The Impact of SNAP on Poverty During the COVID-19 Pandemic

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***Abstract*—Food insecurity and poverty and inequality are a pressing issue faced by millions of individuals and families in the United States. Despite this, the proposed cuts to the social safety net, including the Supplemental Nutrition Assistance Program (SNAP), would be detrimental to the progress made by this nation. This project aims to investigate whether the expansion of SNAP during the COVID-19 pandemic helped further reduce poverty and food insecurity, using data visualizations based on Census data on poverty rates and SNAP participation. The findings suggest that the 2020 SNAP expansions did not correspond with a decline in poverty rate; in fact, the poverty rate rose, indicating that other sources of economic instability may have undermined the program expansions' intended impact.**

I. Introduction

Food insecurity has long been a critical issue in the United States, drawing attention from both researchers and policy makers. However, federal efforts to address food insecurity were largely absent until the aftermath of the Great Depression in 1932, when the first major government food aid initiatives were introduced. Today, the Supplemental Nutrition Assistance Program (SNAP) serves as the nation's largest food assistance program. It provides essential support to about 42 million individuals and families. But recently, the new administration has threatened to cut the funding of SNAP, which, of course, raises concerns about how such cuts could negatively impact the households that rely on this aid. While food insecurity is one of the key concerns of SNAP, this project focuses on evaluating the effectiveness of SNAP in reducing poverty, especially during pandemic era policy expansions.

To begin this analysis, it is important to review existing literature on SNAP's role in alleviating poverty and food insecurity. A lot of work exists on this topic and in particular researchers like to look at times when the country experienced economic downturn and policy change. However, before turning to this research, it is important to define key terms and provide additional background knowledge. Food insecurity is defined as "the limited or uncertain availability of nutritionally adequate and safe foods, or limited or uncertain ability to acquire acceptable foods in socially acceptable ways," [1]. To measure the level of food insecurity, each December, the U.S. Department of Agriculture (USDA) sponsors a supplemental survey to the Current Population Survey, called the Household Food Security Survey. Based on how households answer the questions, they are put into one of four categories: high food security, marginal food security, low food security, and very low food security. Answering with three or more affirmative answers to the questions will label the household as food insecure. To qualify for SNAP, households must meet certain income and asset criteria, though the states have the power to adjust the eligibility requirements. For example, Michigan no longer imposes asset limits as of March 2024 [5]. Now that we have covered the basics, the next part of this section will highlight some key takeaways from the research on how effective SNAP is.

As I said earlier, there are numerous studies that are able to highlight SNAP's effectiveness in addressing food insecurity and improving economic conditions for its recipients. According to research from the University of Kentucky's Center for Poverty Research [10], SNAP has been seen to significantly reduce poverty rates, in particular for households that include children. Additionally, a study showed that SNAP participation has been linked to improved health outcomes, since it allows families to afford more nutritious food, which in turn can lower healthcare costs as they wouldn't have to go to the doctors' as often [2]. More recent studies have provided insights into how the expansion of SNAP during the pandemic helped further reduce the hardship of poverty and food insecurity, which is what this project ultimately wants to show. In response to the pandemic, the government expanded the social safety net, since they were aware of the deteriorating economic conditions the nation was facing during this unprecedented time. The Families First Coronavirus Response Act lays out how the USDA expanded SNAP in numerous ways, the main changes being a 15% increase in all benefits and boosting every household to the maximum benefit for their household size [3] [7]. According to Jackson, Chiang, and Hamad (2024), compared with SNAP-eligible non-recipients, SNAP-eligible recipients experienced decreased food insufficiency (-1·9 percentage points (pp); 95 % CI -3·7, -0·1) and anxiety symptoms (-0·09; 95 % CI -0·17, -0·01), and less difficulty paying for other household expenses (-3·2 pp; 95 % CI -4·9, -1·5) after the SNAP benefit increases [4]. Similar findings were brought forth by Troy, Ahmed, Zheng, and Wadhera (2024) who found that food insecurity decreased in 2021 compared with prepandemic levels among low-income adults, despite worsening unemployment and economic loss. It decreased

from 20.6% (95% CI, 19.4% to 21.7%) in 2019 to 15.5% (CI, 14.3% to 16.7%) in 2021 and returned to prepandemic levels in 2022 [6]. These results are consistent with the findings of other researchers who showed evidence suggesting that the pandemic expansions reduced food insecurity and poverty during those very trying times.

Although the many benefits of SNAP are common knowledge, the current administration's proposed cuts to funding would undercut the positive outcomes that have been seen and slash any progress that has been made to establish a more equitable future. These changes need our urgent attention as they would reverse decades worth of progress in reducing food insecurity and poverty in the United States. A report from the Urban Institute shows that, if the cuts were to be enacted, they could leave many current recipients struggling to afford even a decently priced meal, with some counties experiencing deficits as high as 51% between benefits and meal costs. These reductions could be seen to increase food insecurity, which in turn would lead to higher rates of hunger, poverty, and poorer health outcomes, particularly for our already vulnerable populations [8]. As of April 2025, there has not been any reductions or freezes to SNAP benefits despite the daunting headlines that can be seen throughout the news cycle. However, this does not mean they are for sure off the table, and in fact, the U.S. House of Representatives has called for a $230 billion dollar cut in Agriculture related funding over the next decade, which would most likely include SNAP and other important food plans [9]. The government is supposed to be working in the best interest of the people, however, the current plans will set us back further. Thorough investigation and analysis needs to be done on the impacts of such cuts before deciding to get rid of a program and actually look at the may benefits provided.

II. Methods

Any analysis that is to be done needs to utilize data driven methods, which would allow us to get the full picture without introducing unnecessary bias– bias will still be there but not as much as the human bias and bigotry that would be introduced without data. The goal of this project is to explore if the temporary SNAP COVID expansions were seen to reduce poverty after their enactment. Data visualizations, made using Seaborne and MatPlot, will be used to see if this happened, or if something else that was not hypothesized is true.

I have found four U.S. Census datasets, including county and state level SNAP recipient data that includes the years 1989 to 2022, and state level poverty and median income estimates, with datasets from 2020, 2021, and 2022. The 2020 and 2021 dataset also includes county level information, which would be a later issue when trying to merge the datasets together. The merging of the datasets were going to be on the geographic identifiers and matched by year to analyze the trends over time. However, this does not quite work when one of the datasets only includes states and not any county data points. Therefore, I had to split the merging into two different separate entities. The first was on the county data with the SNAP participation, so the 2020 and 2021 dataset with the SNAP one. The second had to be 2022 and the SNAP sets and that made the outputs from this different from what I could do with the two other years. Since I found datasets from 2020 to 2022, that was why I wanted to explore if the pandemic relief helped alleviate the increased poverty that was to be expected during this time period.

The inputs for this analysis are the county level SNAP participation numbers, state and county level poverty rate estimates from 2020 to 2022, and median household income data for the same years. Additionally, the analysis keeps in the back of its mind the timing of any pandemic related SNAP expansions, such as the 2020 to 2021 changes in benefit levels that was mentioned in the previous section. The outputs of the analysis will consist of many visualizations that can summarize how poverty rates have changed over this time in relation to SNAP participation.

To explore the relationship between SNAP participation and poverty reduction, the project relies heavily on data cleaning and merging and lots of visual analysis. The datasets on SNAP recipients and poverty rates were cleaned and merged, allowing for the alignment of SNAP participation with poverty and income data over time. However, when first starting, there were significant issues when it came to the names of columns so the merging took a lot more than I originally bargained for. Next visual trends were made, such as line graphs, bar charts, histograms, to show changes in SNAP participation and poverty rates over time. These visualizations provide clear and accessible representation of how poverty levels responded to changes in SNAP participation, particularly during our period of policy expansion.

III. Results

Turbulence is a phenomenon that one experiences when hitting a rough patch of air on an airplane. It also perfectly encapsulates uncertain times and the most recent uncertain time we experienced was the COVID pandemic. In response to these very troubling times, the government aimed to help its people by expanding the social safety net and one of these changes included expanding SNAP benefits. SNAP is known to help alleviate food insecurity and poverty for millions of U.S. Citizens so if the program is to be expanded one would make the hypothesis that the expansions would further alleviate these issues. That hypothesis is explored in this section with the utilization of data visualizations.

Before diving into the main question and hypothesis, introductory exploratory visualizations were created for each year and for the SNAP participation. Initial analysis of the 2020 dataset, same as those seen in the project proposal, revealed that median household income follows a right tailed distribution, as seen in Fig. 1, which is expected when examining the income distribution in the U.S., as there is a massive issue with income inequality in this nation. Since only a small number of counties have very high incomes, the true median seems to lie around $65,000. Similar findings were seen for the year 2021, however, the 2022 dataset had to be treated differently as it

does not include county level data, only state level data. As seen in Fig. 2, in 2022 by state, there seems to be a negative correlation between median household income and poverty rate meaning that the higher the median income for a state the lower the poverty rate. This is to be expected as higher income means a household can not be counted as in poverty so if a state has a higher median income their poverty rate should be lower, on average. Moving from one year to the next (from 2020 to 2021 and 2021 to 2022), the top locations are pretty consistent. Comparing Fig. 3, which shows the top 20 for 2021, and Fig. 4, which shows the top 20 from 2022, it can be concluded that 18 of the 20 top locations are the same, but the order is ever so slightly different. For example, in 2021, Tennessee was 16th place, but in 2022 Tennessee moved to 18th place. Lastly, a quick line plot was made to show how SNAP participation has changed throughout the years. Fig. 5 spans from 1989 to 2022 to show how SNAP participation has steadily increased over the years, with a large peak during the 2008 recession and another during the 2020 pandemic.

Turning to the main hypothesis regarding the impact of SNAP expansions during the pandemic, we begin by examining the trends in poverty rates over the years. As shown in Fig. 6, the median poverty rate in 2020 was approximately 13%, which increased to nearly 15% in 2021 before declining to 12% in 2022. At first glance, this might seem counterintuitive since it would be expected that since SNAP and other social safety net programs were expanded in 2020, we would see a decrease in poverty rates. However, the observed increase in 2021 suggests that other factors may have contributed to rising poverty, potentially overshadowing the effects of program expansions. For example, widespread job loss during the early stages of the pandemic likely led to a sharp decline in household income, while inflation would have reduced purchasing power at the same time, leaving many households more vulnerable despite increased support from programs like SNAP. Lastly, Fig. 7 presents a scatter plot that compares SNAP participation to poverty rates for 2020 and 2021. The plot shows no clear linear relationship between the number of SNAP participants and the poverty rate. Both years show considerable spread in poverty rates across counties with similar SNAP participation levels, indicating that other socioeconomic factors likely contribute to poverty beyond just program enrollment. Notably, the 2021 data points (which are the darker grey color) appear slightly to sit at higher poverty rates, aligning with earlier findings that the median poverty rate increased in 2021, despite program expansion. This visualization reinforces the idea that while SNAP plays a critical support role, external factors during the pandemic, such as unemployment and inflation, may have undermined its observable effect on poverty reduction. Further work needs to be done to see what the true effects were from the pandemic relief on reducing poverty and food insecurity for participants.

IV. Conclusion

Despite the notable expansions to the SNAP program that were seen during the pandemic, the data I used suggests that these changes alone were not enough to counteract the economic hardships many households had to face. The results indicate that poverty rates increased in 2021 even as SNAP participation grew and an increase in benefits was implemented, which is likely due to broader issues seen in trying times such as unemployment and inflation that would have diminished household income levels and their ability to spend. While the direct effect of SNAP on reducing poverty during this time may be difficult to isolate, its role as a stabilizer for millions of Americans remains clear, as seen from the research done by more trained professionals.

These findings highlight the importance of maintaining and strengthening social safety net programs, not just during times of crises, but as long term investments in economic stability and well being. Funding for social programs often comes with trade offs, but it is essential to consider the economic and social costs of poverty and food insecurity. Limited access to food can lead to worse health outcomes, lower productivity, and greater financial strain on households to just name a few. Rather than limiting these resources, which is what current policymakers are trying to do, they should consider expanding access and improving their quality to ensure vulnerable populations are not left behind.

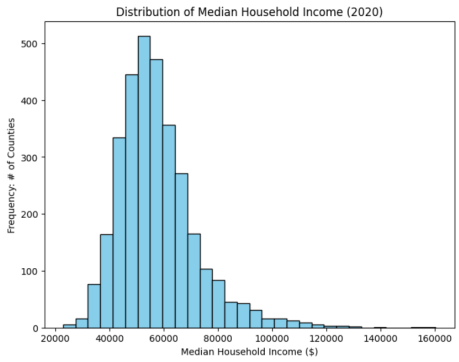

Fig. 1. Distribution of Median Household Income by U.S. County (2020)

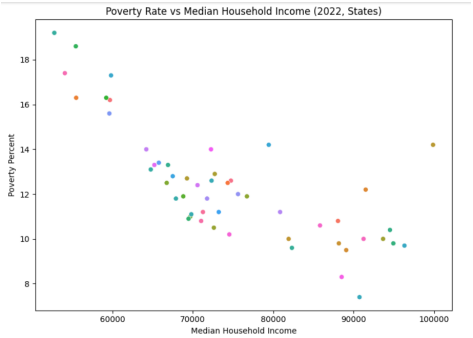

Fig. 2. Poverty Rate vs Median Household Income by State (2022)

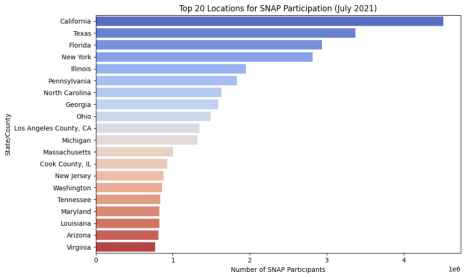

Fig. 3. Top 20 Locations for SNAP Participation (July 2021)

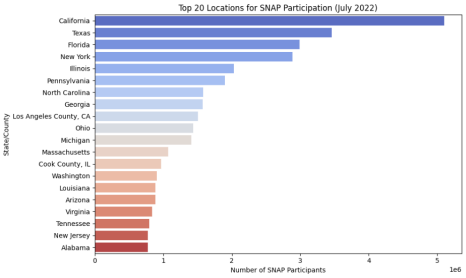

Fig. 4. Top 20 Locations for SNAP Participation (July 2022)

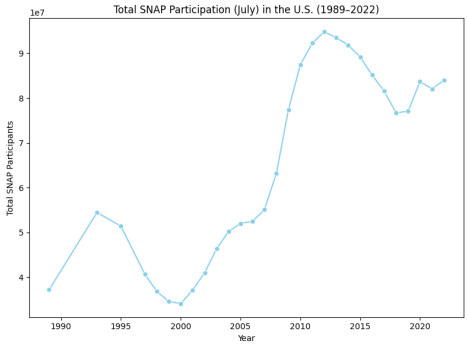

Fig. 5. Total SNAP Participation (July) in the U.S. (1989–2022)

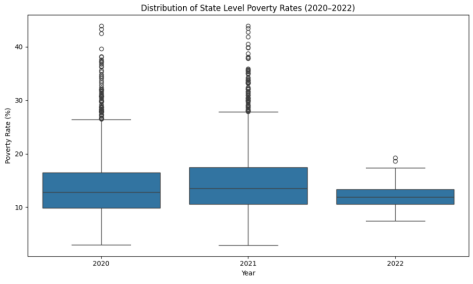

Fig. 6. Distribution of State Level Poverty Rates (2020–2022)

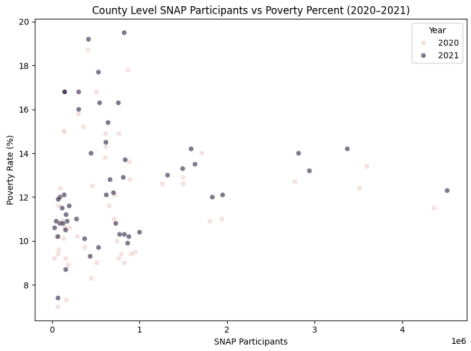

Fig. 7. County Level SNAP Participants vs Poverty Percent (2020–2021)

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