Patna, Bihar	2	1.258	1.481	62.222
Piscataway, NJ	19	11.950	14.074	76.296
Pla2, TX	1	0.629	0.741	77.037
Queens, NY	2	1.258	1.481	78.519
Queens, NY	15	9.434	11.111	89.630
Richmond, VA	1	0.629	0.741	90.370
Staten Island, NY	6	3.774	4.444	94.815
Sugar Land, TX	1	0.629	0.741	95.556
Toronto, Canada	1	0.629	0.741	96.296
Vancouver, Canada	1	0.629	0.741	97.037
Virginia Beach, VA	2	1.258	1.481	98.519
West Windsor, NC	1	0.629	0.741	99.259
Woodbridge, NJ	1	0.629	0.741	100.000
Missing	24	15.094		
Total	159	100.000		

Due to the lack of current published work possessing a household-esque view towards solar energy / panels, our primary source of data collection came in the form of a survey distributed to over 150 people to gain insight regarding individual sentiments towards this form of green energy. As a precursor to the actual results and data analysis, it is important to consider the tables above which contain information regarding the location and income bracket of participants who filled out the survey. Clearly, most of the participants lived in the greater New Jersey / New York area, so while the results may be influenced by norms of the area, due to strong similarities between this region and the others from where participants resided, they can be applied on a larger scale. Also looking at income, a spread between all income brackets is depicted, highlighting this idea that results reflect all socioeconomic classes and are not skewed towards specific groups.

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Frequency Tables ▼

Frequencies for Which income bracket do you fall into?

Which income bracket do you fall into?	Frequency	Percent	Valid Percent	Cumulative Percent
500	1	0.629	0.730	0.730
5000	6	3.774	4.380	5.109
25000	22	13.836	16.058	21.168
60000	14	8.805	10.219	31.387
120000	67	42.138	48.905	80.292
205000	21	13.208	15.328	95.620
375000	5	3.145	3.650	99.270
500000	1	0.629	0.730	100.000
Missing	22	13.836		
Total	159	100.000		

Frequency Tables

Frequencies for Do you currently have solar panels installed?

Do you currently have solar panels installed?	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	12	7.547	7.547	7.547
No	147	92.453	92.453	100.000
Missing	0	0.000		
Total	159	100.000		

Utilizing the results from the survey conducted, a frequency table was created to analyze how many of the candidates had solar panels installed or were in the process of installation. The results as seen in the table above display that of the 159 participants that filled out the survey, only 12, around 7.5%, reported having solar panels installed. This mirrors the findings from major research organizations, such as the Pew Research Center, which stated that 6% of American homeowners had solar panels installed, establishing the fact that findings are very similar throughout (Pew Research, 2020).

ANOVA

ANOVA – Which income bracket do you fall into?

Cases	Sum of Squares	df	Mean Square	F	p
Do you currently have solar panels installed?	1.650e +10	1	1.650e +10	2.785	0.097
Residuals	7.996e +11	135	5.923e +9		

Note. Type III Sum of Squares

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Initially, income was hypothesized to be a major determinant of an individual's sentiments towards solar energy in the sense that higher income individuals would already have solar panels installed or would be more than willing to install them as they have the means to. After conducting several ANOVA tests (tests designed to determine if survey / experiment results are significant) on the data collected to test this theory, it has been proven false. Holding all other factors constant, the propensity for individuals to install solar panels was found to be unrelated to the independent variable of one's wealth as seen from the table above, the p value of 0.097 establishes this idea that the correlation of the two factors is due to chance around 9.7% of the time. This value is higher than the accepted baseline of 5% proving this idea that income is not a predictor of solar panel installation.

ANOVA

ANOVA – Please list all the reasons why you are hesitating to switch to solar.

Cases	Sum of Squares	df	Mean Square	F	p
Which income bracket do you fall into?	24.293	5	4.859	0.812	0.544
Residuals	640.610	107	5.987		

Note. Type III Sum of Squares

A second ANOVA test was run to determine whether income had an impact on the major concern's individuals had when it came to switching to solar panels. The major concerns individuals had been grouped into 9 different categories ranging from High Installation Costs to Weather Constraints, and much more. They can all individually be seen in the table below. In this ANOVA test, each of these categories were held constant and it was found that income was not a predictor of which hesitation / concern individuals had. As seen in the table above, the p-value of 0.544 reflects this idea that any correlation between income and determining these hesitations would be due to random chance 54.4% of the time. Since the likelihood of chance is much higher than the accepted value of 5%, these two factors are completely unrelated. As a whole, these past two ANOVA tests are significant as they reveal a greater truth in that the limited adoption of solar panels is not related to the economic wellbeing of an individual.

Frequency Tables

Frequencies for Please list all the reasons why you are hesitating to switch to solar.

Please list all the reasons why you are hesitating to switch to solar.	Frequency	Percent	Valid Percent	Cumulative Percent
High Initial Costs	64	40.252	47.761	47.761
Live in Rental / Townhome (No Choice to Switch)	23	14.465	17.164	64.925
Decision To Be Made By Parents	12	7.547	8.955	73.881
Not Available / Accessible in Area	9	5.660	6.716	80.597
Newly Moved / Installed New Roof	3	1.887	2.239	82.836
Weather Constraints / Exposure of Sun	3	1.887	2.239	85.075
Lack of Information / Want to Learn More	11	6.918	8.209	93.284
Concerns Over Installation	3	1.887	2.239	95.522
No Hesitation	6	3.774	4.478	100.000
Missing	25	15.723		
Total	159	100.000		

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Rather, at all socio-economic standpoints, solar panels are avoided as they are intrinsically seen as being overpriced with almost 48% of all participants who don't have panels admitting to shying away due to high initial costs (as seen in the frequency table above).

Frequency Tables ▼

Frequencies for If you were to switch over to solar panels, how much would you be willing to spend? (Including tax and other benefits)

If you were to switch over to solar panels, how much would you be willing to spend? (Including tax and other benefits)	Frequency	Percent	Valid Percent	Cumulative Percent
2500	100	62.893	68.027	68.027
7500	33	20.755	22.449	90.476
12500	12	7.547	8.163	98.639
17500	2	1.258	1.361	100.000
Missing	12	7.547		
Total	159	100.000		

Rightfully so, solar panels are by no means cheap as average installation costs for a 6kW system with $3 per watt gross cost averages $13,320. As seen from the table above regarding data as to how much homeowners would be willing to spend on solar, almost 90% would not spend more than $7500 on solar, proving that at its current average price point solar remains out of reach for almost all-American homeowners.

Descriptive Statistics

Descriptive Statistics

	Which income bracket do you fall into?	Please list all the reasons why you are hesitating to switch to solar.
Valid	137	134
Missing	22	25
Mean	117813.869	2.761
Std. Deviation	84155.646	2.432
Minimum	500.000	1.000
Maximum	500000.000	9.000

The average income is around $118000, so an average $13,320 investment in solar energy is about 11.2% of the total average income without taking taxes into account. This is a lot for a person to spend on solar energy as they have to spend on other things such as food, clothes, and entertainment. This again shows us that solar energy is extremely expensive to invest in. Furthermore, the table below shows that only 7.5% of people surveyed have solar panels, so there is still a long way to go to achieve complete solar penetration. The issue of pricing is not the only debacle mass solar energy installation faces. There is the issue regarding the lack of information individuals have regarding solar in terms of who can install, how can this progress be started, the benefits of solar and so forth. Potential buyers have limited knowledge of this technology and how they can harness it to its full potential to save on their electricity needs and for this reason, even those with the means to purchase solar are shying away. Despite this, individuals are open to learning more.

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Frequency Tables ▼

Frequencies for What would motivate you to switch over to solar energy? (Select all that applies) ▼

What would motivate you to switch over to solar energy? (Select all that applies)	Frequency	Percent	Valid Percent	Cumulative Percent
Learning more about the benefits of solar	107	67.296	100.000	100.000
Missing	52	32.704		
Total	159	100.000		

One of the questions on the survey created was to analyze what would motivate individuals to switch to solar. An overwhelming majority of 67% of participants would be motivated to switch to solar if they learned more about its benefits. This emphasizes the fact that the lack of awareness is discouraging potential buyers to make the switch over, diminishing an already reduced market and contributing to low adoption rates of solar panels.

Discussion

The survey established two main points regarding the American solar energy resolved issues that America is currently

1. Solar energy is expensive / overpriced and out of budget for the average American
2. There is not enough information / accessibility of information regarding solar energy for individuals to make the switch.

While America struggles to overcome these barriers to widespread solar energy adoption, another nation, Australia, has pioneered efforts in the large-scale transition to renewable energy and has battling. For some context, according to GreenTech media, Australia is deploying renewables 10 times faster than the global average and their rooftop solar industry is experiencing significant consistent growth throughout the past few years (Deign, 2020). As reported by Bloomberg Tech, about one in four Australian households has solar panels installed and prices are around $1 per watt, meaning the same system in Australia costs one-third of the price of the same system in the US ($3 per watt) on a gross cost per watt basis (Thornhill, 2019).

An EnergySage article discloses as to how Australia was able to cut solar panel costs massively, and it is all due to easing the permitting and inspection process for new solar homeowners. Australia has reduced soft costs by simplifying requirements and hiring dedicated solar inspectors whose sole responsibility is to inspect solar panel installation across various regions. This is different from the US solar energy model as regulations vary between jurisdictions and the inspection / permit process is usually long and tedious with excessive amounts of paperwork needing to be filled (Fields, 2021). Additionally, in the United States solar installation inspections are conducted by building inspectors who lack thorough knowledge of solar energy and its optimal installation as they are mainly focused on the structure / construction element of the project. The main takeaway is that on a higher level, the Australian model has called for the easing of regulations and dedicated solar inspectors to make the process to convert be as smooth as possible. America's solar energy model is decentralized, and this causes a lot of confusion and energy needing to be put into the switch to solar which raises costs and disincentivizes individuals from switching to solar.

Another area where Australia is thriving is pertaining to the accessibility to information homeowners have regarding how to make the switch to solar. energymatters.com.au is a website for a solar installation company in Australia and one of the first results that appears when looking at solar energy. This website provides information regarding the benefits of solar and a quote in minutes. This is just one example, and many from competing companies exist and they provide valuable information that would convince many to make the transition over. Websites of such nature do exist in American societies, but each region would need a specific website as regulations vary per town and installation companies tend to operate in these regional sections, meaning it is harder to connect an individual to them.

Based on the discussion above, the most ideal solution for America would be for policies to be set in place easing the regulations, mirroring the Australian model. This would make the inspection / permit process less of a hassle for homeowners and would drive down costs as the lack of regulations would allow local electricians (who have the skills) to be able to install these panels. Reducing regulations would also expunge a lot of confusion that exists regarding the process to switch to solar and it would eliminate trivial laws established by local jurisdictions, which ultimately would allow installation services to expand their horizons and cater to a greater clientele. Alongside this, a wave of informational campaigns revealing these changes and spreading awareness about green energy would inspire a mass wave of converts as proven by the results from the survey. American cities like Las Vegas already have implemented policies easing the inspection / permit phase of solar panels for homeowners and it is vital that other American cities follow suit and work towards creating a greener society based on values of sustainability and renewable energy.

Conclusion

A green economy serves to be a feasible option that will sustain and even advance our environmental, economic, and social prosperity. The transition to a greener economy is just a foot's step away, starting with the power sector. By switching over to more sustainable forms of energy such as solar energy, environmental pollution will reduce in the long run. Not only this, but solar energy costs will eventually fall below that of electricity. To top it off, acquiring solar power is much more readily available than people may believe. However, in 2019, only 6% of American homeowners claim to have installed solar panels. Armed with these facts, we wanted to uncover what stopped people from transitioning to a green economy.

Initially, we hypothesized that income was a central determinant of how likely someone was to install solar panels.

To test our theory, we conducted a survey that asked a series of questions about solar energy and economic status: geographical location, income brackets, opinions on fossil fuels, the environment, and solar panels, and ownership and knowledge of solar panels. At first, we aspired to aim our survey towards NYC residents, but it became apparent that solar panels were not popular in the metropolitan area. Because of this, we expanded our scope to American residents instead.

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After this change, we received 159 responses. Of the 159 responses, only 12 people—about 7.5% of the responses—reported having or will have solar panels installed.

When running ANOVA tests on our data, we found that income is not a factor of whether an individual is likely to install solar panels. As a result of our extensive research and data collection, we concluded that income is not a determining factor for whether people are likely to install solar panels.

What was more likely to impact an individual's choice of solar panel installation was the costly initial expense to install solar panels. Almost half of our responses, 48% of them, expressed their concern with high prices. With people knowing very little about solar energy, their downfall will ultimately stem from misconceptions of being overpriced and too much of a hassle.

Still, though a little under half of our responses were relevant about installing solar panels, over half of them responded that they would be more willing if they understood and learned more about the benefits of solar panels.

Because of varying laws and regulations in America that may be confusing to the public, some people may stray away from wanting to install solar energy like solar panels, which are a big investment and commitment. Many regulations may also limit their local electricians' ability to install solar and that, in turn, makes the prices higher because most installation companies also charge a premium fee. Having so many fees attached to the initial purchasing of solar panels are probably daunting to many, and it may take years for them to see the benefits, which turn people away even more. Still, no matter how long it takes, solar energy is proven to have more long-term benefits for the buyers and the environment.

A problem that frequently emerges is that some countries do not have adequate environmental plans. However, Sweden's approach to a greener economy is superior compared to other countries' environmental plans.

First off, Sweden was the first country in the world to implement an environmental protection act. Additionally, they further hosted the first UN conference about the green economy. Sweden is a prominent supporter of the green economy as they also imposed a climate tax that reduced the usage of fossil fuels. Through these methods, they have managed to reduce carbon emissions and pollution. More than half of all of their energy comes from renewables, such as hydropower and bioenergy. With these implementations, by 2018, Sweden's renewable share of energy was nearly 55% of their total energy consumption. They even hope to run entirely fossil-free by 2045. The majority of the world has almost 35 million CO_2 emissions, which is extensive compared to Sweden, which only has under 5 million CO_2 emissions. Their environmental protection acts their environmentally conscious imposed taxes as well help to make their country more sustainable.

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Further, Sweden also has various techniques to make everyday life as sustainable as possible. Cities are constantly getting re-developed, and to counteract the environmental challenges that are emerging because of it, Sweden began making eco-friendly homes. They also use biogas, a biofuel produced from the decomposition of organic waste, as fuel for cooking and heating. Not only did they take into consideration housing, but they also thought about
transportation. In the city of Stockholm, their entire public transport system runs on green electricity, along with all buses fueled by sustainable energy as of 2017.

Lastly, Sweden also does not support using materials from other countries because they believe in using raw materials grown unsustainably. For example, cotton produced outside of Sweden is grown in countries where there are dire shortages of water. Also, because cotton from other countries is usually non-recyclable, they pollute the environment; because of this Sweden makes their own cotton using cellulose from trees that are not hazardous to the environment.

The world should take on Sweden's green economy plan because of how much effort they have put in, they have had massive and extensive
accomplishments. More laws targeting polluters and higher taxes should be imposed (like Sweden's carbon tax) to reduce the usage of fossil fuels. Combining that with easing regulations to promote the installation of solar panels and spreading awareness while using Sweden and Australia as a guide will help encourage people, and to larger scale, nations reduce the reliance of unsustainable energy and resources, promoting a more sustainable and greener society.

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New York City Affordable Housing

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Abstract

Affordable housing in New York City has been on a declining trend for years. In 2021, the shortage of affordable housing in the city has reached a point of crisis, with almost every income group across the five boroughs facing negative effects of high rent-burden. This paper closely examines the history of the New York City Affordable Housing System and provides an in-depth analysis of the performance of the current Affordable Housing scheme through average family income and Area Median Income (AMI), Housing Availability, and Affordable Housing Application Density & Wait Times. Ultimately, this gives for a holistic study the efficiency of the Affordable Housing System while addressing its potential drawbacks.
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Categories: New York City, Housing
Key Words: Affordable Housing, New York City, Housing Availability

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The History of NYC's Affordable Housing System

As one of the most densely populated cities in the United States, New York City has had difficulty housing its population. Countless efforts, including one of the largest affordable housing projects in the country, have been made to overcome the challenge. Over the years, general consensus on the purpose of public housing has remained unclear. Some politicians believe it should focus on providing shelter to the poorest families, while others believe it should only provide shelter to working-class families in order to incentivize employment and create a financially stable middle class. Politicians have usually preferred the latter argument, as evidenced by the fact that welfare recipients have never formed the majority of affordable housing tenants in the city, due to the belief that hard working families should not need to rely on welfare (Sribnick, 2012).

According to a 2013 figure, 47% of public housing is occupied by working-class families (Paletta, 2016). As funding for affordable housing continues to decrease, it is increasingly difficult for homeless and impoverished people to access public housing projects. Thus, the issue of affordable housing remains a principal and pressing issue in New York City.

In New York, affordable housing is deemed affordable if the cost of it is approximately one-third of the owner's income (Paley, 2020). Renting costs, however, depend upon the Area Median Income (AMI) of the location. AMI is a statistic that is calculated by the U.S. Department of Housing and Urban Development that affects the qualifications for a household to participate in affordable housing. The lottery system, in regard to the affordable housing situation in New York, is similar to winning the actual lottery. These programs assist families with lower socioeconomic status attain an affordable apartment that is at a lower price than other apartments in New York City. As this system continues to work, the match to receiving a house is highly competitive but with the increasing number of affordable houses being added to the system, the competitive nature of the lottery is decreasing. With Mayor De Blasio pledging to build upwards of 300,000 housing units, the lottery system has dramatically increased in the number of applicants (Paley, 2020).

In regard to recognizing the finances of a family, these financial records are used to categorize households into specific AMI brackets. Those with an AMI from 0-30% ("extremely low-income") are addressed as well as those who have an AMI of 125-160% ("middle income"), encouraging all those who qualify for housing to apply (Cook, 2018). The application process for receiving affordable housing is fairly straightforward; one simply goes to the NYC Housing Connect website and sets up an account. These accounts ask for household income, employment, and other areas that govern the socioeconomic status of a family. Any changes the family goes through that may affect their socioeconomic status (at any point in time) should be noted on their accounts as that may change their qualifications for certain homes. Once the account is set, families are able to access and send applications for the affordable housing lottery and wait to receive a home. These applicants are assigned random numbers, the lower the number, the better the odds.

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Picking future residents during the application process rests on several factors, with a few factors being detrimental to the system. Though the system is built upon the importance of fairness, developers begin with those with a lower log number as well as applicants who may be receiving preferential treatment (Cook, 2018). Some preferences could include if the person has any disabilities/handicaps, are a veteran or senior citizen, are an active part of the community board district, are a municipal employee, or individuals already living within the neighborhood. However, with the plethora of applicants already entering the lottery system, the likelihood of having inflated applications is likely for most of the affordable housing units. This is due to the fact that applicants file for several affordable home lottery applications without considering if their income falls within the range of the lottery qualifications, resulting in inflated application pools that reduce the probability of a properly qualified person being chosen. With these factors affecting the lottery, it creates the competitive atmosphere of the lottery system. With inflated numbers and preferential treatment, discerning the urgency and need for the housing is extremely complex and time consuming, causing the system to take longer to reach out to participants and inform them on their success or failure on achieving the unit. The success rate of receiving a house in the 2019 fiscal year was low, roughly 0.10%, partly because there were 5.9 million applications for 5,650 housing units (Paley, 2020). Over time, there will be an increase in the success rate as further units are built, however, with present factors above, the system does have its flaws, such as competition, long wait times and a neglect for welfare-dependent families, that need to be addressed.

New York City Affordable Housing vs Other Cities

When comparing the New York City lottery system to that of many successful ones around the United States and the world, one prominent discrepancy is clear: the system is not effective in providing sufficient, affordable, and superior quality housing for its residents.
In 2016, the city government of Denver, Colorado made efforts to address the housing crisis within their city. First, they turned vacant apartments into affordable housing schemes, which allowed for an increase in available apartments to meet the demand of an increasing population. This was done through Mayor Michael Hancock's experimental "buy-down" program turning vacant high-end apartments into more affordable units for the public. This increased housing fund allowed for this program to cover the difference between market rate and affordable rent and add attainable units to the city's housing at a much faster rate (Sisson, 2017). This action was made possible due to the $10 million Revolving Affordable Housing Loan Fund, which aided in widening the capital pool (increasing the funds available) required for affordable housing projects. This fund was able to accomplish this through supporting the development of multi-family rental housing units for families that earn up to 60 percent of the region's Area Median Income increasing the number of individuals who will be able to pay for this housing. As a result of this executive action, the city has been able to bring in numerous new affordable housing projects and support efforts to build and preserve thousands of housing units (Martin & Raabe, 2015). This type of revolving loan fund could also be possible in New York City to benefit low-income households to receive more affordable loans and increase homeownership.
In combination with this increased capital pool, a new $500,000 property tax increase and new development impact fees will allow Denver to raise $156.4 million over the next decade to go towards affordable housing (Martin & Raabe, 2015). The New York City housing lottery system,

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however, lacks this capability as there is not a sufficient amount of funding and housing units available for its residents. Home ownership rates in New York City have consistently been low throughout the years. In a sample census of over 3.5 million NYC residents, the owner-occupied housing rate from 2015 to 2019 was approximately 32 percent. This indicates that the majority of NYC residents are unable to afford ownership of their housing units and are rather living as mere occupants due to the exorbitant price of housing (United States Census Bureau, 2019). This is also due to the high levels of competitiveness to obtain affordable housing with a surplus of applicants and not enough homes causing it to be more and more difficult for residents to gain housing.

Social housing refers to public, government-owned housing in Europe. The housing system in Vienna, Austria has been globally recognized for its unique social housing approach that has been known for its effectiveness in providing not only affordable housing for its residents, but also superior quality. It has been under notable interest for many of America's populous cities, including New York, to improve the efficiency of their systems. Austria's social housing plan makes up approximately 23% of the housing stock and in which although the low-income households are targeted, 80-90% of the population are eligible to obtain this housing, due to high levels of affordability (The URBED Trust & Shelter, 2018).

A discussion led by Pamela Lindstrom, the Montgomery County, Maryland commissioner of the Housing Opportunities Commission, in 2013, explained that "Vienna's city government owns and manages 220,000 housing units, which represent about 25 percent of the city's housing stock." Rent in Vienna is also regulated by the government to ensure that residents do not pay more than 20-25% of their annual income on housing, deeming it a much more affordable form of housing (Department of Housing and Urban Development, n.d.) than New York City's equivalent, where the number of households who pay 30% or more of their income for housing costs rose dramatically in the past decade (DiNapoli & Office of The New York State Comptroller, 2019). The role of nonprofits in the effectiveness of an affordable housing system is unique and can be conceptualized through the actions of Northeast Shores Development, a nonprofit in North Collinwood, Cleveland, that offered artists housing with the condition that they could earn bonus equity each month they paid rent over 10 years where they could earn up to $10,000 that could then be used as a down payment for their house (Sisson, 2017). This incentivized homeowners to pay their rent or mortgage in a manner that benefits them. This gives insight into the possibility of an improved housing system in the New York region, where nonprofits play an active role in the housing system and allow for an increase in affordability for numerous individuals, as they have a separate incentive that allows them to pay off their home faster. Encouraging nonprofits to actively participate in affordable housing schemes can effectively improve cities' housing capabilities in terms of affordability and availability. This study aims to further detail the areas of the current New York City affordable housing system that require improvement and identify factors that may aid in successfully addressing these flaws of lack of housing units and prolonged wait times that affect the availability of housing for different income brackets, particularly low-income households.

The Benefits of Affordable Housing

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The importance of improving affordable housing in New York City is that the system directly benefits the nation as a whole. As urban affordability becomes increasingly more strenuous, the issues regarding the New York City affordable housing system emerge at a parallel rate, including the inability for residents to obtain housing quicker on top of the extensive wait

times. Even though these problems are concerning, there are numerous courses of action to address them; but the foremost solution to tackling these drawbacks is affordable housing. Not only do successful implementations of affordable housing prove to help resolve these issues, but they also demonstrate to have a multitude of prolonged benefits.

The economy is benefited greatly by affordable housing as it stimulates the economy through increased job creation, growth in GDP, increases in purchasing power, and new tax revenues. Essentially, economic growth is ensured through long-term employment from consumer demand. As 555,498 NYC residents received public housing by the NYCHA in 2020, low-income housing tax credit developments for families and seniors, likewise, continuously increase the number of local jobs (NYCHA, 2020). LIHTC, closely associated with Section 8, the Housing Act of 1937, was reported to create 235 jobs solely due indirectly and directly to the construction of a single 100-unit multifamily property (National Association of Home Builders, 2010). Essentially, the infrastructure that stems from affordable housing plans is modeled through the state of Utah, which can parallel other states in the nation as the $61.4 million spent for the landlords and housing providers in 2003 successively supported 1,100 jobs through the integration of $17.2 million spending in wages (Wood, 2004). Affordable housing generated $1.4 billion, direct and indirect, of induced economic activity and a resulting $62.5 million outcome in local and state tax revenue. This major stimulation in the economy was derived from a two-year time span between the years 2006 and 2008, where $260.1 million was invested into affordable housing amongst the nation (Wardrip, et. al., 2011).

Furthermore, job creation is ensured through the accessibility of opportunities for affordable housing residents. Exemplified through the struggle in opportunities for low-income families to increase their earnings, a shortage in affordable housing will essentially call for better coverage of the system in order to secure jobs and the nation's GDP, which is subject to increase at a faster rate when individuals maintain the opportunity to increase earnings (NLIHC, n.d.). It is estimated by researchers that for the duration of the years 1964 to 2009, there would have been a 13.5% growth in GDP if there was full coverage of affordable housing present amongst the nation (NLIHC, n.d.). From existing affordable housing circumstances, there was an approximate $0.93 USD of economic activity addition formed in the local market, which is effectuated alongside every dollar in public housing operating expenditures (Econsuit, 2007). In addition, adults' earnings grew roughly 31% when they traveled to high-income neighborhoods as a child, hence indicating the positive impact of stable affordable housing on families' financial status (Chetty, 2015). Overall, this ultimately highlights the significance of affordable housing on economic stimulation.

Moreover, for younger generations, it is without question that acquiring a quality education is vital to the development of young pupils. Due to the reduction in frequent moving and traveling derived from affordable housing, the convenience is ensured as children in non-assisted low-

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income families have an arduous time adjusting to the circumstances of poor housing quality. According to a study pertaining to the examination of poor housing conditions, it was revealed that the physical quality, home hazards, crowding, and clutter corresponded, in general, with poor psychological health for youth aged 9 to 15 years old (Rollings, 2019). This is indicative of the significance in mobility, as it is deleterious for younger generations to succumb to an unfixed, unstable environment; children who are constantly moving from one home to another perform below those who do not experience housing instabilities. Children who experience foreclosure are also likely to switch schools fairly often; evidence shows that the schools they transfer to usually have lower academic quality (measured by average test score) (Cunnigham and MacDonald, 2012). When studied, it was discovered that moving even once during a child's elementary school career negatively contributed to an achievement gap between children in unstable households and children in stable households. Students living in unstable housing in NYC score about 0.31 standard deviations below the citywide mean in math and 0.33 standard deviations below the citywide mean in reading (Cunnigham and MacDonald, 2012). But with access to affordable housing, children also gain access to better educational opportunities. With improved housing quality, children will generally be in safer and healthier environments, which reduces stress and leads to more regular school attendance and more focus in class. In addition, having a stable housing environment will avoid problems such as interruption in the school year due to a sudden need to move. Living in a better neighborhood location will give kids access to better-performing schools, which will lead to better academic performance overall.

Affordable housing not only improves children's academic and social lives, but the relationship between the lack of sterility and quality in unsound environments is also secure and unimpaired. The lack of affordable housing leads to more health complications for those who are subjected to terrible housing conditions because they cannot afford better. Low-income families usually live-in homes with lead-based paint hazards (other sources of lead are windowsill dust, soil, and paint), which puts them at risk of lead poisoning. Furthermore, poor-quality housing may be full of mold, dust mites, cockroaches, or rodents, which are all sources of allergens that cause asthma (Maqbool, et.al., 2015). A study in NYC showed that many parents who are residents of public housing reported their children having asthma or asthma-like symptoms. Between 1998 and 2002, it was shown that 1 in 3 homeless children suffered from asthma (Enterprise, 2014). Because housing expenses are such a large portion of household budgets, access to affordable housing would relieve the burden parents have from using the majority of their income to pay for housing. A 2012 analysis of household expenditures found that low-income families spent more than half their income on housing costs and spent less on food and health care compared to those who spend 30% or less of their income on housing (Maqbool, et. al., 2015). With affordable housing, these families can use that portion of their income that would be going towards housing for other necessary expenses: food, healthcare, and medical insurance. Studies have shown that families with affordable housing can devote over twice as much of their income to health care and are significantly less likely to surrender required doctor's visits and medications due to a lack of money (Enterprise, 2014). Furthermore, health is further impeded through exposure to violence and a high crime rate, which is prevalent amongst domestic violence victims. These victims tend to continue to live with their abusers due to the lack of housing arrangements available. A study has shown that the rate of women returning to their abusers increases when there are fewer housing options available (Maqbool, Viveiros, and Ault, 2015). Other research shows that this

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phenomenon is also partially due to some landlords being reluctant to rent to women who attempt to escape domestic violence, regardless of laws prohibiting this discrimination, because they don't trust the renter's ability to pay rent and fear the danger posed by the abusive partner (Maqbool, et. al., 2015). Affordable housing can aid these domestic violence survivors from their mental and physical abuse. Though there are many health benefits that can come from access to affordable housing, there still remains a lack of accessible housing to low-income households. In recent years, unemployment rates have reached an all-time high, meaning that more families need affordable housing. In addition, from 2005 to 2012, the median gross rent has been increasing, while the median gross income has been declining. Along with this, the NYC population in 2010 was 8,242,624 compared to the population in 1980, which was around 7 million. The population of NYC has been increasing and is predicted to continue increasing throughout future decades. With the rise in rent and population, the demand for affordable housing becomes more prevalent. According to New York City's ten-year housing plan, there is a large imbalance between the supply and demand of housing for low-income families. There are around 424,949 units available, but around 979,142 families are in need of these units (NYC Housing, 2012). In 2020, NYCHA's public housing and Section 8 programs served 555,498 New Yorkers. Their public housing units occupy 11.6% of the city's rental apartments and house 6.6% of NYC's population. These residents have access to over 400 community, senior, healthcare, daycare, and educational centers. Though this is a lot, as of March 1, 2020, there are still 176,646 families on the waitlist for public housing and 138,253 families on the waitlist for Section 8 housing (NYCHA, 2020). With more availability of affordable housing, these households on the waiting list would be able to gain access to all the benefits that those currently in affordable housing have.

A Closer Look Into New York City's Affordable Housing

Average Family Income & Area Median Income

The average median income for all households across NYC stood at roughly $69,407 in 2019. However, the average incomes for each respective county in NYC ranged from $41,432 to $93,651, with the lowest pertaining to the Bronx and the highest to Manhattan. For each category, Manhattan has the highest earners, followed by Staten Island, Queens, Brooklyn, and the Bronx. For the most part, families that have no dependents usually have higher average median incomes than those that do, with exception of the average income in Staten Island. Collectively, all five boroughs have a median income of $69,407.

Median Income for Residents of NYC Boroughs in 2019 (USD)						
	Brooklyn	Queens	The Bronx	Staten Island	Manhattan	Total

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All Households	$66,937	$73,696	$41,432	$89,821	$93,651	$69,407
Average Household Family Size	$74,422	$82,534	$50,835	$105,438	$126,690	$78,113
Families with Children	$66,936	$75,501	$41,129	$104,641	$140,841	$69,028
Families Without Children	$79,400	$86,501	$61,248	$106,015	$121,669	$84,278

Source: Citizens' Committee for Children New York
https://data.cccnewyork.org/data/table/66/median-incomes#66/107/62/a/a

In order to be considered affordable housing, residents' housing accommodations must cost 30% or less of their annual income. The table below displays the maximum amount for each median income that is to be contributed to housing in order to consider the individuals' housing affordable. NYC residents living in Brooklyn must spend $20,081.10, those in Queens must spend $22,108.80, those in the Bronx must spend $12,429.60, and those in Staten Island must spend $26,946.30. This, of course, varies depending on the number of dependents and the household size, but generally reflects the average of each of the boroughs across New York City.

Maximum Portion of Income for Residents of NYC Boroughs in 2019 to be Affordable Housing (USD)						
	Brooklyn	Queens	The Bronx	Staten Island	Manhattan	Total
All Households	$20,081.10	$22,108.80	$12,429.60	$26,946.30	$28,095.30	$20,822.10
Average Household Size	$22,326.60	$24,760.20	$15,250.50	$31,631.40	$38,007	$23,433.90
Families with Children	$20,080.80	$22,650.30	$12,338.70	$31,392.30	$42,252.30	$20,708.40
Families Without Children	$23,820	$25,950.30	$18,374.40	$31,804.50	$36,500.70	$25,283.40

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However, census data reveals that New York City renters spend 32.5% of their income on rent, which is above the threshold of what is considered Affordable Housing. In other words, on average, New Yorkers who rent are not in affordable housing conditions. The median gross rent in New York City equates to $1,483 per month, while the national median gross rent rests at $1,097 per month. Figure 1 (below) depicts the share of moderate and low-income renters whose gross rent made up at least 30 or 50 percent of their monthly pre-tax income. It must be noted that low-income renters hold the highest rent burden, as nearly half of them spend over 50% of their income on gross rent across all five boroughs -- this is over five times as much as the percentage of moderate-income renters that spend over 50% of their income on gross rent. Clearly, the unequal burden on lower-income households is due to lack of affordable housing in the city, as they are more severely impacted by unaffordable rent rates. With increased access to affordable housing, low-income families will not have to spend nearly as much on their gross rent, thus lessening their rent burden. However, though these families qualify for affordable housing, usually, they are not able to obtain it. Because so many low-income households apply for the affordable housing lottery, chances are that it may take months or even years to finally receive affordable housing. So, the lack of adequate affordable housing perpetuates the cycle of low-income families having to pay rent that they cannot afford by sacrificing large portions of their income. And since so much income is put towards rent, they usually neglect other vital necessities.
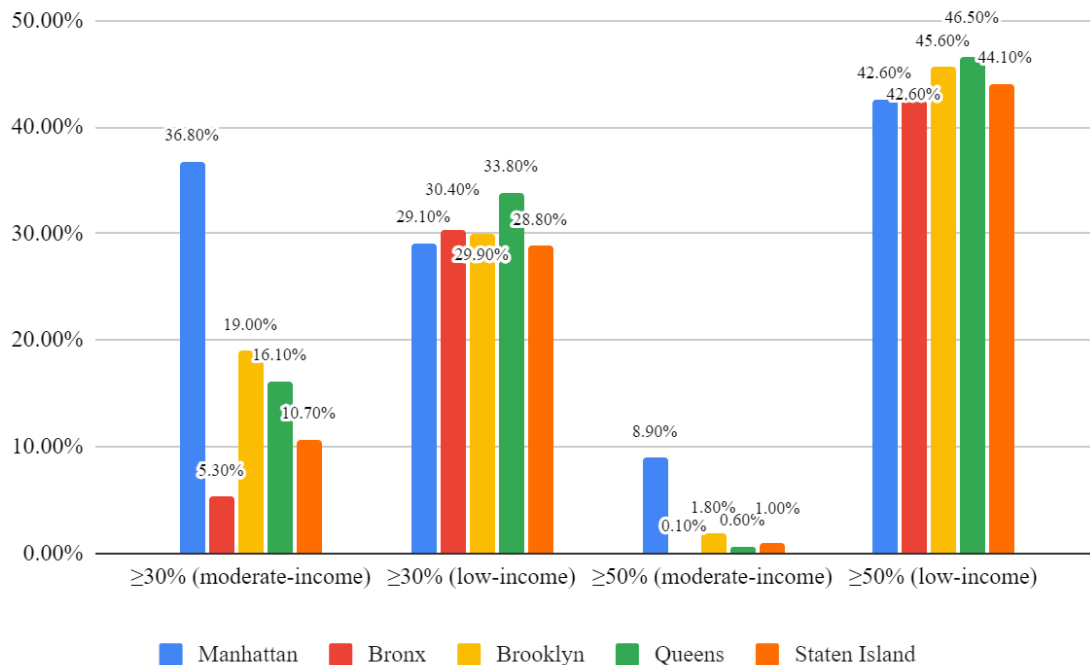

Figure 1: The share of moderate and low-income renter households whose gross rent made up at least 30 or 50 percent of their monthly pre-tax income (Furman Center, 2020).

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Area Median Income (AMI) is the midpoint of a region's income distribution, a statistic determined by the US Department of Housing and Urban Development (HUD) which helps determine the residents' eligibility for affordable housing.Housing in this region is considered affordable if the cost is one-third or less than their AMI income of that region. If one makes over or under the AMI in annual income, they may not be qualified for affordable housing in that particular region as they do not meet the threshold to afford the housing or they do not require it. For instance, for a family of four residing in New York City in 2021, the Area Median Income is $119,300. This indicates that in order for a family of four to receive affordable housing in New York, their housing costs must be either one-third or less than their AMI income of $119,300. In approximation, the total possible cost of the house must come around $39,766.67 to be qualified as affordable housing and for people to sustain an actual living. Figure 2 depicts the average median income in New York City according to the various AMI bands that exist. 0-30% AMI are Extremely Low-Income; 31-50% are Very Low Income; 51-80% are Low-Income; 81-120% are Moderate-Income; and 121-165% are Middle-Income. Naturally, as the AMI percentage increases and the number of members of the household/family increase, the amount of income that qualifies as a certain AMI band increases as well.
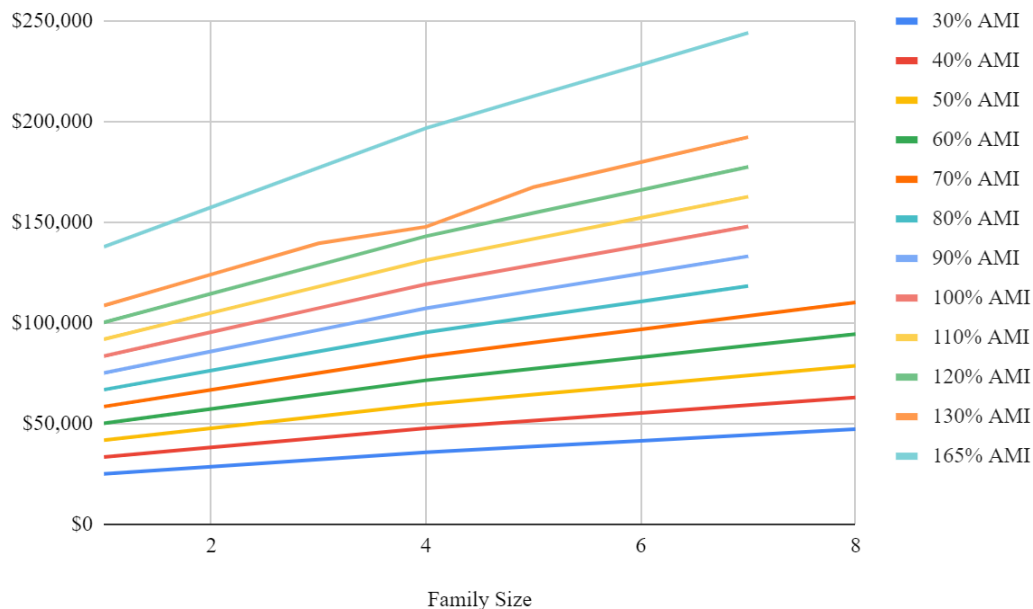

Figure 2: Average Median Income in New York City in 2021 in relation to family size and the income size based on the AMI. (New York City Department of Housing Preservation and and Development, 2021)

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The Area Median Income additionally signifies the range of rent that is considered affordable for a family in a distinct AMI bracket. For a two-bedroom apartment, the 100% AMI for monthly rent is $2,592 deeming that an affordable rent for those with a 100% Area Median Income of $119,300 must be around this figure (New York City Department of Housing Preservation and Development, 2021). Figure 4 depicts the maximum monthly rent deemed affordable for studio-three bedroom housing for each of the AMI brackets in New York City. As with the income level, the amount of rent considered affordable will increase as the AMI and/or the household size increases.

The ratio of Affordable Housing applicants that are lower-income to applicants that are higher income when it comes to applications per household is 650 applications to 123 applications, creating a large disparity between different AMI brackets within locations to receive an affordable home (Smith et al., 2020). More and more individuals end up being unable to procure an affordable housing unit for their families, rendering them with a significant burden in the long-term financially. Many houses fail to meet the AMI criteria and are considered unaffordable for these particularly low-income ranges. This, in conjunction with the evidence of the highest rent-burden belonging to lower-income households discussed prior, emphasizes the impending necessity for more affordable housing for lower-income brackets as more housing allows for reduced rent-burden and availability due to increase in supply to meet the demand of housing.

Figure 4: New York City Affordable Monthly Rents per AMI Bracket (2021)

Housing Availability

Under the current affordable housing system, there are significantly more housing applications than affordable units. When reviewing 18 million applications to the NYC Housing Connect System between January 2014 and March 2019, for every apartment in Mayor Bill de Blasio's Housing New York Plan, 314 applications were filed. For households that qualify as extremely low-income, 650 applications were filed for a single apartment as fewer apartments were available for families with an income below $30,720. However, for applications with income between $122,880 and $168,960, there were 123 applicants per apartment (Smith, et al., 2020). This is indicative of the fact that although low-income families make up the majority of affordable housing applications, they have the smallest chance of receiving a housing unit. The success rate of receiving a house in the 2019 fiscal year was low, coming in at 0.10% due to 5.9 million applications that were applied for 5,650 housing units (Paley, 2020). Nonetheless, an increase in the success rate can occur over time if more units are built.

According to New York City's ten-year housing plan, there is the largest imbalance between the supply and demand of housing for low-income families. As mentioned previously, low-income level households are the most severely rent-burdened in the current affordable housing crisis. Figure 5 (below) demonstrates the number of housing units that were required in 2019 to meet the needs of different household income levels. With just a quick glance, it is very apparent that demand is highest for extremely low-income households; roughly 3 times higher than the second-highest value on the graph, the demand for very low-income households.
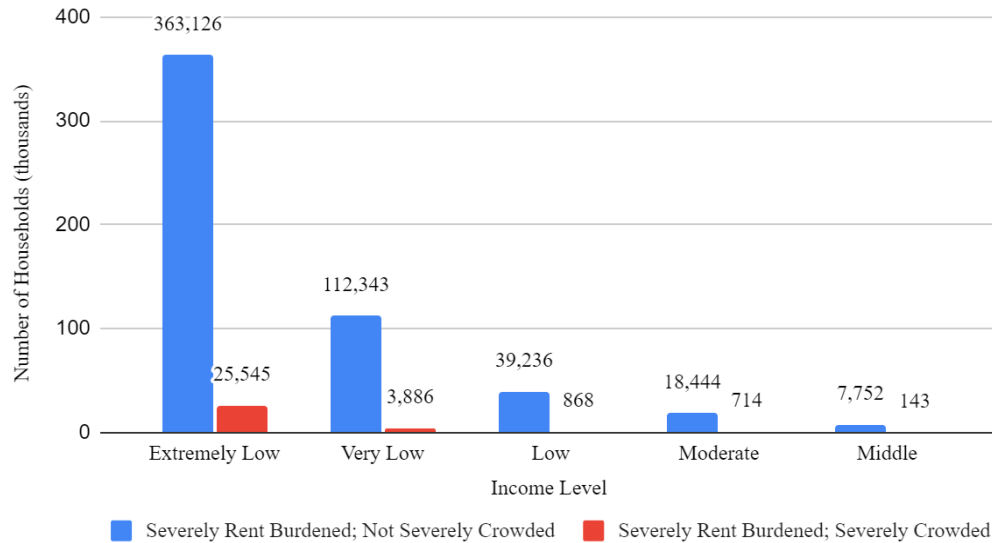
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Figure 5: Number of housing units necessary in relation to household income level
(Comptroller's Office, 2019).

Unfortunately, these high demands were met deficiently, with the mean percentage of available rental units across all five boroughs combined fulfilling only 31.3% of the demand for the 30% AMI bracket. This is significantly less than the amount of demand met for higher-income households (80% of AMI and 120% AMI), as can be seen in Figure 6 below.
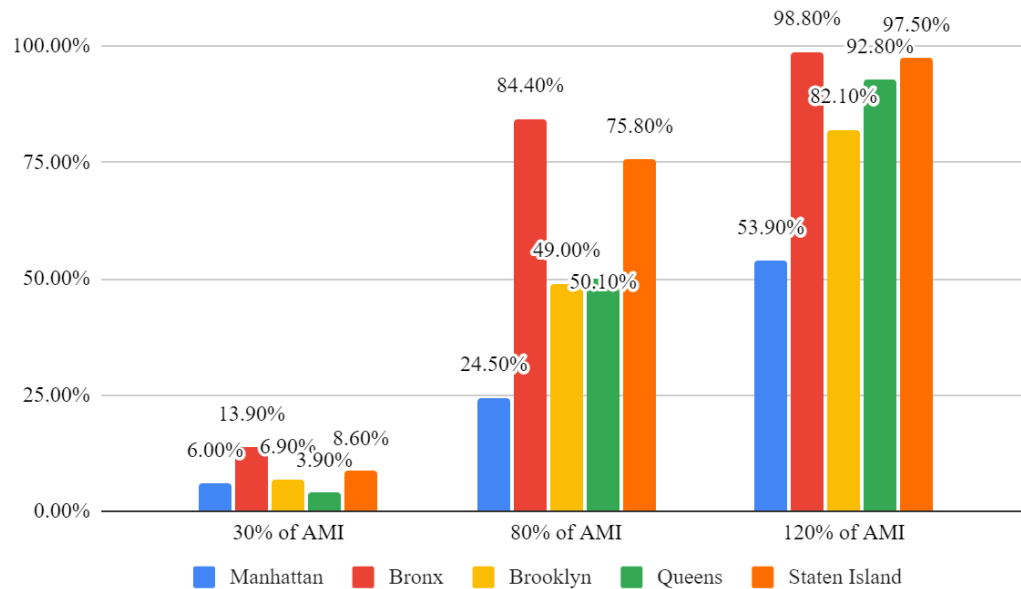
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Figure 6: The mean percentage of occupied, recently available rental units from 2014 to 2019 that are affordable to appropriately sized households with incomes at different percentages of the Area Median Income (Furman Center, 2020)

Since then, the city has seen an increase in the number of housing units necessary to satisfy residents' housing needs. Specifically, an estimated 20,000 new units of housing would be needed each year in order to keep up with the projected job growth in the following years (REBNY, 2020).

Affordable Housing Application Density & Wait Times

An often-overlooked problem with the affordable housing system lies within the online application, NYC Housing Connect, itself. Although the new system is designed to streamline the application process and match recipients' household size and income to appropriate units, the odds of matching to an apartment remain unchanged.

In this system, applicants file for several affordable home lottery applications without considering if their income falls within the range of the lottery qualifications, resulting in an inflated number of applications being calculated, where some applicants may not be qualified for the particular application they applied for, prolonging wait times even further because it impedes developers from being able to get back to legitimate applicants sooner, rendering the system largely inefficient.

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There are two types of housing to which individuals apply: Public Housing and the Housing Choice Voucher program. Public housing is built, owned, and operated by a public agency such as the New York City Housing Authority (NYCHA). For people who are accepted into the public housing program, their options are limited to the community in which they applied. Average waiting times for a New York City Housing Authority (NYCHA) unit stretch to 7.5 years. In addition to that, there may exist an approximate wait time of 2 to 10 months to hear back from developers even after being approved for a new home, to know whether or not an applicant has received the keys to it (Cook, 2018). The Housing Choice Voucher Program, otherwise known as Section 8, allows qualified participants (very low-income families, the disabled, and the elderly) to select and afford any housing in the private market that fits the program's requirements. Options are not limited to units within subsidized housing projects. The median Housing Choice Voucher waiting list length is 1.5 years, though the largest waiting lists have wait times longer than 7 years. In the report, Housing Spotlight: The Long Wait for a Home, the National Low Income Housing Coalition (NLIHC, 2020) found that over half of all waiting lists were closed to new applicants and do not plan to reopen soon under current funding levels and policies.

For either type of housing, those in the Very Low-Income AMI Bracket applicants tend to experience immensely longer wait times than those in higher-income AMI Brackets. Figure 7 and 8 (below) depict the mean percentages of applicants on the waiting list that belong to different AMI levels: ELI (Extremely Low-Income, 0-30%), VLI (Very Low-Income, 31-50%), and LI (Low-Income, 51-80%). Figure 7 reflects the make-up of waiting lists pertaining to all Public Housing Authorities (PHAs), which consist of an average of 67% ELI, and only 19% and 21% of VLI and LI, respectively. The disparity between ELI and VLI/LI applicants on waiting lists remains glaringly large, and even slightly increases, as housing authorities handle more units. A very similar trend is visible in figure 8, which reflects the make-up of waiting lists pertaining to Public Housing Authorities (PHAs) with Voucher housing. For these institutions, an average of 74% of waitlisted applicants were ELI, with 18% VLI and 6% LI.
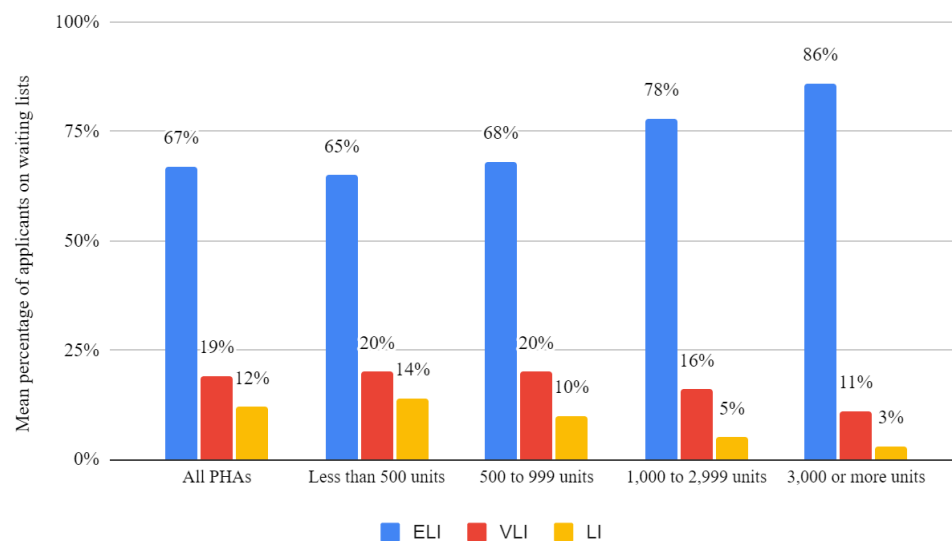

Figure 7: Mean percentage of applicants on waitlists per Public Housing Authorities (relative to size) per AMI levels (NLIHC, 2020).
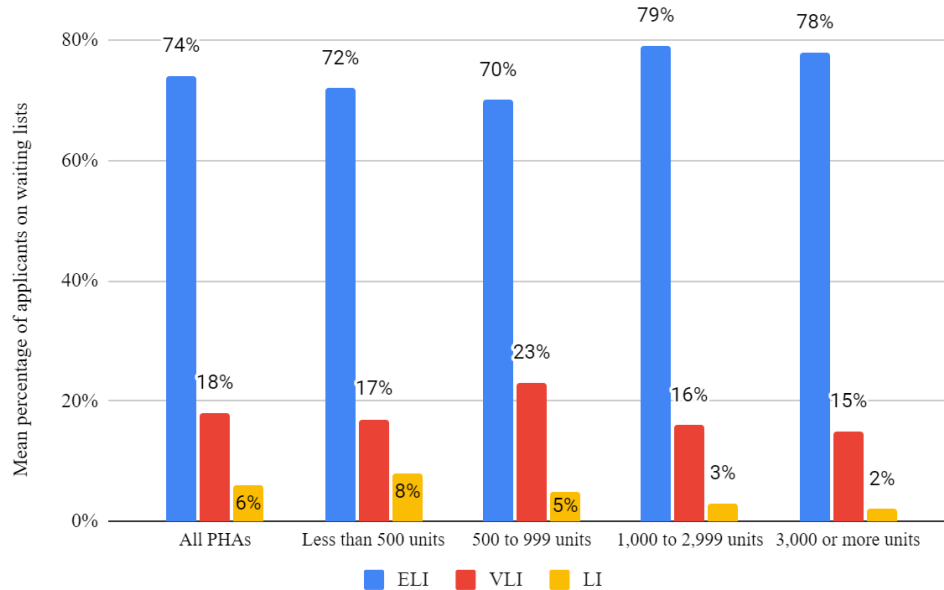
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Figure 8: Mean percent of applicants on waiting list per Voucher Housing Authorities (relative to size) per AMI levels (NLIHC, 2020).

Conclusion:

The inequality and ineffectiveness of the New York City Affordable Housing system clearly lies within the fact that there are not enough affordable housing units to successfully aid the neediest individuals of the city. As of March 1st, 2020, there are still 176,646 families on the waitlist for public housing and 138,253 families on the waitlist for Housing Choice Voucher, Section 8, housing (NYCHA, 2020). With wait times being prolonged as such due to the unavailability of housing units and inflated application numbers, these 314,899 families will continue to endure rent burdens for what may be months or years. Until more housing units are created specifically for Extremely Low-Income and Very Low-Income Area Median Income Levels, the New York City Affordable Housing Crisis will continue (NYC Housing, n.d.).

As earlier discussed, Affordable Housing can have significant influence over the economy, education, and health of an entire population. Therefore, creating a successful system that provides sufficient housing for New York City can go beyond just decreasing the rate of homelessness and improving the financial circumstances of the individuals that will obtain a roof over their head; the overall city's economy may be boosted, criminal rates may decrease, etc. Subsequent studies can be conducted to examine these positive implications of sufficient affordable housing much more thoroughly in New York City, revealing how invaluable an increase in units may prove to be for the city.

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Across the Spectrum of Socioeconomics
Volume 1 Issue 4
DOI: 10.5281/zenodo.4743294

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How Can We Make Public Transportation More Efficient in the United States for Workers Over 16?

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Abstract

There is a long history of American transport, for the most significant parts of history, such as the transcontinental railroad, marks an important change that would change society forever. Railroads and public transport have aided civilians to travel, trade, and spread religions, contributing to continual advanced and revolutionary changes regarding modern technology. After collecting data from two cities in each of the fifty states, we utilized an equation to derive the efficiency of a city's transportation system by examining the variables of a number of passengers transported daily, total working population, and the median commute time. The budget per capita for each city's transportation system and the annual snowfall was also examined, and all data was collected from the United States Census and public transit authority records. Throughout the data, the researched variables have proven their significance to the efficiency of transit systems across the country. The research shows that there is little correlation to total working population and budget of transit systems. Another variable that does not affect the efficiency is average snowfall per city. However, there are proven effects of spending per person and efficiency; the research shows a large correlation.There are several different correlations that the variables have with one another. These relationships play a major part in the efficiency of the public transportation system of these cities.

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Categories: Public transportation, MTA, Economy
Key Words: MTA, Economy, Optimization

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Background/Literature Review

American transportation was revolutionized by the invention of the steam-powered locomotive, allowing Americans to build massive railroad networks. These American steam powered locomotives were pioneered by John Stevens, who received the first charter for a railroad in North America in 1815. Initial railroad systems were no more than horse drawn cars running on tracks that transported freight for short distances. It was not until 1830 that the first mechanical passenger train was completed, setting off a period of rapid railroad expansion that transformed the transportation industry in the United States. By 1850, over 9,000 miles of track had been laid across the United States, and companies adapted a standardized locomotive model and track that allowed railroads to be connected easily. As the railroad industry boomed in conjunction with the steel and oil industries, many smaller railroad companies began to conglomerate into large corporations that dominated the industry. Railroads played an essential role during the Civil War as well, helping to shuttle supplies and reinforcements to faraway armies. After the war was over and the country was united, at the very least in name, again, the need for a railroad system that spanned the country was readily apparent. The Transcontinental Railroad, completed in 1869, was not only a symbol of the newly united nation, but an enabler of trade that allowed goods and passengers to be moved across the country faster than ever before. This ushered in a new age of industrialization that fundamentally altered the American economy. With every new decade, new technological advances made railroad systems more advanced, and labor unions and corporations grappled with terms of employment and new regulations. In 1897, the Tremont Street Subway opened in Boston, making it the first subway system in North America. An effective solution to congestion on the streets, cities across the United States began building subways of their own, slowly replacing the above ground railroads until the modern-day subway systems in use today were developed.

History of the MTA

The MTA is the leading public transport system in the state of New York. Up until the early 1950s, New York was facing an economic crisis that took a toll on its public transportation system, as they had to manage a system with a annual budget of $50 million, which would be $500 million today. With no legislation on the public transport system, many conflicts arose in the industry, with independent subway lines competing with private companies. All in all, until the formation of an official transit authority, the state of public transport was in disarray (Gelinas, 2019). The original New York City Transit Authority, referred to as the NYCTA, or the TA for short), was founded in 1953.A public corporation, the TA took full responsibility for public travel in New York City, including all city-owned buses, trains, and trolleys in use at the time (Cook, 2016). However, the modern-day Metropolitan Transit Authority did not emerge for another decade and a half. Within this fifteen-year period, many advancements were made to improve the

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New York public transportation structure, including new track connections in the subway, discontinuation of trolley cars, air conditioning in trains and buses, and extensions for both the subway and city buses (Cook, 2016). Despite these accomplishments, the fiscal deficit had hardly improved. The TA was able to borrow against future revenues and purchase any needed equipment for public transit. The TA's independence was intended to introduce a sense of "fiscal discipline" to create a fare rate that would be self-sustaining for the subway. Despite these measures, this authoritative structure of the TA ultimately failed. With maintenance costs rapidly escalating, the fare that the TA originally hoped to be "self-sustaining" was unable to cover the costs of running the system. In fact, the significant gap between the costs and the profits continued to grow. In order to salvage the situation, the New York state government needed to step in (Gelinas, 2019). In 1968, the MTA was finally created by Governor Nelson Rockefeller and the New York Legislature. This newly created organization oversaw twelve New York counties, and was identified as the parent agency to the New York City Transit Authority (Cook, 2016).

Although the MTA was created to help the New York transportation system reach financial stability, public transportation ridership decreased drastically when the MTA was first introduced. The initial plan of action was to increase the fare from twenty cents to thirty cents, as the previous "self-sustaining" fare plan was deemed ineffective. Immediately after the fare increase, the MTA saw a drop in public transport ridership. The fare increase was designed to help shrink the large financial gap between the MTA's expenditures and revenue. . . However, the increase did not have the effects its proprietors hoped for. The fare discouraged ridership, and New York public transport hit its darkest point. The subway in the 1970s was underfunded and under maintained, as it was very dirty, covered in graffiti, and had a high crime rate. Many upgrades and maintenance arrangements that were established in the 1960s under the TA were suspended during the 1970s. In 1979, persuaded by the high rate of crime in the New York City subways, Mayor Ed Koch organized a panel to discuss solutions to the rapidly worsening transit crisis. In the coming decade, the MTA was able to make drastic improvements. The corporation was able to create graffiti-free, stainless steel train cars, an improved lighting system, and a new force of police officers to ensure fewer crimes on the subway. As a result of these improvements, ridership began to increase. In the 1990s, the MetroCard was introduced, discontinuing the subway tokens that had been used up to the point; this made riding the subway and other transportation services more efficient. Many further improvements were made to MTA t services, with new technological improvements, more attentive law enforcement, safety measures, subway line expansions, and new subway routes created (Ormsbee, 2004). Today, the MTA has evolved to be the leading state-wide transit system, carrying an average of 5.5 million New Yorkers every weekday.

MTA Budget in the Past

In the past, the MTA budget has been severely criticized, with increased spending correlating to increased debt. Back in 2007, a projected $800 million deficit was on course to reach $1.1 billion in total losses by 2010. Yet, after the economic crash of 2008, this "expected-dent" in financial planning skyrocketed. Since then, many efforts have been made to restore the workforce and

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transport system. In 2008, plans were made to increase the retirement age, allowing for less MTA workers to be employed.

Similarly, over $200 million in pension payments were given out as soon as possible, with risks of inflation looming. While pre-purchase agreements for fuel and metallic parts were able to save over $300 million that year alone, the situation only got worse by 2010. Two years later, the MTA budget began taking more hits alongside revenue losses. To compensate for this, EZ created fines, bus subsidy reductions and utilized Inter-Agency loans.

However, no improvements were made. By 2017, national federal aid to the MTA reached over $4 billion, yet layoffs alongside severe service cuts were made. In 2019, Long Island RailRoad President Phil Eng even defended service cuts, which saved only $15 million yet offended all 4 counties. In the last 2 decades, what has become most intriguing though is the supply chain of the MTA's money. Now, dedicated taxes make up approximately 40% of the budget, when they only accounted for 31% in 2013. The same goes for local and state subsidies, which have greatly risen since farebox revenue has lessened. Over 15% of the MTA's total budget, or $675 million, went into debt payroll as of 2020. The developing issue of paying off this debt is a persistent issue in any MTA financial decision, hence the impractical and delays of multiple vehicles across New York City. While more money goes to overtime wages and pension plans, it seems as if labor and production is on the decline.

Present Day Situation/Present Day Budget

Currently, the MTA system, like all businesses, follows COVID-19 regulations to keep citizens nationwide healthy. The MTA schedule remains the same, but following the coronavirus regulations, the MTA suggests that riders should keep their mask on at all times, use hand sanitizer frequently, social distance from other riders, and, if possible, travel during less busy times. Additionally, New Yorkers and public transportation users in North America can find what the MTA does to follow coronavirus regulations on their side from reading the MTA service website. The website states that the MTA continues to deep clean all stations and vehicles, reminds riders to be precautionary towards the pandemic, and has available masks and hand sanitizers at each station to ensure all passengers are healthy and safe (*MTA Service during the Coronavirus Pandemic*, 2021). When the pandemic hit, the MTA suffered many losses and had to change the system, budget, and policies altogether. From the beginning, some of the most significant problems were a lack of precaution for the coronavirus and an increase in delays. For instance, a New York Times article from April 2020 discusses a vast number of MTA workers who died or got sick due to the virus. Specifically, due to the pandemic's sudden hit, 41 transit workers died, and at least 6,000 fell ill. This led to an unexpected crew shortage for the MTA. That same month, there were over 800 subway delays, and over 40 percent of train trips were canceled in a single day (Goldbaum, 2020). Now, the delays have decreased since last year, and there are many more precautions and safety regulations that followed, unlike the previous year. However, one major conflict currently discussed is the MTA's interchanging and conflicting budget that has been contested for many years. For the past year, the MTA was set on increasing

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the fee for passengers to ride trains and buses from $2.75 to $3.00, as well as hiking up the price for purchasing a MetroCard from $1.00 to up to $3.00 (Chung, 2021).

As mentioned previously, there currently exists massive budgetary and cost inefficiencies within the MTA. First, we see these massive inefficiencies when looking at the lack of adaptability for adjusting to various situations. We saw this firsthand for 2020 and the impacts of coronavirus on ridership in the MTA. The average daily ridership for the MTA in 2019 was at around 5.8 million passengers per day. However, in 2020, the average daily ridership for the public transport system had plummeted to only around 1.5 million daily passengers (MTA Info, 2021). Despite this massive fall, the MTA budget did not decrease at all to account for this. In 2019, the budget for the MTA was $16.7 billion. In 2020, the budget was $16.9 billion. In 2021, the proposed budget is $18.4 billion. We see that even through a nearly 70% decline in ridership, the actual cost of the MTA has only increased (MTA Budget, 2021). Decreased ridership would indicate decreased maintenance costs, as less people would be using the public transportation system. However, we did not see a decrease in non-labor related expenses, although they were not the main factor that contributed to a rise in MTA cost. The 10% increase in MTA expenditures from 2019 to 2021 were due to a nearly $1.5 billion increase in labor costs. Overtime costs experienced an increase of nearly 50 percent, white payroll costs had only seen a 3.5 percent increase. Health related costs saw a ten percent increase, and other labor related costs saw a 50% increase as well. This massive upsurge in labor costs and lack of ability to adjust to outside events has played a large role in the many inefficiencies of the New York City Public Transit system.

Labor Situation

Issues of labor and maximizing the efficiency of MTA workers has also become a prevalent issue. The Transport Workers Union is responsible for ensuring that the rights of urban transit workers are protected across the country, but the Local 100 is specifically responsible for ensuring that MTA workers are fairly compensated for their work. Under pressure of the Local 100, the MTA often hires many more workers than is needed for certain maintenance jobs, causing the costs of labor to skyrocket. In addition, the MTA's train system still relies on an Automatic Block Signaling (ABS) system, which essentially divides the train tracks into "blocks". When a train is in a "block", no other train can be in the same one, slowing down trains significantly. Opting into a Communications Based Train Control (CBTC) system, which makes use of telecommunications between the train and track equipment to allow trains to move faster, would greatly improve the efficiency of the MTA system. Looking into semi-automated train systems, which would allow the MTA to hire less workers and therefore cut down on exorbitant labor costs, may also be a solution to the MTA's massive debt problem.

Modern Day Problems

Among many economic issues, the MTA system in New York City suffers from pollution and unintentionally provides shelter for the homeless population. Intensified by the coronavirus pandemic, these problems affect the everyday lives of commuters in the city. Littered trash contributes to about 700 fire-related incidents every year on the tracks. The trash also causes flooding in the water system, where water flows because of the sewer system. The water build-up

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can affect train signals and can even impair the electrical system used to keep trains running. These problems cause major delays and can even stop an entire line for up to days at a time for repairs. This does not include the lack of sanitation in the cars and between. The cold temperatures force many homeless into the ventilated subway cars as a place to sleep and even ride endlessly. Not only do people sleep on the trains, but some use the tracks in place of a toilet. This is dangerous not only for passengers but MTA workers as well. As of October 25th, 2020, 126 MTA workers have died from the coronavirus. Rats have also been forced to seek a new food source in the subway stations because of the closed restaurants. According to ABC7NY, New York City is the "3rd rattiest city". This lack of hygiene and close proximity is not only dangerous but affects the number of people who want to use public transportation over other modes.

The MTA also deals with financial problems within the system. They have required emergency funding and need billions of more dollars to keep running, which includes major changes to the existing schedules. In order to keep the system running, an estimated 7200 people would lose their jobs amid the pandemic. Bus service would need to be cut by up to 40% and wait times for subways could drastically rise. This economic crisis also stands to affect commuters from outside the city. Specific routes would need to close entirely. The pandemic has not helped the transit system, as the number of people needing to commute plummeted leading to a loss in fare dollars. A whopping 93% of usual riders stopped using the subways at the beginning of the pandemic. As of September 2020, only a quarter of riders are back; however, riders are hesitant about even going back to the subways after the pandemic. Violence and crime have risen, and dozens of MTA workers have been harassed. Murders have taken place on ordinary train lines like the A train that stretches between 2 boroughs. Hundreds of more police officers are said to facilitate everyday travel, but many still do not feel safe. These modern-day problems only pose more need for change in the question of "How can we make public transportation more efficient in the United States?"

Comparison to other US transit systems

Past research has often focused on supply-side efficiency when measuring the efficiency of a system like the MTA or other worldwide and U.S. public transits. However, by focusing on the demand-side efficiency, researchers can produce more accurate results for multiple reasons. For example, the United States Bureau of Labor Statistics gives an illustrating example by saying "an outside observer would likely consider a bus full of passengers to be producing more output than an empty bus. However, a measure of output based on vehicle hours in service would count them the same (Chansky, 2018). New York City may have the largest transit system, but that does not necessarily mean it has the most efficient system. A worldwide comparison of efficiency that compared overarching urban mobility using five measures of success found that only two U.S. cities made the top ten list. In a measure of "Availability, Affordability, Efficiency, Convenience and Sustainability", the researchers found that Chicago and New York make the worldwide top ten with Chicago edging New York out by 1.1% (Knupfer 2018). This study showed that New York's system is lacking in efficiency in comparison to the rest of the world and is not even the most efficient in the United States.

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A study by the Mineta Transportation Institute triangulated New York's public transit system to a ranking in comparison with other states. A transport system is present in almost every densely populated city in America, and each one has differences in its operating technique. Public transport systems around the United States have different amounts of privatization, different operating budgets, and different goals. Privatization has been heavily suggested as an improvement in many public transport systems, and the subject of many research studies and debates, but there has not been a significant correlation between the amount privatized and efficiency. Other factors that go into a public transport system's efficiency are if the system is state-owned or city-owned, the types of transportation vehicles it uses, and the size of its workforce. McKinsey approached their experiment by finding a value for the Super Efficiency of each state. "Super Efficiency" was calculated by dividing the Technical Efficiency of the public transport system by the Pure Technical Efficiency. New Hampshire had the highest by far, with 1.875. The scores slump down after with Wyoming having 1.225, Mississippi having 1.009, and then finally New York having a score of 1.003. The results showed that mass transit systems that made use of van-pooling services or Ride-Share programs tended to perform better, whereas mass transit systems that used light-rail heavily tended to perform poorly (Hokey, 2017). All of the top performers also tended to be open to partnerships with private enterprises. Commuter rail and demand response taxis tended to create greater efficiencies than other modes of public transportation such as trolley bus and light rail. The study further showed that privatization of mass transit systems did not necessarily improve efficiency. The study showed that the efficiency of a public transport system is often attributed to the vehicle types used.

The MTA is the leading public transport system in the state of New York. Founded in 1965 by Nelson Rockefeller, the MTA continues to carry an average of 5.5 million New Yorkers every weekday, helping them commute to their homes, school, work, or anywhere else (Zhang, 2015). Despite the accolade of being the top transit authority in one of the most densely populated cities in the world, the MTA is still very far from reaching its potential for maximum efficiency. The average commute time in New York City averages 53 minutes, taking the place as the city with the longest average commute time, while San Diego has the shortest average commute time in the United States, with an average of 26 minutes (Metro Magazine Staff, 2019). New York is also identified as the least reachable city in the United States, with only 4% of commuters being able to reach the city in less than thirty minutes due to the incredible traffic from regulars and tourists and 6% of public transportation riders being able to reach the city in under thirty minutes (Metro Magazine Staff, 2019). Compared to Minneapolis, identified as the most reachable city in the United States with 31% of public transport riders being able to reach the city in under thirty minutes, New York seemingly can improve significantly. The costs of building and maintaining this transit system are staggeringly high compared to other major cities around the world. The Second Avenue Subway took $1.7 billion per kilometer to build, while the MetroSur line in Madrid, Spain, took $58 million per kilometer, a much lower cost than the construction of the Second Avenue Subway (Sisson, 2017). With these various other large cities being able to incorporate their public transport array so efficiently, it raises the question: How can the MTA learn from this and make public transportation more efficient?

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Material & Methods

We will collect data from two cities in each of the fifty states in the United States. In order to determine the efficiency of a city's public transportation system, the number of passengers transported daily by the system will be divided by the overall number of commuters. This number will then be divided by the median commute time in that city in order to determine an efficiency rating for that city. We will also collect data on average snowfall, total budget, and average spending per capita in order to determine whether weather conditions and a city's funding have an effect on that transportation system's efficiency. All data will be compiled using records from the United States census, as well as records from each city's transportation authority and weather data from each region.

Efficiency= (number of passengers transported daily/total working population)/median commute time

E=(P/W)/M
P=Number of passengers transported daily
W=Working population
M= Median commute time

New York City is only one of many cities across the world that use public transportation systems. This research study will choose other cities to compare to base on similar population sizes. New York City has a population of about 8.5 million across the 5 boroughs, which is significantly more than most cities with public transportation in the US. The cities with the closest consumer usage to New York, which is 56 percent, are Jersey City, Washington, Boston, and San Francisco. Out of these 19 cities, only some are useful for accurate testing because some have spent more on public transportation than others, and typically those that spend more are better. These cities must be close to or less than that 15 billion dollars per year that the MTA spends on transportation.

Public transportation has been around for a very long time and is very beneficial to millions of Americans to the point where it has become a lifeline for them. With public transportation, civilians from all over the world are able to connect with people and places. As well as bringing connections and transporting individuals to their desired destinations, public transportation eases traffic congestion and promotes a cleaner environment, according to a publication made by the American Public Transportation Association. However, since transport systems are so important to society, how many commuters are there that use public transportation such as trolleys, trains, buses, cable cars, etc? Statistics show that in 2019, 9.9 billion trips were made by Americans, using public transportation. Additionally, since there are many ways, we can utilize public transportation in our lives, our statistics will show the main transit systems used by American workers, students, and others. For instance, according to a Bloomberg CityLab report, only five percent of American commuters use transit daily to get to work. There are many statistics shown on a vast range of websites, reports, and publications, this will help us conduct our survey as well as ask around how beneficial public transportation is for you.

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In order to compare the efficiencies of cities around the country, there are many factors we need to consider. One of these factors is the distribution of public transportation throughout a given city. For example, New York City consists of 5 boroughs and reaches out further into the tri-state area. However, the availability of stations is much larger in Manhattan. This inequality between areas is not uncommon when considering major cities. The layout of stations also affects minority communities directly. Because of this, we will be using maps of bus, train, subways, and other modes of public transportation in different cities to evaluate the number of passengers that need more resources in order to get from place to place. This will include the lines and stops and the percentage of land that is covered in the specific city. Across the United States, different transit systems have countless variables that influence efficiency and differentiate their systems from others. A transit system has the choice of using countless different modes of transport. New York City, for example, has buses, railroads, subways, e-bikes, and ferries. Other systems like San Francisco and Boston have light-rail trolley or tram systems. The combination of choices of different modes of transport is a vital variable in changing the efficiency of a transit system. Light-Rail has been shown to have a strong correlation with lowering the efficiency of a transport system. This can be attributed to their low speed and low capacity. Railroads and subways, in comparison, are considerably faster and make less stops while transporting more people. Light-Rail also brings risks and setbacks, as there is always a risk of a pedestrian being in the way of or hit by a tram or trolley. This risk is much greater in trolleys/trams than in railroads and subways, as they are incorporated into pedestrian walkways. This directly brings a higher risk in delay time, thus lowering efficiency. Meanwhile, ridesharing means of public transport has been shown to correlate with increased efficiency. While the public bus is the most common ride-sharing method, there are other methods such as vanpooling that has been incorporated in cities across the world. Measuring the most common mode of transport of a transit system produces valuable, usable data. We can compare our measured efficiency with the most common mode of transport and see if we find patterns across different cities. If the least efficient transit systems all have the same primary mode of transport, we can suggest increases based on this data.

We must take the average snowfall of a given city, in order to see if this could be a cause of their extensive delays. We will go city by city, finding the average snowfall for each. Certain cities, such as those in the Northeast for example, experience much more snow than hotter cities, like those in the Midwest. Finding a statistically significant correlation between average snowfall and efficiency will show if snowfall is a factor that we must consider when comparing efficiencies across different cities. If there is no statistical significance between average snowfall and efficiency, then we can compare efficiencies without considering their respective snowfalls.

We will be using the various data derived and discussed in the above paragraphs to find our E value, the efficiency of various public transit systems. Having this value as just one value, yet a concrete one allows us to have a simple platform that compares the various public transit systems. Through relying on only one value, our data will be much easier to examine, understand, and also replicate. The higher the efficiency value for each city, the more efficient its public transit system is according to our study. If the New York City Public Transit System has a higher E value than Chicago's public transit system, this means New York City has a more efficient system. If a city has a higher E value when compared to the other evaluated cities, we

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will then focus on which of the individual variables discussed above has caused the city in question to have a higher E value. Through a further dissection of this individual variable, we will then be able to produce an explanation for why each city had a higher, or lower, E value than another city. Through this method, we will be able to pinpoint the exact reasons for why one public transit system is more efficient than another public transit system.

Results
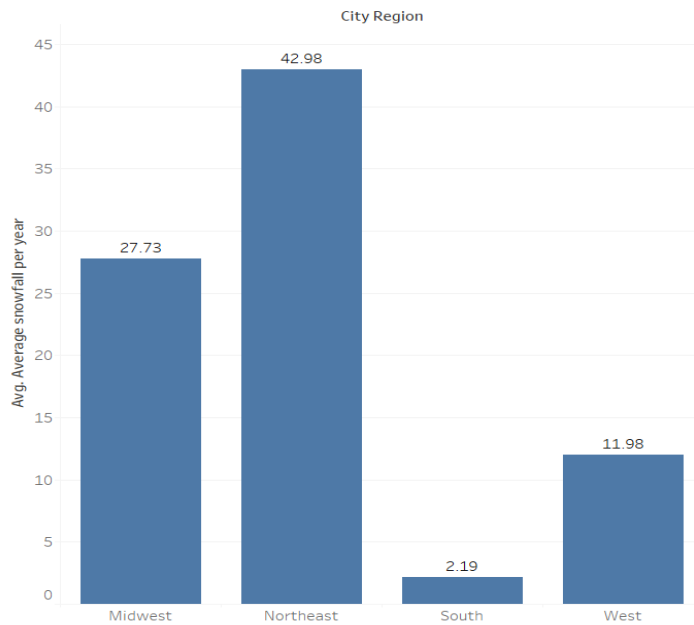
Average snowfall per region according to our data

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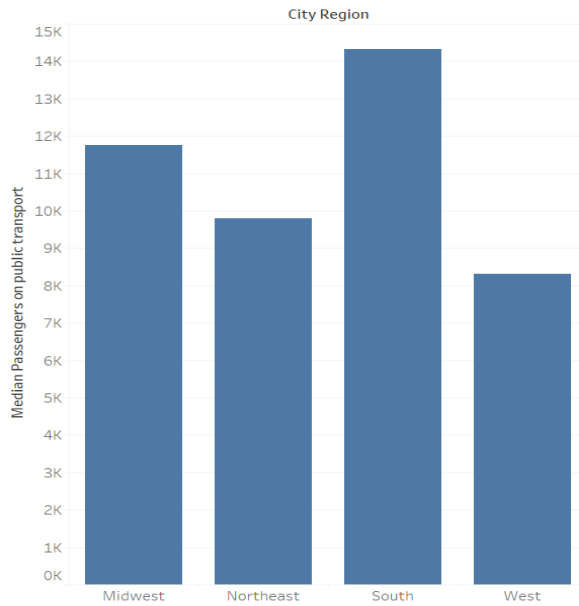
Median Number of passengers on public transit
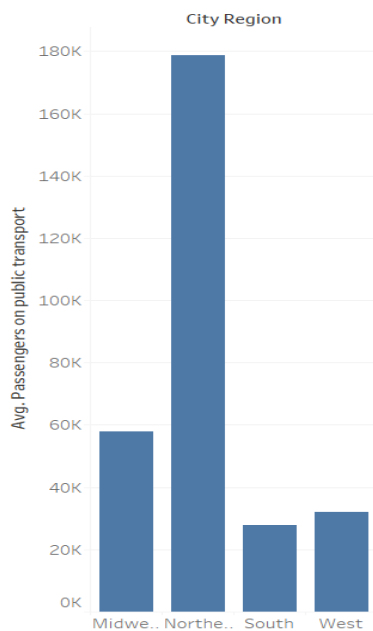
Average number of passengers on public transport by region. Compared to the previous graph, the Northeast has much more commuters due to large outliers like NYC. However, we saw in the previous graph that when excluding outliers by looking at medians, the south has more commuters in its cities.

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Region and Spending Per Person
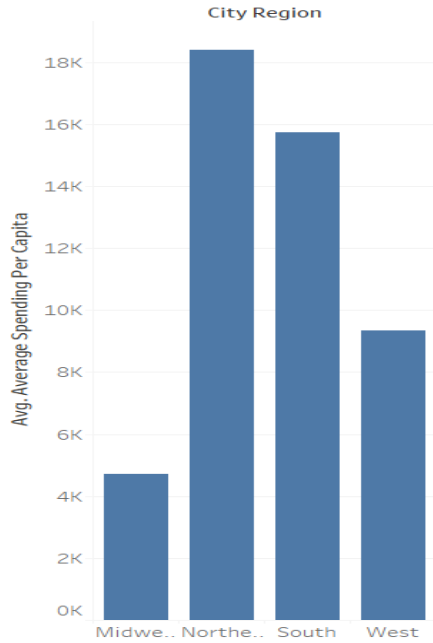
Spending per person for public transport by region.
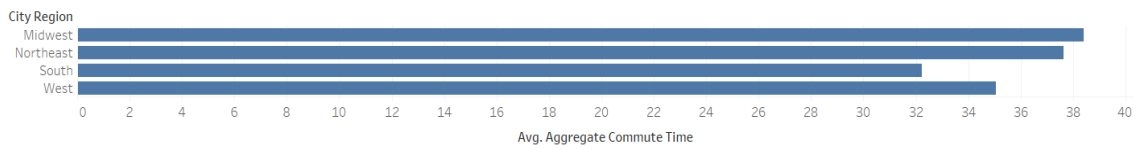
Regions by average aggregate commute time. The Midwest has the highest times, followed by the Northeast, West, and South

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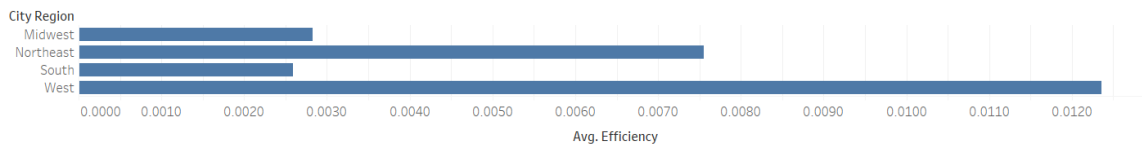
Efficiency levels by Region.

ANOVA

ANOVA - Aggregate Commute Time

Cases	Sum of Squares	df	Mean Square	F	p
City Region	1902.917	3	634.306	6.799	< .001
Residuals	33772.513	362	93.294		

Note. Type III Sum of Squares

In this figure, we can see that the City region has a significant correlation with average commute time, as our p-value is less than 0.05, which allows us to reject our null hypothesis.

Descriptive Statistics

Descriptive Statistics

|	Average snowfall per year				Aggregate Commute Time			
	Midwest	Northeast	South	West	Midwest	Northeast	South	West
Valid	81	100	70	100	96	100	70	100
Missing	19	0	0	0	4	0	0	0
Mean	28.839	42.805	2.010	14.490	38.390	37.625	32.214	35.050
Std. Deviation	17.789	26.799	3.969	21.800	9.406	9.817	3.529	12.296
Minimum	0.000	4.800	0.000	0.000	27.000	22.000	27.000	17.500
Maximum	92.760	151.800	22.200	72.800	60.000	52.000	39.500	60.000

Note. Excluded 1 rows from the analysis that correspond to the missing values of the split-by variable City Region

We see in this figure the average snowfall and commute time per region. The regions in order of most snowfall to least was Northeast, Midwest, West, and South. The regions by order of average commute time from greatest to least were Midwest, Northeast, West, and South.

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Descriptive Statistics

Descriptive Statistics

	Efficiency				Total Working Population			
	Midwest	Northeast	South	West	Midwest	Northeast	South	West
Valid	96	100	70	96	100	100	70	100
Missing	4	0	0	4	0	0	0	0
Mean	0.003	0.008	0.003	0.012	267930.190	342681.850	455132.529	377412.210
Std. Deviation	0.005	0.010	0.009	0.014	296291.482	867079.412	234026.429	433569.451
Minimum	3.409e −5	5.640e −4	1.720e −4	1.087e −4	95227.000	23851.000	130216.000	55403.000
Maximum	0.025	0.050	0.074	0.080	1.586e +6	4.073e +6	1.128e +6	2.021e +6

Note. Excluded 1 rows from the analysis that correspond to the missing values of the split-by variable City Region

The regions by most Efficient to least are the West, Northeast, and South tied with Midwest. Regions with highest average working population in cities from greatest to least are South, West, Northeast, and Midwest.

Descriptive Statistics

Descriptive Statistics

	Average Spending Per Capita				Passengers on public transport			
	Midwest	Northeast	South	West	Midwest	Northeast	South	West
Valid	93	99	64	42	100	100	70	100
Missing	7	1	6	58	0	0	0	0
Mean	4714.283	7929.497	14752.291	9336.403	54057.460	179218.720	27578.286	148259.720
Std. Deviation	6229.485	12117.508	13566.318	8442.919	131841.651	602688.180	51334.302	192350.534
Minimum	3.000	647.930	1140.860	30.420	179.000	1592.000	1486.000	303.000
Maximum	33837.600	96757.470	90927.260	32152.140	530573.000	2.788e +6	378255.000	834179.000

Note. Excluded 1 rows from the analysis that correspond to the missing values of the split-by variable City Region

Regions from greatest to least spending per public transportation use were South, West, Northeast, and Midwest. By public transportation mean users from greatest to least, the regions are West, Northeast, Midwest, South (the Northeast and West are much larger here due mainly to large outliers such as Los Angeles and New York City).

Data Analysis

Formula:

Efficiency=Passengers on Public Transport/Total Working Population/Median Commute Time

In order to interpret the effects of numbered variables, we utilized a linear regression test on all data values of all years on efficiency values. We see that the correlation for number of passengers on public transport ($p=<0.001$) , total working population ($p=<0.001$), average spending per capita ($p=0.018$), and city region all have a significant correlation with efficiency. However, average snowfall per year was found to not be significantly correlated with the efficiency. More

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evaluation on every variable will be given in the following paragraphs. Interestingly, we found that as spending per capita increased, efficiency decreased. All the appropriate correlation values can be seen in the following chart with the unstandardized values.

Model Summary - Efficiency ▼

Model	R	R²	Adjusted R²	RMSE
H_0	0.000	0.000	0.000	0.013
H_1	0.422	0.178	0.166	0.011

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	0.008	4	0.002	15.465	< .001
	Residual	0.037	286	1.305e−4		
	Total	0.045	290			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	0.005	7.334e−4		7.415	< .001
H_1	(Intercept)	0.008	0.001		6.468	< .001
	Passengers on public transport	2.612e−8	3.719e−9	0.776	7.024	< .001
	Total Working Population	−1.372e−8	2.377e−9	−0.651	−5.775	< .001
	Average snowfall per year	1.388e−5	2.768e−5	0.029	0.502	0.616
	Average Spending Per Capita	−7.234e−9	3.036e−9	−0.129	−2.382	0.018

Total working population compared to those who take public transportation

It is important to know if the percentage of people who take public transportation is the majority of the population. If it is, the system is probably efficient and if it is not the public transportation system is not as good as it could be. In this data, the p value is always less than .001, which is less than .005, so it is significant. This means that the system is efficient.

Population effect on spending per capita (p=0.051)

This section examines if a larger working population means a higher spending per capita. This essentially asks if larger cities spend more per person. For all years and values, we found that there is no significance (p=0.051). For 2019, there still is no significant correlation (p=0.352). For 2018, the correlation was insignificant (p=0.396). For 2017 it was also insignificant (p=0.284). For 2016, it was insignificant (p=0.385). For 2015, it was insignificant as well

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(p=0.298). This proves that larger cities do not always spend more money per person for public transportation.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	75399.228	12175.781		6.193	< .001
H_1	(Intercept)	90202.655	14278.252		6.317	< .001
	Total Working Population	−0.041	0.021	−0.111	−1.961	0.051

ANOVA ▼

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	7.290e +7	1	7.290e +7	0.595	0.441
	Residual	3.630e +10	296	1.226e +8		
	Total	3.637e +10	297			

Note. The intercept model is omitted, as no meaningful information can be shown.

Correlation by region

We found that there is a significant correlation between the region of the city being examined and the efficiency of the public transportation system within that city ($p < 0.001$). We also found a significant correlation between the city region and average commute time ($p < 0.001$). Average spending per capita also had a significant difference by region ($p < 0.001$).

ANOVA - Efficiency

Cases	Sum of Squares	df	Mean Square	F	p
City Region	0.019	3	0.006	24.291	< .001
Residuals	0.094	362	2.585e −4		

Note. Type III Sum of Squares

Snowfall effects on Average Commute Time, Budget, Efficiency

The effect of snowfall on multiple transit factors is quite clear, as it surely does not affect budget, commute time, or efficiency entirely. First analyzing the snowfall's p value, it remains greater than 0.05 in all years from 2015 to 2019. Based on this, the success and practicality of transit systems is not impacted by snowfall. Seeing how this relates to budget, the p value for budgets also remains above 0.05 in the majority of years of collected data. In order, it follows with 0.085,

0.084, 0.083, 0.420, 0.032. As 2019 is the only year where snowfall influenced the budget, this outlier concludes that there is some relation to increased budget as well as increased snowfall. Finally, the average commute time on a national basis remains over 0.05 in terms of the p value. For all years 2015-2019, this is depicted. Overall, snowfall does not influence anything in terms of average commute time or efficiency but has recently shown effects on budget plus spending.

The number of passengers has shown to consistently not impact efficiency. In the context of efficiency, there is no shown significance which correlates to the number of passengers. Analyzing the given data, such can be proven consistently. In 2015, a p value of 0.118 can be noted. From 2016-2019 in order, the p value follows with 0.065, 0.075, 0.124, 0.070. In every given year, a p value greater than 0.05 can be noted. All in all, it is evident that the number of passengers does not impact efficiency. No matter how many people board transit, the success of the ride is influenced by other factors.

How median time travel affects efficiency

Model Summary

Model	R	R^2	Adjusted R^2	RMSE
1	0.010	0.000	−0.003	0.011

ANOVA ▼

Model		Sum of Squares	df	Mean Square	F	p
1	Regression	4.435e −6	1	4.435e −6	0.037	0.848
	Residual	0.043	360	1.200e −4		
	Total	0.043	361			

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
1	(Intercept)	0.006	0.002		2.822	0.005
	Aggregate Commute Time	1.130e −5	5.879e −5	0.010	0.192	0.848

As seen by the chart above, the correlation between aggregate commute times within cities and efficiency is not significant. We conclude this information because the P value is larger than 0.05. This information includes all of the years collectively. For the individual years, all but 2017 and 2016 show that the correlation is also insignificant. For the year 2019, the P value was 0.054. For the year 2018, the P value was 0.053. The P value of 2017 was shown to be 0.032. This significance was represented in 2016 as well where the P value was equal to 0.008. Finally, for the year 2015, 0.324 was equal to the P value.

How the number of passengers affects the median commute time

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All Years (p= <0.001)

ANOVA ▼

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	1854.913	1	1854.913	19.964	< .001
	Residual	33820.517	364	92.914		
	Total	35675.430	365			

Based on the chart above, there seems to be a significant relationship between the dependent variable of median commute time and the total amount of passengers. The overall p-value between all the years is shown to be less than 0.001, deeming this correlation very significant. Despite only 2019 and 2015 having p-values that are less than 0.05 (with 2019 having a p-value of 0.027 and 2015 having a p-value of 0.048), this was enough to make the overall p-value be significant. Therefore, it can be concluded that having a larger number of passengers does equate to longer commute times.

The effect of spending per person on efficiency (p=0.026)

All Years

ANOVA ▼

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	7.515e −4	1	7.515e −4	4.972	0.026
	Residual	0.046	307	1.512e −4		
	Total	0.047	308			

From the graph above, we determined that the effect of spending per person on efficiency is significant because the P-values of the charts following were all less than 0.05. It is shown that in the years 2016, 2017, 2018, and 2019, the relationship between spending per person and efficiency is significant, which greatly contributed to the P-value in our chart which depicted all the years. In 2015, the data was significant. However, the P-value was 0.024 which is much greater than the P-values in the other graphs that were reported to be less than 0.001.

When comparing the total working population to the dependent variable of average spending per capita, we see a p-value of above .05. Although this number is very close to confirming the two as statistically significant, it is not enough. As a result, we can conclude there is no statistical correlation between total working population and average spending per capita. More research can be done to see if cities with higher population spend more per person, but our research shows there is no correlation.

Spending per capita compared to median commute time

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When comparing spending per capita to median commute time, we see an R2value of 0.124, suggesting that the two variables have very little correlation. The p value is 0.005, which indicates that this lack of correlation is not statistically significant. Therefore, we can conclude that there is no relation between spending per capita to median commute time, though logically spending more on improving and maintaining a transport system should correlate with shorter commute times, as this would indicate that the improvements made are ones that benefit the customer by decreasing their commute time.

Linear Regression

Model Summary – Aggregate Commute Time

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	8.228
H_1	0.353	0.124	0.110	7.763

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	521.921	1	521.921	8.661	0.005
	Residual	3675.856	61	60.260		
	Total	4197.777	62			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	35.748	1.037		34.483	< .001
H_1	(Intercept)	34.831	1.026		33.937	< .001
	Average Spending Per Capita	1.445e −5	4.911e −6	0.353	2.943	0.005

The above linear regressions show the relationship between the aggregate commute time and the average spending per capita

Discussion

Snowfall affects public transportation budgets and efficiency in several ways. For instance, it affects efficiency because of the delays that snowfall causes. For example, in many cities that don't typically go through snowstorms, even minor snow can cause serious problems. The infrastructure and transportation mechanisms might not be suited to endure these conditions, and most of the time they break down. This can occur in a train system, adding 20-30 minutes to commute time. Secondly, snowfall forces transportation agencies to cancel some routes due to safety. Many above ground vehicles, such as buses, become less frequent. This is due to either

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the company shutting down the routes for safety because of low visibility and bad traction, or the snow stopping the drivers from getting anywhere. Thirdly, snow has many indirect effects. In places with both frequent and infrequent snowfall, the roads get closed, forcing any available drivers to find new ways to get to the right destinations and making travel time a lot longer. In many cases, these problems or the possibility of these problems stops riders from attempting to take public transportation, decreasing ridership. The second problem with snowfall is that it causes major costs for the companies. Snowstorms make public transportation companies lose money through the loss of fares with lower ridership, having to pay workers even if they aren't able to work properly or at all, as well as with repairs to any damage to vehicles or machines used in the transportation. Even with the chance of them accounted for, snowstorms cost a lot of money. For example, in New York City, snow is not an uncommon thing in the winter. However, in 2011 a major snowstorm took place, shutting down almost all parts of the MTA, costing them over 30 million dollars, not including repairs. However, it is even worse in places that don't typically get snow, such as cities in Texas and California. Because they do not have the necessary preparations for these light snow falls that occur every few years, it costs them more in reparations than their budgets can handle.

Using our data, we were able to calculate average spending per capita. This was done by dividing the budget by the passengers on public transport. We ran a linear regression and an anova to see if there was a correlation between the number of passengers and the amount the city spends per person on public transport. There was no statistical significance between passengers on public transport and average spending per person. However, we did notice some patterns in the average spending per person when looking region by region. The Northeastern region spent an average of $27,913.01 per person using their public transport system. The South region spent an average of $24,152.34, and the West region had an average spending of $13,454.31. The Midwest region stands out immensely with an average spending per capita of $123,012.61. This is most likely due to the Midwest having the lowest ridership out of the regions. Areas like New York and Boston in the Northeast have a much higher percentage on average of the total working population riding on public transport than a city in the Midwest, like Lincoln, Nebraska. The same can be said for Southern cities like Washington D.C. which has over ⅓ people in their working population using public transport! Another factor to consider is that some regions are willing to spend more on their transport system. Different systems have different levels of efficiency. Light-Rail systems have been shown in previous studies to be the least efficient mode of transport, while subways are considerably more efficient. It is entirely plausible that cities in the Midwest have a much smaller need for more efficient transport systems like subways because their cities are considerably less dense than areas like New York. Subways can provide exponentially more rides and passengers than a tram or trolley system but could be impractical due to the lack of density in midwestern cities. Light-Rail systems have the benefit of being easier to construct and stretch to long distance but carry sizably less passengers. For less dense cities that are found in the Midwest, it makes sense to build a light-rail system instead of a subway, even if it is more efficient and costs more per person. A New Yorker can take the subway many times in a day, as they traverse the city and stop by different sight-seeing locations. Meanwhile, a light-rail system makes more sense for a small midwestern city, who's occupants only rely on public transport to get to work and home. Subways will provide considerably more rides, but the Midwest does not have the density to support running as many lines and stops if

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they build a subway in the first place. With more riders comes more money spent. New York is willing to spend billions because their citizens will take many more subway rides than a person trying to traverse through his hometown in the Midwest. This institution of less efficient systems is the most plausible cause for the high spending-per-capita of the Midwest region.

In the United States of America, there are many different types of cities ranging from more urban areas to rural. Because of this diversity, there are different population numbers such as New York City which currently has a population of about 8.5 million people (not including the people who commute in and out of the state every day) to 680,000 people in El Paso, Texas. This range in population however does not necessarily correlate with the spread of people in the city. As New York City is a very dense community it also lies in the Northeastern region. The Northeastern part of the nation contains 11 states. There are 162,257 square miles of land in the northeast. This can be compared to another region, the Midwest. The Midwest has 12 states, and it is 821,000 square miles. The landmass makes the Midwest compared to the size of Mexico. This comparison can also be shown by population. The Northeast contains around 55,982,803 people while the Midwest has 65,000,000. When you divide the population by the square miles for the Midwest, you get the number 80246.9135802. When you use this equation for the Northeast, the number is much smaller: 345.025502752. These numbers represent the disproportional relationships between the population and amount of land throughout the country's regions. This pertains to transit systems as well because some cities will have to account for more areas and more passengers, or vice versa. New York City, for example, takes into account 665 miles of subway lines with countless stops, while the Metro of Washington DC has 117 miles. The population of these respective cities is very different since New York City has around 5.6 million riders daily and Washington DC has 626,000. If we divide the number of daily riders by miles covered by the transit systems, we, once again, will see the disproportional relationship between daily riders and mileage by their underground railroad systems. New York City's quotient to that equation is 8421.05263158 while Washington DC's metro's quotient is 5350.42735043. The difference of over 3000 highlights the disparity between cities across the nation in terms of population, land, and coverage of transit lines.

The use and spending of public transportation are unequally dispersed throughout the entire nation. Reports conclude that New York City/New York spends the most money on public transportation also known as the MTA. The same reports display that 56.5% of New York residents exploit public transportation on a daily basis, "with Jersey City in New Jersey where 47.6% of the residents use public transportation instead of commuting by car being a close runner-up." Now, it is no surprise that New York City has the most people who use public transport because New York City has one of the greatest populations in the nation with a whopping 18,823,000 people occupying the city. Compared to other cities, New York City has a massive population which significantly contributes to the high percentage of public transportation users. In New Orleans, Louisiana, for instance, there is only 7.8% of the population that utilizes public transport daily. This should not be seen as a really low percentage considering its population (998,000, which is almost 18 times smaller than the New York City population) Additionally, the population and the percentage of people who use public transport directly affects the budget and how much each city pays for their public transportation. For example, New Orleans spends $109 million to run its public transit system as of 2020, compared to New York

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City which spends so much that the MTA faces an $8 billion deficit through 2024. Additionally, in comparison, New Jersey, which holds the second greatest percentage of public transport users went from spending $2 billion to $2.6 billion for public transport, as of 2020. Another large public transit system to consider is in California. In California, sources display that San Francisco Bay Area, which has a 7.75 million population, has the most effective system in California. California, due to its high population and expenses, has paid $12 billion in expenses for its public transport system.

The efficiency in this formula of the public transportation of a city is determined by the number of people taking public transport divided by the total working population divided by the median aggregate commute time. All these factors are affected by how much of the total budget is dedicated to a city's public transport system. Taking into consideration the total budget of some selects cities that have a low efficiency can help determine how exactly the total budget might not always increase efficiency. One example of this is the city of Stamford, Connecticut. With a total budget of $42700058 in 2019, the public transportation efficiency is still at a mere 0.2227085157, despite only 7,997 people taking public transit as their form of transportation. Oddly, this trend continues for the previous five years in Stamford. In 2018, the budget was $34573016 and had only 8663 people taking public transit, yet still had an efficiency of only 0.2037256147. In 2017, there were 7,278 people taking public transportation and the city had a total budget of $32389867, but the efficiency was only 0.2415361363. The years 2016 and 2015 had a rather higher amount of people taking public transport, with 10,351 in 2016 and 9,558 in 2015. However, the budget was still in the same range for 2016 and 2015, with $34278859.00 and 36059530.00, respectively. As a result, despite the slight increase in ridership, the efficiency value still remains quite low, with 0.2222611342 in 2016 and 0.2288397154 in 2015. Other cities, such as New York City, have low efficiency even with a higher number of people taking public transit every day and a higher budget. The efficiency in 2019 is 0.02782031303 despite the total budget being $3,999,859,000.00. Additionally, the total amount of people taking public transportation is shown to be 2,787,582 people, which is a relatively high number. This same pattern for New York City continues for all five years. 2018 has an efficiency of 0.0277161487 and a budget of $3999859000. The year 2017 has an efficiency of 0.02809671804 and a total budget of $2938292071. 2016 has an efficiency of 0.02777412663 and a total budget of $2,733,958,550.00. Lastly, the public transit efficiency of New York City in 2015 was 0.02786707166, while the total budget was $2,972,675,796. There is seemingly a trend of low efficiency due to having a high quantity of people despite a large budget dedicated to the public transit system.

When analyzing transport efficiency, data has shown that the number of passengers does not impact the efficiency of these systems. However, the question remains; Why don't certain cities have as many public transportation users? Looking for answers, city population and land area can be referred to. Using recent 2019 statistics, Boston, Massachusetts has a reported 272,835 annual users on public transit. Ranking quite high, this number is accompanied by Boston's total estimated population of 692, 600. In 2 the land area, Boston however ranks very little, with only 89. 63 mi. On the other end of the spectrum, 2019 statistics for Fort Worth, Texas tell a different story. With a reported 3,022 annual users of public transport, this total comes as a shock. With a general population of 909.585 and a land area of 355.6 mi², Fort Worth in whole is much larger.

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Yet, it is public transport usage is over 90x less than Boston's. Explaining this, a variety of reasons can be noted. To begin with, Vox's article, *"Why US public transportation is so bad — and why Americans don't care"* by Aditi Shirkant addresses the safety issues brought alongside these transit forms. Mentioning uprises in passenger violence and broken-down train lines all over San Francisco since 2016, she depicts the unreliability of these systems, even prior, a 2014 article by Ecolane titled, *"7 REASONS WHY PEOPLE STOP USING PUBLIC TRANSIT"* addressed some concerns on the end of hesitant passengers. Citing delays due to traffic, overcrowding, and delays due to mechanical failure, this group expressed the variety of difficulties faced by riders. Comparing Fort Worth and Boston once again, the answer to the question presented earlier can be simplified in two ways. First, the compactness and urbanization of major, dense cities like Boston, Washington D.C., and New York City makes public transit more practical. In locations like Fort Worth, more rural surrounding and greater distances between locations makes cars the transport of choice. Additionally, the financial surroundings of these two locations varies greatly, with Boston surrounded by major banks, corporations, and higher-priced institutions. Such makes the need for funding less difficult with increased taxes and allows construction to fit growing communication needs. All in all, city population and land area does not impact public transport usage, whereas budgeting, stop-distances, and communication needs all do.

In New York City, the Metropolitan Transportation Authority spends an exorbitant amount of money and spent $1434.88 per capita in 2019. One would assume that such a large budget would help improve the commute time of the average New Yorker. However, it seems that the variables of spending 2 per capita and median commute time are not correlated. With a p value of 0.124, this indicates that spending per capita does not significantly affect the median commute time in a city. These results are not statistically significant with a p value of 0.005. This lack of a correlation suggests that the budgets of many cities in the United States are not being adequately utilized to improve the customer experience for a passenger on a transportation system. Ideally, the budget per capita should be used to improve transportation by investing in repairs, new train lines, cleaner and new stations, and other improvements that help shorten commute times. Especially in New York City, where the MTA is heavily relied upon by millions of people, this linear regression suggests that the MTA needs to reevaluate its budget and what it is spending money on. Unnecessary repairs and improvements, high labor costs, and other expenditures may be causing this lack of correlation between spending per capita and median commute time. Though it is important to note that some cities will inherently have larger commute times due to the "suburban sprawl" in the region or distance of certain neighborhoods from the city center, working to improve the relationship between spending per capita and median commute time is a surefire way to improve the efficiency of a city's transportation system. More research must be done on the individual budgets of the transportation systems of cities across the cities in order to evaluate what adjustments can be made in order to achieve this goal.

Limitations

In this conducted data collection study, it is possible that the budget records for some of the smaller cities are not fully up to date, affecting the analysis of the budget per capita. A lot of smaller cities fall into a larger public transportation system. The MBTA, for example, does not

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only service Boston. Cities like Cambridge are also a part of the MBTA, and this led to no official budget for the city of Cambridge. Estimates were made based on publicly available information. Although websites like the Census were used in order to solidify accurate values for the working population and aggregate commute time, there is no common database for budgets of all of the various transportation authorities in the United States, which may potentially cause disparities in the ways the budgets were reported. Certain budgets had to be recorded based on pdfs of a city's budget plan, while others were listed on websites and information guides specifically posted by the transit system. The MTA makes their budget available, and so does Albany, but cities in between the two had no information on their transit system's budget. This limited our choice in cities, affecting the creation of our list of cities for each region, and the development of the average spending per capita variable. In addition, the total working population often did not account for out-of-state travelers or even out of city travelers. Cities like Newark had a median commute time of 39.50, as many of their citizens travel long distances to New York City for work. There is no statistic on how many people travel out-of-city to work, only a statistic on the working population living in a city. In a similar vein, median commute times do not necessarily indicate that a city's transportation system is inefficient, as geographic factors also play a role. In cities with more "suburban sprawl", such as Los Angeles, commute times will naturally be longer, as it will take more time for commuters to cover longer distances. The United States Census records used to collect data on the total working population and on public transportation users only accounted for those over the age of 16; however, many children under the age of 16 use public transportation and are not accounted for with these statistics. Although one website was used to recover data for each city in this study, some cities did not have readily available information for each year. Because of this, some cities may have recorded the annual snowfall average rather than the total for each year individually. It is important to address these limitations when considering this investigation; however, this does not undermine the overall conclusion of the data recorded.

Although, according to this investigation, the train systems of the Northeast contained the most efficient transit systems in the country, this does not directly correlate with rider satisfaction. There are still countless issues with the MTA, including cleanliness, delay times, and overall infrastructure of the underground train system. Studying transportation systems in depth across the country will allow New York City to replicate the benefits that are found in the transportation systems of various cities. The MTA has no shortage of problems, and it is important to recognize that solving these problems requires a multifaceted approach to address different parts of the MTA's shortcomings. Ensuring that all reforms made focus on helping the commuter, from shortening commute times to increasing the quality of subway cars and trains. Reallocating parts of the MTA's budget to address these important issues will help increase ridership. Raising the fare is not the answer, as this will only deter New Yorkers from using MTA services. It is essential that the government and the MTA reevaluate their expenditures in order to ensure that the system can continue to run more efficiently in the years to come.

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Healthcare Accessibility in New York City

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Abstract

Healthcare and access to medical treatment are vital to the safety and sanctity of community health, yet often there are vast disparities that make it so that healthcare is not equally accessible or of comparable quality. In New York City alone, many such disparities including those in funding and policy -- or a lack thereof -- exist, with research pointing to low-income and minority neighborhoods being disproportionately impacted. To determine the accessibility of healthcare for the citizens of the various boroughs within New York City, we will be examining how income, gender, race, and age correlate healthcare accessibility. There, the conclusion of how healthcare differs for each person in regard to their opportunity to receive healthcare can be viewed and compared to see if there is any statistical significance. After running the analysis for variance test (ANOVA), through the use of collecting data through random surveys shared across a multitude of social media platforms, the conclusion of accessibility to healthcare is not statistically significant for people in regard to their gender, race, and age because there was not enough data to support the original notion of healthcare accessibility depending on those variables. However, the conclusion of healthcare accessibility relying on income did prove true and there was a statistical significance percentage of 99.4%, which was well within the 95% confidence.

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Categories: Healthcare, Accessibility, New York City
Keywords: New York City, Medical Care, Healthcare

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Background

In New York City, there is a large population of people who come from underserved areas. Communities in medically underserved areas/populations (MUA and MUP) have few primary care providers, high infant mortality, high poverty, and/or high older adult population (HRSA, 2019). Communities like Bed-Stuy and Bedford Park have a lack of medical facilities to support the growing population (Altarum, 2019). Additionally, the income inequality gap has been rising as well as healthcare prices (Altarum, 2019). Most recently, COVID-19 has ravaged these cities leading to a limited access of medical coverage from private and public insurance companies as well as federally funded programs like Medicare and Medicaid. Many people in underserved areas are not insured at all and cannot afford to pay for regular check-ups. As a result, they don't seek medical attention when immediately showing symptoms and their illness worsens until they require government assistance for survival. In 2018, 980 New Yorker adults were surveyed to gauge the accessibility of healthcare in the state (Altarum, 2019). Among all of the adults, 52% experienced a healthcare affordability burden and 76% were worried about affording healthcare in the future. There are multiple reasons why 52% of adults experienced an affordability burden, the most prominent being the high premium cost. Also, 51% of adults stated that it was too expensive. For the table below was used to document the following information gathered during the survey. For individuals that are "Somewhat or Very Worried about Health Insurance", as seen in the table below, the highest percentages came from those with private insurance with 78% reporting not being able to afford health insurance and 53% are about to lose their health insurance (Figure 1). Furthermore, many New Yorkers also had to delay or forego their healthcare due to overwhelming costs. 31% delayed their doctor's appointment or delay a procedure to be done, 29% skipped a recommended medical treatment or test, 26% avoid visiting the doctor or a procedure from occurring altogether, 23% cuts pills in half or skipped doses of medicine, 21% did not fill a prescription and 17% had problems with accessing mental healthcare. Adding on, another issue was struggling to pay medical bills (Altarum, 2019).

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Figure 1

Somewhat or Very Worried About Health Insurance
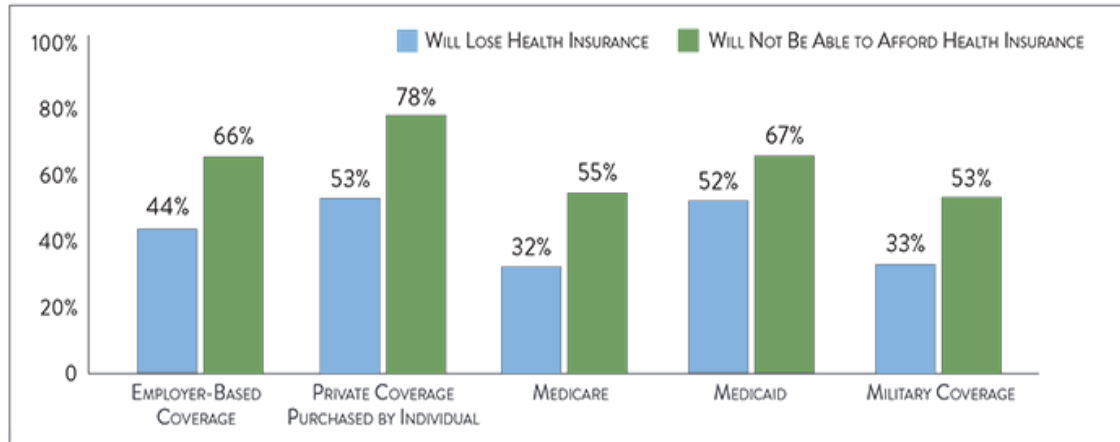
Source: 2018-2019 Poll of New York Adults, Ages 18+, Altarum Healthcare Value Hub's Consumer Healthcare Experience State Survey
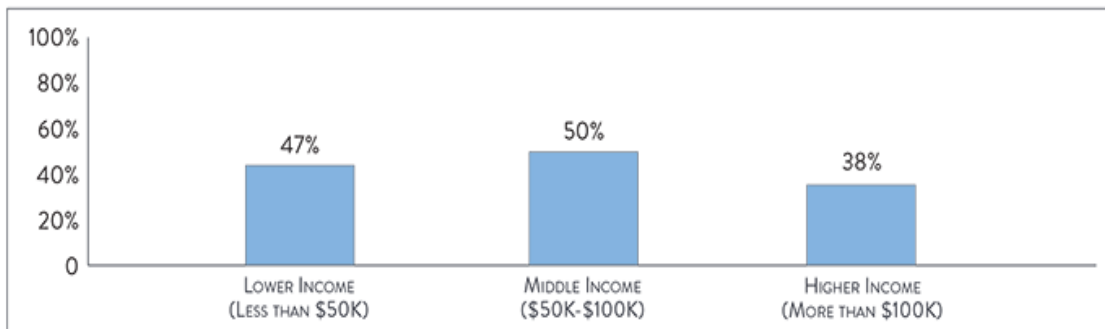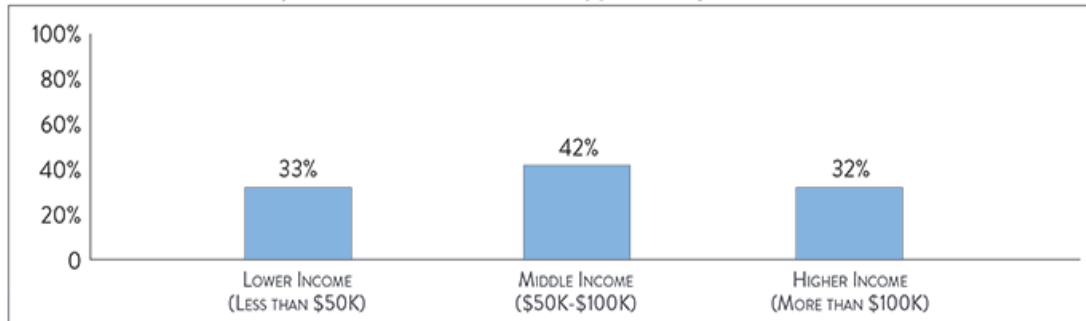
Figure 1: From the Alarum Healthcare Value Hub's Consumer Healthcare Experience State Survey, 980 adults - defined as at or above the age of 18 - from New York State which asked about their healthcare status in a variety of manners. Those that identified "somewhat or very worried about health insurance", were then categorized by the type of health policy they receive and whether or not that they will lose healthcare insurance or will not be able to afford health insurance.

The struggle to pay insurance costs and medical bills has been seen with many other demographics. For those New Yorkers who have encountered one or more financial burdens to obtain health insurance, the highest percentage came from incomes of between $50,000 - $100,000 in which 50% of respondents said they have a financial obstacle that has made getting health insurance more difficult (Figure 2). This same income bracket is also reported being the highest percentage when considering individuals who have struggled to pay medical insurance, with 42% of respondents between $50,000 - $100,000 reporting such struggles (Figure 3). To pay for these high medical bills, 15% of respondents used up all their savings, 13% were unable to pay for necessities like food, heat, or housing, 12% were contacted by a collection agency, 9% borrowed money or got a loan or another mortgage on their home, 7% racked up a large amount of credit card and lastly, 6% placed on a long-term payment plan. By taking money out of their savings or taking out loans, people end more in debt and are forced into poverty. These affordability issues predict the future of how New Yorkers could pay for healthcare. As a result, 76% of people reported being worried about their healthcare costs. Many stated that affording their healthcare in the future comes with a multitude of cost-related issues. For example, 66% said that they would have to pay the cost of nursing homes and home care services, 63% would have to cover medical costs when elderly, 62% would worry about the cost of serious illness or accident and 57% would have to worry about

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covering prescription drug costs. The majority of these concerns came from individuals who were worried about private health coverage. Due to the expensive costs associated with healthcare visits, many people go years without seeing a doctor for diseases or health conditions that could be life-threatening. Without any aid to help them with costs, they are forced to suffer in poverty without proper access to take care of themselves or their family members. Part of the survey and understanding adults' worries helped identify and document whether or not adults who are 18+ will either lose health insurance, won't afford it, or both. This is relevant as it provides a visual understanding of the current situation occurring in NYS on healthcare accessibility through cost (Altarum, 2019).

Figure 2
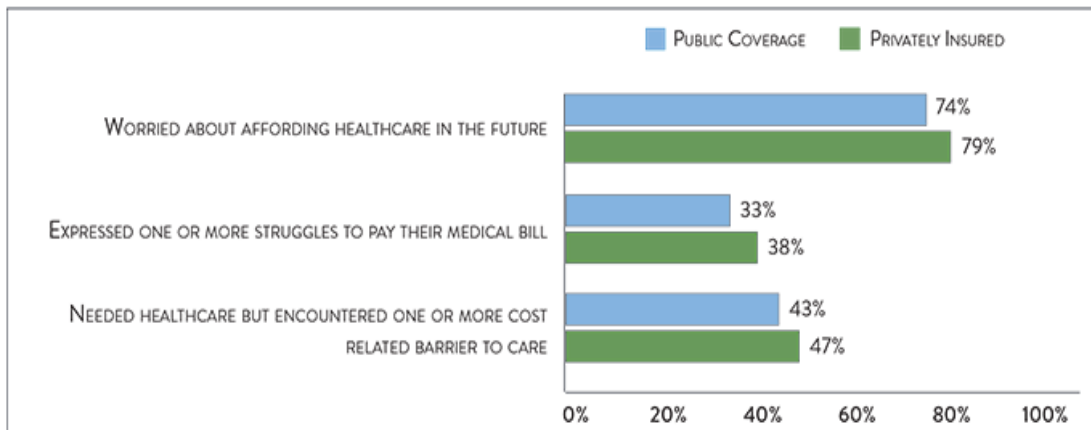### New York Adults Who Needed Healthcare but Encountered One or More Cost-Related Barrier

Source: 2018-2019 Poll of New York Adults, Ages 18+, Altarum Healthcare Value Hub, Altarum's Consumer Healthcare Experience State Survey

Figure 2: From the Alarum Healthcare Value Hub's Consumer Healthcare Experience State Survey, 980 adults - defined as at or above the age of 18 - from New York State which asked about their healthcare status in a variety of manners. Those that needed healthcare, but had one or more cost-related barriers, were then categorized in three basic income brackets: lower than $50,000 a year, between $50,000-$100,000 a year, and those making above $100,000 a year.

Figure 3
New York Adults Who Experienced One or More Struggles to Pay Medical Bills

Source: 2018-2019 Poll of New York Adults, Ages 18+, Altarum Healthcare Value Hub, Altarum's Consumer Healthcare Experience State Survey

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Figure 3: From the Alarum Healthcare Value Hub's Consumer Healthcare Experience State Survey, 980 adults - defined as at or above the age of 18 - from New York State which asked about their healthcare status in a variety of manners. Those individuals that have struggled with paying medical bills one or more, were then categorized into three basic income brackets: lower than $50,000 a year, between $50,000-$100,000 a year, and those making above $100,000 a year.

The first table below displays that low-income residents who earn $50,000 or less a year had the highest level of concern about affording healthcare, and there were two-thirds of high-income households who earn more than $100,000 have healthcare affordability worries as well. In the second and third table Households with middle incomes that earned $50,000-$99,999 a year faced the highest level of healthcare burden within the last 12 months and avoided receiving care along with struggling to pay off their medical payments. In the second and third table Households with middle incomes that earned $50,000-$99,999 a year faced the highest level of healthcare burden within the last 12 months and avoided receiving care along with struggling to pay off their medical payments (Altarum, 2019).

Figure 4

Percent of New York Adults Facing Struggles, Barriers and Worries to Healthcare, by Insurance Type

Note: This summary excludes those without insurance.
Source: 2018-2019 Poll of New York Adults, Ages 18+, Altarum Healthcare Value Hub, Altarum's Consumer Healthcare Experience State Survey.

Figure 4: From the Alarum Healthcare Value Hub's Consumer Healthcare Experience State Survey, 980 adults - defined as at or above the age of 18 - from New York State which asked about their healthcare status in a variety of manners. Those New Yorkers who have faced difficulties with their health insurance were asked three different worries: affording healthcare, one or more struggles with paying medical bills and had cost-related barriers to getting health insurance. From there, they were split into two subgroups: those with public coverage or those that have private insurance. In total, there were six unique groups.

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Table 1: In the table, it displays that, among all the regions of NYS, they all had a spike in worry or affordability burden. In NYC, it spiked by 67% of those worried about affording their medical bills as elderly along with a 65% spike in individuals worried about covering a serious illness or accident while Long island has the lowest.

New York Regional Demographics

REGION	PERCENT OF STATE POPULATION	MEDIAN INCOME
NEW YORK CITY BOROUGHS	43%	$59,071
LONG ISLAND	14%	$98,988
UPSTATE NEW YORK	42%	$62,713

Note: New York Boroughs include Bronx, Kings, New York, Queens, and Richmond counties. Long Island includes Nassau and Suffolk counties.
Source: Population and Income from U.S. Census Bureau; Income is a weighted average of 2017 median income by county.

Figure 5

Percent of New York Adults with Any Healthcare Affordability Burden in the Past Year
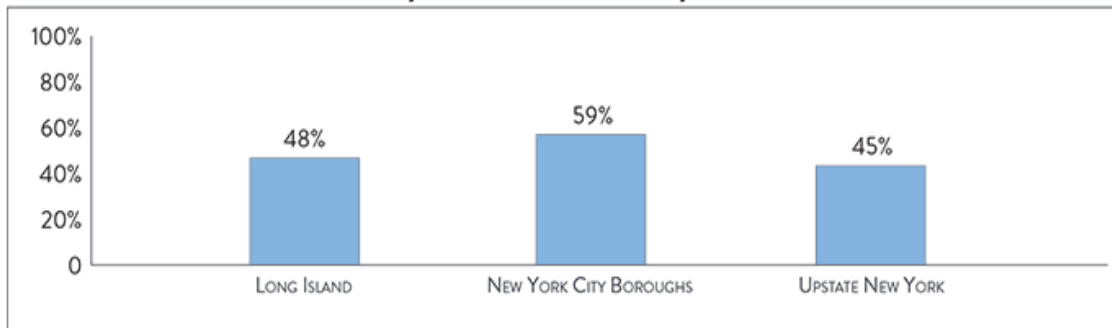
Source: 2018-2019 Poll of New York Adults, Ages 18+, Altarum Healthcare Value Hub, Altarum's Consumer Healthcare Experience State Survey

Figure 5: From the Alarum Healthcare Value Hub's Consumer Healthcare Experience State Survey, 980 adults - defined as at or above the age of 18 - from New York State which asked about their healthcare status in a variety of manners. For those adults in NYC that faced a burden when it comes to paying for healthcare, they were split into three groups based on community: Long Island, New York City (NYC) boroughs, and Upstate New York.

Pandemic effects

The healthcare industry hasn't been able to support patients due to the pandemic and its socio-economic effects. Hospitals in New York City have been dramatically understaffed and under-resourced. For example, in 2017 in the New York and Long Island region, there was a 50% shortage of RNs (registered nurses) with 2 or more years of experience (Martiniano R, et. al, 2018). This situation has exacerbated with COVID-19 increasing stress on the healthcare system through the need for more hospital workers and nurses). There are more patients than doctors, and many doctors have been called to help assist in treating patients due to the lack of staff available. Additionally, current programs under Mayor de Blasio's leadership have been designed to target areas in all five boroughs

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called the "Caring Neighborhoods." Yet, there is a proportion of 109 and 99 per 100,000 residents who identify as American-American or Latino dying from COVID-19 compared to 27 out of 100,000 white residents (Thompson, et al., 2020). A reason that COVID-19 may be higher in these underserved communities is that people are unable to socially distance themselves all the time and are also not able to see doctors due to affordability and financial issues. In fact, there was a request for physicians from New Jersey, Vermont, and even across the nation to aid the patients in New York City since there was a shortage of medical staff available. The shortage of physicians worsened during the pandemic because their priority shifted to treating patients that were insured. This included pressure from medical overhead, government officials, pharmaceutical companies, and others who wanted to get everyone treated as quickly as possible. In the spring of 2020, NYC had one of the highest numbers of COVID-19 cases. Before this pandemic even hit NYC, it was reported that there was already uneven access to health insurance among workers in NYC. The pandemic hit hardest in the Bronx and Queens where most of the COVID-19 cases skyrocketed. This led to a massive loss in jobs, affecting millions of New Yorkers' access and maintenance of healthcare coverage. Since healthcare coverage is tied to employment for millions of New Yorkers, a sudden loss of their jobs causes them to lose the only healthcare that they had available. Because of this, many New Yorkers are not able to afford their healthcare insurance and as a result, are

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unemployed with no ability to see a doctor.

Share of low-income respondents who said that they or member of their household were without health insurance since the start of the pandemic
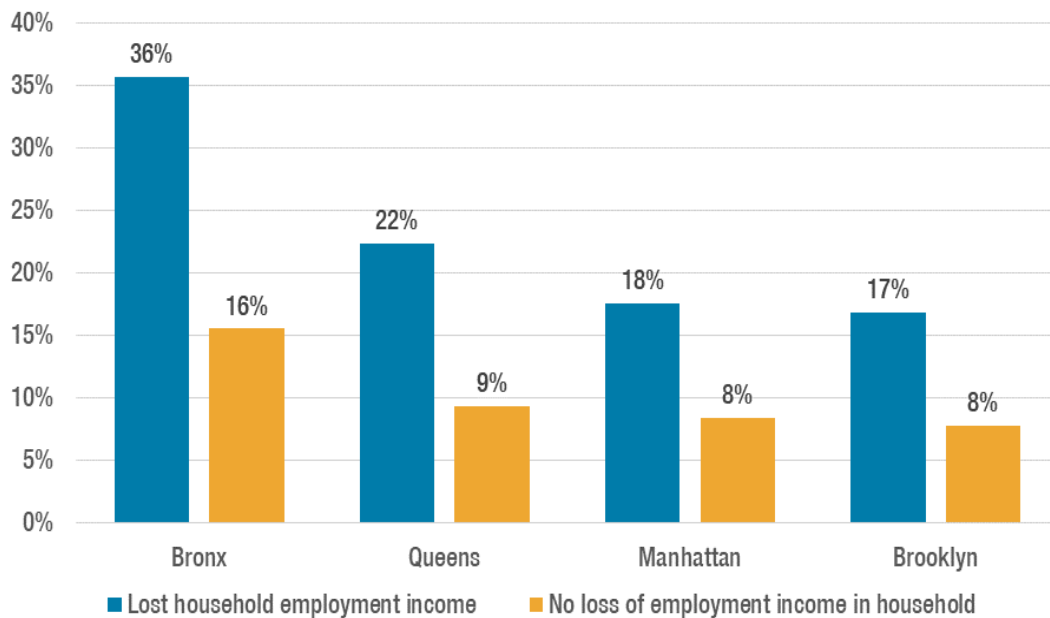

Figure 6: *From New York City's (NYC's) Department of Health, surveyors were split into four different communities: Bronx, Queens, Manhattan, and Brooklyn. From there two subgroups emerged: lost household employment income and no loss of household employment income during the beginning of the pandemic.*

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Share of low-income respondents with household income loss who said that they or a member of their household have lacked health insurance since the start of the pandemic
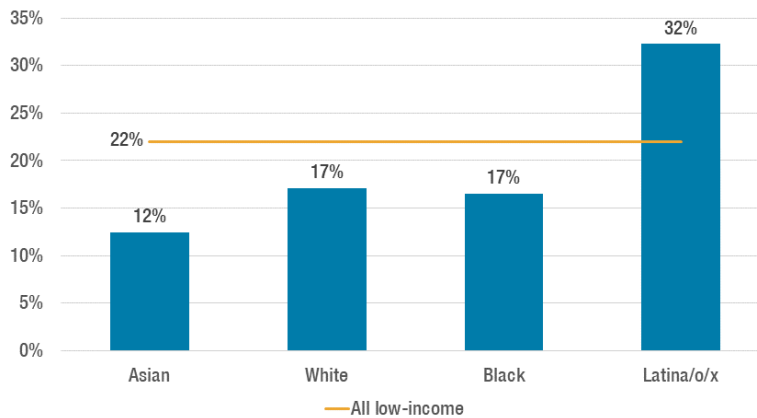
Figure 7: *From New York City's (NYC's) Department of Health, surveyors were split into four ethnic groups: Asian, White, Black, and Latina/o/x. In this case, the population that was surveyed all belong to low-income households with income loss and were responding to whether or not they lack health insurance before the onset of the COVID-19 pandemic in NYC*

Share of all respondents who said that they or a family member had been infected with COVID-19

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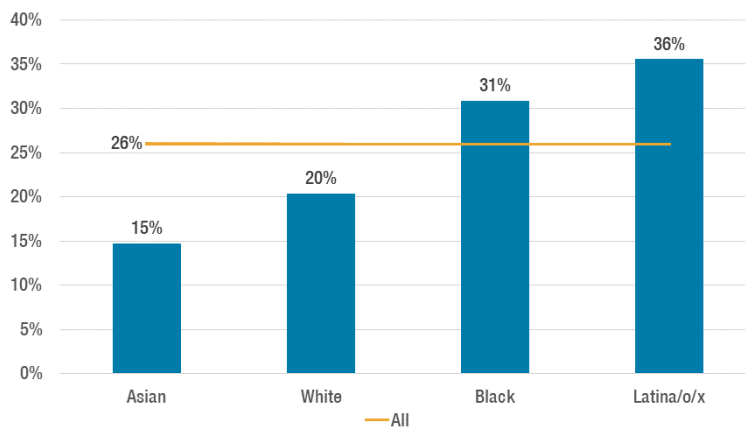Socioeconomics
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Figure 8: From New York City's (NYC's) Department of Health, the responders were asked if they or a family member had been affected by COVID-19. The population recorded was measured in percentage and split into four groups - based on race: Asian, White, Black, and Latina/o/x. The overall average percentage was recorded.
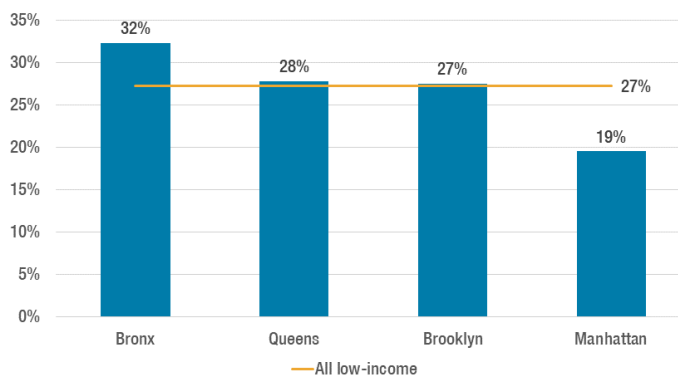

Figure 9: From New York City's (NYC's) Department of Health, the responders who were of low-income backgrounds were asked if they or a family member had been affected by COVID-19. The population recorded was measured in percentage and split into four groups - based on borough: Bronx, Queens, Brooklyn, and Manhattan. The overall average percentage was recorded.

Adding on in the Bronx, many of the COVID-19 cases came from crowded housing, many residents are essential workers, and the borough has the highest rate of pre-existing conditions that put many residents in a high-risk position such as having diabetes. Also, policy actions and decisions brought out many disparities during the pandemic. For example, the hospitals in the Bronx only had 2.7 beds per 1,000 residents, whereas Manhattan hospitals had 6.4 per 1,000 residents. However, it should be noted that affordable care expansion on Medicare and its health plan helped enroll an additional 425,000 New York City residents during February and November as the pandemic took a toll on the healthcare system. Moreover, many residents did not enroll in health-related programs due to their immigrant status; these people were hesitant because they thought doing so would impact their immigration status. In fact, it was reported from the 2020 Unheard Third that more than 52% of low-income New York residents lost their job temporarily or permanently yet they were still able to access Medicare or were enrolled in an essential healthcare plan. Furthermore, before the pandemic, 47% of lower-income

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($50,000 and under) New York residents received healthcare coverage (Lew & Benjamin, 2021). During this pandemic, however, solutions were proposed such as the Equity Action Plan, which was implemented by the NYC Health Department. This plan included increased engagement with healthcare providers to "assess the needs of independent providers in clinics and provide technical assistance to reopen their clinics and continue day-to-day operations, encourage providers to offer telemedicine services and assist them with navigating reimbursement, explore ways to enable in-person primary care visits outside of usual office settings, such as mobile clinics, provide medical supplies, including personal protective equipment, sign up providers to become authorized enrollers in the New York City's COVID-19 Hotel program, inform providers about City services and resources that can support their patients during and after the COVID-19 public health emergency (health, food, other social services)". The plan also consists of working with community centers and associations to help ensure additional services, provide advisory for leadership, and assist community-based voices in their advocacy. Lastly, this plan aims to drive communication with community members by conducting outreach activities and spreading awareness about COVID-19 and the precautionary measures everyone should be following. Although there have been several proposed solutions to address the effects of the pandemic, it still leaves NYC in a negative position when it comes to healthcare accessibility. (*Overview of the NYC Department of Health and Mental Hygiene's COVID-19 Equity Action Plan*, n.d.) (Lew & Benjamin, 2021)

Race in Healthcare

African Americans and Latinos make up a large percentage of the underserved communities and are often mistreated in the US healthcare clinics. The African American community, specifically, has stated previously that they do not feel safe taking the vaccine due to concerns with getting the wrong dosage or wrong vaccine, which has been done before on purpose. Moreover, many physicians have said that they believe African Americans feel less pain or might not feel pain at all. Some physicians have also stated that they prefer not to treat people of color. Since healthcare professionals are refusing to see people of color, some are outright declining to see a doctor because they know they will be mistreated. Unfortunately, many healthcare workers and doctors are not punished for giving wrong dosages to patients or for making racist statements. These attitudes can make it very difficult for such individuals to access quality healthcare. Considering that people of color tend to make lower incomes on average, they are unable to see physicians for long periods. This causes severe problems in the long run for communities of color, especially the African American community, because if problems aren't detected when they are in their smaller, weaker, and essentially treatable stages, they will eventually develop into diseases that are very hard to treat and will only be found the next time they visit a doctor's office. Something that can compound these issues is that people of color, especially African Americans, are more likely to need access to healthcare. For example,

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in Brooklyn, African American individuals were twice as likely as Caucasian individuals to be hospitalized due to COVID-19. Furthermore, 46% of COVID-19 related deaths were African Americans, 30% were White, 15% were Hispanic, and 5% were Asian (Renelus et. al., 2020). This need for more access to healthcare as well as it being generally more inaccessible can create drastic problems for people of color.

Funding and Policy History

With healthcare inequality noted, New York State in 1996 created the Indigent Care Pool, a fund dedicated to reimbursing hospitals for the free healthcare they provide to households of low income. While the idea at the time seemed like a good initiative, a 2016 review of the $1.13 billion budget found a negative correlation between the size of the funding for a hospital and the percentage of low-income patients they were treating (Hammond, 2017). On this point, the report found that four hospitals received grants from the Indigent Care Pool without suffering any net loss in treating patients that could not afford their medical bills, including Memorial Sloan Kettering. This is a major problem for the underserved communities as many of these well-off hospitals are situated mainly in Manhattan and may not be feasible to travel to. In addition, this gap leads to more disparities as the lack of reimbursements leads to even more degradation of local healthcare facilities. By not providing grants to hospitals closer to underserved communities, New York is creating a healthcare inequity where only the affluent people can get access to proper healthcare. The grants must be given to all hospitals so that all patients can be seen by healthcare workers regardless of their socioeconomic background. Over the years, budgeting and public health policies have ignored communities of color. For example, New York invested $1.13 billion into a program called ICP (Indigent Care Pool) which would result in intense disparities for low-income communities. The establishment of the ICP program was meant to help serve and expand healthcare access in low-income communities however this plan left out the idea of safety net hospitals that are in these low-income communities. New York policies have not targeted safety net hospitals along with unequally providing money to these hospitals since $250 million were directed to the top 25 safety-net hospitals in New York while only $675 million were directed to the bottom 75% of hospitals that do not serve or as many low-income people. In addition, New York health and financing and planning policies have left multiple communities without hospitals or decreasing essential needs such as beds. An example is St. John's Hospital in Flushing, Parkway in Forest Hill, St. Joseph in Fresh Meadow, and, lastly, Mary Immaculate in Jamaica. Overall, funding and public health-related policies have not benefited many low-income communities. A relevant understanding of this is that the top 10 wealthiest, white, and less-impacted communities during the pandemic received just as much funding as the top 10 hardest-hit communities that are populated by both minority and immigrant with funding at $2,232,459,094 under the CARE ACT (Benjamin, Dunker, 2020).

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Communities

People in communities within New York City show great diversity, both in culture and in income. New York City classifies its division in the form of boroughs, which are placed in zones on the five main islands: The Bronx, Manhattan, Brooklyn, Staten Island, and Queens. The boroughs share many similarities in terms of access to healthcare, mean income, and common amenities, but the differences become highlighted within the scope of smaller communities, on a neighborhood scale. Areas like western queens tend to have a lower income, which lends itself to having lower high school graduation rates, decreased investment in health, and a higher overall crime rate when compared to neighboring regions. However, areas such as the Soho community tend to have a higher income, which helps fund its safety and overall cleanliness. Disparities in healthcare found in underserved communities tend to arise in areas that lack the common amenities that more privileged areas get, thus becoming deprived of life-saving functions. The communities facing the highest rate of healthcare disparities are 6 communities in the Bronx (Fordham-Bronx Park, Pelham-Throgs Neck, Crotona-Tremont, HighBridge-Morrisania, Hunts Point-Mott Haven, Northeast Bronx), 8 communities in Brooklyn (Northwest Brooklyn, Bedford Stuyvesant-Crown Heights, East New York, Sunset Park, Borough Park, East Flatbush-Flatbush, Coney Island-Sheepshead Bay, Williamsburg-Bushwick), 4 communities in Manhattan (Washington Heights-Inwood, Central Harlem-Morningside Heights, East Harlem, Union Square-Lower East Side), 4 communities in Queens (Long Island-Astoria, West Queens, Flushing-Clearview, Jamaica), 3 communities in Staten Island (Port Richmond, Stapleton, St. George, and South Shore). To understand why these communities are facing challenges to face healthcare, we need to analyze the economic situations of these communities. The official poverty rate in NYC is 19.1%. The Bronx as a whole falls into this category and has the highest poverty rate. Furthermore, there is a connection between race and healthcare access in these communities that develops the understanding of why there is a huge challenge to access healthcare. For instance, Latinx has faced the highest rate of poverty of 28.8% in NYC which is one of the most predominant racial demographics in these low-income communities such as Sunset Park a low-income community struggling to access healthcare with a Latinx community of 39.1%. For example, In some of these communities, there had been a few mini successes with expanding access to healthcare. Such as the NYCEDC community health center expansion program. These programs served as a template towards expanding healthcare access through supporting non-profit health care as they were able to improve primary care and expand services as a whole. These programs helped assist with community development and economic development. With this, it helped support the expansion of jobs along with establishing more healthcare centers which helped the sustainability and development growth for these communities. The NYCEDC program was able to bring along more upgraded health technology adoption, payment reform, and more. Along with the NYCEDC health program, the $20 million investment into an initiative called Caring neighborhoods trying to help improve

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communities in need in all five boroughs, there was also an establishment of the HHC community health centers. This solution helps expand existing services along with financially stabilizing budgets for the upcoming years. HHC sought to create existing centers to be affiliated with them, which includes 40 primary care centers that would serve more than 120,000 New Yorkers. Furthermore, many of these unserved communities have huge immigrant populations. Overall, there are still existing healthcare challenges in these communities such as Queens which includes Corona the epicenter for COVID-19 in NYC.
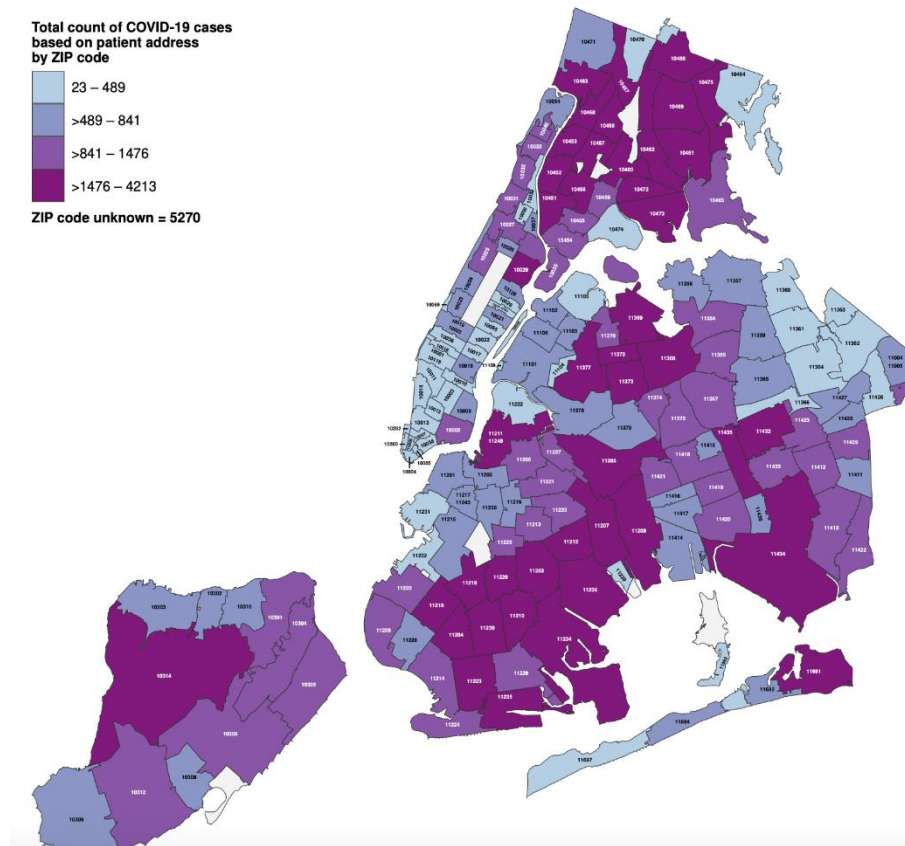

Figure 10: This image helps illustrate the COVID-19 in all the NYC communities from May 17, 2020, reported by the NYC health department.

General Healthcare

Healthcare in New York City is much like any other healthcare system found in the United States of America. Healthcare is contained in the private sector, meaning that costs of healthcare must be paid for by the individual, unless they have insurance. In 2017, a hospital visit, on average, costs $3949 per day without insurance (Fay, 2021).

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These costs can be even greater depending on the procedures required. As a result, healthcare without insurance in the U.S. can be the greatest in the entire world.
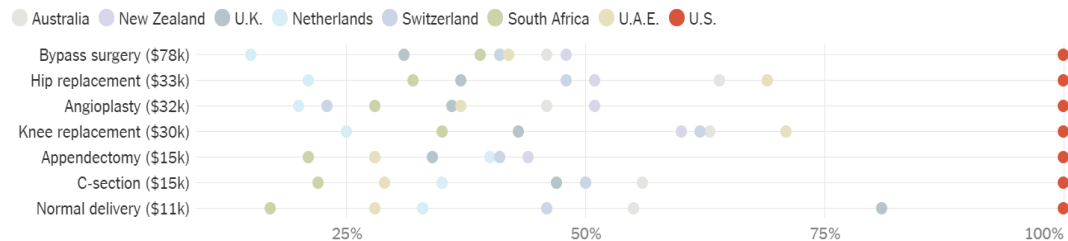
Figure 11: From the International Federation of Health Plans, eight countries were analyzed for the average cost for seven different medical procedures based on the average American (U.S) cost. This percentage to the U.S. average was created and displayed as a scatter plot.

This graph illustrates some of these relative costs of healthcare around the world. Even with insurance, the costs are astronomical. Without insurance, the costs are far worse. As such, it is almost imperative that someone has insurance if they need to access healthcare. People who earn a sufficient amount of money can afford to pay the premiums for private health insurance, which can cover them in the case that they become ill with a life-threatening disease. Others can receive insurance fully covered by the federal government under Medicaid and other government or state-provided health insurance. People who qualify for Medicaid tend to have low incomes, but the downside is that many of the government-funded health insurance comes with extremely high deductibles and generally lower quality of health care. Working citizens can qualify for healthcare through their work, but this has steadily declined throughout the twenty-first century due to increasing health treatment costs. Lastly, the final group of people, who tend to be unemployed immigrants, lack health insurance and have to resort to a lack of treatment due to not having enough funds to pay for insurance, and not meeting the criteria for Medicaid. In general, all these scenarios also exist in the New York City healthcare sector, as it is very similar to the system in all of the United States.

Specific Aims

Does healthcare accessibility differ between communities in New York City? Through this research study, we intend to investigate how different demographics have been impacted by certain discrepancies in healthcare funding and policy. To help answer our research question, we conducted a survey that asks participants from various demographics the following questions:

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- What ethnicity do you belong to? (seven options were given)
- What is your income level? (seven categories were given)
- What is your gender? (four options were given)
- What is your age? (seven categories were given)
- How far is your nearest healthcare facility/hospital in miles? (open-ended)
- How far is your nearest healthcare facility/hospital with the everyday transportation you use in terms of minutes? (open-ended)
- How long is the wait time to see a doctor in the hospital in minutes? (open-ended)
- How large is your insurance copayment in U.S. dollars? (open-ended)
- How often do you visit a facility per year? (open-ended)
- Any issues with healthcare in your community? If so, please explain below. (open-ended)
- Does your job put you at higher risk for health issues? Do they cover your health insurance? (open-ended)

Using the data collected from the survey, we conducted several ANOVA and Post-Hoc tests to detect how access to healthcare differs between groups. . This study aims to aid local and state politicians to divert funding into communities that are most in need of it.It also aims to help future city planners, investors, and private companies to allocate valuable resources to develop a safe, secure, and strong medical infrastructure; this may take the form of increased access to PPP, well-funded and developed hospitals, and new medical centers. New medical facilities in communities hardest hit by the lack of healthcare accessibility will not only lead to healthier populations but will also attract potential investors and private companies into the NYC area; thus, catalyzing economic growth and revitalizing the business and culture in the community as well. As this process occurs, politicians will also take notice and would bring forth additional funding for investment from the local and state government level as well.

Materials and Methods

To address the accessibility of healthcare in New York City communities for our experiment, a survey was sent out and data was collected on the demographics and healthcare accessibility of respondents. The independent variables in this study are the demographics of residents (race, income, gender, age, neighborhood) and the dependent variables are the numerical measures of accessibility (distance from the nearest facility in miles, distance from the nearest facility in minutes, number of annual doctor visits, average wait time, insurance copayment). Short answer questions were also asked to survey respondents regarding their job and its relation to their healthcare (higher risk and insurance) and their subjective view of healthcare problems in their community. These

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responses will not be used for statistical analysis, but to contextualize any data outliers. The survey asks participants to fill out these demographics via a drop-down menu and selected accessibility measures with numerical responses. The responses for each respondent were compiled into a single dependent variable, called the "Healthcare Accessibility Score," using the following weighted equation:

A = distance to the nearest facility (miles)
B = distance to the nearest facility (minutes)
C = wait time to see medical professional (minutes)
D = insurance copayment (dollars)
E = number of annual doctor visits

Healthcare Accessibility Score (HAS) = A + 2B + C + D - E

Of the variables in the equation, Variable B, distance to the nearest facility (minutes), and Variable D, insurance copayment (dollars), were determined to be the most significant factors in healthcare accessibility. As such, since Variable D fell between ranges of 30-100 and was the most influential factor in the HAS, Variable B was weighted by a factor of 2 so it would carry similar weight in the HAS equation. Data were then sorted into various demographics groups: the ones indicated above (independent variables), and ANOVA tests were run to determine if statistically significant disparities in healthcare accessibility exist between demographic groups and healthcare accessibility. The null hypothesis of these tests is that there are no differences between each demographic's healthcare accessibility, whereas the alternative hypothesis is that at least one demographic has different healthcare access than the others does exist. A statistically significant p-value would indicate there is evidence to reject the null hypothesis in favor of the alternative.

Results

Gender and Healthcare Accessibility:

ANOVA - HEALTHCARE ACCESSIBILITY SCORE ▼

Cases	Sum of Squares	df	Mean Square	F	p
Gender	2.089e +6	1	2.089e +6	2.934	0.091
Residuals	5.338e +7	75	711740.336		

Note. Type III Sum of Squares

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A one-way ANOVA was conducted to determine if the healthcare accessibility score differed between genders. Participants' gender was classified into two groups: male (n=32) and female (n=45). With an F statistics of 2.934 and a p-value of 0.091, the ANOVA test detected no significant differences in HAC between Genders at the 5% level.

Income Level and Healthcare Accessibility:

ANOVA - HEALTHCARE ACCESSIBILITY SCORE

Cases	Sum of Squares	df	Mean Square	F	p
Income Level	7.265e +6	3	2.422e +6	3.667	0.016
Residuals	4.820e +7	73	660331.442		

Note. Type III Sum of Squares

A one-way ANOVA was conducted to determine if the healthcare accessibility score was different across income levels. Participants' income labels were classified into four groups: below poverty ($0-20,000, n=13), lower class ($20,000-50,000, n=20), middle class ($50,000-100,000, n=29), and upper class ($100,000+, n=15). With an F statistics of 3.667 and a p-value of 0.016, the ANOVA test detected significant differences in HAC between Income at the 5% level.

Race and Healthcare Accessibility:

ANOVA - HEALTHCARE ACCESSIBILITY SCORE ▼

Cases	Sum of Squares	df	Mean Square	F	p
Race	1.257e +6	4	314274.095	0.417	0.796
Residuals	5.421e +7	72	752944.581		

Note. Type III Sum of Squares

A one-way ANOVA was conducted to determine if the healthcare accessibility score was statistically different between respondents' races. Participants' income labels were classified into five groups: White (n=19), Asian (n=39), Black (n=9), Hispanic/Latinx (n=8), and other (n=3). Healthcare accessibility (HAS) differences were not statistically significant between the races since F(0.417) = 0.796 > 0.05.

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Age and Healthcare Accessibility

ANOVA - HEALTHCARE ACCESSIBILITY SCORE

Cases	Sum of Squares	df	Mean Square	F	p
Age	491571.334	3	163857.111	0.218	0.884
Residuals	5.498e +7	73	753116.916		

Note. Type III Sum of Squares

A one-way ANOVA was conducted to determine if the healthcare accessibility score was statistically different between respondents' ages. Participants' income labels were classified into five groups: minors (0-18, n=20), young adult (21-30, n=9), adult (31-50, n=8), and older adults (51-65, n=2). With an F statistics of 0.218 and a p-value of 0.884, the ANOVA test detected no significant differences in HAC between Age groups.

Discussion

As the data shows, the only demographic with a statistically significant disparity in healthcare accessibility (HAS) among the respondents was income. This means that we have enough evidence to reject the null hypothesis that Healthcare access is the same across income levels; from our analysis, it is plausible to assume differences in Healthcare access across income levels. Past research and literature corroborate these findings, where demographics like gender and age do not have correlations with healthcare accessibility, but ones like income do. In New York City, disparities in access to insurance and government assistance have made medical checkups and facility visits inaccessible to those of lower incomes -- with the COVID-19 pandemic only building upon this gap.

Prior research has concluded healthcare accessibility and income are statistically different. Even within COVID-19, health care costs have risen for most Americans especially due to many hospitals becoming overwhelmed by the overall costs of ordering new respiratory devices to fight the new pandemic. That, coupled with the healthcare system before, has led to healthcare marginalizing people who are of a lower income bracket have felt the increasing costs and seen their overall healthcare accessibility decrease, like the correlation that has been deduced from this experiment which was found to be statistically significant.

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In healthcare, there has been a noted need for new policy change. Healthcare accessibility should not be tied to income as noted in the experiment. Change that can improve upon healthcare whether perhaps nationalizing healthcare or expanding resources to improve healthcare accessibility can improve overall happiness and health within the New York City community, helping its citizens and having a side-effect that can be implemented by other cities of like size. Thus, improving healthcare accessibility can transform most cities and help out the citizens who need to receive the proper level of healthcare without compromising due to their income bracket.

Moving into experimental errors, the differences in healthcare accessibility between races, though statistically insignificant based on respondents' data, has been documented by other literature to constitute a notable disparity. Errors in data collection including a disproportionately large number of responses from Asian respondents (n=39) and comparatively minimal response from Hispanic respondents (n=8) might have skewed data and provided an insufficient basis for the one-way ANOVA to detect statistical differences. Also, though age has not been documented by other research to impact healthcare accessibility, survey responses tended to come from a disproportionate number of minors (0-18) and much smaller numbers of the elderly, potentially providing insufficient data for a one-way ANOVA to prove statistical correlation.

Future improvements to this experiment can be made to ensure a more balanced and diverse respondent pool. Similar questions and survey format can be used with respondents providing numerical responses as opposed to scalar or other measures for the most accurate data analysis. Targeting survey distribution into various diverse communities with residents of various ages, races, incomes, and gender groups can be more heavily emphasized and regulated. Additionally, efforts can be made to have respondents' demographics mirror those of New York City in terms of percentages of the entire population. Regardless, a more balanced and defined survey outreach strategy is necessary for future expansion on this experiment to provide a more comprehensive and representative picture of New York City.

Our study also provides a basis for other researchers to conduct future research into the field of healthcare accessibility. The concept of asking respondents for numerical responses and running one-way ANOVA tests can remain the same; however, a more specific research topic can be adopted such as specific areas of healthcare accessibility such as facility proximity, affordability, or public trust. This research will be useful in identifying and analyzing disparities in healthcare accessibility that exist between demographics in certain aspects rather than from an overall view. Healthcare accessibility is ultimately a wide topic and area of policy concern and our research provides a look into disparities that may exist in New York City and provides future research with a platform to base their experiments on.

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We would like to thank and acknowledge those who participated in our survey, authors of past literature we have cited, and those at the International Socioeconomics Laboratory that have aided in our study of healthcare disparities between demographics in New York City.

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COVID Tax Recovery

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Abstract

As shutdowns due to the novel coronavirus were first implemented in March 2020, businesses across all sectors of the economy began to experience extreme hardship. Nearly a year later, businesses from sectors like food industries to travel industries received little financial aid or even tax breaks. Businesses across America desperately need aid, and the tax code can be one of the most effective optimal mechanisms to provide assistance to struggling businesses. This study aims to identify the sector(s) favored by the public most to provide tax aid by gathering survey data and determining the sector(s) that the public believes need help the most and thus would warrant the largest amount of tax aid. Survey participants chose from the following sectors: restaurants/food services, small businesses (non-restaurants), non-profit organizations, hotels/hospitality services, and tourist attractions/tour agencies. The results indicated that all of the business sectors had an approximately 'aid' equal ranking, though the number of people selecting them as the sector in greatest need of aid varied substantially. There was no significant difference between the survey results of each individual sector, and it can thus be concluded that all of the sectors included in the study are generally viewed as 'in need of aid' by the public. Even though the data is statistically insignificant, it serves as a good indicator of where New York City taxpayers would prefer to have their tax dollars be allocated to. Citizens of New York City do not have strong and justifiable views on where and how their tax dollars should be distributed -- instead, it indicates the randomness of this particular sample and how it provides a relatively accurate glimpse at the distribution of opinions citywide. While the perception of these taxes by the public is not the only decider in policy, it provides a good insight into whether or not people would be supportive of such an action. From the data, it can be reasonably inferred that the taxpayers believe that tax aid should be provided to all sectors listed in the survey. Therefore, the solution of having government-backed 0% loans and/or lines of credit funded by a temporary tax increase as suggested previously can be implemented and would be generally supported by citizens, based on the data collected.

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Categories: COVID-19, New York City
Key Words: Tax Recovery, COVID-19, New York City

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Background

Since its origin, COVID-19 has had a negative impact on businesses across New York City and has crippled many at the same time. Some of the largest and most heavily hit sectors were: small businesses, restaurants, hotels and hospitality services, tourism agencies and tourist attractions, and nonprofits. The purpose of this paper is to determine which sector or sectors are those that the public would be most likely to support giving tax aid to / seeing a portion of their tax dollars go to. Understanding Covid-19's impact on businesses and identifying the ones that need help the most is vital to effectively overcome the financial struggles that the pandemic has inflicted upon certain industries -- that understanding is the ultimate objective of this study. Having a general conception of how the public views these struggling sectors may give some valuable insight into how a solution could be structured.

Potential Sectors

Small Businesses:

Lockdowns have forced small businesses to shutter for extended periods of time. Many NYC residents have also changed their shopping habits, like shopping online from stores such as Amazon or Walmart instead of going to shop at local businesses. Since March 1st of 2020, more than 2,800 businesses in New York City have shut down (Haag, 2020). Roughly one-third of the city's small businesses may be closed for good (PFNYC, 2020). Small businesses are essential for the success of the city's economy as they provide jobs for more than three million people (or about half of the workforce) and make up 98% of the city's employers (Haag, 2020). The government needs to do everything it can to keep New York's small businesses alive through job retention and support the communities that are built around them in this time of crisis. Tax aid is an excellent option to help these struggling small businesses stay afloat by taking some of the burdens off of the businesses and allowing them more time to recover from the tremendous losses they have faced in the past year. This money will help these businesses stay open, enabling them to stimulate the city's economy (Heady et. al, 2009).

Hotels and Hospitality Services:

The Covid-19 pandemic severely crippled hospitality services throughout New York City. Covid-19 lockdowns and travel restrictions destroyed the hospitality industry as tourism declined dramatically, sending the number of customers into a nosedive. During the week of March 1-7, 2020, it was reported that the occupancy levels at NYC hotels were 72.1%; the average daily rate for a room was $188.59, while the revenue per available room was $136.05 (Miller, 2020). However, just three weeks later, after the travel restrictions were imposed; occupancy levels dropped nearly 80% to just 15.2% of rooms being occupied. The average daily rate also fell nearly 25% to $146.37 and revenue per available room fell nearly 85% to $22.34 (Miller, 2020). With tourism significantly falling after travel restrictions were placed (dropped nearly 66% to about 22.9 million people), the pandemic caused a major drought of hospitality service customers,

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and nearly 90% of workers in the hospitality industry have been laid off as a result (Sterling, 2021). With this massive drop in revenue, nearly 28% of hotels, or 200 out of the 700 currently in New York City have already closed, either temporarily or permanently (abc7ny, 2021). The hospitality industry has always been dependent on tourism and with the current pandemic many hotels are struggling to remain open and many workers in the hotel industry are struggling to keep their jobs. These places are continuing to struggle throughout the pandemic and these percentages continue to remain much below normal levels. Tax relief would be incredibly beneficial to the hospitality industry as it would allow hotels to remain open through this time of struggle. It would also enable these hotels to keep holding jobs, which would help to stimulate the economy. With occupancy levels sitting at a historic low for an extended period of time, tax relief would allow a significant part of New York City's economy to remain open and allow their workers to keep their jobs.

Tour Agencies and Tourist Attractions:

The COVID-19 pandemic has had a major impact on tourist attractions and travel agencies. The lockdown has reduced travel to a minimum and tourist presence has been very low over the course of the pandemic. Small businesses have been hit very hard by the lockdown but the businesses that depend on the constant influx of tourists (which has dropped dramatically) have a *long* road to recovery. The customer base for tourist-centric businesses has fallen substantially over the last year, and while small businesses may have experienced a similar issue, the magnitude of that plaguing the tourism industry is much greater (small businesses have lost fewer of their customers than those in the tourism industry). International tourism dropped by 80% in 2020 (Stacey, 2020), and international travel spending fell by 76% (compared to 34% for domestic travel) while business travel spending fell 70% (compared to 27% for leisure travel) (Barnes and Holmberg, 2021). Tour agency jobs have been down 50% in traveler accommodations, 45% in ground passenger transportation, 66% in clothing stores, and nearly 70% in the performing arts. Since tourism has dropped so much over the last year, these jobs are at risk and could put millions of people, who may not have a stable income, out of work. Travel agencies were expected to lose at least $24 billion in foreign spending this year because of the rapidly spreading coronavirus and they lost 8.2 million visitors in one year, even more than the 7.7 million international travelers lost in 2001 and 2002, after the 9/11 terrorist attacks (Hirsch, 2020). The government has aided tour agencies in other cities like Miami where tourism is a significant part of the economy. They have used stimulus checks to aid tour agencies and attractions by helping them remain open. However, agencies and attractions do not have a stable source of income due to the decrease in travel and the tax aid would help greatly because the loss of income has never been so severe in the tourism sector. Stimulus packages and other previously used forms of aid are too small-scale and temporary to provide an effective solution to help keep this sector on its feet (given the perpetual loss of customers/income).

Restaurants and Food Services:

The COVID-19 pandemic has caused many restaurants and food services to shut down, particularly in New York City. In fact, nearly a third of the 2,800 small businesses in New York City that have permanently closed in the last year were restaurants (Haag, 2020). This led many

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to have no income for months which was extremely detrimental to both the employees and the employers. Although takeout was always an option, many businesses couldn't afford to maintain it a few weeks after the shutdown because of rent and other expenses. New York's food businesses had to close down in masses, causing unemployment to skyrocket, which led to more people struggling financially. As of mid-May 2020, open restaurants had reduced staffing for takeout and delivery only and the prospects for returning to full employment by June 30 were dim given the constraints imposed by capacity caps (Kaufman et al., 2020). The types of food services that were hurt the most were businesses that predominantly relied on customers dining in. Many insurance companies denied covering employers during the pandemic, with the claim that New York state considered restaurants an essential business (Haag, 2020). For the most part, smaller independent restaurants have been even more disenfranchised when compared to bigger foodservice companies. "The smallest of restaurants, those under $2 million in revenue, are the ones that most need the help" (Kaufman et al., 2020). As summer came, outdoor dining was allowed with a limited capacity. For many restaurants, purchasing decorative tents, and booths for this new change caused them to go into a great amount of debt, since it was difficult to afford these new necessities. All of the costs that these restaurants have incurred over the last year would have their effects dramatically reduced with the provision of tax aid and loans to tide the businesses (and their employees) over until the lockdowns are lifted and people begin to dine out again (at non-reduced capacity).

Nonprofits:

Organizations have had to find new ways to provide their services during the hard times of COVID-19. Revenues shrank, but expenses did not go away. Things have become more difficult and increasingly expensive while COVID-19 remains undefeated. Minimizing the risk of infection required taking steps that translated into less money coming in and more going out. The top three concerns for generating organizational revenue for nonprofits currently are fundraising events being canceled (64.10%), the loss of funders or corporate partners (45.15%), and difficulties meeting funder requirements (38.46%) (NLC, 2020). The cancellation and postponement of various events have also posed a serious issue -- the majority of income generation for nonprofits has disappeared as well as volunteers (as a result of social distancing) (Larson, 2020). Large non-profit organizations were able to navigate through the pandemic without much trouble as smaller nonprofits did. Nonprofits like Feeding America were able to help local food banks across the nation by using its COVID-19 response fund. Another example would be Oxfam America, which also worked hard to ensure people were able to sustain themselves and provided people with food, water, and helped unemployed people to find jobs. (JWU COE, 2020). However, smaller nonprofit organizations urgently need relief and recovery funding in order to keep their operation alive, but they have faced numerous difficulties in requesting economic aid. Nonprofit organizations have been having a hard time obtaining or receiving money from lenders since lenders tend to lend money to more longstanding organizations, and COVID has made it even worse for these smaller organizations since the economy has been struggling and previous donors have lost income. (McCambridge, 2020) Even if their applications get approved, they still have no idea about which stage of the process their applications were in or if they were even in the system (McCambridge, 2020). A lot of relief and recovery fundings that are available have not focused on supporting nonprofits either, as they are

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focusing on the plight of small businesses (Delaney, 2020). Economic support for nonprofit organizations is vital because it can help nonprofit organizations to serve people that need help and achieve their goals. Tax can be used as economic support and alleviate some of the negative consequences caused by COVID-19. Since non-profit organizations do not pay taxes, the government cannot give them money directly, but non-profit organizations can get help through the use of mechanisms like payroll credits.

Avenues of Aid:

When it comes to monetary aid, there are two primary, rather straightforward mechanisms: government-backed 0% loans and lines of credit. In order to gather the funds needed for these loans and lines of credit, we would recommend the city introduce a small temporary increase in taxes for as long as pandemic restrictions are in place (e.g., the year 2021), on those making over a certain amount per year. This increase in taxes must be small in order to minimize the likelihood of the highest earners leaving the city for another that would not have that increase in taxes, a phenomenon known as capital flight (Chen, 2021). A potential value could be a version of the Biden Administration's American Rescue Plan, where those making a salary over $400,000 per year would get a temporary increase in their personal income tax (e.g., 0.25%) (Watson et al. 2021). This tax would pool enough money to back these loans and/or lines of credit that would be used to help struggling businesses in the sector(s) described above. In order to pay back these loans, businesses would do so through tax credits -- the type of credit depends on their classification in the tax code. If they are a C corporation (a corporation that is taxed separately from its owners/shareholders), they would receive corporate tax credits and use the money that they would have paid in those taxes to pay back the loan. If they are an S corporation or a sole proprietor (like most small businesses) (a corporation that is not subject to income tax, where the owners/shareholders are taxed instead), they would receive personal income tax credits, and use the money they would have used to pay those taxes to pay back the loan. In other cases, such as that of nonprofits, where there is no taxable income, owners would get payroll credits (which apply quarterly rather than annually) and use those to pay back the loans. All of these credits would be refundable in order for them to carry over if they are not used in their entirety (rather than matching expenses dollar for dollar) and help businesses even if they are not currently making a profit.

Materials and Methods

In order to effectively determine how the city ought to distribute the limited amount of funds that they have, we must gauge public opinion. The data needed to draw the necessary conclusions for this study would be gathered through the use of a survey that would ask the general public to choose the sector(s) that they believed were the ones that needed aid the most or would benefit the most from getting monetary help during the pandemic. This would provide a quantitative and objective measure of which industries and sectors of the economy the public sees as 'needing help' the most and allows us to act accordingly. Using the data gathered by our survey, we will be able to determine which economic sector requires the most tax aid. By spreading it out, we will be able to determine the general public opinion on the sector that has so far suffered the most losses relative to their economic importance. With this information in hand, we will be able to

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formulate the best plan for revitalizing a large portion of New York City's economy. Along with that, we can discern which areas would end up having the most effective aid relative to possible costs. We also considered the possibility of location impacting the choice of the economic sector they believed needed the most tax aid; thus, we also asked for their borough in the survey. Utilizing this information, we will be able to draw conclusions on which area requires the most aid, and the most optimal type of aid (i.e. tax credits) to give them. Public opinion would not be the only thing that would be considered when developing a comprehensive solution to these issues (or iteration of a government/tax budget), but it provides insight into where the general public would be comfortable seeing a small portion of their money go to. The survey was distributed online, given the nature of the pandemic, and the demographic was adults that resided (and thus would be paying taxes) in New York City. This unique situation may not provide an *entirely* accurate representation of the preferences of the entire adult population of NYC, as only those with an internet connection were able to participate in the survey.

Results

The survey that was used to collect data for this study consisted of two parts. In the first, participants were directed to choose the business sector that they believed needed aid the most, and then rank (on a scale of one to five) how much aid they believed the sector needed, one being only a little bit of aid and five being as much aid as possible. They were then directed to do the same ranking with the sector that they believed needed aid the most after their first choice (second most). This data was then used to determine what the most common choice of sector was, as well as which sector(s) were deemed "in greatest need of aid".

In order to analyze this data, ANOVA and post hoc tests were conducted. The main outcome measure we examined is the amount of financial aid people thought a certain business sector need (on the aforementioned 1-5 scale). This value is determined from the average rank that participants gave each business sector in the survey conducted for this experiment. Each business sector was indexed in order to run the ANOVA tests. Restaurant/Food Services is represented by 1, Small Businesses (non-restaurants) by 2, Non-profit Organizations by 3, Hotels/Hospitality Services by 4, and Tourist Attractions/Tour Agencies by 5.

Each business sector was then ranked on an "aid" scale of 1 to 5, where a rank of 1 meant that the sector only needed a little bit of aid, and 5 meant that it needed as much aid as it could possibly get. For the frequency test, we looked at which sectors were chosen to be the "sector that needs financial aid" most frequently across the board. For the "needing-help" rank, we looked at the average rank calculated for each sector. In both iterations (most and second-most), the ANOVA test's independent variable was the chosen business sector, and the dependent variable was the rank given to the sector by each participant.

First Choice Analysis

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ANOVA – V1st choice rank

Cases	Sum of Squares	df	Mean Square	F	p
Business Sector Choice (First)	2.554	4	0.638	1.407	0.240
Residuals	32.667	72	0.454		

Note. Type III Sum of Squares

Table 1

Descriptives – V1st choice rank

Business Sector Choice (First)	Mean	SD	N
1	4.526	0.513	19
2	4.323	0.832	31
3	4.727	0.467	11
4	4.769	0.599	13
5	4.667	0.577	3

Table 2

According to the descriptives of the first choice rank (Table 2), the average rank (simply, how badly the sector needs aid) given to the various sectors is as follows: Restaurant/Food Services with 4.526, Small Businesses (non-restaurants) with 4.323, Non-profit Organizations' with 4.727, Hotels/Hospitality Services' with 4.769, and Tourist Attractions/Tour Agencies' with 4.667. The mean square value (0.638) seen in Table 1 is a significance test, the results of which indicate that the data collected was largely pseudo-random. Additionally, because the F-test value is greater than the P-value of our data, we cannot reject the null hypothesis, which is that all of the business sectors would have an approximately equal number of people selecting them as the sectors in greatest need of aid.

From the descriptives in Table 2, we see that the choice with the highest mean, or average, rank was Hotels/Hospitality Services with an average rank of 4.769, with Non-profit organizations coming in at a close second with a mean rank of 4.727. Third was Tourist Attractions/ Tour Agencies at an average rank of 4.667, with fourth being Restaurant/Food Services with an average rank of 4.526 and Small Businesses (non-restaurants) coming in last with a mean rank of 4.323. Most people tended to agree with others that made the same choice, as the average distance between the rank that each person gave a sector and the sector's average rank were less than one point away for every sector. The N column simply indicates the number of people that chose this option when deciding which sector needed aid the most. It ought to be noted that while the average rank for certain categories (namely small businesses) is not as high as the ranks of

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some of the other sectors, a larger number of people chose these sectors as the ones in greatest need of aid (while small businesses has the lowest average rank, it had the greatest number of selectors).

From this table, it can also be observed that Small Businesses (non-restaurants) was the most commonly picked sector, with roughly 40% of people deeming it as the sector in greatest need of aid. Restaurant/Food Services was second, with around 25% of participants. Third was Hotels/Hospitality Services, with around 17% of people, fourth was Non-profit Organizations, with about 14%, and last was Tourist Attractions/Tour Agencies, with a mere 4% of people. However, it ought to be noted that while Hotels/Hospitality Services and Non-profit Organizations had the highest average rank, they were not the most commonly picked choices, rather, they were the third and fourth most common choice, respectively. Also, while Tourist Attractions/Tour Agencies had the third highest average rank, only 4% of participants chose this option, or about three people.
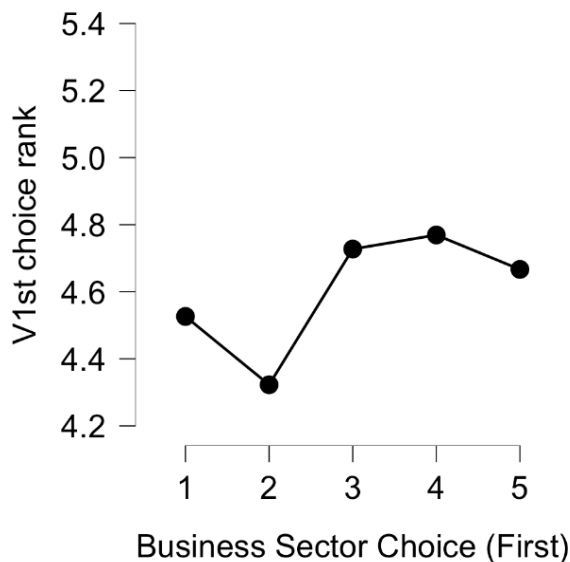

Figure 1

Figure 1 provides a visual representation of the average rank given to each business sector.

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Post Hoc Comparisons – Business Sector Choice (First)

		Mean Difference	SE	t	p_{tukey}
1	2	0.204	0.196	1.038	0.837
	3	−0.201	0.255	−0.787	0.933
	4	−0.243	0.242	−1.002	0.854
	5	−0.140	0.418	−0.335	0.997
2	3	−0.405	0.236	−1.712	0.433
	4	−0.447	0.223	−2.007	0.273
	5	−0.344	0.407	−0.845	0.916
3	4	−0.042	0.276	−0.152	1.000
	5	0.061	0.439	0.138	1.000
4	5	0.103	0.431	0.238	0.999

Note. P–value adjusted for comparing a family of 5

Table 3

The post hoc tests done in Table 3 compares the average rank of each individual sector with another sector. The sector represented by the number in the leftmost column is being compared with the number in the column to its right (second column from the left). The mean difference was calculated by subtracting the mean rank of the second sector in question from the first -- if the difference was positive (such as in row 1), the first sector had an average rank higher than that of the second. If the difference was negative (such as in row 2), the first sector had a lower average rank than the second sector.

The first comparison made was between the Restaurant/Food Services and the rest of the sectors. The mean rank of Restaurants/Food Service is 0.204 higher than Small Businesses (non-restaurants), 0.201 lower than Non-profit Organizations, 0.243 lower than Hotels/Hospitality Services, and 0.14 lower than Tourist Attractions/Tour Agencies. The second comparison was made between the Small Businesses (non-restaurants) sector and the remaining sectors. The mean rank of the Small Businesses (non-restaurants) was 0.405 lower than the Non-profit Organizations, 0.447 lower than the Hotels/Hospitality Services, and 0.334 lower than the Tourist Attractions/Tour Agencies. The comparison between Non-profit Organizations and the rest of the sectors demonstrates that the average rank of Non-profit Organizations is 0.042 lower than the Hotels/Hospitality Services, and 0.061 higher than the Tourist Attractions/Tour Agencies. Lastly, the average rank of Hotels/Hospitality Services is 0.103 higher than the average rank of Tourist Attractions/Tour Agencies. The p-tukey value indicates that these differences were not statistically significant, though their pseudo-random nature provides a good indication of the diversity of the sample that this data was gathered from.

Second Choice Analysis

ANOVA – V2nd choice rank

Cases	Sum of Squares	df	Mean Square	F	p
Business Sector Choice (Second)	5.369	4	1.342	1.672	0.166
Residuals	57.800	72	0.803		

Note. Type III Sum of Squares

Table 4

Descriptives – V2nd choice rank

Business Sector Choice (Second)	Mean	SD	N
1	3.643	0.989	28
2	4.045	0.722	22
3	4.333	0.707	9
4	4.083	0.669	12
5	3.500	1.517	6

Table 5

According to the descriptives of the second choice rank found in Table 5, the average rank of Restaurant/Food Services is 3.643, Small Businesses (non-restaurants)'s is 4.045, Non-profit Organizations' is 4.333, Hotels/Hospitality Services' is 4.083, and Tourist Attractions/Tour Agencies' is 3.500. As for the first-choice rank, the F-test value is greater than the P-value, and thus, the null hypothesis cannot be rejected, which effectively means that all of the business sectors have a relatively even distribution of selections (all sectors are picked a similar number of times).

Although Restaurants/Food Services was the most popular second choice, the necessity of funding that people believe should be allocated for them is given a lower preference. The average rank for this sector in this category is 3.6, though 28 people chose Restaurants/Food Services to be the sector that needs funding the most. It can be reasonably inferred, then, that people think that restaurants/food services are in great need of funding so they can continue to be in business, but they do not need an enormous amount of aid for that to occur. However, the frequency of choice for this sector plays a part in this comparatively lower ranking -- the sectors that get selected the most tended to end up with a lower rank, which can also be interpreted to mean that many people believe that the sector needs aid the most, though with varying degrees of magnitude. Small Businesses (non-restaurants) were the next most popular second choice, with an average rank of 4.045 and 22 participants selecting the option. This higher rank indicates that some participants believed that this sector was in need of a bit more funding than Restaurants/Food Services. Hotels/Hospitality were the third most popular choice with 12

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selections and an average rank of 4.083, which means that they are deemed to need a greater amount of financial aid compared to Small Businesses and Restaurants. Nonprofit organizations were the fourth most popular choice with 9 selections but were deemed to need the greatest amount of aid, with an average rank of 4.3. However, financial aid to less popular choices like Hotels/Hospitality and Nonprofit organizations with higher average rankings did not seem to be a very high priority of the public. Restaurants/Food Services and Small Businesses (non-restaurants) received a greater number of votes, so it can be inferred that they are most valued as a priority for financial aid by the general public.
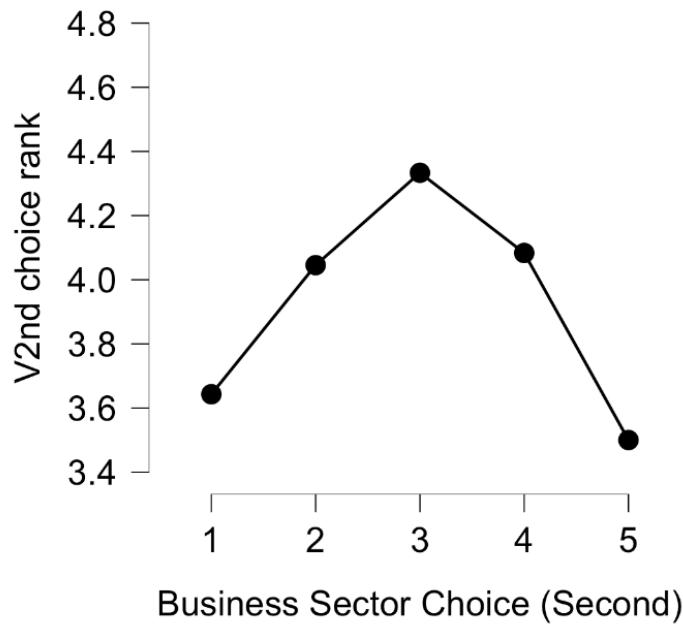
Figure 2

(visual representation of the data (average rank for each sector)

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Post Hoc Comparisons – Business Sector Choice (Second)

		Mean Difference	SE	t	p_{tukey}
1	2	−0.403	0.255	−1.577	0.517
	3	−0.690	0.343	−2.011	0.271
	4	−0.440	0.309	−1.425	0.614
	5	0.143	0.403	0.354	0.997
2	3	−0.288	0.355	−0.812	0.926
	4	−0.038	0.322	−0.118	1.000
	5	0.545	0.413	1.322	0.679
3	4	0.250	0.395	0.633	0.969
	5	0.833	0.472	1.765	0.402
4	5	0.583	0.448	1.302	0.691

Note. P–value adjusted for comparing a family of 5

Table 6

In the second round, the majority of people chose Restaurants/Food Services as the sector that would benefit the most from financial aid. Interestingly, these people did not select this sector to need the greatest possible amount of aid -- in fact, participants chose almost all the other sectors, aside from Tourism, to receive a greater amount of aid. This is shown by the post hoc comparison for the second business sector choice. The comparison shows that compared to Restaurants/Food Services, Small Business, Nonprofit organizations, and Hotels/Hospitality had a negative mean difference (-0.403, -0.690, and -0.440 respectively). The negative mean difference indicates that those sectors were seen as needing to receive a greater amount of aid than Restaurants/Food Services. When compared to Tourist Attractions/Tour Agencies, the Restaurants/Food Services sector's average rank had a positive difference, which means that people generally wanted more funds to be allocated for the Restaurants/Food Services sector instead of the Tourism one. The p-tukey value indicates that while these differences were not statistically significant, they were the product of random choices and thus a relatively good insight into the beliefs of the average New York City resident and taxpayer.

Discussion

Although the data is statistically insignificant, it is still an important reading of the general opinions of where New York City residents and taxpayers believe their tax dollars should go. The First Choice ANOVA test showed a p-value of 0.240 and the Second Choice ANOVA test showed a p-value of 0.166, which are both lower than the $p < 0.05$ threshold for statistical significance. This does not mean that the citizens of New York City do not have strong and justifiable views on where and how their tax dollars should be distributed -- instead, it indicates the randomness of this particular sample and how it provides a relatively accurate glimpse at the distribution of opinions citywide. Even though the data is insignificant, it provides great insight into the attitude of and priorities of those surveyed and can be extrapolated to think in the context

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of all New York City taxpayers. Those surveyed most frequently chose small businesses (non-restaurants) as their first choice of where tax dollars should be allocated, and for their second choice, they most frequently chose restaurants and food services. These results reveal that people are observing the struggling small businesses and restaurants in their communities and do not want them to shut down. Those surveyed least often prioritized tour agencies and non-profit organizations for where their money should be directed, which could be due to the fact that New York City residents are most frequently interacting with small businesses and restaurants rather than non-profits and tourism agencies/attractions on a regular basis. Therefore, it would impact the residents more if those restaurants and small businesses do not receive aid and subsequently shut down. However, this does not mean that people think that some sectors do not need or deserve aid. It simply means that those surveyed believe that aid should be provided to all struggling sectors in a relatively equal fashion (seen in the average ranks, which are all above 3) and are prioritizing some sectors more than others. Therefore, appropriate actions about tax dollar allocation should be implemented by the government in order to address the adverse effects of the pandemic.

Limitations:

Due to the ongoing pandemic, this survey had limitations like conducting it online and this made it difficult to reach out to a more diverse sample size. People having access to the internet, smartphone and personal computer mainly took part in this survey. The study and the survey was limited to New York City and its residents.

Conclusion

The data shows that while there is no clear sector that should be prioritized over another, it can be seen that the taxpayers in New York City do believe that the impact of COVID is severe and assistance in all sectors is needed. This data shows that all sectors included in this survey need assistance and these taxpayers are willing to shoulder the load and see their tax money used for aid for these sectors. The sectors within this survey need to have tax aid as none of the sectors were ranked low, throughout a majority of the responses. It can thus be reasonably inferred that the taxpayers believe that tax aid should be provided to all the sectors. Using this information, the solution of having government-backed 0% loans and/or lines of credit as suggested previously can be implemented and would be generally supported by citizens, based on the data collected. In order to gather the funds needed to help these sectors, there could be (as proposed before) a small increase in taxes for those who make above a certain dollar amount per year (e.g. $400,000, as per the American Rescue Plan numbers). This would help gather the funds needed to allocate to the different sectors and from the data, we can see that people think these sectors urgently need tax aid.

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The Effect of Healthcare on Maternal Mortality Rates

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Abstract

The United States has one of the highest maternal mortality rates among the developed nations, at 20.1 maternal deaths per 100,000 births as reported in 2019. The nation has done little to lower this rate in the past decade, and the maternal mortality rate has increased from the 17.4 maternal deaths per 100,000 live births rate in 2018. The maternal mortality rate for non-Hispanic black women in the US was 2.5 times the rate for non-Hispanic white women in the US. We wanted to determine how healthcare services and insurance coverage play a role in the high maternal mortality rates in the United States, with a focus on the maternal mortality of black women. Due to the nature of our study, we focused on collecting and analyzing archival data instead of conducting a survey or interviews. Our methodology focused on collecting data that we ran multiple linear regression tests on. Unfortunately, there has been a lack of reporting in maternal mortality cases in general, and even more so in the cases of women of color. Therefore, it is crucial that more reporting and further research is done to lower these rates and understand these racial disparities.

Categories: Women, Mortality, Healthcare
Keywords: United States, Mortality Rate, Healthcare, Infant

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Literature Review

Mortality in the US

The United States continues to lag behind other developed countries in terms of healthcare access and lifespan. Much academic research has suggested that countries that have more equitable healthcare access and more robust healthcare systems have better mortality rates. For instance, Heijink et al. (2011) finds that countries with above-average spending in healthcare have above-average reductions in mortality. Unfortunately, the researchers found the link between these two factors is weakest in the US, where healthcare spending does not have a large effect on mortality. Despite the fact that the US spends far more money per capita on healthcare- healthcare spending is 18% of its GDP(Gross domestic product), and the US accounts for nearly 40% of pharmaceutical spending worldwide lifespans in the US are not higher than other developed countries, and in many aspects, mortality rates are worse (Yoe, 2020). The reason for the disparity in healthcare spending and life expectancy in the US is because healthcare is distributed unevenly. Among Americans who have healthcare in the first place, high-income Americans are more likely to utilize healthcare services than low-income Americans, regardless of how "necessary" the service is. This disguises the racial inequality prevalent in the U.S. Specifically, the wealthy - a minuscule population in terms of size - account for 58.7% of healthcare expenditure (Chen & Escare, 2004). Essentially, while as a country, the US may spend a large amount of money on healthcare, this healthcare first and foremost goes to the wealthy. It is unlikely that healthcare services will naturally become more evenly distributed across income groups in the next few years, as research suggests that the wealthy have better healthcare utilization across all age groups - young and old. Unfortunately, the fact that healthcare is functionally a "luxury" that only the wealthy in the US can afford is causing major discrepancies in mortality. Inadequate healthcare access is one of the main causes of the US's poor mortality rates compared to other countries. Interestingly, the life expectancy of seniors (above the age of 65) is less affected by the US's lack of universal healthcare because American seniors qualify for Medicaid. Medicaid allows seniors to be screened for chronic diseases at the earliest stages, resulting in the US actually having better cancer identification and survival rates (National Research Council, 2011). Therefore, the negative effects of inadequate healthcare are mostly visible in the younger cohort of Americans.

One critical area of mortality the US continues to perform badly in is maternal mortality. Indeed, over the last few years, research suggests that maternal mortality is actually increasing. Khozimannil et al. (2019) report that that severe maternal morbidity, the state of being unhealthy for a particular disease, and mortality, the number of deaths that occur in a population, increased among both rural and urban residents from 109 per 10,000 childbirth hospitalizations to 152 per 10,000, from 2007-2015. Importantly, the study also notes that the largest increase in maternal mortality was specifically in rural areas, suggesting that more research needs to be done into the causes of the rural increase to generate solutions to the problem. The issue of maternal mortality is closely linked to the quality of healthcare and hospital care which effectively is a socio-

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economic situation of the United States. In the US, 39% of people have reported not going to a doctor because of concerns about cost, compared with 7% in Norway and Canada, 5% in Sweden and just 1% in the UK - all countries with public healthcare systems (Christiansen, 2017). However, most maternal deaths are preventable with adequate care. With a more affordable, efficient healthcare system, expecting mothers would never be denied or refuse valuable treatment because of cost concerns.

How does location affect mortality?

On the whole, mortality in the United States has been on the decline. Unfortunately, mortality is not indiscriminate. The largest reductions in mortality for many diseases have concentrated in very specific areas of the US. For instance, for white Americans in urban areas, there was a 43% reduction in mortality from coronary heart disease, while mortality was reduced far less among black and rural populations (Kulshreshtha et al., 2014). Heart disease is currently the leading cause of death in the US (Gillespie et al., 2014), so the discrepancies in mortality need to be urgently addressed.

On the whole, rural counties have lower life expectancies than their urban counterparts and are more unhealthy. James et al. (2018) finds that of the 417 rural counties with persistently high rates of mortality, 75% of them are rural counties. These high-mortality rural counties are distributed throughout all regions of the US, although many are in the Southeastern region.

How does race affect mortality?

While the mortality gap has declined slightly between black and white Americans (Masters et al., 2014), discrepancies still exist. Mortality reduction has been the weakest among black populations across the US. When comparing the mortality from preventable diseases like coronary heart disease, black and white Americans in similar geographic settings had very different outcomes. Kulshreshtha et al (2014) report that the mortality rate for black people in large urban areas was 215 per 100,000, while for white people it was 143 per 100,000.

In total, health inequalities result in shorter lifespans for Black Americans throughout the US. In 2010, the life expectancy for white Americans was 4.1 years longer than the expectancy for black Americans (Murphy et al., 2013). These statistics suggest that while the quality of life might be improving for the United States, these improvements are mostly enjoyed by white Americans.

How does healthcare affect mortality?

As stated before, many maternal deaths are preventable with adequate care, yet the US lags behind other countries in healthcare accessibility. Unfortunately, an estimated 15% of women in the US do not receive adequate prenatal care (National Vital Statistics Report, 2018). These numbers are not distributed equally across demographic groups; lower rates of prenatal care occur amongst groups that typically have less healthcare access. Furthermore, the type of payment method used to pay for the delivery of a baby was strongly correlated with how likely a woman was to begin prenatal care. For women who paid out-of-pocket, 54.8% received PNC in the first

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trimester compared with 68.1% of women for whom Medicaid was the source of payment, and 87.0% of women with private insurance. Beginning prenatal care in the first trimester is key in protecting a mother's life; over 88% of women who received prenatal care in the first trimester are classified as having adequate care, meaning it was constant throughout the remainder of the pregnancy.

Likewise, infant mortality is an issue closely linked to healthcare access in the US. Health expenditures on newborns are extremely high; the average 6-month expenditure for preterm infants was $76,153 (Beam et al., 2016).

The gap in maternal morbidity research

While academic research in the US has continually affirmed that location and race impact mortality rates, there is limited research on the intersection of location and race. Current literature has conclusively told us that black mothers throughout the US have much higher rates of mortality. For instance, in California, a state that tackled the issue of maternal mortality in the mid-2000s and was successful in lowering the death rates, black mothers are still three-four times more likely than white mothers (Main et al., 2018). The researchers suggest there are a variety of reasons why black women continue to have much higher rates of maternal mortality, with underlying reasons including lack of hospital access, poor quality of hospitals and healthcare, but racism and social determinants also factor into mortality rates.

The goal of our paper is to gain an understanding of whether geographic location affects the maternal mortality of black women. Research suggests that rural dwellers have higher mortality rates, and black Americans have higher mortality - and specifically much higher rates of maternal mortality. Indeed, the mortality risk for rural black Americans is two to three times higher than urban whites across the country. Worryingly, the mortality gap between rural black Americans and urban white Americans is increasing (James & Cossman, 2016). Thus, our paper aims to holistically analyze the reality of health outcomes for pregnant women and newborns across the US. We look at factors such as race, healthcare access, and location by state to see how these impact maternal and infant mortality.

Materials & Methods

For our study, we defined maternal mortality as the death of a woman from any cause related to pregnancy, childbirth, or 42 days within the termination of a pregnancy. The large gap in research on maternal and infant mortality, in general, prompted us to investigate using a two-pronged approach to explore how several variables, including race and healthcare access, change health outcomes for these two populations, pregnant women and newborns.

Part 1: Maternal Healthcare Services

In order to look at the performance of each state's maternal care holistically, we compiled a spreadsheet of maternal health insurance and care services provided by each state. We assigned a 1 to each service that a state-provided and a 0 to each service that a state did not provide (every

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service was equally weighted). We then totaled each state's points for a total of 16 possible points to determine which states offered the most support and which states offered the least support. Below are the services that we considered:

Medicaid Expansion: State has expanded its Medicaid coverage as of March 31st, 2021, allowing more affordable coverage options and ultimately decreasing the number of uninsured women. This data was retrieved from the Kaiser Family Foundation (Family Foundation 2021).

Paid Family Leave (PFL) as of January 18th, 2021: State has a state-mandated law in place that provides employees with paid family leave. Employees in this state can receive wages when they take time away from work to take care of a new child or ill family member. This data was retrieved from Patriot (Blakely-Gray 2021).

Postpartum Coverage Period*: State has expanded the Medicaid coverage period beyond the typical 60-day postpartum period for women who have pregnancy-specific Medicaid eligibility.

Pregnant Immigration Coverage*: State expands coverage to pregnant immigrants who have been in the United States for less than 5 years.

Presumptive Eligibility*: State permits pregnant women who are determined to be eligible for Medicaid by qualified entities to temporarily enroll until the final eligibility is determined.

Education to Providers*: State has initiatives to educate physicians, nurses, health care facilities, etc. about maternal health issues and provides education to identify high-risk women.

Education to Beneficiaries*: State has initiatives to educate pregnant women in Medicaid about maternal health issues.

Outreach to beneficiaries or prospective beneficiaries*: State contacts all pregnant women for maternal care services for additional support (non-education related).

Peer supports*: State provides peer support programs for pregnant women in Medicaid who are not part of group prenatal care.

Monetary incentives*: State provides incentives to pregnant women for attending visits or completing tasks. Incentives could include payments or goods such as diapers or formula.

Doula care*: State covers doulas, a trained companion who is not a healthcare professional and who supports another individual through a significant health-related experience, and other continuous labor support providers.

Substance use disorder treatment*: State covers substance use disorder treatment for pregnant women.

Mental health treatment*: State covers mental health treatment for pregnant women.

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Postpartum depression screening*: State covers postpartum depression screening for mothers under the infant's Medicaid ID.

Pregnancy medical homes*: State has a pregnancy/maternal medical home program.

Group prenatal care*: State has programs that provide prenatal care in group settings.

*This data was retrieved from a report that was made under contract to the Medicaid and CHIP Payment and Access Commission (MACPAC) (Mathematica 2019-2020).

Part 2: Infant Mortality

Additionally, we ran two linear regression tests, one to test the relationship between healthcare coverage and another on infant mortality. We hypothesized that states with lower rates of coverage would have higher rates of both infant and maternal mortality. For both tests, we used data from the 2019 Census. The Census provides information for the percentage of people in each state who were uninsured at the time of data collection. For infant mortality data, we used data from the CDC which tracks infant mortality. The CDC defines infant mortality as the death of a child under 1 year of age. For a holistic analysis, we investigated infant mortality as a whole and did not specify infant mortality based on race, location, health or mother, risk factors, or labor/delivery characteristics. Results of the linear regression test are in Figure 2.

Results

Part 1: Maternal Healthcare Services
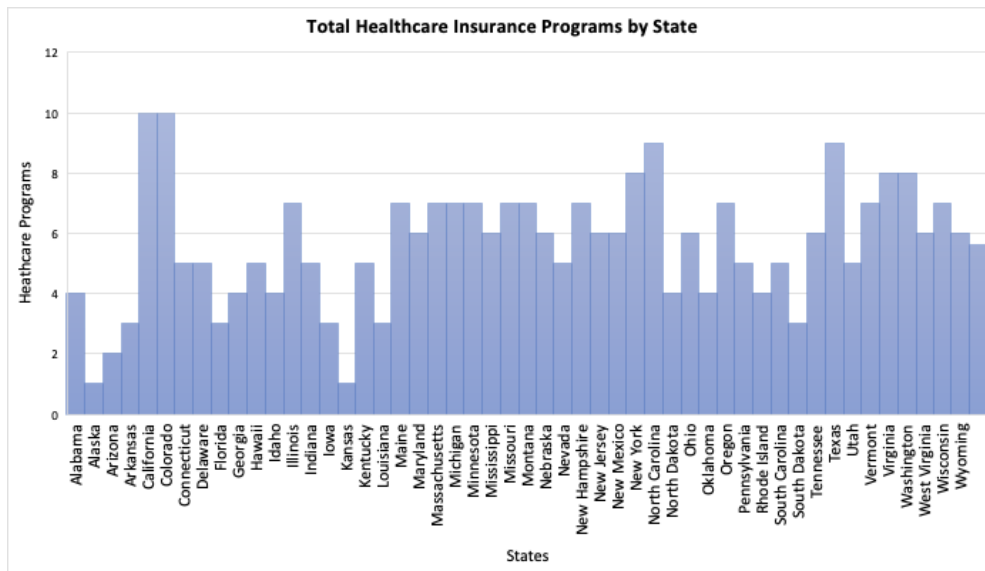
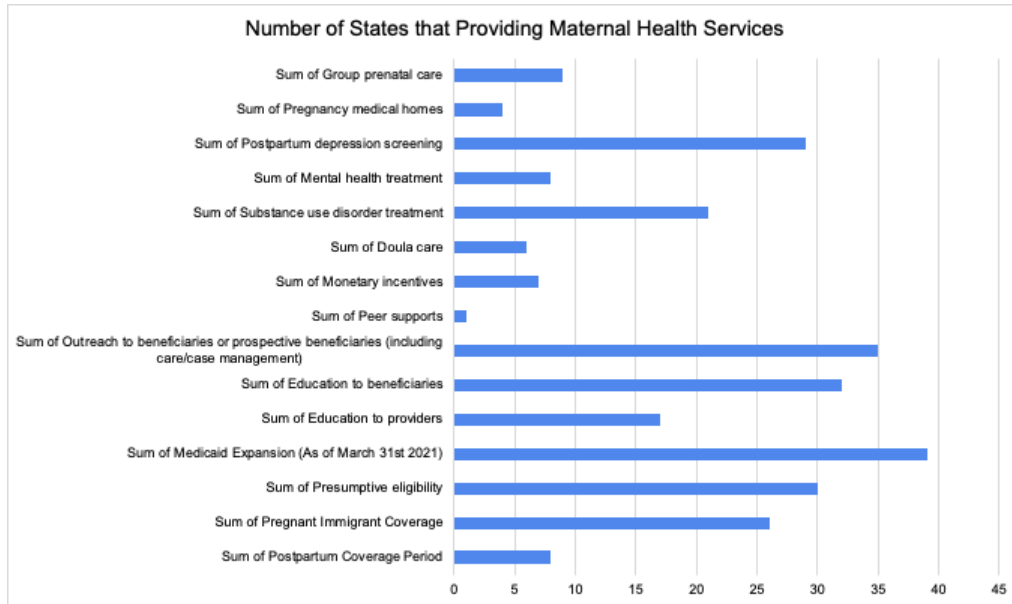Figure 1. Sum of maternal healthcare services by state

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Figure 2: Number of States that Providing Maternal Health Services

Part 2: Regression

Linear Regression

Model Summary – Infant mortality rate

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	1.084
H_1	0.296	0.088	0.069	1.046

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	5.039	1	5.039	4.606	0.037
	Residual	52.508	48	1.094		
	Total	57.546	49			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	5.850	0.153		38.169	< .001
H_1	(Intercept)	4.995	0.425		11.760	< .001
	V2019 uninsured	0.102	0.048	0.296	2.146	0.037

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Figure 3. Results for linear regression test of effect healthcare coverage on infant mortality.

Linear Regression ▼

Model Summary – Maternal Mortality

Model	R	R²	Adjusted R²	RMSE
H_0	0.000	0.000	0.000	10.748
H_1	0.391	0.153	0.134	10.002

ANOVA ▼

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	812.388	1	812.388	8.120	0.007
	Residual	4501.881	45	100.042		
	Total	5314.269	46			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	21.974	1.568		14.016	< .001
H_1	(Intercept)	10.129	4.405		2.299	0.026
	V2019 uninsured no DC	1.366	0.479	0.391	2.850	0.007

Figure 4. Results for linear regression test of effect healthcare coverage on maternal mortality.

Discussion

We see that while most states contain more than four different kinds of maternal healthcare services, a majority of those services are centered around education rather than action. Superficially many states look like they're making progress in terms of maternal health care access, while 74 percent of states have Medicaid expansion there is still a large discrepancy in maternal mortality rates. The implementation of these programs has yet to affect the quality of healthcare. This could be attributed to the fact that many of the programs adopted in Figure 1 favored expansion on eligibility and postpartum depression screening over practical support such as mental health treatment or Doula care.

Eligibility and screening can assist in overall access but do not guarantee medical assistance nor treatment. The lack of support for services that provide active care, such as Doula coverage, stunts practical change. Programs that provide services pre and post-pregnancy are essential to supporting mothers. The lack of public health care leaves low-income women at a great disadvantage. Many low-income women need additional support postpartum yet can not afford additional support. In contrast, high-income women have greater access to healthcare and the

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ability to afford additional healthcare services. This is supported by our linear regression test for the impact of healthcare access on infant mortality. Our results suggest there is a positive correlation between higher rates of uninsurance and higher rates of infant mortality ($p < 0.037$). Looking at these economic factors and the general racial makeup of citizens with a low socio-economic health economic state in the US black mothers are at a clear disadvantage.

Geographically, we clearly identify four leading states, California, Colorado, North Carolina, and Texas. California's placement is expected considering its history with maternal healthcare. California has seen a decline in maternal mortality by 55 percent between 2006 to 2013 in comparison to the steady increase of maternal mortality on a national scale (State of California, Department of Public Health). But the additional states in comparison have much lower mortality rates, this signals that there is no direct correlation between the number of programs and the rate of maternal mortality.

Limitations and Further Study

The solutions that we identified may be too generic to apply on a state or local level considering that every state has a different level of progress when it comes to decreasing maternal mortality rates. Also, in the Maternal Healthcare Services part of our study, we only looked at certain insurance-related programs that each state offered. Some states have implemented various other programs at the state level and local level that this study does not consider. Contrarily, many states have not already established the groundwork to lower maternal mortality, so our solutions may not apply to these states.

Additionally, referring back to the maternal health programs that each state provides, our study did not focus on how some programs may have a more significant impact than others. Some services might have a more profound effect than others. This limits the scope of our study because the total points of one state may represent services that are not as valuable as the services another state offers even if they have the same total score. Our assessment of maternal mortality may also be slightly inconsistent with other similar studies considering that some maternal mortality data reporting centers consider pregnancy-related deaths of mothers up to 60 days after labor to qualify as maternal mortality cases. The data we used may not cover all of the cases considered as pregnancy-related deaths by other sources because our datasets only contain data that follows our definition of maternal mortality that is limited to 42 days after labor.

The biggest limitation of our study was the limited time range that we were able to retrieve maternal mortality rates data from. Years before 2003, specifically in the United States, research tended to underestimate the amount of maternal mortality. Between the years of 2007 and 2018, there was an overall stop in reporting by the CDC due to the lack of accurate interpretation of maternal mortality. In mid-2017 all states implemented a checkbox item to their death certificate asking whether the decedent was pregnant or recently pregnant. 2018 was the first year in which a checkbox indicated if this was implemented (Hoyert & Miniño 2020).

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To expand on our research, studies could be done to investigate maternal mortality under a new context. Further studies could be done to analyze the relationship between illegal and unsafe abortion procedures and maternal mortality. Certain states are passing stricter abortion laws, which may cause an increase in maternal mortality rates (World Population Review 2021). The conditions of hospitals and how they may contribute to the death of these mothers is another under-researched area. California, a state that has been successful in lowering the amount of maternal mortality in their state in recent years, could be used as an exemplar for other states that are lagging behind. The feasibility of expanding California's efforts on a national level would make for an impactful research study. Research on the improvements in data collections needed to standardize the reporting of maternal mortality cases and rates would close the gap in maternal mortality reporting. Lastly, further studies should be done to find possible solutions to decrease maternal mortality within minority communities in rural areas. This study should analyze how both geographic location and race are factors that are highly influential in the prevalence of maternal mortality in the United States, and internationally.

The most efficient way to prevent these high maternal mortality rates is through potential solutions such as preventing unwanted pregnancies with equitable access to contraception, safe abortion services to the full extent of the law, and essential, quality post-abortion care. In order to eliminate the racial disparities in maternal mortality, it is important to address the need for improved access to critical service through training and strengthening already existing health programs. One example would be offering African American women tools to navigate the healthcare system and be screened and treated for the risk of preterm birth. Another way to look about this is training providers to address racism and build a more diverse healthcare force by dismantling care barriers. It is crucial that the healthcare system ensure equity for this whole process.

With the United States maternal mortality rates rising steadily over the past two decades, it is imperative that the federal government, state governments, hospitals, and all healthcare workers implement changes in the maternal healthcare system. Through our research, we have pinpointed the areas of underperformance in maternal healthcare, identified certain demographics that have historically been underserved, and provided solutions that can help decrease the maternal mortality rates and reduce the racial disparity. Further, it will take each state's cooperation to increase both the reach of maternal health programs and the accuracy of maternal mortality rate reporting in order to tackle this issue on a nationwide level. We would like to thank all of the authors of the papers we have cited and any researchers, healthcare workers, or policymakers who are working on decreasing maternal mortality rates.

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Exploring the Allocation of Resources for Competency-Based Youth Education in the United States

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Abstract

Education in the United States, specifically higher education institutions, concentrate their efforts on preparing students for standardized exams and on gaining entrance into prestigious colleges and universities, while the workplace concentrates their efforts on the prestige of the institution that the students attended rather than whether or not the graduates possess the right skills. Together, higher education institutions and the workplace resemble a pivot away from Competency-Based Education (CBE), posing the the question of, "How much money (in United States Dollars, or USD) of its available federal resources has the United States allocated towards Competency-Based Education, and what effect(s) can the proper allocation of the available federal resources for Competency-Based Education have on youth career outcomes?" Archival literature was used to answer the research question. Furthermore, a combination of qualitative and quantitative methods was adopted to answer the two respective parts of the research question. Results found that the United States government allocates $720.9 billion on education. However, there is insufficient research conducted and therefore a lack of evidence to quantify the amount of money that the United States government allocates towards Competency-Based Education. It is postulated that the lack of research is attributed to the fact that the United States Office of Education recognized Competency-Based Education in the early 1970s. There is a need for transparency regarding the budget of the United States Department of Education on Competency-Based Education to determine whether or not the United States government is properly allocating its resources.

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Categories: Youth, United States, Education
Keywords: Competency, Resources, Culture Grade

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Background Research

Involving youth into a skilled workforce is supposed to be the main purpose of education. However, education and school reforms focus too much on getting students to pass certain tests or getting entrance into prominent colleges and universities (Brand, 2007-2008).

There are two major terms of education: Education for Development and Education in Development. Education for Development considers the role of education as an investment for economic development and productivity. On the other hand, Education in Development focuses on the relationship between education and development more precisely. According to this school of thought, education can socioeconomically and culturally change society (Sung-Sang Yoo, 2019). To be productive in the economy, youth must gain a certain Competency-Based Education for their future careers. Many graduates face difficulties with skills and knowledge in their work careers. Youth are expected to reform society and to change the world using their knowledge, attitudes, and behaviors. Competency-Based Education is well-known across the world today. The United States Department of Education and different levels of policy organizations of the United States support Competency-Based Education (Lynn Curry, 2017), but there is insufficient research on how to properly allocate the resources of the United States government on Competency-Based Education. The Federal Resources for Educational Excellence (FREE) program was offered by the United States Department of Education in 1997 to provide a way to gain digital teaching and learning resources. In the 2017-2018 school year, there are 137,432 institutions in the United States including elementary and secondary (middle and high schools) schools, combined schools, and post-secondary (colleges and universities) institutions (Bouchrika, 2020). Defining the feasible educational institutions that utilize Competency-Based Education, this paper would describe how to properly allocate the available resources of the United States government on Competency-Based Education.

Operational Definitions

What is Competency-Based Education? Competency-Based Education (CBE) has multidimensional aspects. Therefore, it does not have any universally shared definition (Gervais, 2016). CBE connects theoretical perspectives to practice, and so the learning outcomes of students are given priority in CBE. Riesman (1979) describes CBE as "a form of education that derives curriculum from an analysis of a prospective or actual role in modern society and that attempts to certify student progress on the basis of demonstrated performance in some or all aspects of that role. Theoretically, such demonstrations of competence are independent of time served in formal education settings." (Gervais, 2016).

Who is the Youth? According to the United Nations, youth are people between the ages of fifteen and twenty-four This definition was made during preparations for the International Youth Year (1985) and endorsed by the General Assembly. All United Nations statistics on youth are based on this definition, as illustrated by the annual yearbooks of statistics published by the United Nations system on demography, education, employment and health (Youth, 2020).

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Career and Technical Education Programs. Career and Technical Education Programs (CTE) are the alternative programs that provide a hands-on learning experience and ease students' transition into the workforce.

Literature Review

Competency-Based Education (CBE), also known as Outcome Based Approaches, dates back outside of education to the Late Middle Ages in craft guilds, apprenticeship training programs, technical training programs, and licensure programs. During the Middle Ages, medieval societies were organized into social hierarchies under the feudal system. Contingent on the feudal system was the division of labor among the social classes. These medieval societies were ruled under monarchs, or kings and queens, who were the absolute owners of the land in their respective kingdoms. While the kings were the absolute owners of the land in their respective kingdoms, they entrusted the lords (nobles) with their land by gifting their land to the lords. The lords would then provide knights (vassals) with their designated portion of the king's land, fiefs, in exchange for the provision of military service of the king's land to protect it from invasion from the other nearby medieval kingdoms. At the bottom of the feudal system, the peasants (serfs) were delegated to work the land by growing crops in exchange for the provision of physical and legal protection by the knights.

The townspeople of the medieval kingdoms were free since they did not belong to the feudal system. Instead, they engaged in craft guilds, apprenticeship training programs, technical training programs, and licensure programs. However, these craft guilds and training programs were regulated to limit the number of townspeople that could enter specialized crafts. Although there was a revitalized need for specialized craftsmen due to the feudal system conditional on growing international trade, the number of specialized craftsmen that were enabled to enter a craft was exclusionary (See Appendix A for more information on the feudal system). Ultimately, Competency-Based Education in craft guilds, apprenticeship training programs, technical training programs, and licensure programs "[identified] established standards for competence and performance … for specific jobs and roles" (Nodine, 2016).

In the late nineteenth century, several centuries after the development of craft guilds, apprenticeship training programs, technical training programs, and licensure programs, Competency-Based Education expanded across the Atlantic Ocean to the United States in the form of legislation. President Abraham Lincoln signed the Morrill Land-Acts of 1862, formally known as "An Act Donating Public Lands to the several States and Territories which may provide Colleges for the Benefit of Agriculture and the Mechanic Arts," that granted each of the then 34 states (Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, and Wisconsin) the ability to sell up to 30,000 acres of their land to the federal government to establish higher-education institutions, specifically land-grant colleges. The First Industrial Revolution in the United States from the late eighteenth century to the mid nineteenth century followed in the footsteps of Great Britain by urbanizing itself. Furthermore, the transformation of

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the American communities entailed agricultural inventions, notably the Norfolk four-course crop rotation system, seed drill, threshing machine, selective breeding, cotton gin, reaping machine, and the steel plow. Consequently, the land-grant colleges trained the local, rural communities on the proper usage, including the operation and management, of the new farm machinery for agricultural production through kinesthetic learning in which the students demonstrated that they were able to both operate and manage the farm machinery. In the Second Industrial Revolution, Frederick Taylor, crowned the Father of Scientific Management, published a book titled "The Principles of Scientific Management" where he proposed that if the management of a business decomposed every step of the extensive manufacturing process, simplifying the jobs of its workers into specialized, repetitive tasks, then worker productivity would increase. Conversely to craft guilds and training programs in the Late Middle Ages, Competency-Based Education in the United States evolved into being democratized.

Until Benjamin Bloom's development of the Bloom's taxonomy in 1956 and Fred Keller's development of the Keller Plan in 1962, Competency-Based Education in the United States was concentrated in the workplace rather than in higher education (See Appendix B for more information on Bloom's taxonomy and Appendix C for more information on the Keller Plan). In the late 1960s, after the development of Bloom's taxonomy and the Keller Plan, the United States Office of Education recognized that Competency-Based Education could be used to dictate student learning. In the early 1970s, the usage of Competence-Based Education to dictate student learning expanded to higher education. Nodine (2016) characterized that there are three phases in pivoting higher education in the United States towards Competency-Based Education:

1. 1960s - Present: Innovative Teacher Education Programs

2. 1970s - Present: Vocational Educational Programs

3. 2000s - Present: Online, Hybrid, or Direct Assessment Programs Using Adaptive Learning Technology

Recently, Pace (2013) devised a model to aid higher education professionals in pivoting to Competency-Based Education. The model is presented in Table 1.

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Table 1
Competency Education Continuum

	Traditional	**Emerging**	**Competency-Based**
School Culture	Learning happens inside a traditional classroom with little to no accommodation of student interests and learning styles.	Educators make limited accommodation for student interests by incorporating real-world experiences and partners into the classroom.	Students choose from a wide range of learning experiences at school, online, and in their community. Educators work with diverse partners and students to piece together individual learning pathways that accommodate student interests and learning styles.
Learning Progression	Students are expected to master grade level college and career ready standards.	Students are expected to master grade level college and career ready standards and transferable skills.	Students are expected to master competencies aligned to college and career ready standards. Each

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	Traditional	Emerging	Competency-Based
Learning Progression			competency has clear, transferable learning objectives.
Learning Pace	Students advance at the instructor's pace regardless of whether they mastered the learning objectives or need additional time.	Students may take accelerated courses if they demonstrate readiness. Students receive specialized support when they fall behind peers. Educators continually group students to encourage peer learning and maximize learning gains for all.	Students receive customized supports and accelerated opportunity both in-school and out-of-school to ensure they stay on pace to graduate college and career ready.
Instruction	Every classroom has one teacher who designs and delivers an instructional program with very	Educators engage in some collaboration across teams and content areas to align and differentiate	Educators work collaboratively with each other, community partners, and students to

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	Traditional	Emerging	Competency-Based
Instruction	little differentiation for individual students.	instruction based on real-time feedback on student performance.	develop a unique learning plan for every student based on student interests, learning styles, and real-time data.
Assessment System	Assessment instruments are used to set times to evaluate and classify students, not to guide instruction. Students have one opportunity to take the summative assignment at the end of the year.	Educators use formative assessment instruments when they believe students are ready to demonstrate mastery. These assessments help educators tailor instruction so that more students are ready to master the summative assessment at the end of the year.	A comprehensive assessment system is an essential part of the learning system. Formative assessments guide daily instruction and student selection of customized learning opportunities. Summative assessments show mastery of competencies. Students take these

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	Traditional	**Emerging**	**Competency-Based**
Assessment System			Assessments when they are already and have multiple opportunities to demonstrate mastery.
Grading Policies	Grades are norm-referenced, reflect mastery of course standards, and are typically based on weighted quarters and a final exam.	Grades reflect mastery of course standards and skills and are typically based on weighted quarters and a final exam or project. Students have multiple opportunities to demonstrate mastery of required coursework.	Grades reflect the degree of mastery of competencies ranging from advanced to not yet competent. When students do not earn course credit their record indicates competencies that need to be re-learned instead of the entire course.

Note. The model requires higher education professionals to use their current teaching policies to pivot towards Competency-Based Education.

How much money (in United States Dollars, or USD) of its available federal resources has the United States allocated towards Competency-Based Education, and what effect(s) can the proper allocation of the available federal resources for Competency-Based Education have on youth career outcomes? Given the extensive history of Competency-Based Education, although there exists comprehensive research conducted on Competency-Based Education, there lacks the

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proper allocation of federal resources towards it. Thus, if the United States properly allocates its available federal resources (USD) towards Competency-Based Education, then it can have a strong effect on youth career outcomes.

Materials & Methods

In order to test the hypothesis of "If the United States properly allocates its available federal resources (United States Dollars, or USD) towards Competency-Based Education, then it can have a strong effect on youth career outcomes," credible archival literature on Competency-Based Education in the United States, including various primary and secondary sources while fixating on primary sources, will be used to conduct the study because extensive research has been conducted on Competency-Based Education and the research has been made public through online databases. Considering that the research question of "How much money (in United States Dollars, or USD), of its available federal resources, has the United States allocated towards Competency-Based Education, and what effect(s) can the proper allocation of the available federal resources for Competency-Based Education have on youth career outcomes?" has two parts to it — a combination of qualitative and quantitative methods have been adopted to answer both parts of the question. Qualitative methods will be adopted to answer the second part of the research question, "What effect(s) can the proper allocation of the available federal resources for Competency-Based Education have on youth career outcomes?" On the other hand, quantitative methods will be adopted to answer the first part of the research question, "How much money (in United States Dollars, or USD), of its available federal resources has the United States allocated towards Competency-Based Education?" Ideally, the varied perspectives will be collated to have an inductive understanding of the need of Competency-Based Education.

Results

By using a combination of qualitative and quantitative methods from archival research to not only answer the research question, "How much money (in United States Dollars, or USD), of its available federal resources has the United States allocated towards Competency-Based Education, and what effect(s) can the proper allocation of the available federal resources for Competency-Based Education have on youth career outcomes?," but to also test the hypothesis, "If the United States properly allocates its available federal resources (USD) towards Competency-Based Education, then it can have a strong effect on youth career outcomes. Results found that in 2020, the United States government — comprising federal, state, and local governments — spends $720.9 billion USD, funded by local property taxes and state governments, on education for students in primary and secondary schools, or K-12 schools. Handson (2020) constructed a table to visualize a comparison between the amount of money (USD) that the United States government allocated per student for their education and how much money (USD) they spend per student for their education. A visualization of this comparison is provided in Table 2.

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Table 2

Educational Spending in Public Schools

Rank	State	Funding Per Pupil	Spending Per Pupil	Differential
1	New York	$28,228	$24,040	$4,188
2	District of Columbia	$31,280	$22,759	$8,521
3	Connecticut	$23,135	$20,635	$2,500
4	New Jersey	$22,424	$20,021	$2,403
5	Vermont	$21,614	$19,430	$2,274
6	Alaska	$19,017	$17,726	$1,291
7	Massachusetts	$20,581	$17,058	$3,522
8	New Hampshire	$18,667	$16,893	$1,774

Rank	State	Funding Per Pupil	Spending Per Pupil	Differential
9	Pennsylvania	$20,435	$16,395	$4,040
10	Wyoming	$19,435	$16,224	$3,212
11	Rhode Island	$18,628	$16,121	$2,507
12	Illinois	$18,652	$15,741	$2,911
Rank	**State**	**Funding Per Pupil**	**Spending Per Pupil**	**Differential**
13	Delaware	$18,034	$15,639	$2,396
14	Hawaii	$18,095	$15,242	$2,853
15	Maryland	$17,793	$14,762	$3,031
16	Maine	$15,996	$14,145	$1,851
17	North Dakota	$16,269	$13,758	$2,511
18	Ohio	$15,321	$13,027	$2,294

Rank	State	Spending Per Pupil	Funding Per Pupil	Differential
19	Washington	$15,380	$12,995	$2,385
20	Minnesota	$15,571	$12,975	$2,597
21	California	$14,819	$12,498	$2,321
22	Nebraska	$14,138	$12,491	$1,647
23	Michigan	$14,741	$12,345	$2,396
24	Wisconsin	$14,741	$12,285	$1,674
25	Virginia	$13,169	$12,216	$954
26	Oregon	$14,592	$11,920	$2,672
Rank	State	Spending Per Pupil	Funding Per Pupil	Differential
27	Iowa	$13,774	$11,732	$2,041
28	Montana	$13,097	$11,680	$1,417

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29	Kansas	$13,406	$11,653	$1,753
30	Louisiana	$13,118	$11,452	$1,666
31	West Virginia	$13,645	$11,334	$1,311
32	Kentucky	$12,444	$11,110	$1,333
33	South Carolina	$13,438	$10,085	$2,582
34	Missouri	$12,866	$10,810	$2,055
35	Georgia	$12,304	$10,910	$1,494
36	Indiana	$12,866	$10,262	$2,604
37	Colorado	$12,371	$10,202	$2,169
38	Arkansas	$11,589	$10,139	$1,450
39	South Dakota	$11,961	$10,073	$1,887

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Rank	State	Funding Per Pupil	Spending Per Pupil	Differential
40	Alabama	$10,871	$9,696	$1,175
41	Texas	$12,122	$9,606	$2,516
42	New Mexico	$11,906	$9,582	$2,324
43	Tennessee	$10,547	$9,544	$1,004
44	Nevada	$10,983	$9,417	$1,565
45	North Carolina	$9,931	$9,377	$554
46	Florida	$10,715	$9,346	$1,369
47	Mississippi	$10,001	$8,935	$1,067
48	Oklahoma	$9,548	$8,239	$1,310
49	Arizona	$9,645	$8,239	$1,406

| 50 | Idaho | $8,980 | $7,771 | $1,210 |
| 51 | Utah | $9,158 | $7.628 | $1,530 |

Note. Although the District of Columbia is not a state, it is listed as a state in the table. The table is modified from the original table constructed by Hanson, with the "Funding Per Pupil" and "Spending Per Pupil" columns being swapped in the original table. Furthermore, the table uses green and red text in the "Funding Per Pupil," "Spending Per Pupil," and "Differential" columns to visualize that the amount (USD) in the "Spending Per Pupil" column is subtracted from the amount in the "Funding Per Pupil" to determine the differential. Overall, the Spending Per Pupil is less than the Funding Per Pupil in each state, hence why the text in the "Differential" column is green.

Despite the fact that there is a definite number on the amount of money (USD) that the United States government spends on education in primary and secondary public schools, plausible that this amount may fluctuate from year to year, there lacks research conducted on the amount of money that the United States government has allocated towards Competency-Based Education. For this reason, it is concluded that there is insufficient research to determine the amount of money that the United States government has allocated towards Competency-Based Education.

Discussion

To reiterate, the research paper proposed the question of "How much money (in United States Dollars, or USD) of its available federal resources has the United States allocated towards Competency-Based Education, and what effect(s) can the proper allocation of the available federal resources for Competency-Based Education have on youth career outcomes?" and postulated that "If the United States properly allocates its available federal resources (USD) towards Competency-Based Education, then it can have a strong effect on youth career outcomes."

This research paper had two aims, first being how much the United States government had allocated towards Competency-Based Education for youth, and the second being the impact that this form of education can have on youth and their career outcomes. Through a series of quantitative and qualitative methods, these two aims were explored. A limitation of this archival research was data inaccessibility; while the amount of money the United States government has allocated towards education was found, the specific amount allocated towards Competency-Based Education was not due to lack of data. Furthermore, various forms of learning models and their impacts on the quality of education were examined. Additional research in the area of Competency-Based Education is required in order to understand just how much is being spent in this sector every year, as well as how funds can be better allocated. As a next step, more

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quantitative data can provide meaningful insights within this field.

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Appendix A: European Feudal System

Figure #1

A Pyramid Chart of the European Feudal System During the Middle Ages

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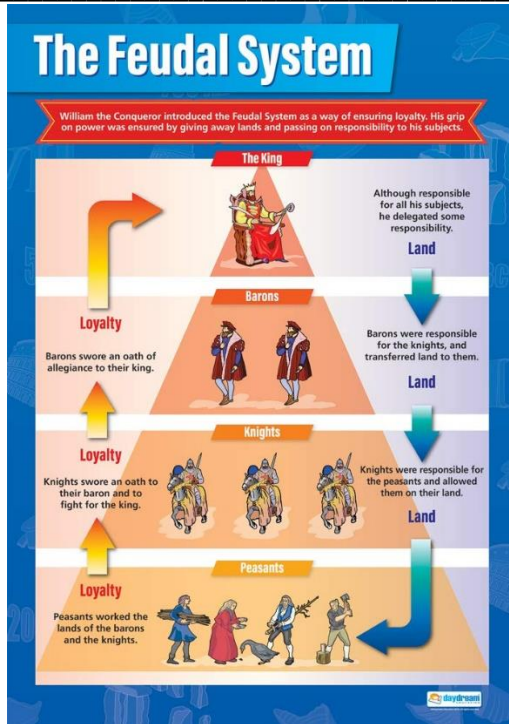
Note. Barons often use the title "Lord" to denote themselves.

Appendix B: Bloom's Taxonomy

Figure #2

A Pyramid Chart of Bloom's Taxonomy

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Bloom's Taxonomy

create — Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

evaluate — Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh

analyze — Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

apply — Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

understand — Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

remember — Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state

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Note. The higher levels of the pyramid are dependent on the lower levels of the pyramid.

Appendix C: Keller Plan

Figure #3

A Flow Chart of the Keller Plan

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Flow Chart of Keller Plan
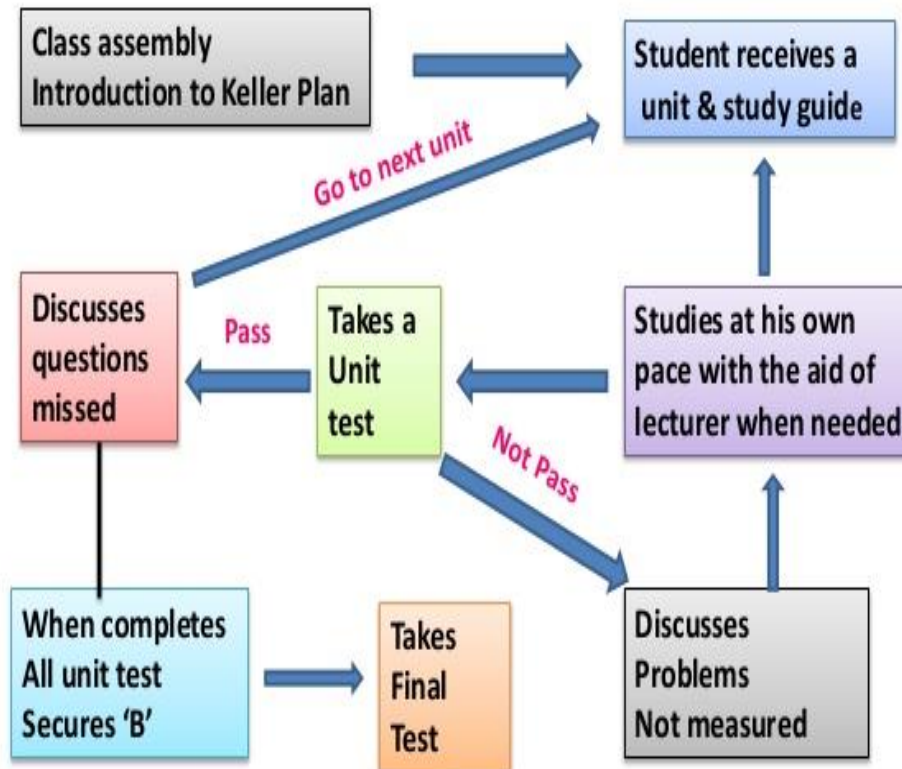
Note. The Keller Plan is alternatively referred to as the Personalized System of Instruction (PSI).

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Racial Bias in the Medical Field and Its Influence on BIPOC Teenagers & Young Adults' Decisions to Get Vaccinated for COVID-19

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Abstract

Racial discrimination prevailing in our society is reflected in the healthcare industry. To study how these racial disparities affect an individual's decision to get the COVID-19 vaccine, a survey was sent out to research how BIPOC teenagers and young adults are influenced by specific factors. The google form survey included questions asking respondents whether a specific factor influenced their decision to get the vaccine as well as asking their opinions on possible solutions for racial discrimination in healthcare. The data indicated that 88.1%, 86.7%, 90.2%, and 78.3% of the White, Black or African American, Asian, and Hispanic or Latino population, respectively, will be receiving or have already received the COVD-19 vaccine. It was observed that 87.4% of the participants responded that they will receive the COVID-19 vaccine where 77.2% of them believe there is racial bias in medicine but 85.6% of them did not experience racial bias. Linear regression was used to analyze the data to discover whether the responses to a specific question would impact whether they will get the COVID-19 vaccine. The linear regression analysis found that the most of data correlations were not significant where the p values were mostly greater than 0.05, with the exception of one, which is the correlation between receiving the COVID-19 vaccine and whether they think there is racial bias in medicine. Regardless, weak correlations where the R values were all close to 0 were found in the analysis of the data and therefore, the study did not produce any conclusive results. Limitations of this study include a small sample size where the primary responses came from the Asian population when the research was conducted to study the effects of racial bias on the BIPOC population.

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Categories: Medicine, COVID-19, Adolescents
Key Words: COVID-19, Racial Bias, Medicine, Vaccination, Young Adults, Teenagers

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Introduction

Race-based discrimination and disparities are prevalent in the healthcare industry and is reflected in the quality of and access to healthcare, as well as in society in general. Indeed, racial stereotypes and general racial discrimination has often led to differential care and treatment for BIPOC (black, indigenous, people of color). This may also stem from the lack of efforts in placing resources and establishing programs in communities and neighborhoods that have a denser POC population. These communities may sometimes not be prioritized when funding comes into play, which would result in the scarcity of medical resources and centers. Even if there were resources made publicly available, people also play a vital role in race-based discrimination. Many healthcare workers are inherently and racially biased, which leads to misdiagnosis and therefore mistreatment of diseases BIPOC population could face. Some research has shown that healthcare worker attitudes differed when it came to Whites and non-Whites (Hall et al., 2015). Due to this inherent racism, many BIPOC have learned to be doubtful of modern medicine. There has been a history of events and occurrences in which BIPOC, and specifically the Black community, were experimented on, and essentially treated as lab rats for scientific discoveries and research (Ferdinand et al., 2020). In the name of science, medical researchers and scientists had sometimes hidden the agendas for the experiments, thus leaving the BIPOC subjects clueless and ignorant of what has happened to them.

In contemporary society, specific instances of medical racism are often brought to light in modern media, further informing youth of these prevalent issues and potentially inspiring new fear of healthcare. Some of this fear may have been rooted from knowledge of events such as the Tuskegee experiment on African Americans, and instances such as the HeLa cell controversy (Ferdinand et al., 2020). In both cases, informed consent had not been considered, leaving those affected to be blind from the truth. This could affect whether black communities decide to get vaccinated for COVID-19, specifically the teenage population who are young and have more access to media coverage on discrimination and racism. The teenage population would more drastically show the effects of the impacts of systemic racism since they are still developing and growing, so systemic racism can negatively influence their growth, mental and physical health. Already, it seems like racism has affected other sectors in society pertaining to education, housing, and policing. With instances such as the murder of George Floyd (Bryant, 2020), whose murder by the hands of a policeman was recorded and broadcasted worldwide, it has sparked countless movements to uplift and represent the Black community, some of which are led by students or has had students participate in the protest to spread awareness of such systemic racism. This also occurred during the time of the COVID-19 pandemic.

While most data present and available are of the general public, there are little to no studies conducted that investigate the hesitancy of students on the COVID-19 vaccines. One research that has been completed investigated vaccine hesitancy among university students in Italy, in which a majority of the sample had a desire to be vaccinated (Barello et al., 2020). However, this study does not incorporate the factor of race or race-based discrimination in healthcare in their study, nor had the researchers include any respondents from the U.S. Another study conducted has examined the willingness of medical students to receive the vaccines, as they are a vital

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component in the battle against COVID-19 (Lucia et al., 2020). Their research, however, also did not focus on the element of race or ethnicity, though had a focus more on education. As such, very limited data on race and COVID-19 vaccination are made publicly available.

Currently, the U.S has offered three different brands of vaccines to protect against COVID-19, namely the Pfizer vaccine, the Moderna vaccine, and the Johnson and Johnson vaccine. It is worth noting that the Johnson and Johnson vaccine requires one dose, whereas the Pfizer and Moderna vaccines both require two doses. Different states in the U.S have been also expanding the vaccine eligibility at different stages, with New York state currently allowing anyone above the ages of 16 to receive the vaccine. This encompasses most of the students in college and some of the students in high school. It is eminent to mention that Johnson and Johnson have begun pausing the distribution and vaccination of their vaccines as of April 13, 2021, as there have been 6 rare instances that have led to severe blood clots as a complication and side effect of receiving their vaccine. Currently, only Moderna and Pfizer vaccines are being distributed and utilized amongst the U.S states, while some other countries have been offering AstraZeneca and other brands of vaccines. As more and more people are getting vaccinated, more and more appointments are now becoming available in healthcare centers and pharmacies. This is where technical dilemmas and the side effects of the vaccine come into play. With much of society operating remotely and virtually, scheduling for an appointment often requires internet connection, knowledge of surfing the web, and also knowing which centers offer them. This becomes a complicated process for the older generation, who might not have as much technical expertise when it comes to using electronic devices and the internet. The root cause is education, and specifically the education of the BIPOC community on technology. The lack of education and educational programs may be tied to racial problems, and lack of effort in setting up more educational centers and resources in BIPOC neighborhoods.

Due to the current severity of the virus, the research conducted in this experiment aimed to gauge just how much systemic racism affects the medical decisions of today's BIPOC youth. To evaluate the relationship between ethnicity/race and a student's decision on getting the COVID-19 vaccine, an anonymous survey was distributed amongst high school and college students throughout the U.S using a convenience sampling methodology. Questions regarding the student's demographics, vaccination history for the Influenza virus, and whether they believe there is a presence of racial bias within the medical and healthcare industry, were asked in the survey. The collected data were analyzed quantitatively through multivariable linear regression models as well as qualitatively through analysis of respondents' rationale regarding their decision of whether or not they plan on getting the COVID-19 vaccine or if they have already gotten the vaccine.

Literature Review

Access to Healthcare

Various research studies suggest that minority groups including Blacks, Asians, and Hispanics "have lower levels of access to medical care" compared to their white counterparts in the U.S.

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(Blendon et al., 1989; Brown et al., 2000; Williams and Rucker, 2000). Possible reasons for this disparity in access to health care include the racial disparities in income, employment, and wealth. According to a research study published in 2003 analyzing data from "1996-1997 and 1998-1999," factors like income, insurance coverage, and accessibility of safety net services contributed to over "80 percent of the difference" between Hispanics and Whites in terms of access to healthcare. For African Americans, different rates of insurance coverage was the primary contributor to the disparity in access to healthcare between the two groups. However, around 50% of the difference between African Americans and White Americans in access to healthcare was left unexplained, but the study suggests that this unexplained difference could possibly be due to racial discrimination in healthcare workers, mistrust, and miscommunication (Yearby, 2018). Racial disparities can lead to disparities in socioeconomic statuses, which can then lead to a lack of access to healthcare. These differences in socioeconomic statuses can arise from residential racial segregation, which has placed a disproportionate amount "of African Americans in" areas with poorer "housing conditions (and reduced) educational and unemployment opportunities," leading to reduced mobility in socioeconomic class (Williams, 1997).

However, although differences in socioeconomic status can be a potential factor in racial disparities in access to healthcare, a couple of research papers suggest that regardless of income level, these disparities are still present (LaVeist, 2005; Smedley et al., 2003; Williams, 1996; Williams et al., 2016). Specifically, a 2002 research paper suggests that although economic access does contribute to disparities in access to physician care, it doesn't contribute to the "ethnic/racial disparities in seeking physician care" (Dunlop et al., 2002). These research papers suggest that socioeconomic status and race are two different factors that both contribute to disparities in access to healthcare independently with no significant relationship between the two and access to healthcare. A research paper published in 2005 suggests that socioeconomic class plays a factor in health status, which contributes to blacks having reduced health status compared to their white counterparts. However, class isn't the only contributor to this disparity - education levels can also contribute to this, particularly with infant mortality due to low birthweight (Kawachi et al., 2005).

Politics can additionally contribute to disparities in healthcare through the implementation of legislation that contributes to systemic racial inequalities. Examples include "political influence in decision-making" for hospitals and public clinics' funding levels, locations, and closings as well as the number of hospitals built in an area, which a lack of can contribute to overburdening (Smith, 2005; Williams, 1997).

This disparity in access to healthcare takes root in access to health insurance, mental health care, kidney transplant, long-term care, neurological health care, dialysis facilities, cardiac rehabilitation, primary care, physician care, "simultaneous pancreas-kidney transplantation," and "left ventricular assist device therapy" among others (Cook et al., 2016; Isaacs et al., 2008; Joyce et al., 2009; Kulkarni et al., 2019; Lurie, 2007; Mahmoudi & Jensen, 2012; Patricia et al., 2006; Saadi et al., 2017; Saunders et al., 2014; Shi et al., 2014; Smith et al., 2008).

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Patients' Preference for Physician Race

Racial discrimination can factor into a patient's preferences for certain races for their healthcare providers, including physicians. One 2005 study found a link between the strength of "beliefs about racial discrimination in health care" and a preference for a same-raced physician among African Americans and Latinos. For African Americans, although "only 22% of [them] preferred" a race concordant relationship with their health care provider, including, but not limited to, physicians compared to 78% of them having no preference or preferring a race discordant relationship, among the 22%, those who "had an African American physician were more likely to rate their physician as excellent than" those who didn't have one at a rate of 57% vs. 20%. Similarly, this applies to Latinos and their preference for Latino physicians (34% preferred one). However, there is no statistically significant data that suggests that a preference for "a Latino physician" increases levels of satisfaction among Latinos who had one. African Americans also perceived "racial discrimination in health care" more strongly than did Latinos. For white Americans, around 75% of them "had no [racial] preference" for their physicians, but among those who did prefer a same raced physician and had one, there were higher levels of satisfaction with their physician than did those who had a preference for "a white physicians but had a nonwhite physician" at a rate of 71% to 29%. Chen et al. (2005) suggests that this difference in satisfaction could be due to less trust "in race-discordant relationships" among "patients with strong racial preferences" (Chen et al., 2005). A similar finding was reported in another research paper that found that minority patients' perception of the quality of their "interactions with their physicians" is lower than that perceived by White patients (Cooper-Patrick et al., 1999). This correlation is supported by various other research papers including in other minority groups like Hispanics and Asians (Cooper et al., 2003; Doescher et al., 2000; Saha et al., 1999; Saha et al., 2011). However, this preference for a same race physician/ healthcare provider could be due to sociocultural reasons as well as for communication reasons rather than racial discrimination reasons (Saha et al., 2000).

Racial Discrimination in Healthcare

As aforementioned, race negatively impacts how BIPOC are treated by healthcare workers due to their inherent biases. Many of the speculated reasons for the health disparity among racial/ethnic groups include the gap in socioeconomic status, the difference in access to care, the quality of care, and health outcomes. In summary, racial discrimination is a prevelant issue in the healthcare system. In a review analyzing implicit racial/ ethnic bias in healthcare and the influence on healthcare outcomes, it was found that the majority of health care providers seem to have implicit bias as they had positive attitudes towards Whites and negative attitudes towards non-White individuals (Hall et al., 2015). Moreover, research studies have pointed to a relationship between perceived discrimination and adversity in health outcomes. There has been proven associations with racial discrimination with reduced use of cancer screening, increased risk of hypertension, increased depressive symptoms, and more (Mouton, et al., 2013; Roberts et al., 2017; Lambert et al., 2009).

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Furthermore, recent studies have pointed to racial bias in an algorithm that is widely used in US hospitals. This is a major issue as algorithms are something that health systems heavily rely on, given that they are used to identify and help patients with complex health needs. The study found that the algorithm was less likely to refer Black individuals than White individuals who were equally sick to programs intended to help patients with complex medical needs. When taking a close look at the data, it was revealed that the average Black person was provided with $1,800 less care than a white person with the same health issues, raising questions about the systemic racism in the healthcare system (Obermeyer et al., 2019). This alludes to another issue in the healthcare system: racial bias in pain assessment and treatment recommendations. In 2016, a study found that 73% of white medical students held at least one false belief regarding the biological differences between different racial or ethnic groups. Some of these beliefs include the idea that Black people have a higher pain tolerance than white people because they have thicker skin, less sensitive nerve endings, or stronger immune system. These beliefs are centuries old, and have a deeply rooted history of racism, given that in the 19th century some doctors used these ideas to justify the inhumane treatment of slaves (Hoffman et al., 2016). Taken together, these studies have important implications for understanding race-related biases and healthcare disparities.

Misdiagnosis/Race Playing a Factor in Side Effects and Symptoms

Racial discrimination in healthcare often leads to poorer treatment in "patient centerdness, contextual knowledge of the patient, and patient-provider communication" (Hall et al., 2015). Consequently, patients of color often face misdiagnosis, resulting in improper treatment. Mistreatment also leads to worsened symptoms and side effects, as shown in a study done in 2012 which revealed that pediatricians were more likely to recommend an ideal pain management strategy to vignettes of white patients versus black patients (Sabin and Greenwald, 2012). This means that POC are more likely to suffer worse symptoms than their white counterparts for the same disease. This type of bias could be the result of a lack of POC healthcare workers, as a 2019 American community survey showed that whilst 60% of healthcare workers were white, only 16% were black and 13% were hispanic (Painter et al., 2021). The disparity in race within the field of healthcare could contribute to the inherent racism within workers, continuing the cycle of unequal treatment.

Racial Divide in the Healthcare Field

Besides biased diagnoses and treatment, racial division continues into the accessibility of healthcare resources. Because of the "system of racism" that has been created in America, it is harder for POC to attain the same quality of life and health as their white counterparts. This is shown in the American nursing home system- a national study performed in 2015-2016 showed that 75% of residents were white (Painter et al., 2021). To further this point, in 1972, a study named The Abecedarian project was performed to determine the effect of early childhood intervention on black children. The program provided access to pediatric care, nutrition, and a safe, nurturing environment. By their mid-30's, participants from the study were found to have lower rates of depression, as well as lower levels of risk factors for a multitude of different

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cardiovascular and metabolic diseases (Williams & Cooper, 2019). This study demonstrated that those with proper access to healthcare and a nurturing environment grow up both physically and mentally healthier. However, by that standard, POC are at a disadvantage. A survey performed in 2014 showed that hispanic and black nonelderly adults (aged 19-64) had the highest rates of uninsurance, with 33.4% of hispanic and 20.7% of black participants being uninsured. Additionally, when looking at rates of insurance, white participants had the highest rates of private insurance, at 74.3% (Buchmueller et al., 2016). As such, white, insured citizens in America hold an advantage over all.

Impact of Racial Discrimination on the Mistrust of Healthcare System

The inherent racism in medicine has been an ongoing issue. Unequal treatments and mistrust in our healthcare system has historical roots, reaching as far as the 19th century (Wells and Gowda, 2020). Some have theorized that the mistrust in medicine and healthcare have risen due to the historical maltreatment of African Americans in the US healthcare system (Wells and Gowda, 2020). Within African American communities in the South during the 19th century, approximately 90% of Blacks were in slavery, and were sold into medical experimentation as they were no longer needed in the fields (Wells and Gowda, 2020). No rights were in place during this time that protected Blacks from being experimented, nor were they given informed consent (Wells and Gowda, 2020). People rationalized that Blacks were inhumane and thus, was their logic as to why African Americans should be experimented on (Wells and Gowda, 2020). Wells and Gowda described that African Americans related western medicine to punishment where there was a loss of control over their bodily functions (2020).

Following, there are other cases that demonstrated the maltreatment of POC groups in medicine. For one, the reluctance of African American to receive vaccinations may be attributed to the lingering and traumatic effects of the Tuskegee Syphilis Experiments (Ferdinand et al., 2020). The study lasted for 40 years, and consisted of 600 African Americans, some which had syphilis. The purpose of the experiment was to observe the progression of untreated syphilis in African American males, yet they were poked, prodded, and subjected to x-rays, spinal taps, and treatments that they've received. Towards the end, penicillin was scientifically proven to be effective against the syphilis, yet was not administered to a majority of these African American males in order to continue the experiment (Wells and Gowda, 2020).

Lack of POC Receiving the Vaccine

As such, the mistrust in medicine is reflected by the statistics on COVID-19 vaccine uptake. Only 39.6% of racial and minority groups have received the vaccine as compared to the other 60.4% (Painter et al., 2021). General statistics have also shown that women and non-Hispanic Whites were vaccinated more compared to other groups (Painter et al., 2021). Ferdinand et al. talks about the importance of vaccination, as "suboptimal influenza immunization acceptance exacerbates flu-related adverse health outcomes, similar to difficulties from the effects of the COVID-19 pandemic" (2020). Additionally, Blacks, AI/AN, and Hispanics were reported to have more severe reactions and symptoms to COVID-19 (Painter et al., 2021). This may be attributed to

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preexisting morbidities within these populations, and may be a result of the lack of quality treatments and socioeconomic factors. As such, a 2009 study in Pittsburgh, Pennsylvania has shown that Blacks were twice as likely to distrust medical research compared to Whites (Wells and Gowda, 2020). Recent data show that "Black Americans are dying of COVID-19 infection at disproportionately high rates. In Milwaukee County, for example, nearly three quarters of COVID deaths were black, with blacks representing only about a quarter of the county's population. Additional data from New Orleans, Detroit, Chicago and New York show similar racial imbalances" (Wells and Gowda, 2020). It becomes evident with studies like this that reveal the eminent need for new programs and practices to better serve and attend Black patients and the Black community.

Interventions to Address Disparities and Discrimination in the Healthcare System

Discrimination has led to the unequal opportunities in terms of social and economic resources especially due to a system that favors the success of one racial group over another group (Pager and Shepherd, 2008). A consequence of racial discrimination could be in terms of the quality of healthcare. Healthcare disparities pertaining to race and ethnicity are defined as the differences in healthcare quality provided to patients of color and white people' (Griffith et al., 2007). Throughout its history, the healthcare system in the United States has not provided equal care (Griffith et al., 2007). According to Byrd and Clayton (2000) and Krieger (1987), "African Americans [specifically] have had the worst health care, the worst health status, and the worst health outcomes of any racial or ethnic group" (Griffith et al., 2007).

Common approaches to addressing these disparities have been through individual educational sessions and training to increase knowledge of different cultures (Griffith et al., 2007). However, as common as these approaches are, they have been shown to have limited effectiveness, especially if they are not coupled with policies and change efforts organization-wide (Griffith et al., 2007). There have been implementation of programs and training over the years as an effort to address these racism and inequities in the healthcare system. The Southern County Public Health Department had implemented a dismantling racism training along with an optional section to address institutional racism (Havens et al., 2011). In healthcare, dismantling racism refers to the systematic intervention to address racial inequities and disparities, which can include policy and organizational changes, reeducation, or community organizing (Griffith et al., 2007). Some possible strategies include increasing regulatory vigilance and initiatives to train medical professionals of minority groups (Williams and Ruckere, 2000). In 2004, the Sullivan Commission suggested that the essential starting point for understanding the disparities in the healthcare system is for people to recognize the presence of race-based inequities and identify how racism operates (Griffith et al., 2007). Another approach to addressing the inequities is anti-racist community organizing, which is "an intervention strategy that builds on the core components and principles of community organizing and infuses anti-racism as a core value" (Griffith et al., 2007). Thus, to effectively address the disparities in healthcare quality, it is important to identify and implement strategies that can eliminate the racial inequalities, and this should be made a national priority (Williams and Ruckere, 2000).

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Connecting these disparities in the healthcare system and the current COVID-19 pandemic and vaccination process, how does these racial disparities affect how teenagers' decisions in getting vaccinated? Perhaps BIPOC teenagers and young adults will be more likely to fear the vaccine due to racial bias in the medical field. Studies in the past, such as the Tuskegee Syphilis experiment, have put BIPOC, specifically Black Americans, in a position where they were poked and prodded, for the sake of investigating the natural progression of untreated syphilis. With a new disease and epidemic, it is possible that occurrences such as the Tuskegee experiment will influence the desire of BIPOC teenagers and adults to receive the vaccines.

Methodology

Research Question

This research study aims to determine the correlation between an American adolescent's views regarding racial discrimination and bias in the medical and healthcare industries and his/her/their decision to get the COVID-19 vaccine. The research also aimed to see if adolescents thought that racial bias exists in medicine and healthcare, and if so, what they thought would be the best solution to address this.

Data Collection & Sampling Method

Convenience sampling was used for the purpose of data collection. A survey made on google forms was sent out to high school and undergraduate students, specifically American teenagers and young adults between the ages of 13 and 22. The survey was posted on various social media platforms as well as emailed out to guidance counselors from various schools in order to ask them to distribute it to their students.

The survey was divided into four sections, general participant information, vaccinations, racial bias in the medical field, and racial bias' impact on decision to get vaccinated. In the first section, general information about the participants was collected, including their name or nickname, age, location (US), and ethnicity/race. In the second section on vaccination, respondents were asked about their decision on getting vaccinated for COVID-19 when eligible, whether they received the flu vaccine in previous years, whether or not they plan on or are currenting doing in-person or hybrid school/classes. In the third section on racial bias, respondents were asked about their opinions on racial bias in the medical field, whether they have experienced racial bias in the medical field, and their preference for a same race physician. Here, they were also asked to identify specific examples of racial bias they have experienced and witnessed according to the options that were thought of based on the literature review and if possible, suggest their own. In the fourth section on the impact of racial bias, respondents were asked whether racial bias affected their COVID-19 vaccination decision and provide possible solutions to racial bias. Data collection took place over the span of 3 weeks.

Data Analysis

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Data was analyzed through multivariable linear regression. The correlation between the respondents' response about their decision on whether or not they plan on getting vaccinated for COVID-19 when eligible and factors that may influence those responses including were compared.These factors were the respondent's response to the questions of whether they have received the flu vaccine in the past, whether or not they plan on returning to are currently doing in-person school, and whether they think there is racial bias in the medical field, and whether they have experienced racial bias.

The correlation coefficients will be calculated in order to determine the strengths of the relationships. A breakdown of the data in terms of percentages will be put into a chart in order to better analyze it. For the sections regarding instances of racial discrimination experienced, instances of racial discrimination witnessed, and possible solutions that can address racial biases in medicine and healthcare, responses will be analyzed both quantitatively (pre-written choices provided) and qualitatively (respondent's own responses).

Ethical Considerations & Possible Risks

Ethical concerns for this study included anonymity, informed consent, confidentiality, privacy, and comfort. These concerns were addressed by making the google form responses anonymous so no identification information other than their name was collected. There was also an added option to leave a nickname if they felt uncomfortable. The data collected was kept strictly confidential, and it was only used for research purposes. A brief synopsis of the research study was provided at the start of the survey in order to have an informed consent for the participation. And if the respondents felt uncomfortable at any point of the survey, they were free to stop whenever they wanted.

Results

Data

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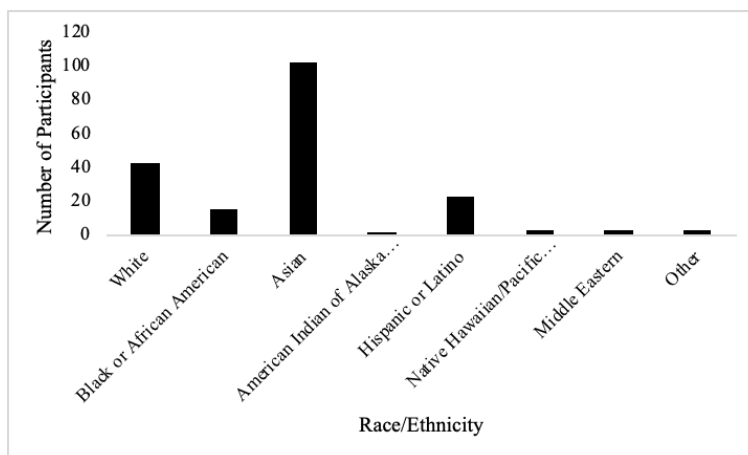
Figure 1 Race/Ethnicity of Participants

Our participants pool consisted of 42 White respondents (25.1%), 15 Black or African American respondents (9%), 102 Asian respondents (61.1%), 1 American Indian or Alaskan Native respondents (0.6%), 23 Hispanic or Latino respondents (13.8%), 3 Native Hawaiian/ Pacific Islander respondents (1.8%), 3 Middle Eastern respondents (1.8%), and 2 Guyanese respondents (1.2%). *****Percentages may add up to over 100 due to multiracial respondents****
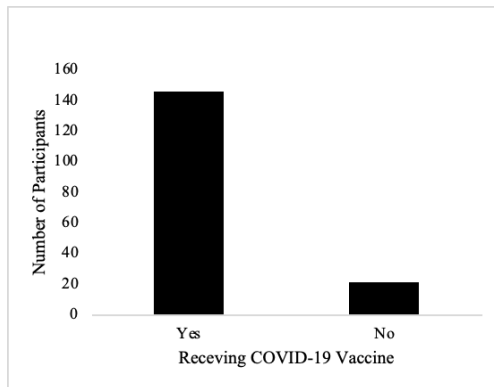
Figure 2 Whether participants will be receiving COVID-19 vaccine

146 respondents (87.4%) replied yes, and 21 respondents (12.6%) replied no.
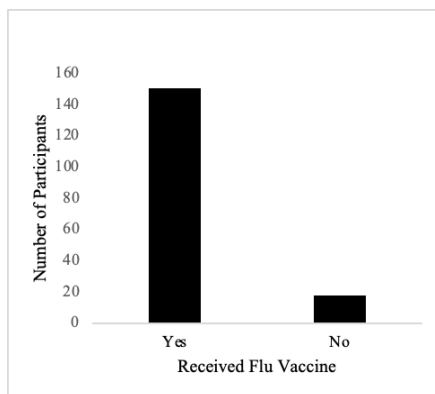
Figure 3 Whether participants have received flu vaccine in the past

150 respondents (89.8%) replied yes, and 17 respondents (10.2%) replied no

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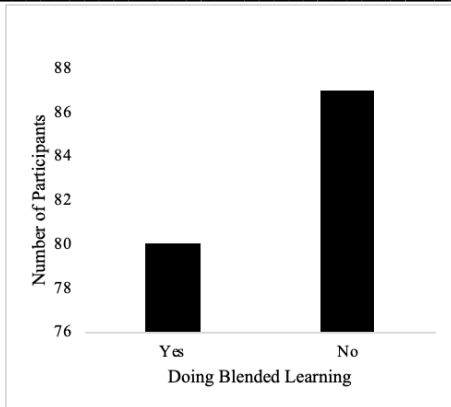
Figure 4 Whether participants will be doing blended learning

80 participants (47.9%) replied yes, and 87 respondents (52.1%) replied no
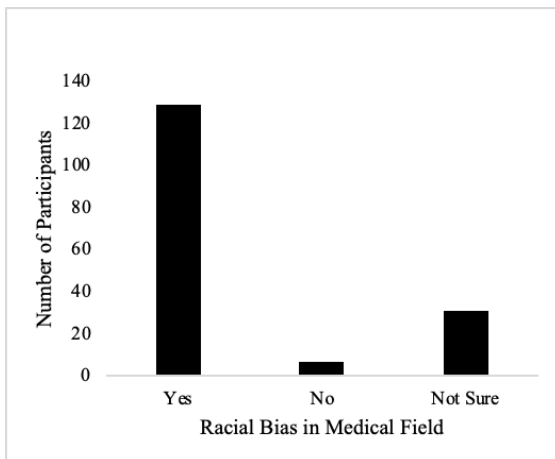
Figure 5 Whether participants believes there is racial bias in the medical field

129 respondents (77.2%) replied yes, 7 respondents (4.2%) replied no, and 31 respondents (18.6%) replied not sure

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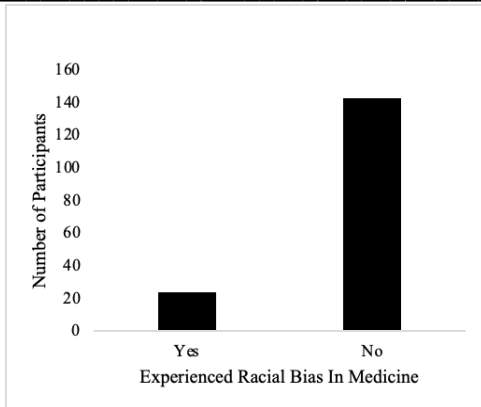
Figure 6 Whether participants have personally experienced racial bias in medicine

143 respondents replied no (85.6%), and 24 respondents (14.4%) replied no
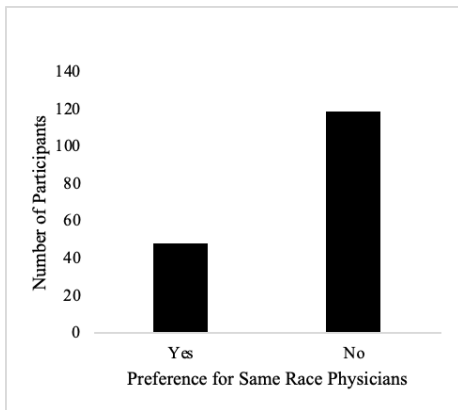
Figure 7 Whether participants have a preference for a same race physician

48 respondents (28.7%) replied yes, and 119 respondents (71.3%) replied no

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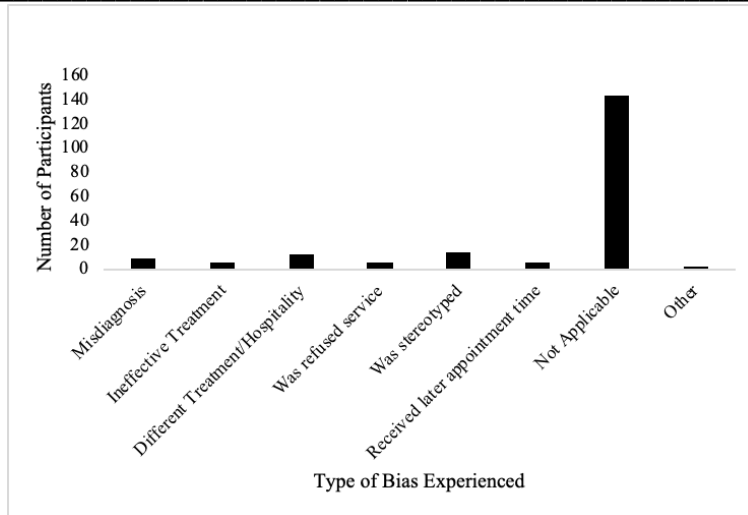
Figure 8 Types of bias participants have personally experienced

9 respondents (5.4%) have experienced misdiagnosis, 5 (3%) have received treatment that wasn't effective due to race, 5 (3%) have been refused service(s) due to race, 14 (8.4%) have been stereotyped when receiving diagnosis or treatment, 6 (3.6%) have received a later appointment time compared to others, 12 (7.2%) have received different hospitality compared to other patients due to race, 143 (85.6%) have not experienced racial bias, 1 (0.6%) have been gaslighted in the sense that their "issue was [deemed as] just a cultural thing"
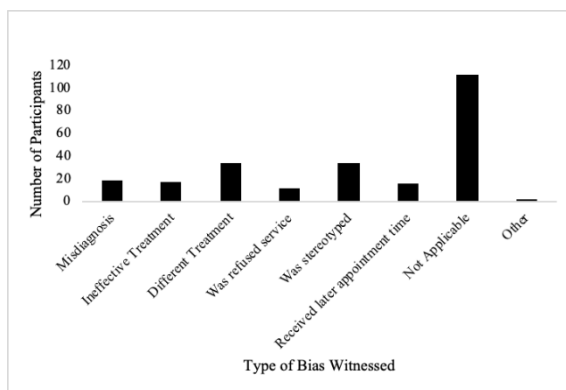
Figure 9 Types of bias participants have witnessed

19 respondents (11.4%) have witnessed misdiagnosis, 17 (10.2%) have witnessed a patient that received treatment that wasn't effective due to race, 11 (6.6%) have seen someone being refused service(s) due to race, 33 (19.8%) have seen someone who have been stereotyped when receiving

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diagnosis or treatment, 16 (9.6%) have seen someone who received a later appointment time compared to others, 2 (1.2%) have heard about it through social media, and 110 (65.9%) have not witnessed racial bias.
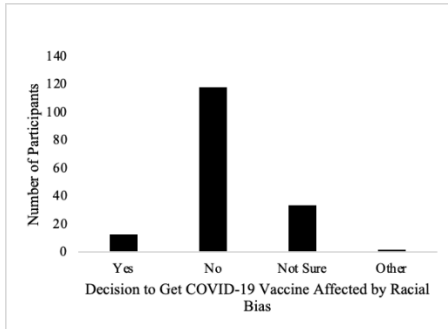
Figure 10 Whether participants' decision to get vaccinated is affected by racial bias

118 respondents (70.7%) replied no, 13 (7.8%) replied yes, 35 (21%) replied not sure, and 1 (0.6%) replied somewhat.
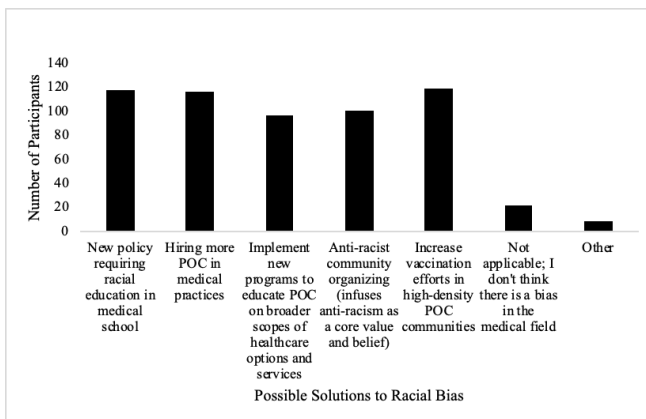
Figure 11 Possible solutions that participants believe could help reduce racial bias

117 respondents (70.1%) chose new policy requiring racial education in medical school, 116 respondents (69.5%) chose hiring more POC in medical practices, 96 respondents (57.5%) chose

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implement new programs to educate POC on broader scopes of healthcare options and services, 101 respondents (60.5%) chose anti-racist community organizing, 119 respondents (71.3%) chose increase vaccination efforts in high-density POC communities, 21 respondents (12.6%) chose not applicable, and 8 respondents (4.8%) chose other options including acknowledge of past bias and investigations and inspections.

Linear Regression

Model Summary – Will you receive the COVID vaccine when you are eligible?/ Have you already received it?

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	0.333
H_1	0.122	0.015	0.009	0.331

ANOVA ▼

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	0.273	1	0.273	2.492	0.116
	Residual	18.086	165	0.110		
	Total	18.359	166			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	1.126	0.026		43.745	< .001
H_1	(Intercept)	0.975	0.099		9.874	< .001
	In the past, did you get the flu vaccine?	0.137	0.087	0.122	1.579	0.116

Multiple regression analysis was used to test if the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* was affected by the participant's response for *in the past, did you get the flu vaccine*. The proportion of variability accounted for by this model is 0.015 or 1.5%.

A model consisting of the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* did NOT significantly predict the participant's response for *in the past, did you get the flu vaccine*, $F(1, 165) = 2.492$, $p > 0.05$, $p = 0.116$.

Y(*will you receive the COVID vaccine when you are eligible?/ have you already received it?*) = 0.975 + 0.137 (*in the past, did you get the flu vaccine?*)

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In the regression model, there is a weak, positive correlation between the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* and *in the past, did you get the flu vaccine*.

When a participant's decision of getting the flu vaccine in the past was the only variable, it was not a significant predictor of our DV ($p > 0.05$, $p = 0.116$).

Model Summary – Will you receive the COVID vaccine when you are eligible?/ Have you already received it? ▼

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	0.333
H_1	0.002	0.000	−0.006	0.334

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	8.603e−5	1	8.603e−5	7.732e−4	0.978
	Residual	18.359	165	0.111		
	Total	18.359	166			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	1.126	0.026		43.745	< .001
H_1	(Intercept)	1.124	0.083		13.583	< .001
	Are you doing blended learning now? / Do you plan on doing it in the future?	0.001	0.052	0.002	0.028	0.978

Multiple regression analysis was used to test if the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* was affected by the participant's response for *are you doing blended learning now/do you plan on doing it in the future*. The proportion of variability accounted for by this model is 0.000 or 0.0%.

A model consisting of the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* did NOT significantly predict the participant's response for *are you doing blended learning now/do you plan on doing it in the future*, $F(1,165) = 0.0007732$, $p > 0.05$, $p = 0.978$.

Y(*will you receive the COVID vaccine when you are eligible?/ have you already received it?*) = 1.124 + 0.001 (*are you doing blended learning now/do you plan on doing it in the future*)

In the regression model, there is no correlation between the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* and *are you doing blended learning now/do you plan on doing it in the future*.

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When a participant's decision of doing blended learning was the only variable, it was not a significant predictor of our DV ($p > 0.05$, $p = 0.978$).

Model Summary – Will you receive the COVID vaccine when you are eligible?/ Have you already received it?

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	0.333
H_1	0.215	0.046	0.040	0.326

ANOVA ▼

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	0.848	1	0.848	7.991	0.005
	Residual	17.511	165	0.106		
	Total	18.359	166			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	1.126	0.026		43.745	< .001
H_1	(Intercept)	0.997	0.052		19.179	< .001
	Do you think there is racial bias in the medical field?	0.091	0.032	0.215	2.827	0.005

Multiple regression analysis was used to test if the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* was affected by the participant's response for *do you think there is racial bias in the medical field*. The proportion of variability accounted for by this model is 0.046 or 4.6%.

A model consisting of the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* did significantly predict the participant's response for *do you think there is racial bias in the medical field*, $F(1,165) = 7.991$, $p < 0.05$, $p = 0.005$.

Y(*will you receive the COVID vaccine when you are eligible?/ have you already received it?*) = 0.997 + 0.091 (*do you think there is racial bias in the medical field*)

In the regression model, there is a weak, positive correlation between the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* and *do you think there is racial bias in the medical field*.

When a participant's response on whether there is racial bias was the only variable, it was a significant predictor of our DV ($p < 0.05$, $p = 0.005$).

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Model Summary – Will you receive the COVID vaccine when you are eligible?/ Have you already received it?

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	0.333
H_1	0.051	0.003	−0.003	0.333

ANOVA ▼

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	0.047	1	0.047	0.423	0.516
	Residual	18.312	165	0.111		
	Total	18.359	166			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	1.126	0.026		43.745	< .001
H_1	(Intercept)	1.214	0.139		8.748	< .001
	Have you experienced racial bias in medicine?	−0.048	0.073	−0.051	−0.650	0.516

Multiple regression analysis was used to test if the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* was affected by the participant's response for *have you experienced racial bias in medicine*. The proportion of variability accounted for by this model is 0.003 or 0.3%.

A model consisting of the participant's response for *do you think your decision to get the vaccine is affected by the racial bias in the medical field* did NOT significantly predict the participant's response for *have you experienced racial bias in medicine*, $F(1,165) = 0.423$, $p > 0.05$, $p = 0.516$.

Y(*will you receive the COVID vaccine when you are eligible?/ have you already received it?*) = 0.997 - 0.048 (*have you experienced racial bias in medicine*)

In the regression model, there is a weak, positive correlation between the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* and *have you experienced racial bias in medicine*.

When a participant's response on whether they experienced racial bias was the only variable, it was not a significant predictor of our DV ($p > 0.05$, $p = 0.516$).

Race/ Ethnicity and Decision to Get COVID-19 Vaccine

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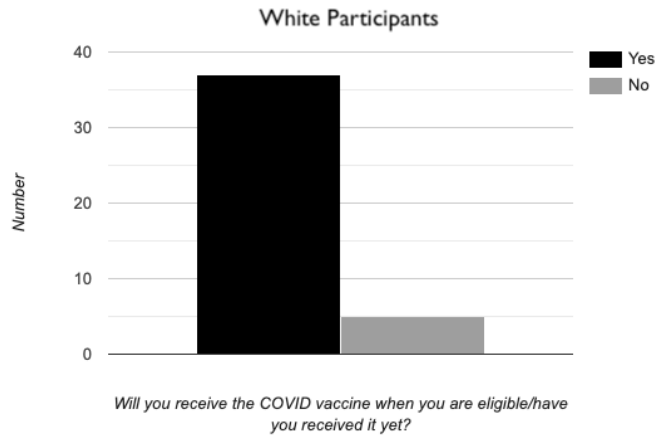
Figure 12 Responses of **White** Participants for Receiving COVID-19 Vaccine

A total of **42** White participants

88.1% of this population responded that they **will**/ have already gotten the vaccine

11.9% of this population responded that they **will not** get the vaccine when eligible

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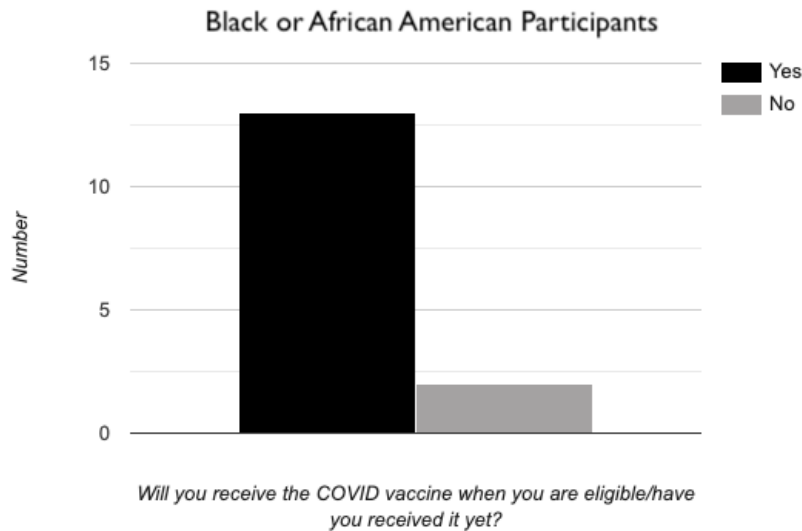
Figure 13 Responses of **Black or African American** Participants for Receiving COVID-19 Vaccine

A total of **15** Black or African American participants

86.7% of this population responded they **will**/ have already gotten the vaccine

13.3% of this population responded that they **will not** get the vaccine when eligible

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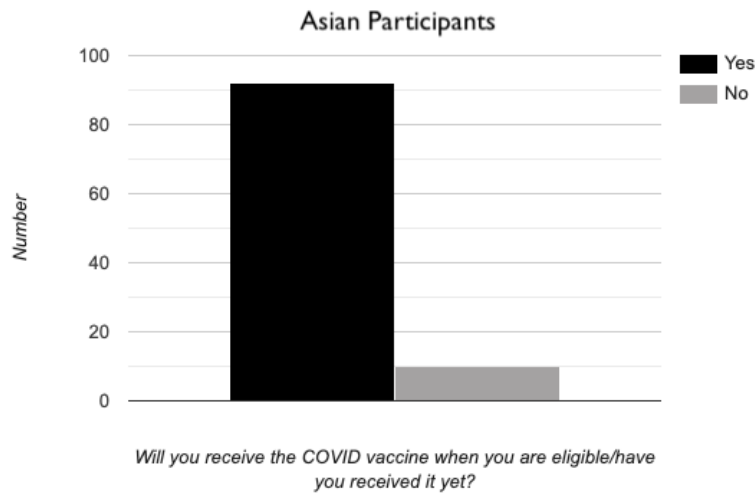
Figure 14 Responses of **Asian** Participants for Receiving COVID-19 Vaccine

A total of **102** Asian participants

90.2% of this population responded they **will**/ have already gotten the vaccine

9.8% of this population responded that they **will not** get the vaccine when eligible

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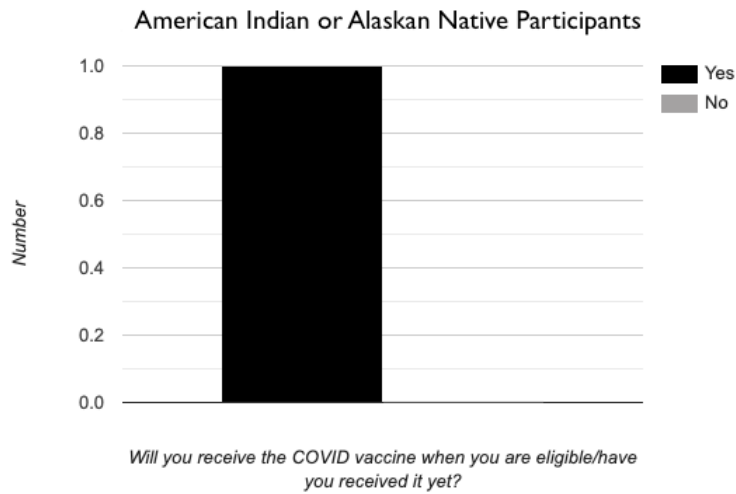
Figure 15 Responses of **American Indian or Alaskan Native** Participants for Receiving COVID-19 Vaccine

A total of **1** American Indian or Alaskan Native participants

100% of this population responded they **will**/ have already received the vaccine

0% of this population responded that they **will not** get the vaccine when eligible

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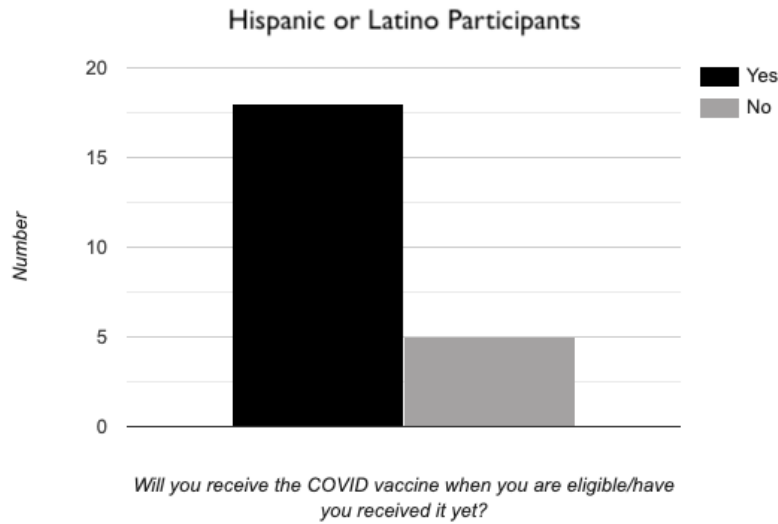
Figure 16 Responses of **Hispanic or Latino** Participants for Receiving COVID-19 Vaccine

A total of **23** Hispanic or Latino participants

78.2% of this population responded they **will**/ have already received the vaccine

21.8% of this population responded they **will not** get the vaccine when eligible

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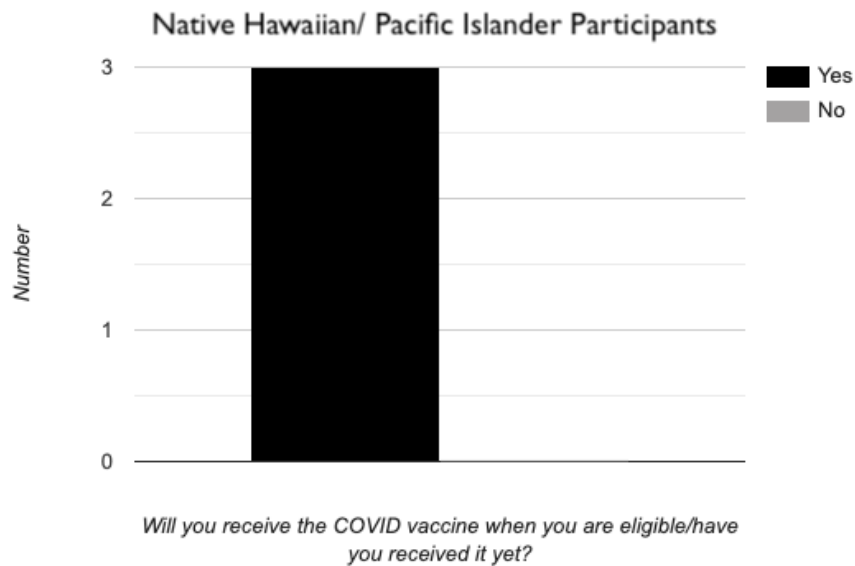
Figure 17 Responses of **Native Hawaiian/ Pacific Islander** Participants for Receiving COVID-19 Vaccine

A total of **3** Native Hawaiian/ Pacific Islander participants

100% of this population responded they **will**/ have already received the vaccine

0% of this population responded that they **will not** get the vaccine when eligible

Discussion

Racism in healthcare has been a systematically implemented issue for decades, beginning with medical experimentation on slaves by their owners. Medicine today is written to favor the health of white able-bodied men, while diseased POC may fly under the radar due to different risks and symptoms. Many case studies have shown the mistreatment of POC by healthcare professionals, including the one involving renowned tennis player Serena Williams. Post-birth, Williams, with a pre-existing history of blood clots, informed her medical staff that she was experiencing strange symptoms and felt something was wrong. However, she was brushed off until she got herself out of bed and insisted a CT scan was performed. When performed, doctors found several small blood clots had formed in her lungs. This is just a singular example of the type of discrimination POC, specifically BIPOC women could experience on an everyday basis.

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When conducting the literature review, different papers were selected based on how well they could provide evidence to our hypothesis. From analyzing the works mentioned in our literature review, the hypothesis was that BIPOC would be more hesitant in receiving the COVID-19 vaccine, and that many would have experienced medical bias due to race. However, the data concluded that an overwhelming majority of participants had not experienced this type of bias. Therefore, the conducted research did not collect sufficient evidence to support our hypothesis.

While most participants believed that there is racial bias in medicine, the evidence suggested that most of them have not personally experienced racial bias. However, most participants agreed with the possible solutions that were given to help reduce racial bias with nearly 100 participants that chose each possible solution, indicating that these solutions may be chosen by a larger population.

Because the participant pool was majority students, the research factored in whether or not their decision to do blended learning next year would bias their willingness to be vaccinated. The hypothesis was that because certain participants were planning on seeing classrooms full of people next year, they would be more inclined to get vaccinated. However, the collected data did not prove that the relationship between the two variables was significant or had a strong correlation. Therefore, this hypothesis was not supported.

The linear regression models indicated that there are no strong correlations between the variable *will you receive the COVID vaccine when you are eligible/have you already received it* and the other variables that may affect it. The R values for each model was greater but very close to 0, indicating a weak positive correlation. The p values for most models were greater than 0.05, indicating that our data was not significant. The only exception to this was the regression model for the participant's response for *will you receive the COVID vaccine when you are eligible/have you already received it* and the participant's response for *do you think there is racial bias in the medical field*, which had a p value of 0.005. However, due to the small R value, there was only a weak, positive correlation. Therefore, none of the factors that were considered to influence the response for *will you receive the COVID vaccine when you are eligible/have you already received it* were supported to influence that response.

Although there wasn't a strong correlation between race and a participant's decision to get the vaccine, qualitative survey responses indicated participant worries of racial discrimination and its link to vaccine distribution/ treatment when getting the vaccine. Participants also expressed concerns regarding race/ethnicity and getting the COVID-19 vaccine. Some of them were worried about getting a lower quality of care personally or for others based on race. Some were also worried about vaccine availability, being discriminated against while getting the vaccine, allergic reactions to vaccine ingredients, racial discrimination for who can get the vaccine, mistreatment of minorities leading to mistrust of "vaccines [and] medical professionals," and side effects of the vaccine. Overwhelming, respondents who expressed concerns were worried about the racial discrimination they might face when receiving the vaccine or racial-based mistrust of the vaccine and of the medical & healthcare industries in general. Specifically, one respondent indicated their

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concern regarding going to a hospital without "Asian workers due to the increase in hate towards Asian Americans." Others were concerned about the "past of racial bias in the medical profession," and "that history [might] repeat itself [,] and people of color['s] … trust will be broken once again." This supports results found in our literature review regarding racial discrimination increasing mistrust of the medical & healthcare industries, particularly for people in color.

The research itself did not produce solid results. This could be due to a multitude of reasons. Firstly, there was an issue in collecting data stemming from a flaw in our survey. When filling out the surveys, many participants did not answer whether or not they were from the United States because the question had not been made mandatory right away. This resulted in having to dismiss responses that had not answered that question in addition to those who had answered from outside of America, giving us a smaller sample population than we'd initially hoped for. Additionally, there may have needed to be an implementation of different methods to reach our expected results. For example, diversifying our population instead of convenience sampling may have helped, as a majority of respondents indicated that they were Asian, with a much smaller number of Black and Hispanic or Latino participants. As aforementioned, the research had been intended to have a majority BIPOC participant pool. In future experiments, purposefully reaching out to BIPOC might produce research to support our hypothesis. Another solution to this issue would be reaching out to different schools/programs for participants instead of relying on responses from personal organizations. In addition, there could be other variables impacting participant's decision to get the vaccine, including allergic reactions to vaccine ingredients preventing them from getting the vaccine, as expressed by two respondents, and efficacy of the vaccine.

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Socioeconomic and Health Care Demands of Anxiety Disorders

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Abstract

This research paper examines the socioeconomic and healthcare demands of common anxiety disorders, specifically isolating Generalized Anxiety Disorder (GAD), and seeks to determine which socioeconomic factors have the greatest impact on the prevalence of these disorders and may widen the treatment gap and socioeconomic burden associated with GAD with the use of surveys and data analysis. Anxiety disorders can disrupt a person's way of life by impacting their relationships with others, their sleep patterns, eating habits, self-confidence, and ability to complete daily tasks at work or school (Green & Benzeval, 2013). A survey was distributed across various regions in the United States through a form utilizing digital platforms and various social media platforms. An ANOVA test was run to analyze different factors such as current income level, race, gender, education level, living situation, financial independence, and employment which characterize different socioeconomic groups; this assessed the correlation to General Anxiety Disorder (GAD) and healthcare access to treatment. The results depicted income as a defining factor which correlates with economic burdens faced due to anxiety disorders and contributes to economic barriers that make it harder to seek mental health care. There is a lack of correlation between General Anxiety Disorder (GAD) and the variable of race/ethnicity, leading to the conclusion that race does not affect the economic barriers and burdens faced due to anxiety disorder. Further implications of this study include a deeper analysis of how families of different socioeconomic status spend money on mental health compared to other illnesses, such as colds, cancers, viruses etc.

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Categories: Mental Illness, Health Care
Key Words: Generalized Anxiety Disorder, Socioeconomics, Anxiety, Rehabilitation

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Background Research

This literature review examines aspects of the healthcare and socioeconomic demands of common anxiety disorders such as Generalized Anxiety Disorder (GAD) as the illness causes a great deal of pressure for people across the country not only mentally and emotionally, but also socially and financially. Without proper treatment, anxiety disorders can severely impair the day-to-day lives of these patients. Anxiety disorders can disrupt a person's life by impacting their relationships with others, their sleep patterns, eating habits, self-confidence, and ability to complete daily tasks at work or school (Green & Benzeval, 2013). These mental disorders result in disease burdens for individuals who are experiencing symptoms like heightened stress levels, disabilities, and impairment.

These disorders have long been observed to occur more frequently among individuals who come from disadvantaged social circumstances and that socioeconomic inequalities in anxiety disorders are increased with the lack of finding adequate support and treatments (Reiss, 2013). Thus, it is crucially important to understand how such burdens develop over the life course; the individuals' socioeconomic backgrounds and access to healthcare play a major role as people are more susceptible to suffering from anxiety disorders when there are limited opportunities to find solutions to combat these mental illnesses.

Generalized Anxiety Disorder (GAD) is a psychological condition characterized by excessive worry, persistent and unsubstantiated distress with accompanying feelings of restlessness for at least six months concerning matters of healthcare, family, work, and financial status (Anxiety Disorders Association of America, 2015). GAD affects around 3.1% of the U.S population, or 6.8 million adults, where only 43.2% of these individuals are receiving treatment (Anxiety & Depression Association of America). In the U.S, treatment of GAD often includes selective medications, counseling, psychotherapy, and professional guidance. Therapy under the guidance of professional mental health counselors and the implementation of prescribed medication can be highly effective in management of GAD (Locke, et al., 2015). Medication or psychotherapy is deemed a reasonable initial treatment of anxiety disorders as both aid the individual patient with therapeutic and biological solutions. There are countless medications available for treating anxiety as antidepressants, selective serotonin reuptake inhibitors (SSRIs) and benzodiazepines are accessible from an individual's healthcare provider, pharmacist and over the counter prescription medications. However, the financial barriers prevalent in the lives of many GAD patients continue to increase as high cost of care, unmet health needs, lack of insurance coverage and inability to get preventive services lead to more severe mental health conditions. A person who suffers from GAD would be burdened with the exhaustion, tension and nausea that comes with living daily life with this mental condition. The numerous treatment options available in the U.S fall short to effective results especially due to the rise of healthcare and economic barriers in relation to mental health. When individuals do not seek care, or are unable to, their ability to live their life in a normal manner will be acutely affected (the extent of which depends on the severity of the condition).

Many of these people are often unable to actively seek help due to challenges such as

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affordability, stigma, lack of support, etc. Treating anxiety disorders in the United States prove to be a hefty and costly experience as the healthcare services and economic barriers prevent free access to all. National Healthcare Expenditure (NHE) grew 4.6% to $3.8 trillion in 2019 which can be looked at from a different angle of $11,582 spent per person; this cost accounted for 17.7% of Gross Domestic Product (GDP) of the U.S (U.S. Centers for Medicare & Medicaid Services).

In 2010, mental and substance use disorders occupied 10.4 percent of the global burden of disease and were the leading cause of years lived with disability among all disease groups (Trautmann, S., et al.,2016). The effect of a long-term mental disorder is often overlooked. A mental disorder not only drains one mentally but economically as well. Although many are familiar with the direct costs of an illness, such as hospitalization and medicine, many fails to realize the extent to which a mental illness integrates itself into one's social fabric.

Indirect costs of a disorder include lost production and income losses due to absences and disability. Higher rates of anxiety may contribute to lower work productivity and higher rates of unemployment (German, J., 2019). Based on a 2010 study, the global direct and indirect economic costs of mental disorders were estimated to be 2.5 trillion dollars with indirect costs approximately being 1.7 trillion dollars and direct costs averaged to be 0.8 trillion (Trautmann, S., et al.,2016). Even though solutions, such as universal health care, have been proposed, they have been proven to be costly and exclude mental disorders.

Moreover, the treatment gap for mental disorders is higher than any other health sector due to lack of personnel, infrastructure, and effective treatments. The economic burden brought about by mental disorders, such as anxiety, directly and indirectly cause tremendous losses in the lives of individuals affected by them and exacerbated by the lack of programs available to help those who seek it.

A link between socioeconomic status and the prevalence of GAD has already been drawn. Anxiety, along with other mental health disorders has been shown to be more noticeable among those at a lower socioeconomic status who are at a disadvantage (Reiss, et al, 2019). This increased prominence can most likely be explained by inequalities between socioeconomically disadvantaged individuals and those without a disadvantage when looking for an affordable, quality treatment for mental health disorders.

Those with a lower socioeconomic status are more likely to be prone to stress and economic hardship that can put an individual at a higher risk of a mental illness (German, J., 2019). Since one's socioeconomic status is prominent in one's life and affects living conditions and behaviors, its role in one's mental health is reciprocated since one's personal identity and social status can subject them to discrimination and difficulties. Therefore, high levels of anxiety may have a correlation with high levels of stress, which is more common in those with a low socioeconomic status. Those with a lower socioeconomic status often receive lower quality resources, such as education. In the face of literature, education is perceived as a symbol of power and honor.

Education available to people of low socioeconomic class will most likely be of lower quality

than that available to a higher socioeconomic class and can reduce the number of opportunities available to those in a lower socioeconomic class in the future. (German, J., 2019) This traps them in an endless cycle of hindrance. Those with a limited education are more likely to struggle and obtain a lower paying job that prevents them from rising in class. Moreover, having a lower degree of education has shown to be related to reluctance in seeking adequate treatment. Studies show that individuals with no high school degree predicted to have less adequate care for their mental health (Roy-Bryne, P.,2009). In relation to early education termination, generalized anxiety disorders are more likely to occur in higher rates among individuals with a lower education level. (German, J., 2019)

Results from the National Comorbidity Survey Replication (NCS-R) indicated that unmet need for treatment among respondents who had a mental disorder in the past 12 months was greater among those with low incomes than among other respondents (Roy-Bryne, P., et.al, 2009). However, socioeconomic status has been proven to have a weak or no correlation with mental health service use, but this does not diminish the possibility that certain socioeconomic factors influence other aspects of treatment, such as the setting or types of medication in which treatment in received. Our study will examine the correlation between generalized anxiety disorder and whether one is able to meet economic and health care demands brought upon diagnosis.

Once an individual encounters socioeconomic inequality, they tend to prevail in an individual for a prolonged period of time. As one becomes older, the inequality gap between one and their peers tends to widen due to higher rates of anxiety among those with disadvantages and the likelihood that symptoms will persist for a longer period of time for those in a lower socioeconomic status when compared with people with access to mental health resources. Recent data from the British National Child Development study has shown that about 80 % of the differences by educational level in psychological distress at age 42 were already present within the same individuals at age 23 (Green, M., 2013). Moreover, anxiety and depression are considered comorbid diseases since anxiety may exacerbate and turn into depression. Understanding the relationship between worsening anxiety and depression may provide a light to whether socioeconomic factors and inequalities contribute to the development and progression of symptoms.

The socioeconomic burden on those impacted by common anxiety disorders diminishes their possibility of receiving better healthcare and support systems. With anxiety being the most common mental disorder in the United States, affecting more than 40 million adults, shame or stigma are the highest cited barriers to treatment, followed by logistical and economic barriers (Goetter et al., 2020). The economic burden on a systemic level is estimated to be over $40 billion, often due to misdiagnosis, undertreatment, medical treatment costs, indirect workplace costs, mortality costs, and prescription drug costs (Konopka, 2019).

This includes direct cost, which involves the monetary value of medical and non-medical services, and indirect cost, the monetary loss that results from a decrease in productivity on account of the disorder (Konopka 2019, Mwinyi et al., 2016). Many people who experience symptoms of anxiety often have difficulties obtaining a differential diagnosis and proper treatment for their condition due to various social and economic barriers. Factors such as income level, societal stigma, and cultural perceptions of mental health may prevent people from

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successfully seeking out and finding care. Furthermore, even when in the presence of a medical professional, it can sometimes be difficult to come to the proper diagnosis as there is a wide variety of conditions that the individual might be subject to. Procedures and processes to try to obtain the proper diagnosis can sometimes be tedious and time-consuming, which only makes it harder for these people to obtain the help they need. Due to the aforementioned difficulties, more than half of these costs when it comes to this are attributable to repeated use of healthcare services to treat somatic anxiety symptoms similar to those of physical conditions, which are often comorbid.

There is also substantial evidence for the undertreatment of anxiety disorders, which increases the economic burden on the individual as well as the indirect cost. When people face barriers in seeking professional help due to social and economic factors, and their anxiety disorder goes untreated, they typically face consequences of this in their everyday lives. For instance, an individual suffering from an anxiety disorder may find themself having a difficult time going to work and effectively doing their job. Although this is not directly a result of their anxiety disorder, it can cause the individual to struggle in their job and therefore face financial difficulty. Similarly, experiences that trigger an individual's anxiety disorder can cause an individual to go out of their way to avoid these experiences. Consider this in a real-life scenario: large crowds and being too close to people may trigger an individual's anxiety disorder. As a result of this, they may avoid taking subways, busses, or other forms of public transportation to get to where they need to go. This can make commuting a much more difficult and complicated process for them, which subsequently can have an impact on their social and financial situations (i.e., instead of taking public transportation due to their anxiety disorder, the individual might feel the need to take an Uber, which is considerably more costly than the alternative). It is crucial to identify and assess plans that already exist within the system that intend to facilitate access to professional services for individuals suffering from anxiety disorders, while also critiquing and understanding why and how these systems have often failed to help individuals.

Contributing factors lie in current systems which place all those diagnosed with mental health issues under the same umbrella. In 2008, the United States passed the Health Parity and Addiction Equity Act, which attempted to eliminate problems in a prior system that allowed insurers to restrict care for those suffering from mental conditions. However, the policy was not without fault. There were two key points to the Health Parity and Addiction Equity Act: first, it allowed health insurers to only cover medical conditions that were deemed "medically necessary" and deny coverage if said coverage increases the total cost by 1 or 2% in the first and subsequent years (Burns, 2009).The problem within this lies in the fact that it is usually in the insurer's discretion on whether or not to offer affordable healthcare for individuals suffering from mental health disorders. Policies likewise the Health Parity and Addiction Equity, enacted to cover mental health in group health insurance plans, use the concept "formal equality" which groups all people with mental health issues together (Burns, 2009).

We as society should attempt to reach "substantive equality" instead of "formal equality." Formal equality overlooks individual differences and extenuating circumstances, and thus is unable to address the roots of a problem. As such, policies enacted under "formal equality" sometimes do better than harm. One example is how the aforementioned Health Parity and Addiction Equity

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Act views individuals with schizophrenia. Patients with schizophrenia often require more resources, such as rehabilitative services which benefit their psychological and occupational health in the long run, but because the Act functions under formal equality, it does not provide these services (Burns, 2009). Substantive equality, on the other hand, attempts to bridge the gap between pressing concerns--I. e financial obstacles--and affordable healthcare for those who require treatment.

Some efforts have been made in recent years, leading to a paradigm shift. The United Nations Convention on Rights of Persons with Disabilities redefines people with disabilities as people who may not be on equal parting with others in society due to physical, mental, intellectual, sensory issues (Burns, 2009). Because this definition is so broad, it is much more inclusive; it acknowledges the wide spectrum of disabilities and warns against underestimating mental disabilities. However, institutionalized medical language which addresses mental health disorders is outdated and inaccurate. Often, medical definitions of mental disability are shallow and fail to notice the nuances in the wide spectrum of anxiety and other imposing mental health disorders. To recognize and work towards issues of intersectionality, much more must be done to continue the work for a more equitable society for those who suffer from a mental health disorder.

Participants' responses in our survey will indicate why the system is not helping them in any manner or if it is and this will allow us to propose changes accordingly. For example, exposure-based cognitive behavioral therapy (CBT), one of the more effective treatments for anxiety disorders (Deacon & Abramowitz, 2004), is inaccessible to many individuals, especially those of lower socioeconomic status (Wolitzky-Taylor et al., 2018). Not only is the cost barrier keeping people with anxiety disorders from receiving CBT, but there is a lack of institutional funding and effort to implement these services in health care centers (ex. not enough training for CBT administrators), which ultimately increases their inaccessibility. (Wolitzky-Taylor et al., 2018). A more comprehensive analysis of socioeconomic burden and cost on the individual and population level related to these disorders is required. The measures of burden include the prevalence of disorder, associated stigma, diagnosis cost as well as healthcare service treatment utilization costs. More research is needed to develop and increase access to personalized treatment as well. By identifying and quantifying the greatest factors contributing to the socio-economic barrier in treatment accessibility, this cost-of-illness analysis aims to emphasize the need for greater funding for anxiety disorder research, more efficient treatment and recovery programs, and effective public health policy.

As well as a deficiency of government-based initiative, individual factors, such as education, income, or demographics, have been shown to contribute to worsening the already prominent socio-economic barrier in treatment accessibility for mental disorders. Although previous research has drawn a connection between certain socioeconomic factors, few studies include all socioeconomic factors that may contribute to the increased prevalence of untreated mental disorders within those who hold a low socioeconomic status. Moreover, many studies disregard how each socio-economic factor will contribute differently to a mental disorder due to changes in social and economic resources and prevalence in life stages. Our survey aims to fill these gaps by drawing a clear correlation between one's age, living situation, and education level and whether

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they have experienced anxiety and have received adequate treatment for it. We also analyze whether our participants believe enough mental disorder related programs are implemented where they live and what more can be done in order to target gaps in treatment programs designed to aid and better assist those struggling with mental illnesses.

Materials and Methods

By collecting original data through a large public survey, this research study assessed the number of individuals who are clinically diagnosed with anxiety disorders. The questions within this survey asked people for the extent that Generalized Anxiety Disorder (GAD) affects their daily lives. These questions displayed choices that highlight the multiple socioeconomic factors that contribute to the economic burden and cost of illness of having Generalized Anxiety Disorder and how people believe their socioeconomic status impacts their access to treatment.

We surveyed 140 respondents in total. The targeted demographic was people from the five boroughs in New York City, however the survey was still open to respondents living outside of New York City to ensure that the survey would have a variety of responses. We surveyed the background of respondents with questions in regard to their race, education status, financial independence, employment, current income level, and living situation. In regard to mental health and access to treatment, we surveyed their type of healthcare insurance plan, their support systems (i.e., reliable family and friends), whether or not they are clinically diagnosed with an anxiety disorder.

The remaining questions were heavily opinion based and asked for an answer on a subjective scale from 1 to 5. The first of these types of questions was: How would you describe any economic burdens faced due to anxiety disorders? This question is meant to assess the level of severity of economic burdens on participant's ability to cope with their anxiety disorder. The options were scaled from 1 to 3 with 1 representing minimal to no impact of economic burden on the participant's ability to cope with their anxiety disorder, and 3 representing the maximum burden on participants. "Economic barriers have significantly impacted my ability to receive healthcare treatment for anxiety disorders." was another question, analyzing the participant's own opinion and outlook on whether or not the statement is true. This question was on a scale from 1 to 5, with 1 being the least significant impact on the participant's ability to receive healthcare treatment for anxiety disorder, and 5 being the greatest impact. We then asked responders who have experienced financial and economic barriers to identify exactly what they had difficulty receiving in terms of diagnosis, therapy and counseling, and medication to give us an insight in where the lack of accessibility to treatment was most prominent.

There were also questions with yes or no answers, including: "Have you ever experienced stigma around anxiety or felt hesitant to ask for help?" and "Do you think the stigma you may have experienced has anything to do with your socioeconomic status? ", in order to allow us to draw a correlation, if any, between socioeconomic status and the stigma around anxiety and the reluctance to seek for help. The last question group in our survey were answer choice questions where participants could choose a choice that was the closest to what they believed. One such question was: What are the various ways you are seeking help for your anxiety disorder? For this

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question we provided an array of different ways, such as individual therapy or online resources, that one may use to treat or cope with GAD. Another question was: "What solutions would you like to see in the future regarding anxiety disorders?" Answer choices ranged from greater accessibility to treatment resources such as diagnostic services or therapy. The last of our questions was "My anxiety disorder has caused me to…" and participants were given a list of the ways an anxiety disorder may negatively impact their social lives, such as school or work or isolating oneself, asking them to choose which one they believed most related to the way their disorder had impacted them. These types of detailed questions meant that we could isolate for specific factors that influence access to treatment for General Anxiety Disorder (GAD) and examine how having an anxiety disorder can disrupt or negatively impact one's daily routine.

Researchers of this paper were in charge of distributing the survey to a wide range of participants through the use of social media such as Instagram, Facebook, and LinkedIn. Furthermore, researchers emailed friends, family, and teachers to share the survey to more respondents. The form was anonymous to protect the personal information collected from survey-takers, such as their annual income, race, and age. Surveys were conducted via Google Forms to effectively gain the most submissions. By having a simple survey, it was easily distributed through link sharing. Furthermore, researchers of this paper were able to distribute the survey by putting the link on social media platforms for others to access with ease.

The survey is connected to the research collected from data archival, past studies, graphs, and statistics from credible sources such as CDC and medical journals in order to increase the logos of our research paper and avoid bias. We aimed to use a comparative approach by evaluating the survey results and data sources to interpret the connection between low socioeconomic backgrounds and disease burden and lack of treatment accessibility.

To analyze the data, we utilized a one-way analysis of variance (ANOVA) test because we wanted to see if the scores vary based on income bracket, race and etc. This was the best method of data analysis as it determines if there is any statistically significant difference between how people respond to the questions based on their education status, financial independence, employment, current income level, or living situation. In other words, using an ANOVA test for our research will allow us to find out if our survey results require us to reject the null hypothesis or accept the alternate hypothesis.

Results

A one-way ANOVA was conducted to determine if the accessibility of mental health treatment for anxiety disorders was limited due to socioeconomic and health care barriers; these barriers were classified by income levels, race, economic crises, and access to treatment. Participants were classified into five groups: individuals clinically diagnosed with anxiety ($n \leq 16$), individuals not clinically diagnosed with anxiety ($n \leq 61$), individuals that are not diagnosed with anxiety disorder but are experiencing the symptoms ($n \leq 60$), individuals who are unsure ($n \leq 1$) and individuals who are diagnosed with depression as well as symptoms of anxiety ($n \leq 1$).

The anova results found there to be a statistical significance between many variables including

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income level, economic barriers, and economic burdens faced due to anxiety disorders. The first correlation reported to be statistically significant was income level and economic burdens faced due to anxiety disorders (fig. 1). With a significance level of 0.004, it fell below the 0.05 significance level to indicate that there was a correlation between these two variables, meaning that it is likely that either income level or the economic burden faced from anxiety disorder impact each other. One thing to note is that the graph in descriptive plots (fig 1.) shows a peak of 2 at a yearly income of 120k-140k.

ANOVA - How would you describe any economic burdens faced due to anxiety disorders? (1- no change, 2- increased a little, 3- increased significantly)

Cases	Sum of Squares	df	Mean Square	F	p
What is your current income level? (Parent's income if you are not financially independent)	8.832	6	1.472	3.347	0.004
Residuals	55.424	126	0.440		

Note. Type III Sum of Squares

Descriptives

Descriptives - How would you describe any economic burdens faced due to anxiety disorders? (1- no change, 2- increased a little, 3- increased significantly)

What is your current income level? (Parent's income if you are not financially independent)	Mean	SD	N
$100-$120k	1.176	0.393	17
$120k-$140k	2.125	0.641	8
$160k or higher	1.222	0.548	18
$40k-$60k	1.688	0.704	16
$40k or lower	1.750	0.742	40
$60k-$80k	1.615	0.768	13
$80k-$100k	1.619	0.669	21

Descriptives plots
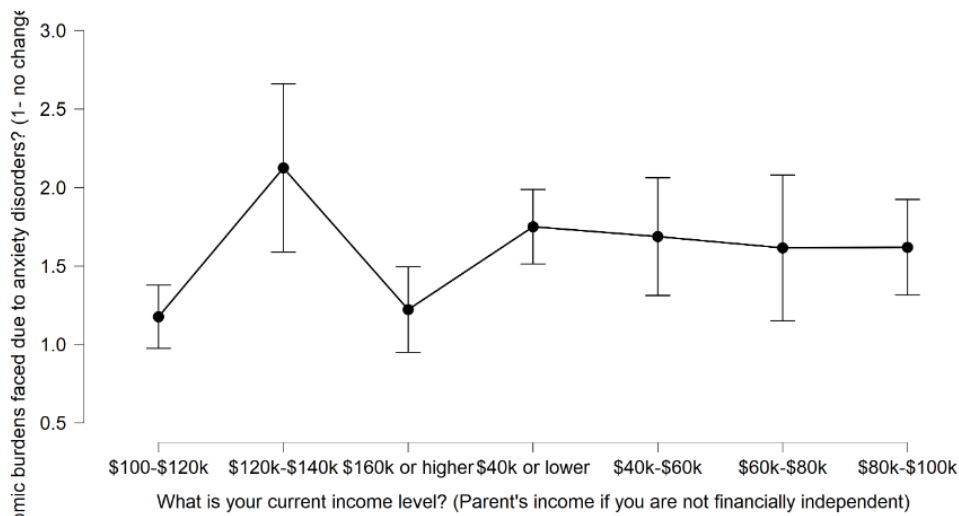
Fig 1.

The second significant correlation found was between the income level and the economic burden faced due to anxiety disorders (fig 2). With a significant level of 0.016, there was strong evidence

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to support a correlation between these two variables, meaning that income level influences the economic burdens faced by those with anxiety disorders. One thing to note in the description plot is that the mean number of respondents who had an income of 40 k or lower indicated the highest level of increase in economic burdens for them/their families with the lowest variance, meaning that many of the respondents chose answers similar to each other. Another trend one can notice is that there is a sort of inverse relationship between income level and economic burdens faced by anxiety disorder whereas income decreases, the level of economic burden due to anxiety disorders decreases, so there is a possible relationship to note there. Finally, similarly to the same income level of 120k-140k mentioned in the previous result, these results in terms of increase in economic burden due to anxiety had the most variance, meaning the respondents chose a variety of answers between 1-3.

ANOVA

ANOVA - Economic barriers have significantly impacted my ability to receive healthcare treatment for anxiety disorders.

Cases	Sum of Squares	df	Mean Square	F	p
What is your current income level? (Parent's income if you are not financially independent)	24.090	6	4.015	2.711	0.016
Residuals	186.586	126	1.481		

Note: Type III Sum of Squares

Descriptives

Descriptives - Economic barriers have significantly impacted my ability to receive healthcare treatment for anxiety disorders.

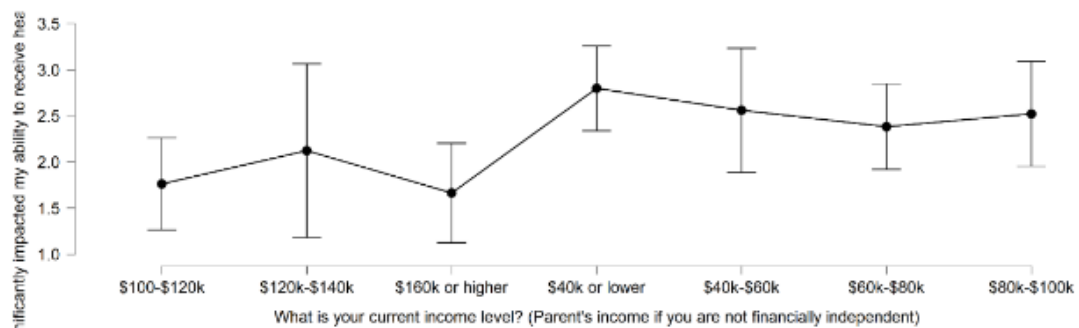| What is your current income level? (Parent's income if you are not financially independent)	Mean	SD	N
$100-$120k	1.765	0.970	17
$120k-$140k	2.125	1.126	8
$160k or higher	1.667	1.085	18
$40k-$60k	2.563	1.263	16
$40k or lower	2.800	1.436	40
$60k-$80k	2.385	0.768	13
$80k-$100k	2.524	1.250	21

Descriptives plots

Fig 2.

There was also one result from the ANOVA test that came close to being significant with a p-value of 0.0579 and it was between income level and the belief that studying mental health disorders is as important as other illnesses (such is the flu, colds, cancer, etc.). Looking at the graph, the highest mean number of respondents with an income of 40k or lower answers indicated that mental health should be studied as extensively as other illnesses compared to the respondent

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in income bracket 40-80k, which had the lowest mean score indicating that anxiety disorder should be as important as other diseases. For these to be income brackets right next to each other, that is an important difference to note.

ANOVA

ANOVA - I believe that the treatment research for anxiety disorders is as important as that for other diseases (eg. cold, common flu, cancer, etc.)

Cases	Sum of Squares	df	Mean Square	F	p
What is your current income level? (Parent's income if you are not financially independent)	11.080	6	1.901	0.797	0.574
Residuals	313.134	126	2.485		

Note. Type III Sum of Squares

Descriptives

Descriptives - I believe that the treatment research for anxiety disorders is as important as that for other diseases (eg. cold, common flu, cancer, etc.)

What is your current income level? (Parent's income if you are not financially independent)	Mean	SD	N
$100-$120k	1.941	1.345	17
$120k-$140k	2.375	1.685	8
$160k or higher	2.556	1.093	18
$40k-$60k	2.000	1.461	16
$40k or lower	2.750	1.660	40
$60k-$80k	2.538	1.808	13
$80k-$100k	2.571	1.399	21

Descriptives plots
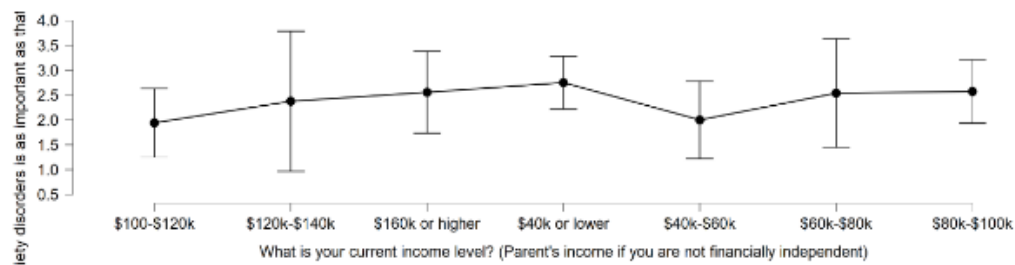
Fig 3.

Finally, our ANOVA tests looking for correlations between race and other factors were found too not be statistically significant. Our first test which looked for a correlation between race and economic barriers faced due to anxiety disorders had a p-value of 0.167, which is greater than our significance level of 0.05. Therefore, we are unable to conclude that race affects the increase in economic barriers due to anxiety disorders. Similar with two other variables including research into anxiety disorders being as important as research for other illnesses and economic barriers impacting ability to receive mental health care were not significant. Overall, there seemed to be more correlations between income level and issues pertaining to anxiety disorders rather than race.

Two conclusions can be further drawn from our survey. Out of 140 participants, 34.5% claimed that their economic burdens grew under the duress of anxiety disorders. 52.5% claimed that there had been no significant impact on their financial situation, and 12.9% would state the opposite:

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that there had been significant strain as a result of having an anxiety disorder. 34.5% of the survey pool claimed that having an anxiety disorder did not significantly affect their ability to receive adequate healthcare for their needs, while 7.2% stated that their financial situation drastically changed due to the duress of an anxiety disorder. 18% would claim they are somewhat affected, 28.1% claimed that they were averagely impacted, and 12.2% claimed that they were slightly affected.

Discussion

This study was run within the region of the United States taking into account numerous responses from foreign countries such as Canada, Nigeria, India, Turkey, and Azerbaijan. These foreign countries were not part of the responses and were taken out of the total participant responses in order to maintain an accurate sample of individuals facing financial and healthcare burdens due to their anxiety disorder. The distribution of this research survey took place amongst the research fellows at the International Socioeconomic Laboratory, students and faculty at each researcher's school, and individuals affected by diagnosed anxiety through social media platforms such as Instagram, Discord, Twitter, and Facebook. The purpose behind seeking responses from various places was to analyze and investigate the frequent trends between socioeconomic factors such as lack of healthcare service and financial constraints to anxiety disorder and eventually draw intricate conclusions to whether or not these factors influenced the prevalence of anxiety disorders and the stigma corresponding with them. The results of our survey would allow us to see which socioeconomic factors exacerbated the economic and mental burden associated with an anxiety disorder.

Additionally, by including questions concerning future solutions and how one is receiving adequate treatment for their anxiety disorder, we are able to accurately recognize where the treatment gap lies and what more should be done to aid those struggling with an anxiety disorder. Our anova test aimed to look for correlations between multiple socio-economic factors, such as income levels, race and percent of people who said there has been an increase in their economic barriers. We found two statistically significant relationships pertaining to income level. The first correlation reported to be statistically significant was income level and economic burdens faced due to anxiety disorders. This means that income level influences the level of economic burdens faced due to seeking help for anxiety disorders.

However, it seems there wasn't any linear relationship between these two factors, so we were unable to conclude that an increase in come led to the increased economic burden, for example. Mentioned earlier, it is interesting to note that the peak mean score of 2 at 120-140k income was the highest out of all income groups. This is because one would expect those with a lower income to experience bigger stresses economically seeking help. For an income admittedly high over the poverty line, it is slightly puzzling since these families should be able to afford mental health care given that mental health care costs an average of 1,592 dollars on average per person and should be affordable for these families (Pal, 2015). This income bracket also had the highest variation within its answer, which could mean that there is not a main consensus between the people within these groups pertaining to the economic burdens they faced due to seeking help for anxiety disorders.

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One hypothesis is that the continued stigma surrounding mental health not being as important as other illnesses, which makes families think that spending money on mental health is an added burden that could be resolved without money. Moreover, the public tends to disapprove and are less likely to pity those diagnosed with a mental illness when compared to those with a physical disability, causing those with a mental disorder to self-discriminate and withhold from seeking help. (Corrigan & Watson, 2002). This brings us to another anova result between income level and the level of importance that should be placed on research into anxiety compared to other illnesses. These results were not statistically significant, but had they been, it would help us explain our result for the anova result between income level and economic burdens due to anxiety disorders. This is because if there is a connection between the way families of different income levels perceive mental health, we could conclude that a certain income level is more predisposed to perceive mental health as important/not important.

The second anova test comparing economic barriers stopping families from seeking mental health and income level was found to be statistically significant. Not surprisingly, it followed an inverse relationship on the descriptive since increased economic income would mean there is less worry about using money for mental health treatment. This is a relationship that would make sense. However, mentioned from our other anova tests, the 120-140k income bracket group seems to have the largest variation in answers. The emphasis on this income bracket seems puzzling because it appears that there is some sort of other lurking variable that is making respondents choose varied answers between 1-3. Our research indicates that based on the responses from each of the participants, there is the most variation from this scaling in comparison to all the other questions in the form. Therefore, for future research it would be interesting to look at and assess how high-income bracket families perceive seeking help for mental health or why they don't seek help even with the resources to do so.

In addition, it is important to note that the income bracket lower than 40k had the highest mean score, indicating the importance of affordable healthcare to low-income families. Although this has been a problem heavily stressed, research shows time and time again that there must be an affordable system developed to help low-income families have access to mental health without needing them to spend large amounts of their income doing so. In our survey, results indicated that the high mean score for low-income families correlated to those who lacked the adequate mental health service and care. It should also be noted that initially the goal of responses for this research study was centered around participants who are clinically diagnosed with anxiety disorder and not participants who were unsure of their diagnosis or are not clinically diagnosed at all. Majority of the 140 responses from this survey did not center towards clinically diagnosed anxiety patients but rather a combination of all three categories which affected our results and led to a less approachable way of assessing healthcare and financial burdens on these participants.

Finally, the lack of significance between race and other factors pertaining to anxiety disorder was a conclusion that can be interpreted in different ways. One, that anxiety disorders do not discriminate based on race, and race does not affect the economic barriers/burdens faced due to anxiety disorder. Our research paper aimed to fill in the gaps of previous research studies by attempting to examine the relationship between many socioeconomic factors and the mental and

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economic burden associated with an anxiety disorder. By doing this, not only were we able to determine whether individuals with a low socioeconomic status experienced more of a burden and hardship when seeking diagnosis and treatment for their anxiety disorder, but which factors exacerbated the treatment barrier the most, allowing us to recognize where current solutions for anxiety fall short and what more can be done and is needed to help the greatest amount of people struggling with their mental health.

It is important to note that future studies that focus on the socioeconomic factors that affect anxiety disorder treatments should make sure to isolate hidden variables that can alter the results from participants in the study. Solutions include making a greater range of mental health resources more accessible and available to the public in order to relieve some of the economic burden and normalizing mental health disorders, deeming them of equal importance as physical illnesses, and removing the stigma associated around mental health disorders to hopefully make people less reluctant and comfortable when asking for help.

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Public Perception Towards Climate Change in India and the USA

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Abstract

Climate Change has become one of the pressing problems of the 21st century. Perceptions regarding climate change vary from nation to nation. This study was aimed at assessing perceptions towards climate change in India and the USA. This study utilizes quantitative data collection through a structured questionnaire and statistical methods to analyze the accumulated data. In this study, not a huge gap in perceived differences among the residents in India and the USA is being witnessed. Determinants like country of residence, age, type of locality, ethnicity, gender and the level of education, were not of major concern. However, variables like 'class of society' and 'Regular following of climate change information' had a significant influence on climate change awareness. Majority of the respondents in both the nations have shown their dissatisfaction towards climate change action steps taken by the concerned authorities and propose to promote clean and renewable energy alternatives. In summary, there is a need to understand one's responsibility in tackling this issue.

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Categories: Climate, Government, India, USA
Keywords**:** Climate change, perception, awareness, government, India, USA

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Introduction

Climate change has become one of the most burgeoning topics of the 21st century. Earth's average temperature has risen by 1.5°F over the past century and is projected to rise another 0.5 to 8.6°F over the next hundred years (EPA, 2017). This change in temperature would result in dangerous shifts in our Earth's climate, which would be detrimental to all life on earth. An understanding and awareness of the climate change scenario among the residents of a country is important as it encourages adaptation and mitigation efforts (Sullivan and White, 2019). However, public perceptions of climate change vary from nation to nation (Capstick *et al.*, 2015). Past research has involved the use of surveys to understand more about how people think about climate change. A survey report entitled 'European Perceptions of Climate Change (EPCC)' (2017) shows that there is less concern for climate change in the United Kingdom while the French are more worried about this than Germans and Norwegians. It has also been shown that women are generally more worried than men on the issue of climate change (Shi et al., 2016). A study concluded that the most important determinants of concern for climate change were gender, educational status, and marital status. However, no significant difference was found according to age groups and income in one study (Korkmaz, 2018). Public perceptions also fluctuate over time. Social Science research shows that in the USA, concern about climate change has fallen considerably since 2008 (Scruggs and Benegal, 2012). However, in many parts of the world in general, concerns over climate change have increased in recent years (Capstick et al., 2015).

Another specific research conducted in China analyzed China's public perception of climate change in terms of several influence factors. They found that some individuals were willing to take action and had confidence that the government could deal with it, while others (27% of respondents) believed that climate change was just a natural consequence and didn't bother (Yu *et al*., 2013). Public perceptions on climate change in the USA and Europe was captured by Lorenzoni and Pidegeon (2006). Though, limited research has been conducted on how the perceptions about climate change vary in developing and developed countries. India and the USA; both the nations are reeling under the impacts of climate change (Chinowsky *et al.*, 2011). Building off of past research, our research aims to capture perceptions towards climate change in both developing (India) and developed (USA) countries since it's important to understand that to take action in addressing this crucial aspect, some degree of involvement of citizens is necessary. The purpose of the present research is to have better insights on how these two countries with completely different economies and demographics perceive climate change. It will bring to hand a wider scope of research and mark the progress of climate change actions in the respective nations. This research analyzes how people think currently, how their perception varies and what steps can be taken in the future to slow down climate change.

Materials and methods

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Study Area

Both the developing and developed countries are bearing the brunt of climate change (Chinowsky *et al.*, 2011). In this study, our main focus is mainly on a developed country; the USA and a developing country; India. The target audience is the general public of both the countries.

Data Collection and Analysis

This research was based on quantitative data collection. A structured survey questionnaire was designed consisting of a variety of questions to comprehensively capture the perception of the general public towards climate change. The survey questionnaire was divided into four sections; a) Demographics b) Their beliefs and concerns of climate change c) Causes and impacts of climate change in their region d) Their beliefs in the Government's /CBOs'/ Think tanks' role in climate change action (Table 1). The questionnaire was rolled out in the USA and India through social media platforms like Whatsapp, Facebook, Linkedin, Instagram and Discord. Snowball sampling technique was used for this purpose for choosing the sample population (Figure 1). A total of 428 samples were collected; 306 from India and 122 from the USA.

The data collected from the questionnaire were analyzed using statistical techniques. Statistical software, SPSS has been used to conduct descriptive and inferential statistics. For the first section, bar graphs with error bars were made to visually represent the profile characteristics and check whether they are comparable. For the second section, parametric test (Logistic regression) and non-parametric tests (chi-square test, Fisher's exact test, Spearman's Rank Order Correlation (rho) were performed (Table 2). The third and fourth section has been visually analyzed through stacked bar graphs.

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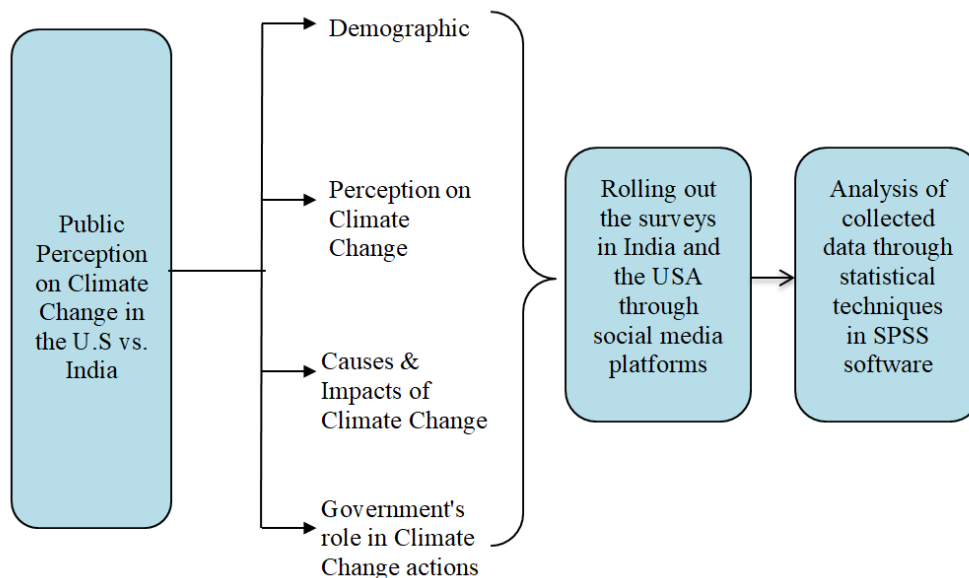
Table 1: Questionnaire

Section I: Demographics/ Profile Characteristics of the participants	
Parameters	**Options**
Country of Residence	a.　　　　　　　India b) USA
Gender	a.　　　　　　　Male b) Female c) Prefer not to say
Ethnicity	a.　　　　　　　American Indian or Alaskan Native b) Asian c) Black or African American d) Hispanic/ Latino e) White f) I prefer not to say
Age	(Text question)
Types of locality	a.　　　　　　　Urban b) Rural or countryside
Class of the society	a.　　　　　　　Lower Class b) Middle Class c) Upper Class
Highest level of education completed/pursuing	a.　　　　　　　10th standard or below (10th grade or below) b) 12th standard (High School) c) Under-graduate d) Post-graduate e) PHD or above

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Section II: Belief and concern regarding climate change

What is the most serious problem existing in your country	a. Poverty b) Unemployment c) Climate Change and its consequences d) Environmental Degradation e) Rising population
Are you aware about Climate Change	a. Yes b) No
According to you, what is climate change (Multi-select)	a. Rise in global temperature b) Global sea-level rise c) Rising pollution d) Melting glaciers e) Change in Earth's climate f) Change in rainfall pattern
Do you follow information regarding climate change regularly	a. Yes b) No
What are the different sources you follow to get updated on issues related to climate change (Multi-select)	a. Newspaper/ Magazines b) Television/ FM Radio c) Research Articles d) Social Media
How concerned are you on climate change	a. Not concerned at all b) Not really concerned c) Neutral d) Fairly concerned e) Very concerned

Section III: Causes and impacts of climate change

What are the major causes of climate change in your region?	a. Population increase b) Extensive use of fossil fuels c) Rapid deforestation d) Industrialization e) Global Warming f) High standard of living g) Modernization
How well do you agree that man-made activities are the	1. Least Likely; 5- Most Likely

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primary causes of climate change?	(Scale type option)
How well do you agree that man-made activities are the primary causes of climate change?	1. Least Likely; 5- Most Likely (Scale type option)
Impacts of climate change experienced in the region (Multi-select)	a. Melting of glacier b) Displacement due to climate change c) Temperature rise d) Impact on agriculture e) Impact on livelihoods f) Health impacts g) Increase in disasters/ extreme weather events h) Sea level rise i) Changes in precipitation patterns

Section IV: Government's role in climate change action

Are you aware about Paris Climate Agreement?	a. Yes b) No
Do you think that the government/ think tanks/ NGOs are doing enough to tackle climate change?	a. Yes b) No c) Not sure
What do you think the government's role should be in tackling climate change? (Multi-select)	a) Responsibility for climate action should be assigned to all departments b) Formulate Policies and Guidelines that demands immediate necessary actions c) Support small agricultural producers d) Promote clean and renewable energy e) Focus on resilient livelihoods and infrastructure f) Promoting sector specific adaptation and mitigation measures g) Promoting public awareness

Table 2: Tests performed between different variables

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S.No	Name of statistical test performed	Variables chosen for the test	Description
1.	Logistic Regression	*Independent variables:* a) Country of Residence b) Gender c) Age d) Type of locality e) Class of society f) Highest level of education g) Do you follow information on climate change regularly *Dependent variable:* Are you aware about climate change?	To assess which of these independent variables have a significant influence on the dependent variable
2.	Fisher's exact test and Chi-square	a. Country of Residence b. Are you aware about climate change	To check if there is a significant association between country of residence and Are you aware about climate change
3.	Spearman's Rank Order Correlation (Rho)	a. Do you follow information regarding climate change regularly? b. How concerned are you on climate change?	To check if there is a significant relationship between these two variables

Results and Discussion

Demographics

Out of a total of 428 respondents, 71.5% of responses were captured from India while the USA constituted 28.5% with the overall majority being from the urban locality (77.8%). A majority of the respondents belonged to the middle class (84.8%) and a large proportion is young and middle-aged (90.89%). An equal proportion of the males (50.7%) and females (48.6%) participated in the survey. In terms of educational level, 45.1% are post-graduates, followed by under-graduates (24.8%) and High School students (15.9%). Table 3 shows the profile characteristics of the respondents. The error bars formed in the characteristics (Name of the Country, Type of locality,

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Gender, Age-group, and Level of education) are almost of the same height, indicating homogeneity of error for each group and that the groups are comparable (Figure 2).

Perceptions about Climate Change

Research in China shows that 93 % of the respondents were aware of climate change (Yu et al., 2013). Additionally, despite the concern and awareness of climate change, the importance of climate change is secondary in relation to other environmental, personal and social issues (Lorenzoni and Pidegeo, 2006). In our study, 29.51% and 14.38% of the respondents reported climate change as one of the most serious problems in the USA and India respectively (Figure 3). The results show that 97.9% of the respondents are aware about climate change (100% and 97.06% of the respondents in the USA and India respectively) (Figure 4). A Fisher's exact test suggests that there is no significant association between awareness regarding climate change and the country of residence i.e India and the USA ($P>0.5$). The Pearson Chi-Square test statistic (X^2 (1) =3.665, P=0.056) also does not reach the significance (Table 3). However, a logistic regression shows that there is a significant influence of the independent variables 'Class of the society' and 'Do you follow information regarding Climate Change regularly' on the dependent variable 'Are you aware about Climate Change' (X^2 (7)=21.974, $p<0.01$). The model explained 27.1% (Nagelkarke R^2) variance in awareness regarding climate change and was able to identify 98.1% cases accurately. Those who regularly follow information on climate change are likely to be 5.37 times more aware regarding climate change than those who don't follow (Table 4).

Table 3: Profile characteristics of the respondents

S.No.	Characteristic	Parameters	Percentage
1	Name of the Country	India	71.5%
		USA	28.5%
2	Type of locality	Urban	77.8%
		Rural/ Country side	22.2%
3	Gender	Male	50.7%

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		Female	48.6%
		Prefer not to say	0.7%
4	Ethnicity	American Indian or Alaskan Native	0.93%
		Asian	78.27%
		Hispanic/Latino	1.64%
		White	3.74%
		Black	1.49%
		Prefer not to say	14.02%
5	Age-groups	<18 years	28.04%
		18-35 years	62.85%
		35-50 years	5.84%
		>50 years	3.27%
6	Class of society	Lower class	10%
		Middle Class	84.8%

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		Upper Class	5.2%
7	Highest level of education completed/pursuing	10th standard or below (10th grade)	8.2%
		12th standard (High School)	15.9%
		Under-graduate	24.8%
		Post-graduate	45.1%
		PHD and above	6%

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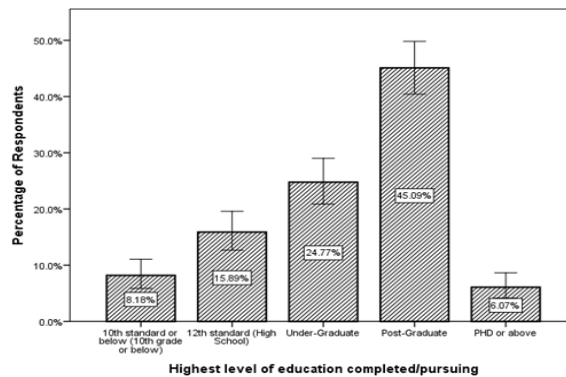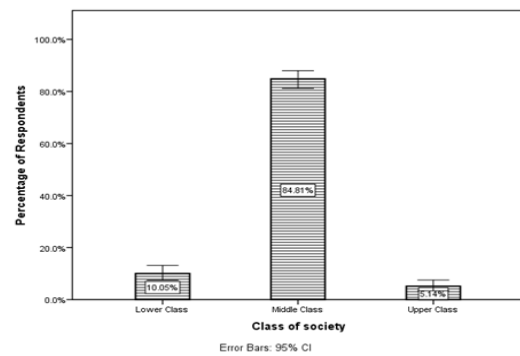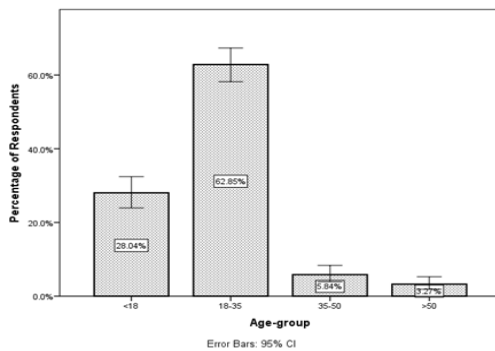
Figure 2: Bar graphs showing error bars of 'Profile Characteristics' with 95% C.I

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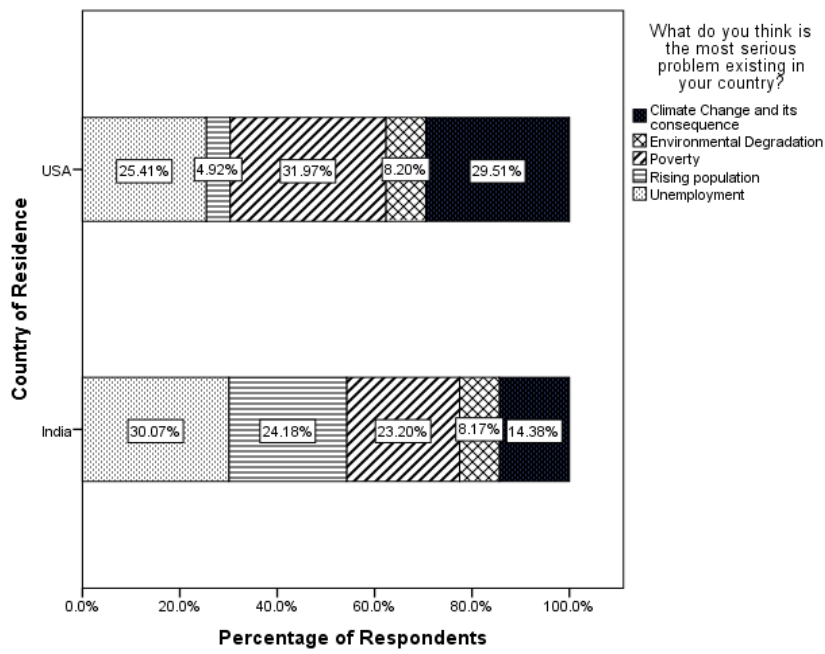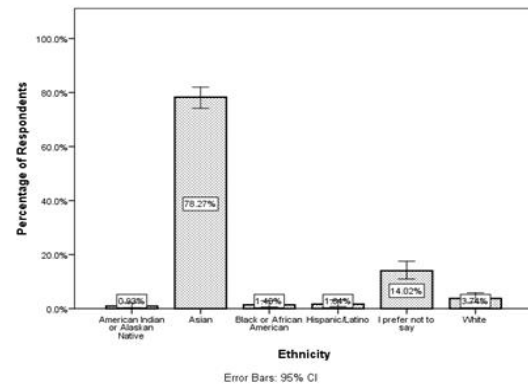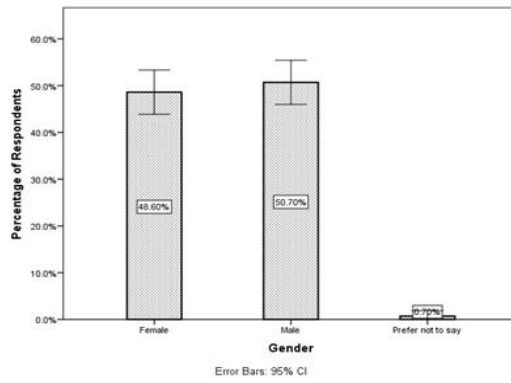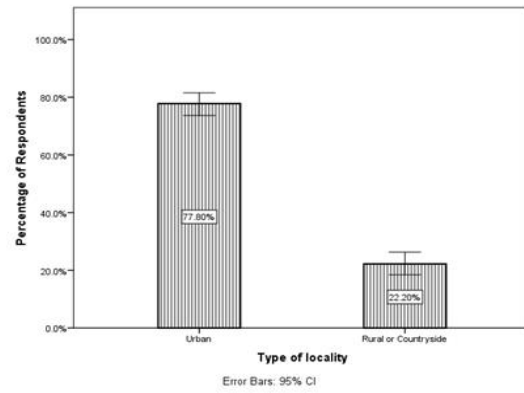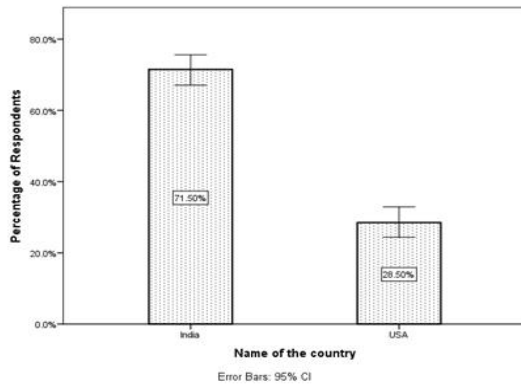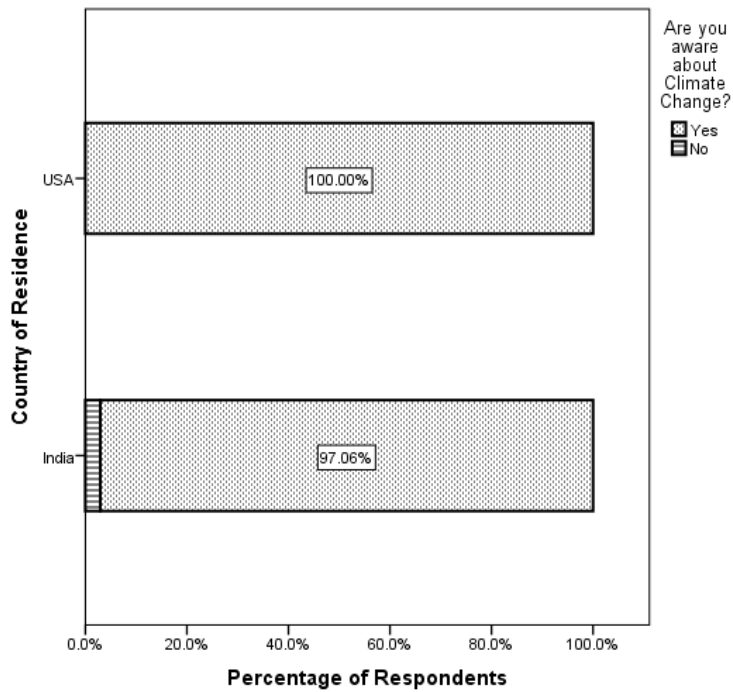
Table 3: Results of Chi-Square Test (Country of Residence & Climate Change Awareness)

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.665ᵃ	1	.056	.066	.047
Continuity Correctionᵇ	2.376	1	.123		
Likelihood Ratio	6.116	1	.013	.050	.047
Fisher's Exact Test				.066	.047
N of Valid Cases	428				

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Table 4: Results of Logistic Regression Analysis

Variables	B [95% C.I B]	S.E.	Wald	Odd Ratio
Country of Residence	19.037	3175.210	.000	185184700.646
Gender	-.345 [0.15, 3.22]	.774	.199	.708
Age in years	.022 [0.94, 1.11]	.045	.229	1.022
Type of locality	-.035 [0.20, 4.62]	.799	.002	.966
Class of society	2.335 [1.77-60.06]	.898	6.754**	10.326
Highest level of education completed/ pursuing	-.471 [0.27-1.42]	.421	1.255	.624
Do you follow information regarding Climate Change regularly	2.027 [1.37-42.15]	.875	5.374*	7.594
Constant	-27.163	3175.212	.000	.000

Omnibus X^2 (7)=21.974, $p<0.01$, R^2= 0.50 (Cox & Snell) 0.271 (Negelkarke)

*p <0.05, **p<0.01

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95% C.I

There also seems to be a relationship between regular following of the Climate Change information and the concern level of the respondents. A Spearman's Rank Order Correlation (Rho) suggests that there is a significant relationship between these two variables ($r=0.216$, $p<0.001$) (Table 5). Indians (65.36%) regularly follow Climate Change information more than those in the USA (41.8%) (Figure 5). However, not a huge difference is being reported between the concern level of the respondents towards Climate Change in the USA and India (Figure 6).

Table 5: Results of Spearman's Rank Order Correlation (Rho)

		Do you follow information regarding Climate Change regularly?	How concerned are you on Climate Change?
Do you follow information regarding Climate Change regularly?	Correlation Coefficient	1.000	.216***
	Sig. (2-tailed)	.	.000
	N	428	428
How concerned are you on Climate Change?	Correlation Coefficient	.216***	1.000
	Sig. (2-tailed)	.000	.
	N	428	428

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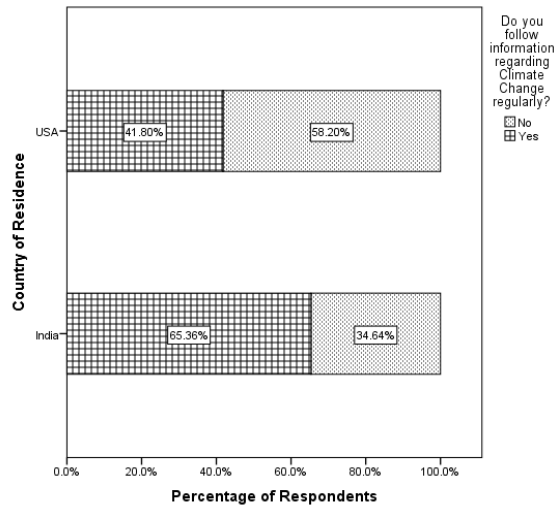
***p<0.001*

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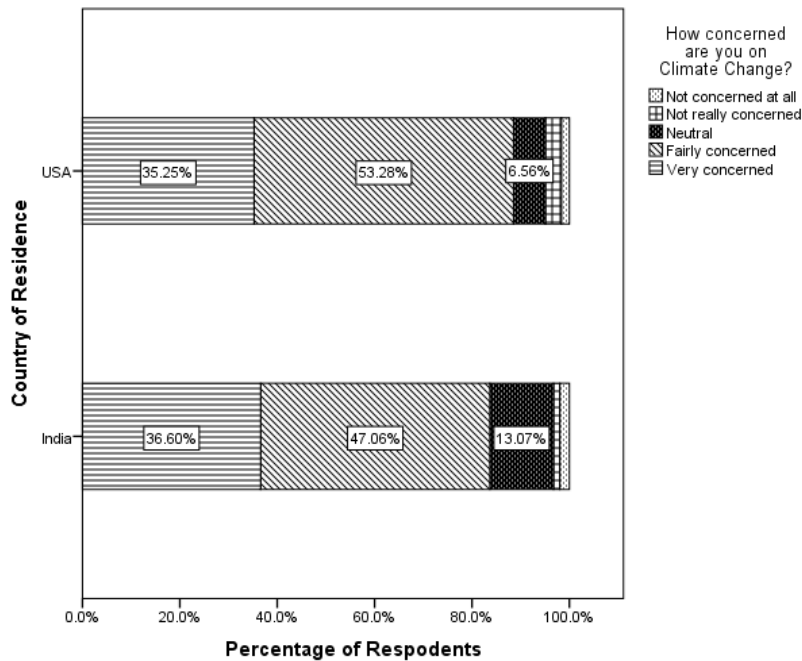
Climate Change was majorly perceived as Rise in global temperature (84.6%), Change in Earth's Climate (81.3%), Melting glaciers (72.9%) and Global Sea Rise (70.1%) by the respondents. Social media (79.9%) and Newspapers/ Magazines (65.4%) were the more preferred sources of information than Research Articles (46.5%) and Television (38.3%). This is similar to findings in Turkey where 72% of the respondents said that they were provided information and awareness about climate change through the media (Korkmaz, 2018).

Causes and Impacts of Climate Change

Rapid Deforestation (80.1%), Industrialization (78.7%), Global Warming (78%) and Extensive use of Fossil Fuels (73.4%) were the most commonly cited causes of Climate Change. In our study, rapid deforestation was the most cited cause of climate change when in fact it's in fact secondary to the burning of fossil fuels. This may indicate that individuals have a limited understanding of the human contributions to climate change (Lorenzoni and Pidegeo, 2006). About 19% of the respondents in the USA and 16% from India have collectively chosen these options (Increase in population, extensive use of fossil fuel, Rapid Deforestation, Industrialization, Global Warming, High standard of living, Modernization) as the major causes of climate change (Figure 7). Majority of the respondents (USA: 67.21%, India: 51.31%) agreed that anthropogenic activities are the primary/ most likely causes of climate change (Figure 8). However, the scenario reverses when it comes to its natural causes (USA: 3.28%, India: 5.56%) (Figure 9). Rise in temperature (83.2%), increase in frequency of extreme weather events (61.4%) and health impacts (54%) were the major impacts of climate change felt by the respondents.
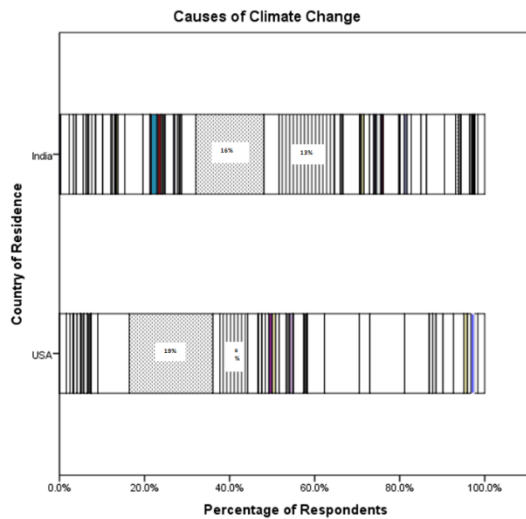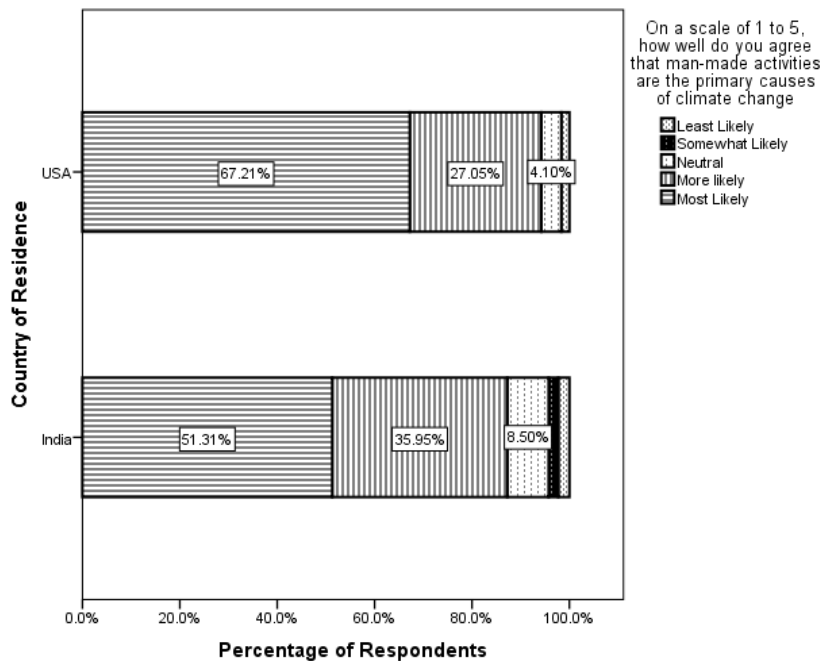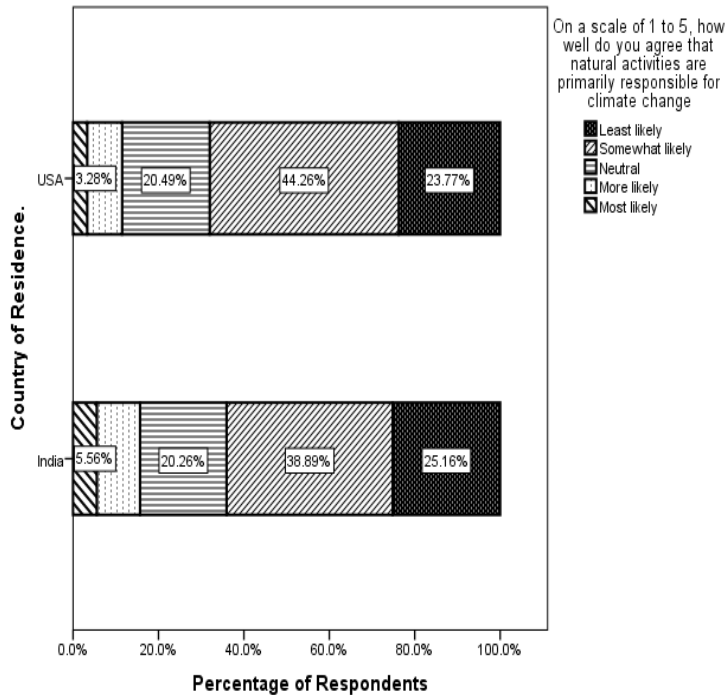
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Figure 7: Causes of climate change (Dotted lines represent the percentage of respondents who have collectively chosen 'Increase in population, extensive use of fossil fuel, Rapid Deforestation, Industrialization, Global Warming, High standard of living, Modernization' options)

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Government's Role in Climate Change Action

Results show that the awareness regarding the Paris Climate Agreement is more in the USA (78.69%) than India (66.67%) (Figure 10). Majority of the respondents from both the countries (USA: 72.13%, India: 62.42%) are not satisfied with the steps taken by the Government/ CBOs/ NGos/ Think tanks in tackling climate change. However, almost an equal proportion of the respondents in both the countries are unaware about it (USA: 20.49%, India: 21.24%) (Figure 11). Majority of the respondents believed that the government can help promote clean and renewable energy (82.9%), promote public awareness campaigns on climate change (77.3%), formulate policies and guidelines for necessary action (75.7%) and assign roles and responsibilities to the several departments (71%). The respondents from both the states want their respective governments to majorly focus on clean and renewable energy (USA: 30.33%, India: 27.78%) as one of the main measures in combating climate change.
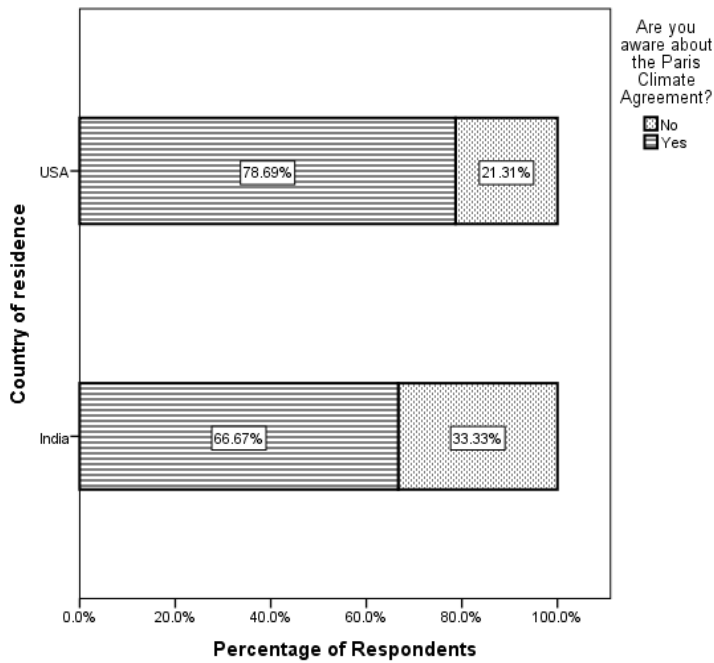
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Figure 10:

Awareness regarding Paris Climate Agreement in the USA and India
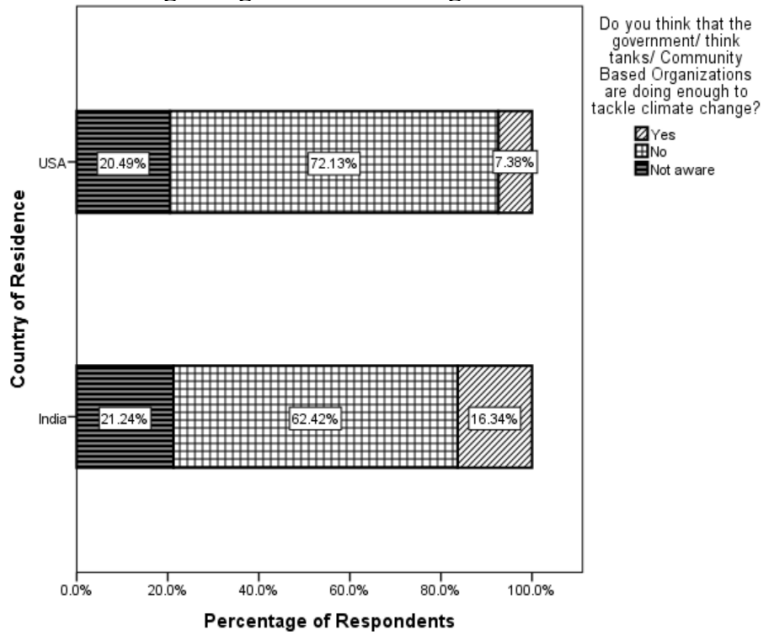

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Figure 11: Government's/ Think tanks/ CBOs role in combatting climate change in the USA and India
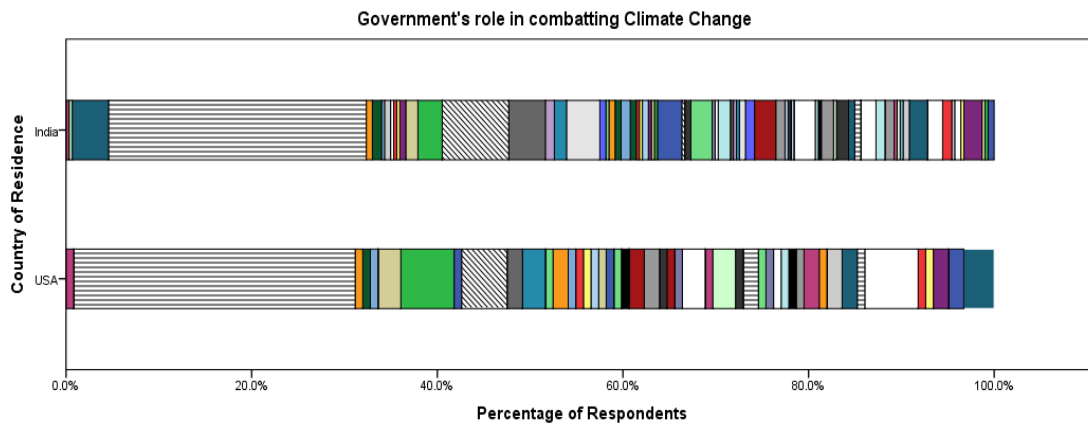

Figure 12: Role of the Government in combating Climate Change in the USA and India (The lines represent the option 'Promoting clean and renewable energy)

Conclusion

In this study, we found that there is not a huge gap in perceived differences among the residents in India and the USA. In India, though a very minor proportion (2.4%) is still unaware about climate change, hence there is a need to spread awareness in this regard. Independent variables like 'Class of society' and 'regularly following the climate change information' had a significant influence on the dependent variable 'awareness regarding climate change'. Regular follow-ups of Climate change information have also significantly impacted the concern level of the respondents towards climate change. Determinants like country of residence, age, type of locality, ethnicity, gender and the level of education, were not of major concern. This indicates that climate change is being experienced by all the segments of the society. More respondents in the USA cited 'Climate Change' as one of the major problems however, in India it was less due to other burgeoning issues like population growth, poverty and unemployment.

Not much difference in the perceived causes and impacts of climate change has been recorded between India and the USA. Majority of the respondents from both the countries attribute anthropogenic interventions as the primary cause of climate change. The need of the hour is to take necessary steps in promoting 'Nature based solutions. Awareness regarding international treaties on climate change like the Paris Climate Agreement is more in the USA than India. A major proportion of the respondents in both the countries are not satisfied with the steps taken by the concerned authorities in combating climate change. However, the majority propose that the government has a significant role to play in promoting clean and renewable energy. In India, apart from this, the major focus is also on 'adaptation' and 'mitigation' plans. Hence, to deal with

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such a pressing concern of climate change, a more focused and dedicated effort is needed in this direction. The fight against climate change can only be won by the collaborative efforts of the common man, government, think tanks and the NGOs. In summary, there is a need to understand one's responsibility in tackling this issue.

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The Effects of Socioeconomic Status on the Quality and Accessibility of Healthcare Services

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Principal Investigator: Loan Kim

Affiliation: International Socioeconomics Laboratory, University of California Los Angeles and Pepperdine University

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Abstract

As the wealth gap continues to increase in the United States of America, disparities in healthcare, exacerbated by the COVID-19 pandemic, continue to grow. Healthcare patients of lower socioeconomic status (SES) are affected by such disparities through lesser quality and accessibility of healthcare services. SES is defined by the American Psychological Association as the social standing or class of an individual or group, often measured through the intersection of education, income, and occupation. However, the measurement of SES is not limited to these criteria. In order to explore areas of healthcare services where quality and accessibility vary due to the effects of SES, this study gauged SES by examining race, and income to determine an individual or household's SES. A questionnaire distributed online collected data that helped determine the healthcare quality and accessibility of households in New York City and Los Angeles County neighborhoods, in which the services, experiences, and obstacles of healthcare were ranked on a one to five scale. The results of the study indicated that SES factors had significant correlations with healthcare quality and accessibility in which people with a lower SES experienced lower quality of medical care and faced more difficulties in accessibility than their counterparts with higher SES. These findings could be used to further research into the flawed aspects of the American healthcare system, and could also be used to determine what aspects of the healthcare system need solutions implemented to reduce disparities in healthcare based on SES.

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Categories: United States, Healthcare, Accessibility
Keywords: Wealth Gap, Healthcare, New York City, Los Angeles

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Literature Review

Healthcare inequity describes the substantial differences between specific population groups that vary between race, gender, income, geographic location, etc. Based on previous medical studies relating to healthcare inequity, research has indicated that those who are at the bottom of the socioeconomic ladder often face worse health outcomes than those at the top due to socioeconomic impediments. In a study conducted by George A. Kaplan, income had a direct correlation with survival rates and health problems, such as anemia, arthritis, and diabetes, that are more prevalent among lower socioeconomic groups. The study found that lower-income patients were three times more likely to develop heart disease than participants who had higher incomes (Kaplan et. al, 1987). Income and mortality rates also display an inverse correlation as demonstrated by the studies conducted in several countries in which participants of lower socioeconomic status had higher mortality rates than participants of higher socioeconomic status; further analysis showed that the gap in the mortality rate increased over the past years (Pappas et.al, 1993).

Kaplan suggests that the largest contributor to these concerning statistics is inadequate healthcare (Kaplan et. al, 1987). Insurance and other financial stressors pose significant disadvantages for those of lower socioeconomic status (SES). Black, Indigenous, and People of Color (BIPOC) and low-income families are more likely to be uninsured or on Medicaid, which is not accepted by many healthcare providers, especially private clinics and specialists. A study reported that one in eleven African Americans did not receive health services due to financial issues compared to one in twenty White Americans (Blendon et. al, 1989). Expensive healthcare services have disincentivized patients from visiting their doctors without an emergency in the fear of making out-of-pocket payments. A previous study displays that many participants reported traditional barriers to medical care such as high cost (24.1%) no health insurance (8.3%) (Taber, Levya, and Persoski, 2015).

In an effort to make health insurance available to more people and minimize financial barriers, the Affordable Care Act (ACA) was enacted in March 2010. Although the Commonwealth of Nations stated that uninsured rates dropped 9% among Black Americans and 12% among Hispanics (Commonwealth, 2017), healthcare equity was still beyond reach. Even with various ACA or employer-based insurance plans, many patients continue to avoid medical visits as they are required to pay thousands on their own. A study conducted in 2017 explored the relationship between economic and health inequality and provided unsettling data on health expenses. Those who receive employer-based private insurance often have to pay out-of-pocket for treatment due to new programs such as cost-sharing with deductibles. Before insurance begins to cover medical costs, the average employee has to pay about $1478 out-of-pocket first, and this amount has nearly tripled since 2006 (Dickman, Himmelstein, and Woolhandler, 2017). Moreover, cost-sharing is significantly worse in insurance plans given by the ACA, which is meant to reduce uninsured rates and provide public healthcare. For "silver-tier plans", which make up the majority of insurance plans in the country, the average deductible amount exceeds $3000 (Dickman,

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Himmelstein, and Woolhandler, 2017). In addition, many insurance plans only agree to cover costs if the provider is one in their restricted list. When patients seek other providers (either out of their comfort or for specific medical reasons), insurance companies often refuse to cover costs.

Those of lower SES also face issues such as inadequate services. Medical procedures that are typically undesirable (and not performed unless necessary), such as amputations, were performed on low-income and BIPOC patients at a much higher rate. Disparities in available resources at healthcare facilities raise a major concern about the differing standards of healthcare quality among different socioeconomic groups. An observational study measured the quality of care that Medicaid patients received for services such as breast cancer screening and eye examinations. According to this study, 62.9% of the studied Black population received breast cancer screening compared to 70.9% of the studied White population (Schneider et. al, 2002). Black patients were less likely to receive similar levels of care and medical tests compared to White patients, so it can be assumed that race was a major differing factor. Despite all the patients owning the same insurance and a similar income, it is evident that the BIPOC patients were given less regard when receiving treatment.

The question raised is whether access to and quality of healthcare vary among people of different socioeconomic statuses. In recent years, those with lower socioeconomic statuses were often turned away from treatment at medical institutions or had substandard healthcare facilities available to them, while those with higher socioeconomic statuses were often taken into care more quickly (American Psychological Association., n.d.). This demonstrates that healthcare accessibility is not consistent between different classes. In many instances, those who are on the lower end of the socioeconomic hierarchy are often filled with dissatisfaction because of the ways they are treated and their limited accessibility in receiving healthcare. It can then be hypothesized that people with low socioeconomic statuses report a lower quality of healthcare and dissatisfaction than those who are of higher socioeconomic statuses.

This study aims to highlight the poor quality of healthcare many Americans with low socioeconomic class have access to. In addition, the factors as to why they are tended to this way are identified and solutions to these issues are formulated to promote further awareness of this situation to the public. These are achieved by conducting surveys to send out to people in low, medium, and high-income neighborhoods, who then anonymously respond to a survey. The surveys typically consist of questions such as how satisfactory their experiences at a medical institution were and if that affected how many times they visited the location yearly. Thus, the research conducted brings to light these conditions to prevent disadvantaged patients from being placed in these situations again in the future.

Material and Methods

For the purposes of this paper, research has been conducted through the use of archival research and data collected from an online questionnaire. To gauge the existing SES of the communities in

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areas being studied, academic studies detailing mortality rates, insurance rates, health treatment, and cost barriers related to SES and healthcare were utilized in this paper.

To elucidate the current socioeconomic situation of healthcare quality and accessibility, an online Google Form questionnaire was developed asking relevant questions about respondents' personal experiences with healthcare quality and accessibility in relation to their SES. The online format allowed for many participants to be reached considering the simple interface and relatively high accessibility to device and internet access. A first set of questions asked standard personal information regarding status and healthcare: (one) participant's residence (New York City or Los Angeles County), (two) zip code, (three) race, (four) annual household income, (five) number of members in the household, (six) type of health care insurance, (seven) the number of urgent care visits to healthcare facilities, and (eight) the number of primary care visits to healthcare facilities.

To specifically measure healthcare quality, a second set of questions were asked about the participants' experiences in the healthcare environment. Participants responded to this question set in a 1-5 ranking system of services: one indicating highest dissatisfaction, two indicating dissatisfaction, three indicating a neutral opinion, four indicating satisfaction, and five indicating high satisfaction. In this set, four questions required participants to rank their satisfaction of: (one) medical staff interactions, (two) wait times, (three) care received, and (four) the cleanliness of facilities. Respondents were then provided with the option to give testimonials on their personal experiences.

The final set of questions measured healthcare accessibility, in which questions assessed possible obstacles of healthcare accessibility. In this set, six questions were asked: (one) ranking satisfaction of the variety of healthcare services around the participant's area, (two) type of transportation usually used to get to primary healthcare facility, and (three) distance to primary facility in miles. The remaining three questions utilized a 1-5 ranking system: one indicates strong disagreement, two indicates some disagreement, three indicates a neutral opinion, four indicates some agreement, and five indicates strong agreement. The remaining questions are as follows: (one) whether lack of free time prevents healthcare facility visits, (two) whether lack of transportation prevents healthcare facility visits, and (three) whether healthcare costs prevent medical attention from being received.

Questionnaire responses were anonymous to preserve the security of the participants as well as to ensure respondents filled out the questionnaire as accurately as possible. At the top of the survey was an explanation of research purposes, an outline of the survey's contents, and a statement of survey anonymity. The questionnaire was administered to at least 200 households in New York City and Los Angeles County neighborhoods each, via virtual outreach, primarily through the use of social media. Friends, family, and community members from either New York City or Los Angeles County were reached out to on social media platforms such as Discord, Reddit, and Instagram.

Statistical analysis was carried out through several separate one-way ANOVA tests using JASP software. This was used to measure the significance of our tests along with Microsoft Excel to

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form the graphs and trend lines. All measurable responses from the survey relating to the subjective opinions of the participants (such as satisfaction levels with quality and agreement with accessibility statements) were compared with income as the independent variable, and then race. The p-value of each test was then recorded to determine which tests were significant indicators of differences in healthcare quality and accessibility. Responses with significant correlations were then graphed in a bar chart with a linear trend line to present the data in a clear, comprehensible manner.

In data analysis, the household income and race of the participant determined their SES. Participants were characterized with a lower SES if their income ranges were below the median threshold or if they were considered a racial minority in the US.

Results

Demographics

403 responses were collected from the survey measuring health quality and accessibility. Five were removed due to incompletion, resulting in 200 responses from Los Angeles (50.3%) and 198 from New York City (49.7%).
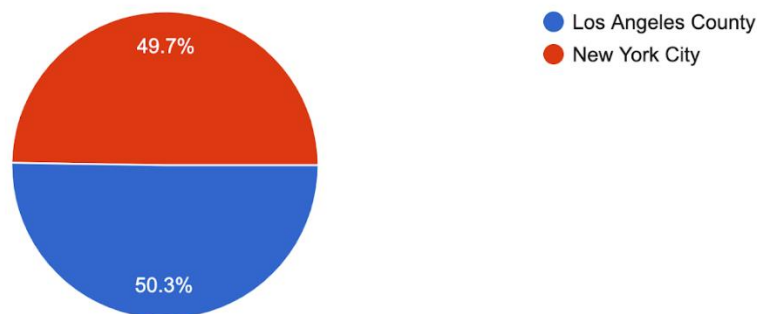

Figure 1. Regional breakdown of survey participants.

Of all respondents, 9.3% are American Indian or Alaska Native (n=37), 31.7% are Asian (n=126), 15.1% are Black or African American (n=60), 15.6% are Hispanic or Latino (n=62), and 13.6% are Native Hawaiian or Other Pacific Islander (n=59).

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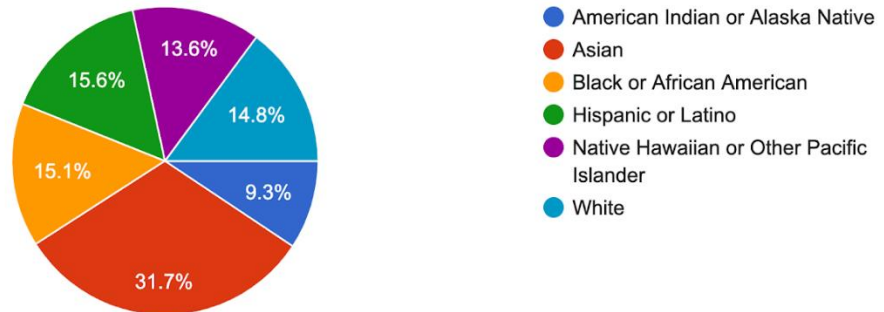Socioeconomics
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Figure 2. Racial breakdown of survey participants.

Figure 3 displays the income breakdown among the participants. 13.6% fall in the $0-25k range (n=54), 15.1% in $26-50k (n=60), 13.8% in $51-75k (n=55), 13.6% in $76-100k (n=54), 10.3% in $101-125k (n=41), 7.8% in $126-150k (n=31), 7.5% in $151-175k (n=30), 6% in $176-200k (n=24), and 12.3% in $201k+ (n=49).
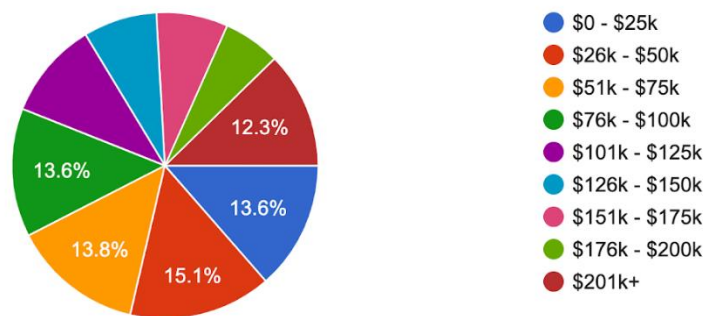
Figure 3. Income breakdown of survey participants.

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Healthcare Quality

The following analysis of the data collected from the survey participants relates to the quality of their healthcare experiences; interactions with medical staff and wait time were two factors that were largely influenced by one's SES.
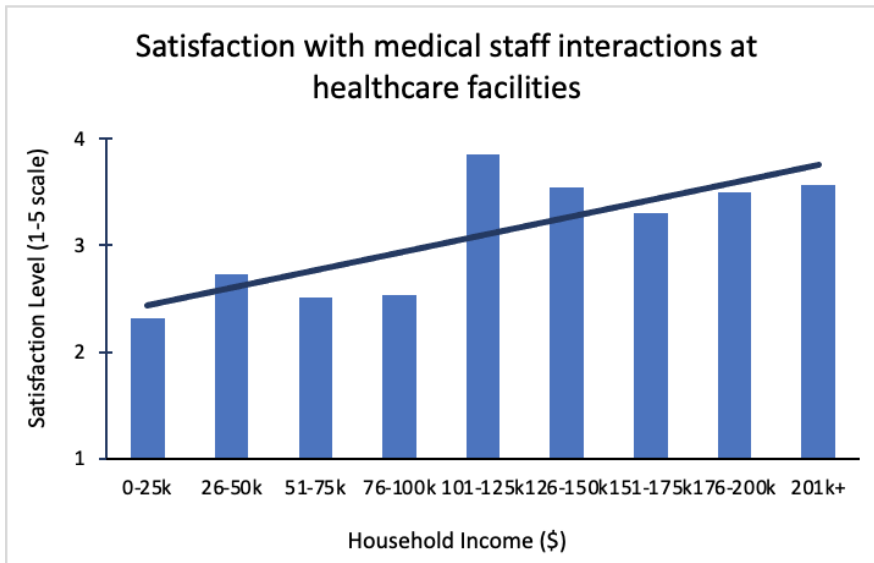

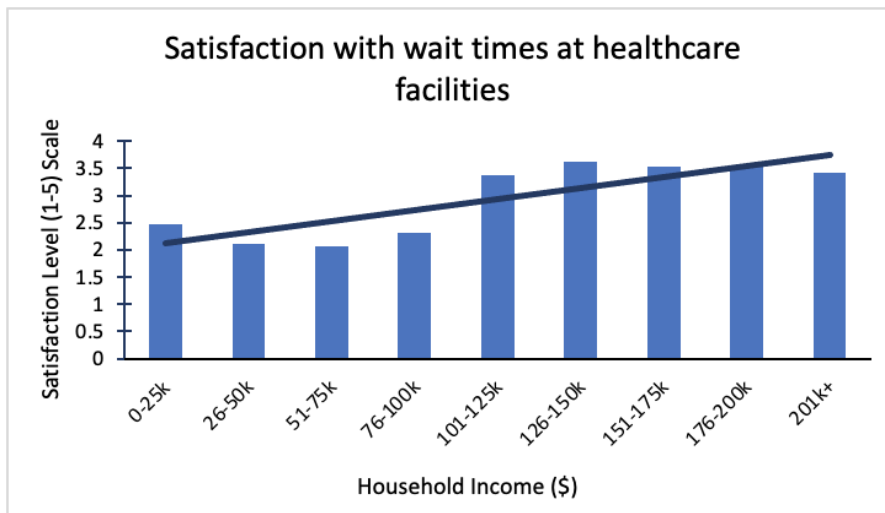*Figure 4. Satisfaction with Medical Staff Interactions v. Income (1=very dissatisfied; 5=very satisfied).*

Figure 5. Satisfaction with Wait Times at Healthcare v. Income (1=very dissatisfied; 5=very satisfied).

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Figure 4 displays how satisfaction with medical staff interactions at healthcare facilities generally increased as household income increased, as indicated by the increasing trendline. Out of the participants included in the 0-25k household income range (n = 54), the average staff interaction satisfaction rating was 2.3 out of the 1-5 scale. This low rating is also present in the 26-50k (n = 60), 51-75k (n = 55), and 76-100k (n = 54) income ranges, which all have ratings under a 3. However, once the data reaches the 101-125k range (n = 41), the average satisfaction rating increases drastically to a 3.9; this increased rating is also consistent in the greater income ranges of 126-150k (n = 31), 151-175k (n = 30), 176-200k (n = 25), and 201k+ (n = 49).

Figure 5 displays how satisfaction with wait times at healthcare facilities increased as household income increased. Similar to the data in Figure 4, the satisfaction rating of participants in the income ranges before 101-125k were below 3. Once the 101-125k range was reached, satisfaction ratings rose to 3.3 and stayed at a similar level for the greater income ranges.

The trends present in Figure 4 and Figure 5 are indicative of a correlation between wealth and healthcare quality. Income is a significant predictor of both wait time and staff interaction satisfaction, as p<.001 for both tests. It is evident that healthcare quality rises with wealth, as indicated by greater satisfaction ratings.
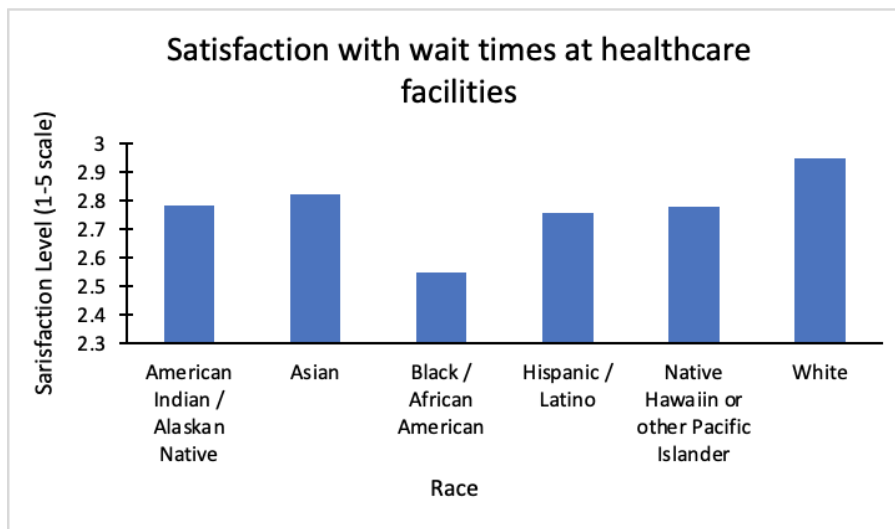

Figure 6. Satisfaction with Wait Times at Healthcare v. Race (1=very dissatisfied; 5=very satisfied).

According to Figure 6, Black/African American participants (n = 60) experienced the lowest satisfaction with wait times at healthcare facilities, having an average satisfaction rating of 2.6. On the other hand, White participants (n = 59) reported the greatest average satisfaction rate of

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2.9. Overall, participants characterized as racial minorities experienced lower satisfaction with wait times.

Healthcare Accessibility

According to the analysis of data collected from the survey participants regarding healthcare accessibility, it was found that a lack of transportation and the cost of healthcare services were two significant factors heavily influenced by participant SES.
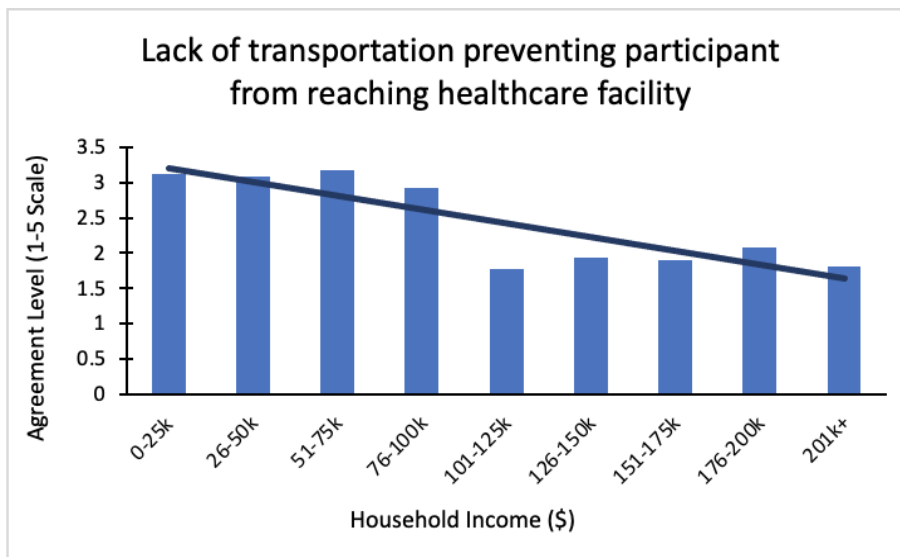

Figure 7. Lack of Transportation Preventing Participants from Receiving Medical Care v. Income (1= Strongly Disagree; 5=Strongly Agree).

The survey assessed how much the participants agreed with the fact that a lack of transportation affected their ability to access a healthcare facility. As displayed in Figure 7, the results demonstrated a downward trend. Those of lower SES, as indicated by lower-income ranges, had higher agreement levels with the statement, meaning they were prevented from accessing healthcare facilities more often because of lacking transportation. This agreement level would decrease as income increased as those with higher SES felt that lack of transportation did not make a large impact on their ability to receive healthcare. For instance, participants from the 0-25k income range (n = 54) reported an average agreement rating of 3.1 while participants from the 201K+ (n = 49) range reported an average rating of 1.8. Overall, this depicts how lower SES decreases healthcare accessibility as a result of less available transportation. This data shows that income is a significant indicator of whether transportation serves as a barrier for healthcare accessibility since $p<.001$.
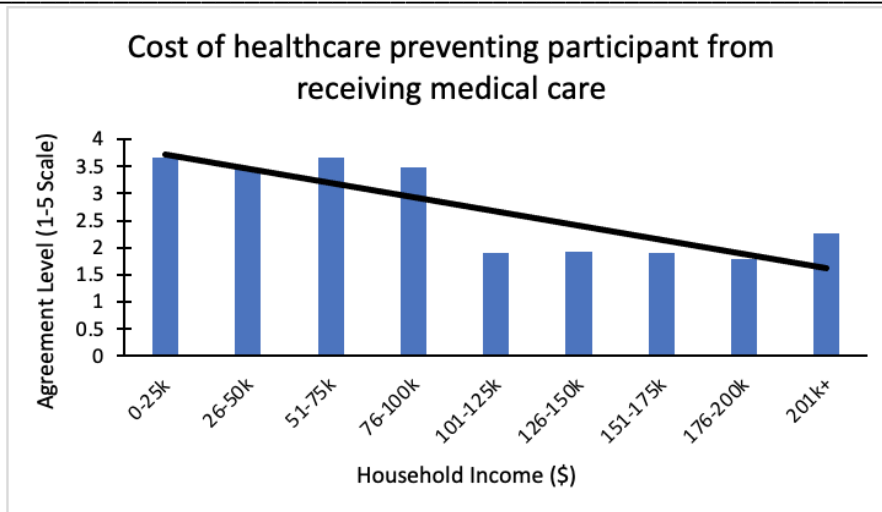
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Figure 8. Cost of Healthcare Preventing Participant from Receiving Medical Aid v. Income (1= Strongly Disagree; 5=Strongly Agree).

A similar trend occurred when participants were asked their agreement rating with the statement that the cost of healthcare influenced the reception of quality medical care. Once again, the data demonstrates a downward trend with those of lower SES perceiving the cost of healthcare as a relatively greater impediment. The lowest income range, 0-25k, reported a 3.7 agreement rating with the statement. A similar rating was reported by the generally low class and lower-middle-class incomes until the 101-125k range, which reported a significantly lower agreement rating of 1.9. Income is a significant indicator of whether healthcare cost is a barrier in healthcare accessibility since p<.001. A pattern develops for incomes ranges greater than $101k in which the agreement level regarding the cost of healthcare levels off, suggesting that people with higher income ranges may not be as concerned with receiving medical care as they are likely in jobs that provide medical insurance for them and possibly even their household.
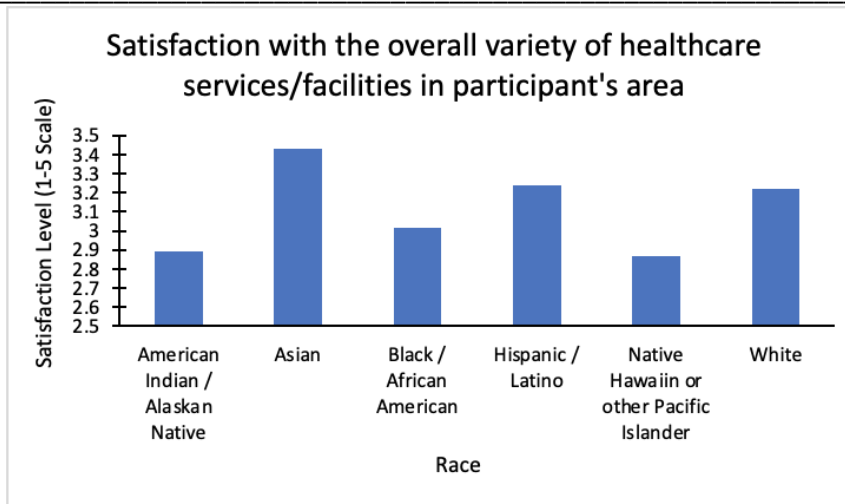
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Figure 9. Satisfaction with the Overall Variety of Healthcare Services/ Facilities v. Race (1=very dissatisfied; 5=very satisfied).

When considering the accessibility of healthcare, another important factor considered was the accessibility of specialized healthcare facilities to participants. With the specialization of medical care, more effective and targeted treatments are provided for those with health issues in a specific area. According to Figure 9, it is evident that racial groups often denoted as minorities reported the lowest satisfaction levels of the variety of healthcare facilities/services available to them in their areas. The American Indian/Alaskan Native group (n = 37) responded with an average satisfaction rate of 2.9, the Black/African American group (n = 60) responded with a 3.0, and the Native Hawaiian or other Pacific Islander group (n = 54) responded with a 2.9.

Discussion and Conclusion:

Through the analysis of around 400 survey responses from participants located in Los Angeles County and New York City, the initial hypothesis proved to be overwhelmingly accurate. Participants that indicated a lower SES based on the metrics of household income and racial background indicated lower levels of satisfaction with healthcare quality and accessibility. This study gauged healthcare accessibility in terms of cost, transportation, and time as barriers for patients. Healthcare dissatisfaction rates were analyzed on factors such as wait times and medical staff interactions to provide insight on the variation of healthcare quality among varying socioeconomic statuses.

As initially hypothesized, the results demonstrated that the quality of healthcare for people of lower SES was of lower quality than for people of higher SES on every metric evaluated. The correlation between lower quality healthcare and low-income communities can be attributed to fewer resources, scarcity of medical staff, and higher healthcare needs due to syndemics of poverty (Mendenhall et al., 2017). Inadequate healthcare in low-income areas can also perpetuate the cycle of the communities needing healthcare more often; this cycle could be partly

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responsible for overcrowding in facilities and prolonged time in the waiting room. Another effect could be medical staff rushing to examine as many people as possible and not making an effort to develop a meaningful relationship with their patients, degrading the relationship between patients and medical staff: a component of healthcare necessary for a healthy environment. These issues put a strain on local medical facilities, thus lowering the quality of care that low SES populations receive.

The COVID-19 pandemic may also have widened the quality gap. As many medical facilities began to crowd with patients due to the onset of COVID-19, the aforementioned impact of overcrowding in medical facilities likely exacerbated the quality of healthcare as well (Moghadas et al. 2020). Telemedicine has become a popular option for medical professionals to consult their patients digitally in order to avoid in-person contact and the possible spreading of the virus. However, some respondents claimed that they were aware of telemedicine options but were not provided with instructions to access the resource. Many respondents also mentioned in the survey that the primary factor affecting their experiences at healthcare facilities was the waiting times. One respondent described how he/she waited in the emergency room for seven hours to get a diagnosis for their "minor mental health issues".

Participants of lower SES were also found to have less access to healthcare services when compared to their wealthier counterparts because of many logistical differences. High costs and lack of transportation were shown to be significant barriers for participants receiving medical care. Additionally, there is an evident trend between the variety of healthcare services available and race. The average satisfaction rate for the availability of varying healthcare services was overwhelmingly low for those considered to be racial minorities, suggesting that minority neighborhoods may lack access to many medical facilities and specialty offices (such as dialysis centers or internal medicine offices). In fact, a study conducted by Darrell J. Gaskin on the disparities in healthcare services based on residence found the number of providers present in minority neighborhoods was relatively low due to certain cultures and traditions that reduce the use of healthcare services and the reimbursement rates in these areas (Gaskin et al., 2011). Hence, this study underscores a strong correlation between SES and healthcare quality and accessibility, placing those with lower SES at a disadvantage in both regards.

Exploring the intersection of healthcare quality and accessibility through the perspective of socioeconomics is important considering the importance of healthcare in our lives. The evidence of inequity in the American healthcare system is likely to be more apparent than it would be in other countries, including Nordic countries such as Switzerland. The cost of healthcare in the United States is among the most expensive in the world (Anderson, Hussey, and Petrosyan, 2019). During the years 2020 and 2021, in the context of the unprecedented COVID-19, it is as important as ever to pinpoint where the American healthcare system can be improved. By approaching this issue through the lens of socioeconomics, the study ensures that the well-being and benefit of all people, regardless of social or financial background, will be given proper attention. Data on the coronavirus from 2020 to 2021 has found that low-income minority communities were the most affected by the virus and, hence, need to be accounted for in studies

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that focus on healthcare. These discoveries are a direct reflection of the American healthcare system, and this study pinpoints these flaws in order to create a more equitable system in the future.

In an attempt to encapsulate a wide range of experiences affected by SES, Los Angeles County and New York City, two diverse locations in terms of household income and racial diversity, were surveyed to collect data that could consider all individuals regardless of SES within the study (County of Los Angeles, 2018). However, since only two primarily urban locations were surveyed, a lack of geographical diversity may have still played a role in the collection of data as it is not representative of all Americans. As very populous and economically productive areas, the results collected are not likely representative of healthcare experiences in non-urban areas like the rural Midwest. Additionally, as the survey requires internet access, those with true financial issues may not be able to access and complete the survey. In this sense, the survey may not account for groups that may face financial struggles and, hence, have technological limitations. While this study applied subjective measures of healthcare in assessing quality and accessibility, numeric values were used by respondents to provide data on their experiences that would be more comprehensible. Metrics in healthcare quality and accessibility that this study used were measured from a value of 1 to 5 by questionnaire respondents. Reducing highly subjective metrics of healthcare quality and accessibility to numeric values removed necessary nuance which would better allow us to truly understand the experiences in healthcare of people of different SES. While a free-response section was incorporated in the survey to provide respondents with the option to elaborate on their ratings, only 21 out of the 400 total respondents utilized this section. The respondents were disproportionately of Asian descent (not including Native Hawaiians or other Pacific Islanders) despite being the smallest ethnic group in the United States (US Census Bureau Public Information Office, 2011). This may have skewed certain data points such as average familial income as Asian-Americans make on average more than any other of their fellow minority groups in the United States (Kochhar, Rakesh, and Cilluffo, 2020).

To address the limitations of the study in future research, data should be collected from all 50 states of America to ensure geographical diversity and to account for differing populations. As this survey focused on primarily urban regions, examining suburban and rural areas would expand the breadth of future studies. Future studies would additionally have to consider collecting personal experience without the restraints of utilizing numeric values. Conducting interviews could be a potential method of subjective data collection, but the issue remains in the interpretation of such data that could be perceived differently by each individual viewing the data. The racial diversity within survey participants can be maintained by targeting a certain number of participants for each racial category, which could be adjusted later in the study depending on the number of responses received. All these changes could potentially affirm and expand the range of the survey results.

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Will Highschool Students After the Pandemic want a System of Education to be a Hybrid of Remote Learning and in Person Learning

Mehadi Chowdhury, Ildem Demir, Jason Jiang, Naima Shahzad

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Affiliation: International Socioeconomics Laboratory and John Jay College of Criminal Justice
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Abstract

As the pandemic persists over a year after the initial outbreak, it is imperative to keep an open mind on the innovations schools have adopted to continue teaching as it may benefit schools when permanently implemented in the correct manner. This study was conducted to open up discussion for the possible adaptation of a blended learning model permanently with a higher ratio of in-person learning or suggest alternative implementations of remote tools to in-person learning. Data was collected through surveying high school students and their opinions on such systems with the idea that experiments with different learning models would be dangerous in the midst of the pandemic and that students should be included in this discussion as they are the ones impacted by this potential change the most. Results indicate that students are in favor of this blended learning model of four days of in-person instruction and one day of remote instruction as the drawbacks of the blended and e-learning model during the pandemic would be solved by such an implementation with the added benefits of more time for students to focus on healthy-activities. Additionally, the study indicates that many students are willing to try various implementations of remote tools to the school system. However, due to a small number of responses (n=66), this study is not extremely significant and may not apply to how a majority of students feel. Instead, this study should be taken as an introduction to the idea of implementing blended learning after the pandemic to attempt reaping the benefits of both e-learning and in-person learning.
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Categories: Education, E-learning, Pandemic,
Keywords: Blended Learning, In-person Learning, Remote Tools

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Literature Review

Covid-19 spread rapidly, encroaching upon global populations within mere weeks of its discovery in December 2019. First identified in Wuhan China, the virus, according to many scientists, originates in the bodies of various animals including bats, cattles, camels, and cats. A relatively novel disease, Covid-19 is caused by a new coronavirus that has not been seen before. Previous coronavirus cases, MERS-CoV and SARS-CoV also had their origins in bats(Center For Disease Control and Prevention, 2020). In January 2020, it was declared a Public Health Emergency of International Concern and by March 2020, the outbreak was declared a global pandemic by the WHO. This disease was caused by the virus SARS-CoV-2, also known as severe acute respiratory syndrome coronavirus-2 by the International Committee for Taxonomy Viruses because of its genetic relation to the SARS outbreak in 2003. The initial case of the SARS-CoV-2 might have been associated with the Huanan South China Seafood Food Market but the exact source and origin remains unknown. (Santos, 2020) Since the outbreak in February 2020, the disease has spread rapidly around the world. Its relatively high infection rate allowed COVID-19 to spread to many areas in Europe like Italy and Great Britain and later to the United States.

As of the first of May 2020, COVID-19 has infected over 3 million people while killing over 250,000 people. Many political leaders and governments in the world were criticized by their failed attempt to secure the virus. For instance, in the United States many people criticized the government for insufficiently testing its citizens during the early stages of its spread in the nation. While in Japan, many criticized it for not declaring a national emergency sooner as it hoped to host the 2020 Olympic Games that year. Government insufficiency in Hong Kong caused many professional doctors and nurses to go on strikes as a result of their failed precaution in securing the virus. Nonetheless, these factors contributed to the worldwide panic that this ongoing epidemic had on civilians. (Yam, 2020) In June 17, 2020, the European Centre for Disease Prevention and Control identified 8,142129 caes of COVID-19 and 443,488 reported deaths worldwide since December 31st, 2019. Despite its origin in Asia, the American continent was among the ones with the highest number of cases with 3,987,543 in June. Specifically, with leading countries being the United States with 2,137,731 cases and Brazil with 923,189 as of June 2020. (Santos, 2020)

The disease can be transmitted between humans by respiratory droplets, close contracts with those infected and also by fecal-oral and aerosol contact. Recently, it was shown that airborne transmission is the dominant cause to spread the disease. Therefore, it is revealed that adopting measures such as social distancing and wearing marks cause the airborne spread of the disease to lessen. In this term, wearing a face mask in public and maintaining 6 feet distance can be one of the most effective ways to prevent the spread of the disease. Symptoms and signs associated with the disease are fever, cough, sore throat, headache, and fatigue. However, these symptoms are not limited as loss of taste and small can also be an effect of Covid-19 in addition to nausea, vomiting or diarrhea. Additionally, pre-existing conditions such aws diabetes, cardiovascular and kidney diseases can increase the risk of the infection. (Santos, 2020)

The unprecedented circumstances created by the pandemic have led schools to adopt either a remote model of teaching or a combined model of in-person and remote learning to safely continue teaching students and accommodate lockdown restrictions. Online learning and "most of the terms

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(online learning, open learning, web-based learning, computer-mediated learning, blended learning, m-learning, for ex.) have in common the ability to use a computer connected to a network, that offers the possibility to learn from anywhere, anytime, in any rhythm, with any means" (Cojocariu et al, 2014). A study done by Singh and Thurman adds that online learning are "learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access. In these environments, students can be anywhere (independent) to learn and interact with instructors and other students" Simply put, it is a tool that allows for flexibility and innovation for students and teachers alike (Singh and Thurman, 2019). E-learning is not at all a new phenomenon; in fact, online tools have been accompanying secondary and tertiary education curriculums for a while (Kopps, 2019; Leszczyński, 2018), but with the outbreak of Covid-19, e-learning is no longer a supplementary addition but a necessity.

Overnight, academic institutions had to adapt to the changing circumstances and modify the curriculum to be carried over online. Carey (2020) argues that the concern is not about whether online learning can provide quality education, rather, it is about how well institutions can adapt swiftly and efficiently. With this pandemic, it has become clear that the education system is susceptible to external dangers (Bozkurt & Sharma, 2020). Adedoyin and Soykan (2020) identify two types of responses to the crisis of the migration of moving online: external-integrated migration and external-assisted migration. The former refers to how institutions and faculty deliver the same instructions and assessment through video meetings, submitting assignments and forum discussions. The latter refers to external programs and software being used for delivery of instructions, for example, Moodle or Google Classroom. The process of migration can depend on literacy in technology. Those faculty members or students who are natives of the digital age will have an easier time switching the mode of learning (Prensky, 2001). On the other hand, more contemporary studies have shown that a number of people do not have the skills usually associated with the digital age which has led to the belief that the full effects of the rise of technology have not been fully felt and is yet to reveal itself (Bennett et al, 2008; Shariman et al, 2012).

Indeed, since the outbreak, these online-based models have come with a variety of issues, particularly stemming from the hasty transition from regular learning. It has been declared that emergency remote learning during a pandemic is not the same as remote learning (Hodges, 2020). For some scholars, the education provided by these models have proven to be an insufficient replacement for traditional in-person learning due to the difference in the quality of education (Dhawan, 2020). Feldman (2020) examined student assessment methods and recommended the following considerations for districts to implement unbiased and even grading policies: (a) pandemic-related anxiety having negative effect on performance, (b) racial and economic disparity having a negative effect on performance, and (c) majority of instructors have been ill-prepared for delivering high quality instruction remotely. These are three issues that have been pointed out to be the greatest concern for students. Students were not sufficiently prepared for a hasty transition into an online environment as they face difficulties in balancing work, family and social lives when online learning. They were also found to be ill-prepared for e-learning competencies (Dhawan, 2020; Parkes et al, 2014).

Mental health has also been a concern for university faculty as inevitably the pandemic has personally affected many students (Cao et al, 2020; Liu at al, 2020, Torales et al, 2020). University

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faculty has been concerned about student affairs in this respect as significant trauma has implications for identity development for college students (Lederman, 2020; Turk and Vigil, 2020; Shalka, 2020).

On the contrary, some scholars argue the drop in quality cannot solely be attributed to the ineffectiveness of e-learning. Their studies show there are benefits of e-learning, including lesson interactivity and collaborative learning (Cojocariu et al.,2014). Advantages of online education can also include the accessibility of time and place unrestricted by geographical location, which is further nuanced by technological tools allowing for lectures to be recorded, archived, and shared for future reference amongst students (Mukhter et al, 2020; Muchi-Ferris et al, 2021). In addition, it offers flexibility of instructional pace, and more control over which learning activities are more appropriate to engage in (Alexandra, 1996). Moreover, it simply offers the same instructional material to each student as they do in person (Allen 2003; Bullen, 2003; Piskurich, 2003). Essentially, with online learning, students do not have to be in a physical classroom anymore to get their education, thus lowering commute time and eliminating geographical restrictions.

The acclimatizing of e-learning opens up the possibility of future implementation of online learning as a supplement to in-person learning even after the pandemic is over (Ligouri & Walker, 2020). There is merit in experimenting with different combinations of learning that could be an effective balance by providing benefits of e-learning and in person learning. This leaves the question of how effective a blended learning program would be. Exploring this question through the opinions of students is important to gauge whether blended learning is indeed beneficial and whether it should be implemented to stay after the pandemic. It will also allow for the potential discovery of unforeseen benefits that could have come with remote and blended learning during the pandemic that could not have been studied prior without such a large sample size.

In the midst of a pandemic, it would be unsafe to experiment with new learning models consisting of a heavy emphasis on in-person learning. Based on prior and current research, we have seen that remote learning has its drawbacks and benefits. The current implementation of remote learning does not necessarily have to be the final iteration of it, nor does it have to go away post-pandemic. In order to bring up a discussion of further implementation of remote learning, this study aims to open up the discussion to one of the major groups impacted by this potential change: students. The study will attempt to accomplish this by answering what high school students think of remote-learning and whether they will want the implementation of it in some form post-pandemic. This will be done through a survey that will suggest potential implementations of remote-learning post-pandemic.

We hypothesize that out of the various potential implementations that will be proposed throughout the survey, a majority of students will react positively to some of the ideas. For instance, the idea of attending class remotely when absent would appeal to students by providing them the ability to partake in class in instances they would normally be unable to. They may also find the idea of combining e-learning and in-person learning beneficial because the emphasis on in-person learning would overcome the common problems that come with e-learning, such as the lack of social interaction with peers and teachers (Loades et al., 2020). Additionally, students may prefer not needing to commute on the day of e-learning as it may allow them to spend more time

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on health-related activities like sleep or exercise (Christian, 2012).

Materials and Methods

In order to conduct this study, we will be making use of anonymous survey responses collected from high school students. First and foremost, we will be establishing how the transition from in-person teaching to remote online learning has changed the quality of education, whether the transition was smooth, and what benefits and challenges have been presented over the course of the past year. Moreover, it is important to determine how e-learning has evolved from its first implementation when the outbreak was declared a pandemic and to determine if there has been adaptation and improvements over the course of the year. After establishing the current learning climate in the educational sphere, the survey will then propose possible implementations of remote learning after the pandemic, such as taking extra classes online or using e-learning when absent for in-person classes.

A survey was deemed to be the most effective method of studying this question as it allows the implementations to be hypothetical, since it would be impractical and unsafe to suggest such implementations during these times. The specific questions asked on the survey are the following:

1. What Country are you learning in right now? (IE: United States, UK or etc.)

2. What year of highschool are you in?

   Freshman, Sophomore, Junior, Senior, Other:

3. What is your learning situation during the pandemic? How work is assigned?

   1: Blended 2: Remote 3: In Person 4: All of the above

4. How easy is it to learn new materials in class in your current learning situation?

   1: Worst   2: Awful   3: Neutral   4: Good   5: Best

5. How effective is your learning situation during the pandemic in terms of remembering the material?

   1: Not effective at all   2: Barely effective   3: Not sure 4: Sort of effective 5: Really effective

6. How do you feel about your current learning situation during the Covid-19 Pandemic?

   Open-Response

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7. What are the benefits you have experienced in this learning situation?

   Open-Response

8. What are the challenges that you have experienced in this learning situation?

   Open-Response

9. How much do you like in-person learning?

   1: Worst   2: Awful   3: Neutral   4: Good   5: Best

10. How much do you like remote-learning?

    1: Worst   2: Awful   3: Neutral   4: Good   5: Best

11. How was the transition into remote learning when lockdown first started?

    1: Worst   2: Awful   3: Neutral   4: Good   5: Excellent

12. What factors affected your answer to the previous question?

    Open response

13. Is online learning more collaborative or less collaborative?

    Less, The same, More, Other

14. Since March 2020, have the mechanisms of online learning improved?

    1: It's gotten a lot worse 2: It's a bit worse 3: No improvements 4: It's improving a little bit 5: It's improved a lot

15. If the mechanisms have improved, how?

    Open-Response

16. How would you feel about a blended curriculum of both in-person learning and remote learning?

    1: It's a horrible idea 2: I don't think that's a good idea 3: I don't know/not sure 4: I'm willing to try it 5: I definitely like the idea and would want it 6: Other (Open Response)

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17. If you had to be absent from school, for whatever reason, would you appreciate the idea of taking online classes from home instead? Effectively not missing school at all.

    1: It's a horrible idea 2: I don't think that's a good idea 3: I don't know/not sure 4: I'm willing to try it 5: I definitely like the idea and would want it 6: Other (Open Response)

18. With the flexibility that remote learning provides, would you take extra classes, subjects or simply spend more time with teachers if needed?

    1: Never   2: Probably Not 3: Unsure 4: Probably 5: Definitely 6: Other (Open Response)

19. Did you have more time while learning remotely?

    1. Less time 2. A little less time 3. No difference 4. A little more time 5. More time

20. Do you think that you were more productive in a remote setting?

    1. Not productive at all   2. Barely Productive 3. The same as in-person 4. A little more productive 5. A lot more productive

21. Do you think a ratio of 4 days of in-person learning and 1 day in-person would fix or alleviate the challenges you experience with your current learning situation and retain some of the benefits of e-learning? If not, what kind of ratio do you think works?

    Open-Response

22. Would you prefer going back to 5 days of in-person learning or would you be willing to try something different?

    Open-Response

23. Any additional comments, concerns or suggestions you would like to express about remote learning and the idea of having it incorporated in some way post-pandemic?

    Open-Response

    The aforementioned questions were asked to assess how students felt about their current learning situation to be able to analyze potential benefits of the proposed blended learning program. The questions that collect qualitative data will have their responses in the categories of positive, neutral, or negative, in order to gauge reaction to these proposed implementations (if applicable) or used to supplement and draw parallels to the results in the discussion. Each question that collects quantitative data will be composed into a chart or table with the respective responses and will be used to gauge overall response to these proposed implementations to paint a more holistic picture.

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Results

*Demographics of
responses*

What year of high school are you in?
66 responses

- Freshmen
- Sophmore
- Junior
- Senior
- Undergraduate (Final Year)
- College Sophmore
- college junior
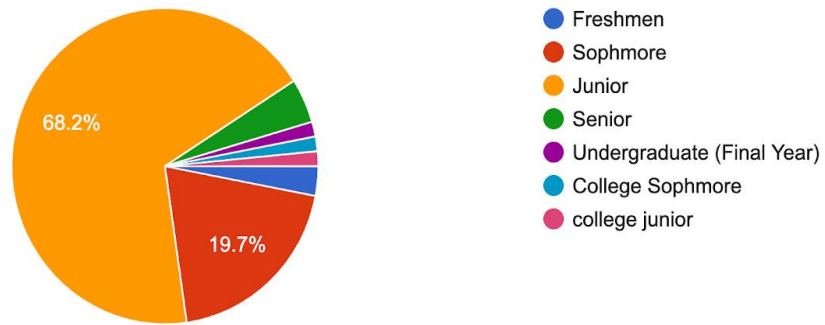
Figure 1: Grade Level Demographic of the Respondents

What Country are you learning in right now?
66 responses

- USA
- Turkey
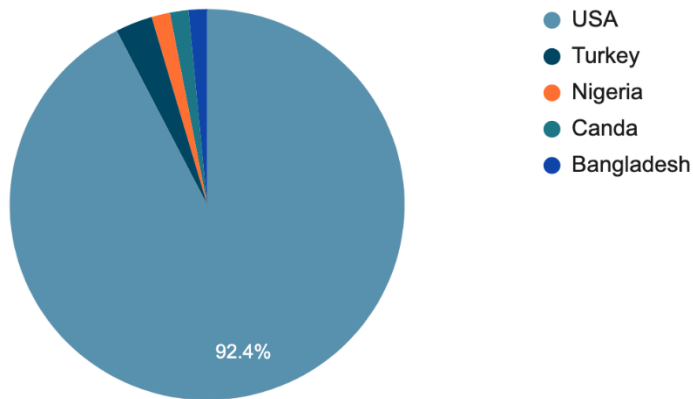- Nigeria
- Canda
- Bangladesh

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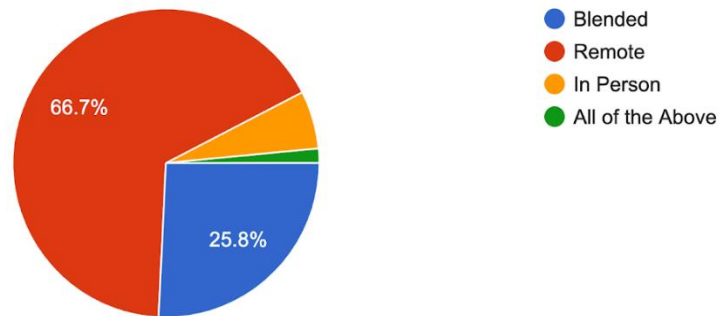Figure 2: Regional Breakdown of the Respondents

Figure 3: Circumstances of learning of the Respondents

Question and Summary of Qualitative Data

Qualitative data was collected in asking students their personal feelings towards their current modes of learning, the challenges they face and their opinions on the implementation of blended learning post-pandemic.

Q. How do you feel about your current situation during the Covid-19 pandemic?

The common theme in the responses to this question was general neutrality because while it is not an ideal situation it is necessary for the safety of students; thus respondents conclude they have adapted to their learning plan. Some of the answers recognized the privilege of having access to education despite trying times while other children around the world do not. The glaring issue that majority of respondents pointed out was a lack of motivation:

"It is very difficult to focus and actually learn content"

"It is harder to learn with COVID and harder to remain focused"

"In person is a lot better than online because I can focus more"

"It is alright but the stress and lack of motivation is hindering my ability"

"Stressful, I've been gaining a little of knowledge but I'm still overwhelmed"

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"Studying and work feels not mandatory"

These are only some of the several responses pointing out a lack of motivation and inability to retain information. One respondent mentioned having an unhealthy home environment as a contributor to their negative feelings towards their current online learning plan. There were mixed reviews for blended learning; one student explained that they feel as if they are going to two separate schools, one in person and the other online, while another felt that teachers have been doing their best to adapt to both modes.

Overall, out of the responses to the survey (n=66), 8 respondents felt positive about their current situation, 29 respondents felt neutral and 29 respondents felt negatively.

 What are the benefits you have experienced in this learning situation?

There were three common responses: more free time to indulge in other opportunities, more time to sleep and no need for a commute. Other answers included more independence and the ability to focus on one's own self. Some responses mentioned less social anxiety and better mental health. In reference to academic benefits, there is better time management, better access to notes and the access of learning tools during exams. One respondent also said they have had "higher academic performance holistically."

What are the challenges you have experienced in this learning situation?

Respondents gave varying challenges they have been facing depending on their situation and their environment. Overall, there have been challenges regarding motivation, focus, and less engagement. It is important to note that this lack of motivation, focus and engagement may be due to mental health as some students have reported feelings of loneliness from the lack of social interaction. Some students found issues with distractions at home and not having a boundary between school and home. Many also found technological issues to be a major challenge, such as internet connectivity struggles, having to share electronic devices, audio glitches, websites crashing, and technology breaking. Teachers are also said to struggle with assistance in correcting any audio glitches. One respondent mentioned their home environment as a challenge to their studies.

Q. What factors affected the [transition into remote learning when lockdown first started]?

Respondents gave varying factors that affected how well they transitioned into remote learning when lockdown was first initiated depending on their situation and their environment. Majority of respondents said the transition was "good", reasoning they had access to technology, good Wi-Fi, a good home environment and that their teachers were lenient in aiding students with the transition. Other answers included that their work was asynchronous, that there were assignments and no video calls, and the cancellation of final exams which alleviated stress. The minority of answers who answered that the transition was "excellent" also reasoned it was because teachers were lenient and that they already had access to the technology, Wi-Fi and other materials to accommodate e-learning. Many of those who answered "neutral" gave the same reasoning as

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those who answered "good". Other negative answers for those who answered "neutral", "awful" or "worst" mentioned the lack of preparation for the transition, learning to use the technology, not having access to the appropriate platforms, and lack of organization. There were also personal challenges such as depression, anxiety, personal deaths, and a bad home environment.

Q. If mechanisms have improved [since March 2020], how?

A large majority of respondents report improvements in the way online learning is being conducted, mainly by the implementation of proper structure, better organization, and effective use of apps, and learning platforms. One respondent noted how online learning has effectively become the new norm so there has been a natural adjustment to it; other notes how, given the current state of affairs, 5 day in-person classes will not be returning in the near future which has prompted a more positive attitude and willingness to learn online. Websites and apps have also been noted to improve their service given the circumstances of the pandemic. On the other hand, there are a number of respondents who do not find much change at all.

Q. Do you think a ratio of 4 days of in-person learning and 1 day remote would fix or alleviate the challenges you experience with your current learning situation and retain some of the benefits of e-learning? If not, what kind of ratio do you think works?

Majority of respondents agree that the mode of 4:1 would alleviate the challenges they face while others prompted a 3:2 of in-person and online learning to be a better combination. Indeed, there are some who would prefer to go back to the regular 5 days of in-person learning, thus they find the 4:1 day schedule as a step back. Overall, many respondents seemed to respond positively to having a blended learning ratio in the future as 49/66 respondents had either agreed to the alleviation or proposed another ratio of in person to remote learning, while 10/66 respondents were unsure or neutral about it, and 7/66 respondents wanted complete in person learning.

Q. Would you prefer to go back to 5 days of in-person learning or would you be willing to try something different?

The answers were split as 27/66 respondents were open to the idea of trying out a hybrid system in the future, while 32/66 respondents would prefer to go back to the regular 5-day school week pre-covid when it is safe to do so. 8/66 respondents were unsure of whether they would be willing to try something new or were undecided.

Q. Any additional comments, concerns or suggestions you would like to express about remote learning and the idea of having it incorporated in some way post-pandemic?

Majority of respondents did not have any extra comments. Some answers different from what has already been established above:

"I think that in-person learning is generally more conducive, but the breaks and alleviation in schoolwork students experience during remote learning is good to incorporate in some way"

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"Concerned it will be used to hold kids to a standard of needing to perform well in school while being very ill and actually needing rest"

"I personally believe that in-person learning is superior to other types of learning, and schools should try to maximize onsite learning as much as possible, as long as it's safe of course."

"The school system should change. We spend too much time in school, and we rarely learn any life necessary skills like filing taxes. Also, some online lessons are just lecturing that you can teach yourself with YouTube."

Summary of Quantitative Data Concerning Previous and Current Learning Situation
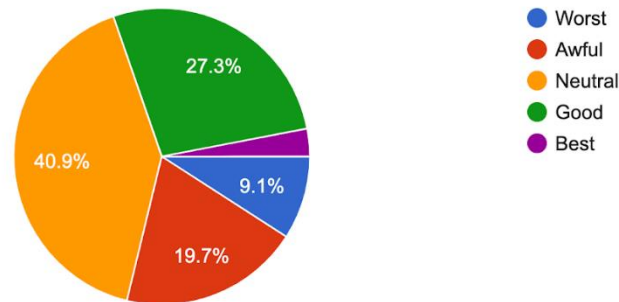
Figure 4: Ease of Learning under current circumstances

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Figure 5: The efficacy of the Respondent's current learning environment for remembering
material

How effective is your learning situation during the pandemic in terms of remembering the
material?
66 responses

Legend:
- Not effective at all
- Barely effective
- Not sure
- Sort of effective
- Really effective

36.4%
12.1%
7.6%
42.4%
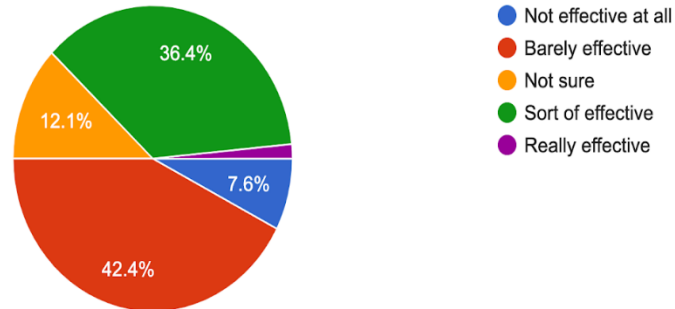
How much do you like in-person learning?
66 responses

Legend:
- Worst
- Awful
- Neutral
- Good
- Best

42.4%
18.2%
31.8%
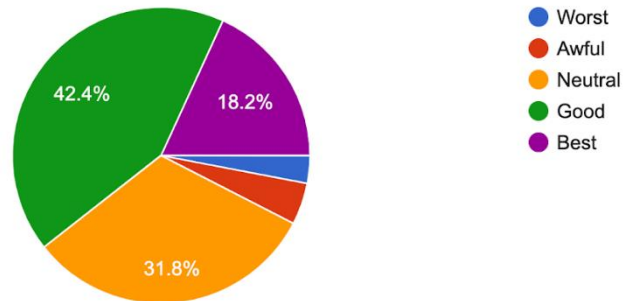
Figure 6: Breakdown of how Respondents feel about in-person learning

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How much do you like remote-learning?
66 responses
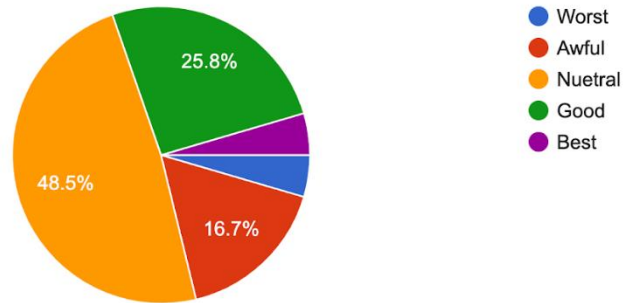

Figure 7: Breakdown of how Respondents feel about remote learning

How was the transition into remote learning when lockdown first started?
66 responses
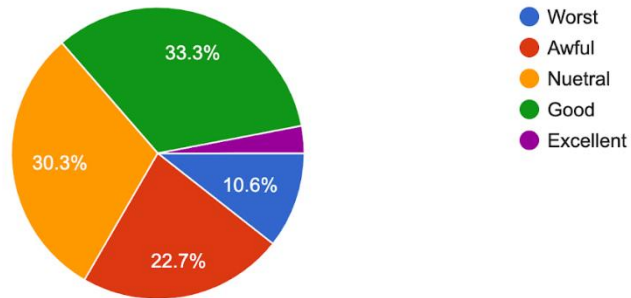
Figure 8: Breakdown of how Respondents felt their school handled the transition to the new remote learning environment

Figure 9: The collaborative difference between online and in-person learning according to the Respondents

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Is online learning more collaborative or less collaborative?
66 responses
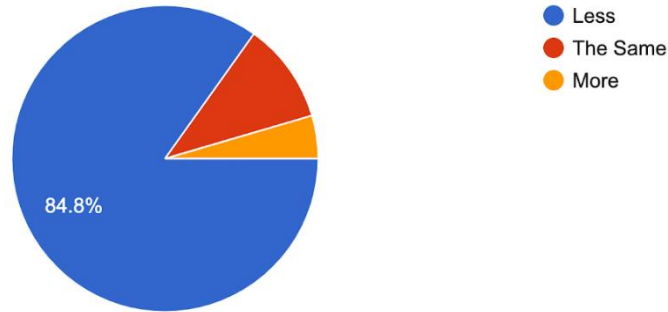
Figure 10: How Respondents feel online learning has improved over the course of the pandemic.

Since March 2020, have the mechanisms of online learning improved?
66 responses
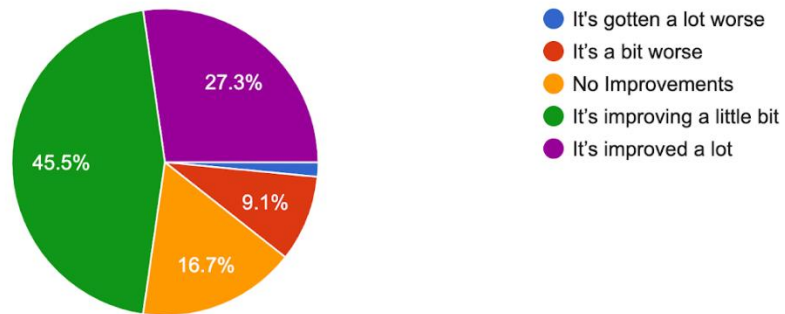
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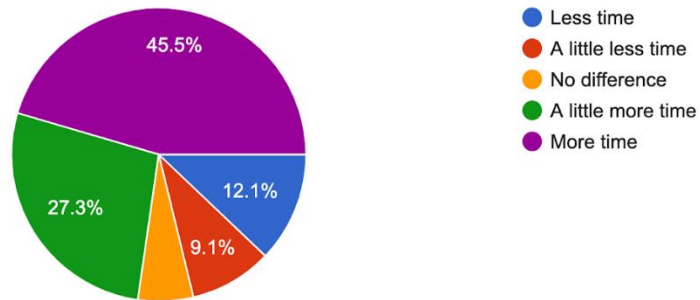
Figure 11: Breakdown of how much free time the Respondents had during remote learning compared to in-person learning

Figure 12: Breakdown of how productive the Respondents had felt during remote learning compared to in-person learning

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Summary of Quantitative Data Concerning Potential Future Implementations

Figure 13: Breakdown of responses towards a blended curriculum post-pandemic

Figure 14: Breakdown of responses towards the potential use of remote learning to avoid absences from school

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With the flexibility that remote learning provides, would you take extra classes, subjects or simply spend more time with teachers if needed?
66 responses

Figure 15: Breakdown of responses towards the potential use of remote learning for extra classes or extra help

Discussion
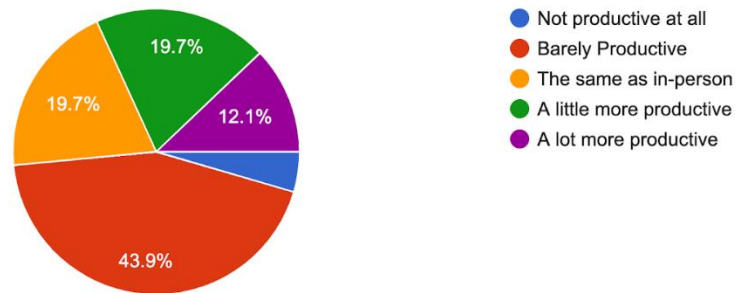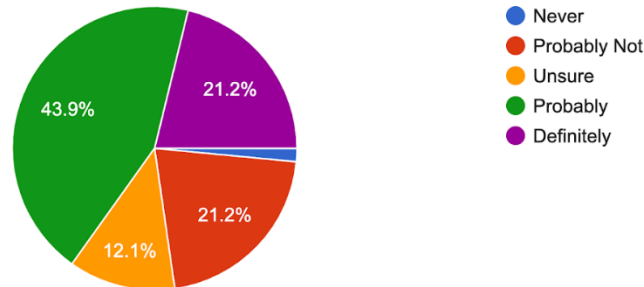
The main purpose of this study was to propose several possible implementations of remote learning in schools after the pandemic to high school students in order to gauge whether these students would want such implementations as they would be the ones most impacted by it besides teachers. By analyzing the open-response questions by categorizing them into for, against or neutral towards the implementations and/or taking note of patterns and trends within these responses in conjunction with the qualitative data collected, this study provides insight into whether any form of remote learning should be implemented from the students' perspective. Additionally, this study will add to the body of data on how students feel about the current system and the challenges and benefits they feel they are experiencing in such unprecedented times.

The responses collected concerning the students previous and current learning situation during Covid-19 aligns with and is supported by previous research as the trends of lack of focus, engagement, and social interaction were present in the responses collected (Dhawan, 2020; Addedoyin and Soykan, 2020). Besides these recurring trends, potential drawbacks found with the current remote learning system include but are not limited to harm from an unhealthy home environment, inability to be a part of the school community as extracurricular activities/sports aren't on the same scale as before and teachers being unable to effectively adapt to the new circumstances. However, there were benefits that came with the current learning environment as well: Students had more time to themselves as they didn't have to commute consequently leading to more sleep and time towards healthier habits, and Students were given less work overall by teachers to alleviate some of the stress that came with the pandemic.

As hypothesized, the responses were mostly in favor of some of the potential implementations of remote learning proposed in this study however, it was not an overwhelming majority as previously thought. In fact, the responses to the implementations were nuanced as many potential

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drawbacks as possible and benefits were listed by the respondents. The respondents in favor of the potential implementations, as expected, had listed the benefit of less commute and extra personal time. This result suggests that some implementation of remote learning post-pandemic is a possibility to explore as students seem willing to try something different to change or supplement the standard 5 days of in-person instruction. But, with such nuanced responses, it is important to take into consideration the drawbacks of such implementations. Some respondents were worried that implementing a permanent hybrid model may be damaging to students who have an unhealthy home environment or don't have the accommodations to attend class in this way. Keeping this in mind, it may be beneficial to make future implementations be up to the student, essentially allowing them to choose a blended learning model or in-person learning in order to address these concerns and the split opinions on the implementations proposed in this study. In addition to concerns of accommodations and home environment, concerns on the amount of workload and pressure that may be placed on students from these implementations were brought up as well. To alleviate or prevent such problems in the future, schools may need to consider giving less work overall in conjunction with these proposed implementations as many respondents noted a benefit of remote learning had been less work and time spent on school.

It is important to note that our study comes with a myriad of limitations that can be further worked upon by others (Ross and Zaidi, 2019). One such limitation is the geographical reach of this survey as most of the responses were heavily located in the U.S. meaning our survey will not be reflecting how students in other countries would feel about such a program. Additionally, since other countries had responded to the online-learning situation differently the proposed benefits and challenges faced by these students and the impact of this blended learning model may not be accurate. Moreover, remote learning certainly may not work for those who come from disadvantageous backgrounds. In the survey, one respondent consistently reasoned a bad home environment to be the main challenge in the adjustment and implementation of online learning for them. We realise this is a major issue being experienced by students worldwide which should be addressed. Another limitation faced is the nature of this study, conducting a survey and collecting data qualitatively from students may indicate false positives on the benefits of this system. However, it is still important to take student opinion as they and teachers would be the ones who will be impacted by such a change. The final limitation of our survey is the sample size. If we were able to conduct this survey over a longer period of time and obtain a larger sample size of responses the accuracy and implications of our study would increase significantly as we would have more evidence to refute/support our hypothesis.

However, despite the limitations within our study, there are several future implications that can stem from our study. One implication is to open the discussion of making blended learning the standard within the education system in place of the five days in-person learning system as the surveys suggest there are potential benefits in doing this as it opens-up more time for the students. Additionally, another implication this study holds is that there may be unseen benefits that can be found in changing the education system as experiments cannot totally account for how the student feels and their opinions on the matter. Thus, implying that the education system can be improved in other ways then the course material or how subjects are taught as we can also change/shift whether students need to go to a physical building to learn or can learn from home.

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Other researchers can take the variables in this study and aim to answer the same question more significantly by changing the questionnaire to be able to measure them in a quantitative way as this would allow for statistical analysis to be made. Gathering data on how students feel and experience e-learning and in-person learning opens up schools to adapt and evolve during the pandemic and after. Or other researchers can propose different or more detailed implementations of remote learning tools/methods into the school system.

We would like to thank and acknowledge those who participated in the surveys we sent out, all of the authors of the papers we have cited and any researchers who are working on related topics regarding the impacts of online learning on students.

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Meritocracy in the Educational System

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Abstract

A meritocratic education system, by nature, is one where students are enabled to accomplish achievements, and receive corresponding rewards, regardless of outside factors. The common norm in schools is that achievement based on merit explains school success, and that merit is the only means of the upward mobility of all students in regard to societal status, regardless of age, gender, ethnicity, current social status, etc. The primary motive of this study was to determine whether education reflected this meritocratic nature and if education is merely a scale of academic achievement by examining trends within students. The materials we used to justify our results were demographic trends, school performance (self-assessment scale), and family background. Data was collected through surveys distributed to students (n = 351) with a mean age of 16.2. Our study was run within three main regions: United States, Canada, and Nigeria, and the results indicated that even though there is evidence of a correlation of a meritocratic nature in the education system (from the contingency tables), it fails to take into account socioeconomic factors, with other external factors affecting student achievement such as the generational cycle. Factors of constraint that are evident in our study include an uneven bell curve based on the categories of students surveyed, inequitable (biased) self-assessment responses, and achievement gaps in the education system.

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Categories: Education, Equality
Keywords: Education, Department of Education, Reform

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Background and Literature Review

In 1958, Michael Young wrote a book called *The Rise to Meritocracy*, this book introduced the concept of meritocracy: a system that appoints status on the basis of an individual's merit. It seemed to be a fair system, where success is granted to those who are deserving. Since its introduction, it has been integrated into many systems within society. (Mijs, 2015). In (Liu, 2011) the four major principles of a meritocratic system– the concept of merit, distributive justice, equality of opportunity, and social mobility– are examined. One major principle of meritocracy is the concept of social mobility. (Liu, 2011) While it is acknowledged that meritocracy engenders and legitimizes elite social classes, (Young, 2001) it also creates a potential pathway for individuals to "achieve social status by virtue of their actual abilities and contributions" (Moore, 2004 p. 39). This is something that had not previously been possible with other systems such as hereditary aristocracy or nepotism. The idea of meritocracy and its function of distributive justice has been favored by many because it creates a strong incentive for effort and it "provides a principle of justice for the allocation of reward" (Mijs, 2015). However prominent the ideology might be, its presence has drawn much criticism. A major point of criticism is centered around the conception that a meritocratic system fails to take into account the unmeritocratic factors that contribute to the talents of an individual that allow them to procure success within the system. Factors such as genetics, wealth, and quality of schooling all have an influence on the abilities of an individual. Each member of the population does not start off on the same playing grounds, but a meritocratic system takes the best performance, on the assumption that everyone has an equal opportunity to be the best when that is just not the case in reality. (Mijs, 2015)

Young reflected on the consequences of a meritocratic system, where societal status was dependent on natural intelligence capabilities and hard work. He concluded that meritocracy would lead to dystopia and establish prolonged inequality, which would become the basis of social justice issues and a kleptocratic diffusion among politicians, who would feel entitled to rewards as they are relatively high in the meritocratic scale, as mentioned in a 2001 Guardian newspaper article (Young 2001).

In this sense, meritocracy is not merely reflected in inherent attributes, but rather a culmination of "IQ plus effort" (Menand, 2019) with a coalescence of talent, cognitive ability (an extension of the IQ framework), and personal qualities, such as cooperation and leadership, which, of course, could be a reflection of domestic activities or outside influences as well. Nevertheless, a student with a reflection of effort and development that does not coincide with these factors conventionally end up lower on the meritocratic scale, which is proven to erode student academic self-esteem as they are perpetuated to believe that their failure is a reflection of their lack of hard work, intelligence, and acquired talent (Sobuwa et al., 2019).

Even worse, the rapid growth in the numbers of students that attend schools reflect a loss of homogeneity and increased diversity, and this diverse body constitutes a nature in which

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academic associations are pressured to assist students who are underprepared due to their plight in their education, which, of course, could be because of several distinct factors as well. Through the transition to a higher population of students, pedagogy and corresponding school curricula are sometimes modified to adjust to the evolving demographics of the student body. In other scenarios where higher education institutions fail to alter the system of merit, underprepared or disadvantaged students are doomed to fail. This hypothetical situation presents a challenge as student services and institution governing bodies must establish a close working relationship with students in order to maintain the non-traditional students who do not have or did not have access to adequate resources or educational foundations. A specific solution proposed for students who underwent poor prior educational experiences (due to a number of factors such as sub-standard curricula, work environment, and/or socioeconomic status) is that higher education institutions can avail these "non-traditional" categories of students through attending to the educational needs of students prior to entry, mainly through social inquiry in order to develop the academic foundation of non-traditional students so that they may be entitled to success in a robust education setting (Thomas et al., 2002).

Talking about meritocracy as a system that is rapidly evolving, a thorough analysis of the consequences and ideologies of meritocracy should be discussed. In an analysis regarding quota systems, Thomas Conrad describes the basic principles for meritocracy. First, merit should be dependent on the individual's level of talent. Under these circumstances, the most talented should receive rewards, of greater value, compared to the less talented. Essentially, the distribution of rewards should be based on merit. (Conrad, 1976)

Our hypothesis for this study is that the educational system is not entirely meritocratic because of the existing disparities that place students at a disadvantage.

Materials and Methods

To investigate the general nature of students in various achievement groups, we collected primary international data by distributing surveys created via the platform of Google Forms.

A majority of our responses came from Canada, Nigeria, and the United States of America. Initially, we wanted to reach out to both public and private schools across six different countries to have them distribute our surveys to their students. Our original target countries were the USA, South Korea, Mexico, Nigeria, Switzerland, and India. We sought to choose countries from varying geographical locations to validate the universality of our results. Countries were chosen based on the rigor of the national curriculum, the location of our team, and the general quality of education. Research into these countries involved the languages spoken, understanding how the education system worked, compiling a list of schools. However, due to the eventual lack of responses on the part of the schools, we turned to the use of digital media instead. We created multiple versions of the survey, to better fit the region it was answered in. Surveys were primarily distributed through various digital, social platforms such as Whatsapp, Instagram, Discord, and Reddit.

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Participants were selected using opportunity sampling and snowball sampling. The target demographic of the respondents was high school students or the international equal, between the ages of 14-18 years. In actuality, some respondents fell beyond the scope of the targeted demographic and were filtered out.

The surveys consisted of multiple-choice questions, as well as 4 short answer questions. Questions were organized into 3 categories.

1. *Demographic information*

This category aimed to collect information about the demographic background of respondents. Such questions included age, school grade, gender, type of area of residence, and race/ethnicity where applicable.

2. *School performance*

Questions regarding effort, awards, academic placement, level of achievement, extracurricular activities, and exam preparation. These questions were asked to determine the level of school performance of each participant.

3. *Family background*

To better understand the context in which respondents lived, questions concerning household size, level of parent education, family priorities, and student employment were included.

To conclude the survey, participants were given the chance to share anything else about their schooling experience as a response option in the form.

Surveys were designed to provide information about students in different achieving groups, to see if any correlations could be drawn between high achieving students and average achieving students.

Results

A total of 351 high school students across five identified countries answered our survey. (233 female, 106 males, 12 other) Participant ages ranged from 14-18 ($\bar{x} = 16.2$, $\sigma = 0.83$). Respondents were required to indicate what type of student they considered themselves to be: high achievers, average achievers, or low achievers. 242 students considered themselves high achievers, 104 considered themselves to be average achievers, and 5 considered themselves to be low achievers. Information derived from our primary data showed a strong statistical correlation

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between respondents' backgrounds and their educational experience. The level of education a student's parents achieved, is directly proportional to the type of achiever the student is in an academic environment. High achieving students were likely to have parents with an undergraduate degree or higher. $X^2(10, N = 351) = 20.76$, p = .023. The probability that a student will be a high achiever given that their parent has an undergraduate degree is 71.6%, and the probability that a student will be a high achiever given that their parent has a master's degree is 77.5%. Similarly, results showed a strong relationship between the prioritization of education in a student's household and their plans to pursue education beyond the secondary level. Students that came from households that do not prioritize education were more likely to not continue school after high school. $X^2(1, N = 349) = 68.43$, p < .001. There was a strong positive correlation between high achieving students and allocation of merit. High achievers were more likely to receive an academic award relative to average and low achievers. $X^2(2, N = 351) = 18.02.$ $p = <$ .001. This demonstrates that award distribution Students are more likely to receive an award if they are in the top 25% of their peers, relative to the middle 50%. $X^2(3, N = 351) = 25.31$, p < .001.

Type of Achiever and Academic Awards

Contingency Tables

Have you received any academic awards in the last 3 years in school?		What type of student do you consider yourself to be?			
		Low Achiever	Average Achiever	High Achiever	Total
Yes	Count	1.000	40.000	149.000	190.000
	Expected count	2.707	56.296	130.997	190.000
	% within column	20.000 %	38.462 %	61.570 %	54.131 %
No	Count	4.000	64.000	93.000	161.000
	Expected count	2.293	47.704	111.003	161.000
	% within column	80.000 %	61.538 %	38.430 %	45.869 %
Total	Count	5.000	104.000	242.000	351.000
	Expected count	5.000	104.000	242.000	351.000

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| | % within column | 100.000 % | 100.000 % | 100.000 % | 100.000% |

Contingency Tables

Have you received any academic awards in the last 3 years in school?		What type of student do you consider yourself to be?			Total
		Low Achiever	Average Achiever	High Achiever	
Yes	Count	1.000	40.000	149.000	190.000
	Expected count	2.707	56.296	130.997	190.000
	% within column	20.000 %	38.462 %	61.570 %	54.131 %
No	Count	4.000	64.000	93.000	161.000
	Expected count	2.293	47.704	111.003	161.000
	% within column	80.000 %	61.538 %	38.430 %	45.869 %
Total	Count	5.000	104.000	242.000	351.000
	Expected count	5.000	104.000	242.000	351.000
	% within column	100.000 %	100.000 %	100.000 %	100.000%

Chi-Squared Tests

	Value	df	p
X²	**18.024**	**2**	**< .001**
N	**351**		

Figure 1. *Proportional nominal comparison of each type of achiever on the self-assessment scale, statistically significant at the level of P < 0.05.*

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Academic Placement and Academic Awards

Contingency Tables

Have you received any academic awards in the last 3 years in school?		Where would you place yourself in your grade?				
		Bottom 25%	Lower middle 25%	Upper middle 25%	Top 25%	Total
Yes	Count	0.000	10.000	73.000	107.000	190.000
	Expected count	2.165	15.157	87.151	85.527	190.000
	% within column	0.000 %	35.714 %	45.342 %	67.722 %	54.131 %
No	Count	4.000	18.000	88.000	51.000	161.000
	Expected count	1.835	12.843	73.849	72.473	161.000
	% within column	100.000 %	64.286 %	54.658 %	32.278 %	45.869 %
Total	Count	4.000	28.000	161.000	158.000	351.000
	Expected count	4.000	28.000	161.000	158.000	351.000
	% within column	100.000 %	100.000 %	100.000 %	100.000%	100.000%

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Chi-Squared Tests

	Value	df	p
X²	25.308	3	< .001
N	351		

Figure 2. *Proportional numerical percentage comparison of each type of achiever on the self-assessment scale, statistically significant at the level of P < 0.05.*

Education Prioritization and School Continuation

Contingency Tables

Is education prioritized in your household?		Do you plan on continuing school after high school?		
		No	Yes	Total
Yes	Count	1.000	337.000	338.000
	Expected count	3.874	334.126	338.000
	% within column	25.000 %	97.681 %	96.848 %
No	Count	3.000	8.000	11.000
	Expected count	0.126	10.874	11.000
	% within column	75.000 %	2.319 %	3.152 %
Total	Count	4.000	345.000	349.000
	Expected count	4.000	345.000	349.000
	% within column	100.000 %	100.000 %	100.000%

Chi-Squared Tests

	Value	df	p

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X²	**68.429**	**1**	**< .001**
N	**349**		

Figure 3. *Proportional nominal comparison on education prioritization vs. pursuits in higher education, statistically significant at the level of P < 0.05.*

Type of Achiever and Parent Level of Education

Contingency Tables

Did your parents or guardian go to school? If so, to what level?		What type of student do you consider yourself to be?			
		Low Achiever	Average Achiever	High Achiever	Total
Less than Secondary School/High School	Count	0.000	7.000	8.000	15.000
	Expected count	0.214	4.444	10.342	15.000
	% within column	0.000 %	6.731 %	3.306 %	4.274 %
Secondary School/High School	Count	1.000	23.000	40.000	64.000
	Expected count	0.912	18.963	44.125	64.000
	% within column	20.000 %	22.115 %	16.529 %	18.234 %
Undergraduate Degree	Count	1.000	24.000	63.000	88.000
	Expected count	1.254	26.074	60.672	88.000
	% within column	20.000 %	23.077 %	26.033 %	25.071 %
Master's degree	Count	0.000	27.000	93.000	120.000
	Expected count	1.709	35.556	82.735	120.000
	% within column	0.000 %	25.962 %	38.430 %	34.188 %
	Count	3.000	14.000	25.000	42.000

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Specialized Profession (e.g., Medicine, Law, etc.)	Expected count	0.598	12.444	28.957	42.000
	% within column	60.000 %	13.462 %	10.331 %	11.966 %
PhD	Count	0.000	9.000	13.000	22.000
	Expected count	0.313	6.519	15.168	22.000
	% within column	0.000 %	8.654 %	5.372 %	6.268 %
Total	Count	5.000	104.000	242.000	351.000
	Expected count	5.000	104.000	242.000	351.000
	% within column	100.000 %	100.000 %	100.000 %	100.000%

Chi-Squared Tests

	Value	df	p
X²	**20.759**	**10**	**0.023**
N	**351**		

Figure 4. Proportional nominal comparison of each type of achiever on the self-assessment scale vs. the level of parent/guardian higher education in the globally recognized respective degrees, statistically significant at the level of P < 0.05

Discussion

Analysis of the results indicate that at its core, the educational system is indeed meritocratic: the top 25 percent of students were recognized and awarded for their performance, and students in the middle 50 percent were less likely to be rewarded. This can be modeled through a bell curve. Aside from the two extreme tails on either side of the bell curve; in which recognition and merit may not necessarily be allocated by work and achievement, success and merit are consistent according to two factors; hard work and achievement. However, meritocracy as a system is inherently flawed as it fails to consider the underlying and external factors that affect a student's success in regard to education. Such an example is domestic influence, in which students are influenced by their upbringing and family values. This in turn impacts their educational experience. Three out of the 4 students who reported that education is not prioritized in their household asserted that they would not be continuing school beyond high school regardless of their achievement level and despite the fact that a tertiary education provides many economic

benefits to the individual. (Baum and Ma, 2007). The academic success of a student is also influenced by their parents. As exemplified in our data, high achieving students are likely to have parents who are educated beyond the secondary level. Parents who have found success in the meritocratic systems of higher education will look to aid their children and help them succeed (Mijs, 2015). This could be reflected in various ways like an upbringing that emphasizes the importance of good academic performance, extra tutoring, or motivation. These helps enable students to perform well and be rewarded accordingly by the meritocratic system. It gives them an unfair advantage compared to students whose parents do not provide the same things. What is considered the individual's merit cannot be accredited to them alone, but to their circumstances as well. As Mijs argues, individuals are no longer "deserving" of their success, because meritocracy itself is flawed, in that it perpetuates a generational cycle where high achievers come from a generation of people that have found success in the meritocratic system. In the future, when these students become parents, they are likely to follow this cycle to help their own children become high achievers, and this cycle continues indefinitely.

In accordance with the meritocratic trap that Markovitz asserts, our results lead to the conclusion that the rise in inequality is the product of meritocracy itself, reinforced by a generational cycle. The generational cycle works by enabling individuals to flourish within the meritocratic system, therefore providing these individuals with access to high-skilled jobs and then displacing those disadvantaged from the center of economic production. (Markovitz 2019) These high-skilled workers, who we will refer to as elite workers, use their acquired affluence to ensure an elite education for their children, ensuring that their offspring are able to acquire a qualified education to be professionally suited for the labor market. (Markovitz 2019) The generational cycle that has been created produces an unequal generational advantage that amplifies economic inequality, dramatically suppresses social mobility, and creates a time divide between an elite class whose members work (due to a higher demand for their talents) and an increasingly idle disadvantaged class (whose work has been made redundant). The mere principle of meritocracy is described to have an indiscriminate nature aimed to eliminate bias and therefore allow an equal starting point for everyone in a society to succeed. Even if meritocracy allowed for equal levels of opportunity, this does not diminish the reality that subsequent successful generations generate an endless cycle of success for the top 25 percentile as demonstrated on the bell curve. First-generation members of the cycle who emerge from the system successfully would be in an advantageous position to provide better socioeconomic conditions for the next generation to compete in the same meritocratic system. The opposite is also true, in which the first-generation parents who were unsuccessful within the meritocratic system fall to a disadvantage that will most likely pass on to their children (Klusener 2018).

The majority of data from our results demonstrated that more than half the time, high achieving students had parents who pursued higher education. The same is proven when observing our results from lower achieving students. Low achieving students often had parents who completed secondary education/high school. Also, when focusing on the correlation between education prioritization vs. school continuation, our results indicate that the vast majority of students stated that education was a priority within their households. While a majority of our responses were high achieving students, it is significant to note that 3 out of the 4 respondents that indicated that education was not prioritized in the household do not plan on continuing school after high school.

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The four respondents that stated that education was not a priority also stated that their parents had completed an education level up to secondary/or high school. When compared to their more affluent peers, low-income students are four times more likely to perform academically worse. (Klusener 2018) We can logically assume that the unsuccessful parents produce a cycle of disadvantage for their children in which education as a result is not prioritized and continuing education is overlooked. The successful parents of the first generational race continue to build a head start they can gain benefits from, while the unsuccessful parents struggle, thereby exacerbating existing inequalities and justifying it with meritocratic principles.

Particular responses from the short answer questions highlighted just how strong an influence a student's background has on their experience in the meritocratic system. A student who did not plan on pursuing an education beyond high school due to financial implications, came from a large household where work took priority over education was academically placed lower relative to students from other backgrounds.

This response draws insight into how a household where education is not prioritized, and where the student's parents do not have a proper education, affects the student's performance and view on school. It also can be assumed that there are other factors amongst the student's responses that factor into their education, such as their race. In a Stanford paper, it was found that in a 1966 study (Equality of Educational Opportunity), which presented data from over 600,000 students, that "parental education, income, and race are strongly associated with student achievement" (Hanushek et al., 2019). Upon concluding their data, the smaller the difference between the student's and the parent's education level is, the higher the education level of the student. In numerous other studies and journals, this same correlation can be found.

This study presented data that could be considered as the group of students from the lower end of the bell curve. These students can be characterized as the students who are largely disadvantaged compared to their peers within the meritocratic system. One notable response is described below:

Limitations

This study was mostly limited in the type of respondents that answered the survey. A majority of our respondents were high achievers, and data collected on low achievers was rather limited. Additionally, as the responses to the survey were self-reported, participants were susceptible to social desirability bias. A participant is less likely to report themselves as a low achiever academically as it may not be considered desirable. Equally students who are very focused on their education may be more inclined to fill out a survey concerning their educational experience as opposed to those who do not regard their education as something important. Limitations are also evident in the methods that were used to distribute the survey and collect information. Opportunity and snowball sampling meant that collected data came from a sample that did not accurately represent the general population of high school and secondary school students. Another is that type of respondents is skewed to one area. The virtual nature of the survey also meant that we could not collect responses from members of our target population that lack adequate access to the internet. Due to time and resources, the geographical location of our respondents was also largely concentrated, which could have affected the general nature of our

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responses.

Moving Forward

Future research could account for the limitations present in this study and work to collect data from a larger and more representative sample. Perhaps a method other than self-reported surveys could be used to collect data on different types of achievers. If this study were redesigned, it could be distributed more, both individually and by networking with schools, to receive a greater sample size. The initial attempt to receive survey responses by networking with schools (as mentioned in Materials and Methods) could be improved by calling schools instead of emailing, for a faster response rate. Other forms of media could be used to collect data such as posting the survey on individual school social media pages, physical surveys, or interviewing students.

More data could be collected from low achievers to see if the bell curve works as presented currently. Additionally, more regions throughout the world could be assessed to generalize results among students, as a whole, and gain credibility. Upon receiving more data, it could be sorted among different geographical areas (rural, suburban, urban, city, etc.) as well as country/state. Analyzing using this method would solidify if the results were consistent throughout varying factors. Lastly, different factors could be studied such as the type of achievers the student's parents were, and the monetary value put into the student's education.

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Concluding Statements

All research fellows and Principal Investigators worked in partnership to conduct in-depth data collection and analysis to better understand the various socioeconomic issues presented within the research papers. Each study evaluated specific dependent variables addressing their respective topics, such as healthcare availability and MTA optimization. Researchers then worked to analyze significant data and produce trends that can be used to support the creation of new policies.

With the research created by our research fellows, Principal Investigators, and advisors, we will be able to work towards finding solutions to the many socioeconomic issues present in our world today. Through a combination of non-partisan, open access research and lobbying to various well-regarded and well-connected politicians, the Finxerunt Policy Action Institute will work in collaboration with the International Socioeconomics Laboratory to produce sustainable and innovative solutions to the problems addressed throughout the research studies. Every empirical study has revealed a systemic economic or social science issue, along with its long-term and short-term effects.

The International Socioeconomics Laboratory will continue to address prevalent socioeconomic problems in society through conducting experiments that will help evaluate the significance of the issue and the viability of future solutions. Each research paper will have the potential to become the basis of a large-scale project, similar to that of the institute's $150 million COVID-19 healthcare facility project in New York City. With the network and connections established by the Finxerunt Policy Action Institute, the results produced within this journal will be a cornerstone of large-scale policies that will ensure a more equitable and sustainable future.

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