Floods in the United States

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Table of contents

Introduction

Floods are extremely destructive storm events that are negatively impactful in any area of the world. Specifically, in the United States, post-flood recovery is offered through the Federal Emergency Managment Agency (FEMA).

Post-Flood Recovery Experiences

Experiences of post-flood recovery in the United States (US) vary by neighborhood (Varela Varela 2023). Additionally, these experiences differ among different racial and economic groups (Varela Varela 2023).

Racially and Economically Marginalized Groups

Neighborhoods are often segegated by race and income ((Mijs and Roe 2021; Varela Varela 2023)). Races tend to live among one another, as well as incomes ((Mijs and Roe 2021)). Low-incomes cannot afford to handle the income-related material stressors, and Black and people of color are the majority of US citizens living in poverty ((Varela Varela 2023; Mijs and Roe 2021)).

Lower Educational Attainment

Finally, racially and economically marginalized groups are more likely to be less educated than those who are not (Mijs and Roe 2021). People with lower educational levels often have less access to resources, like health services, transportation, food, which can be exacerbated when additional hardships, like floods, arise (Center on Society and Health, 2015; (Varela Varela 2023)).

Strengths-Based Note

Before beginning, it is important to recognize that several pieces of data are missing to fully capture the true story of how different racial and income-levels may have been impacted. Although lower educational levels may related to less available resources, it does not mean that they do not receive additional support elsewhere. Most often, these communities experience resilience through other avenues, which are not recorded in the data. This data alone holds a "deficit-based" approach, but the aim of the analysis is to determine what groups were most impacted to then determine additional areas of support to implement. This changes the narrative and opens doors for marginalized groups to overcome hardships that may make existing hardships much more difficult.

For all groups, it is important to remember the trauma that could result from experiencing a natural disaster, mental health resources should be offered, and in future research, this should be examined.

Exploratory Data Analysis

This Exploratory Data Analysis will include Census data pertaining to rac

Aim

It is important to delineate how different racial and economic groups were impacted by floods, specifically among different counties in the US. This will have implications on different additional community resources that should be offered to those are racially and economically marginalized and experience hardships prior to disasters, such as floods.

Data Acquisition & Assessment

There are three data sets used for this exploratory data analysis: one on Census data for all the counties in the US from 2023, and the other two on storm event data from the National Centers for Environmental Information (NOAA), one from 2020 and the other from 2021.

NOAA

2020

See a glimpse of the NOAA Storm Event data frame from 2020 below:

```
Rows: 61,279
Columns: 51
$ BEGIN_YEARMONTH    <dbl> 202006, 202005, 202002, 202005, 202005, 202004, 202~
$ BEGIN_DAY          <dbl> 24, 25, 6, 22, 22, 10, 13, 12, 29, 29, 10, 28, 28, ~
$ BEGIN_TIME         <dbl> 1620, 1700, 1600, 1931, 1932, 0, 30, 1900, 1555, 15~
$ END_YEARMONTH      <dbl> 202006, 202005, 202002, 202005, 202005, 202004, 202~
$ END_DAY            <dbl> 24, 25, 7, 22, 22, 10, 13, 13, 29, 29, 10, 28, 28, ~
$ END_TIME           <dbl> 1620, 2000, 2100, 1931, 1932, 1500, 330, 600, 1855,~
$ EPISODE_ID         <dbl> 149684, 147310, 146077, 147059, 147059, 145924, 146~
$ EVENT_ID           <dbl> 902190, 885808, 877747, 883975, 883976, 881761, 880~
$ STATE              <chr> "GEORGIA", "WEST VIRGINIA", "NEW YORK", "ALABAMA", ~
$ STATE_FIPS         <dbl> 13, 54, 36, 1, 1, 54, 51, 51, 6, 6, 6, 39, 39, 39, ~
$ YEAR               <dbl> 2020, 2020, 2020, 2020, 2020, 2020, 2020, 2020, 202~
$ MONTH_NAME         <chr> "June", "May", "February", "May", "May", "April", "~
$ EVENT_TYPE         <chr> "Thunderstorm Wind", "Flash Flood", "Winter Storm",~
$ CZ_TYPE            <chr> "C", "C", "Z", "C", "C", "Z", "C", "Z", "Z", "Z", "~
$ CZ_FIPS            <dbl> 321, 101, 41, 95, 95, 31, 51, 3, 54, 53, 54, 97, 89~
$ CZ_NAME            <chr> "WORTH", "WEBSTER", "NORTHERN SARATOGA", "MARSHALL"~
$ WFO                <chr> "TAE", "RLX", "ALY", "HUN", "HUN", "RLX", "RLX", "R~
$ BEGIN_DATE_TIME    <chr> "24-JUN-20 16:20:00", "25-MAY-20 17:00:00", "06-FEB~
$ CZ_TIMEZONE        <chr> "EST-5", "EST-5", "EST-5", "CST-6", "CST-6", "EST-5~
$ END_DATE_TIME      <chr> "24-JUN-20 16:20:00", "25-MAY-20 20:00:00", "07-FEB~
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$ INJURIES_INDIRECT  <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ~
$ DEATHS_DIRECT      <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ~
$ DEATHS_INDIRECT    <dbl> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, ~
$ DAMAGE_PROPERTY    <chr> "0.00K", "3.00K", NA, "0.00K", "0.00K", "5.00K", "5~
$ DAMAGE_CROPS       <chr> "0.00K", "0.00K", NA, "0.00K", "0.00K", "0.00K", "0~
$ SOURCE             <chr> "911 Call Center", "Department of Highways", "Train~
```

```
$ MAGNITUDE          <dbl> 50.00, NA, NA, 1.75, 1.75, 31.00, NA, 42.00, 56.00,~
$ MAGNITUDE_TYPE     <chr> "EG", NA, NA, NA, NA, "MG", NA, "MG", "MG", "EG", "~
$ FLOOD_CAUSE        <chr> NA, "Heavy Rain", NA, NA, NA, NA, "Heavy Rain", NA,~
$ CATEGORY           <dbl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,~
$ TOR_F_SCALE        <chr> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,~
$ TOR_LENGTH         <dbl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,~
$ TOR_WIDTH          <dbl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,~
$ TOR_OTHER_WFO      <chr> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,~
$ TOR_OTHER_CZ_STATE <chr> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,~
$ TOR_OTHER_CZ_FIPS  <chr> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,~
$ TOR_OTHER_CZ_NAME  <chr> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA,~
$ BEGIN_RANGE        <dbl> 1, 1, NA, 0, 0, NA, 1, NA, NA, NA, NA, 0, 1, 1, 2, ~
$ BEGIN_AZIMUTH      <chr> "W", "NNW", NA, "N", "N", NA, "E", NA, NA, NA, NA, ~
$ BEGIN_LOCATION     <chr> "DOLES", "ERBACON", NA, "HORTON", "HORTON", NA, "OS~
$ END_RANGE          <dbl> 1, 2, NA, 0, 0, NA, 2, NA, NA, NA, NA, 0, 1, 1, 2, ~
$ END_AZIMUTH        <chr> "W", "E", NA, "N", "N", NA, "NE", NA, NA, NA, NA, "~
$ END_LOCATION       <chr> "DOLES", "ERBACON", NA, "HORTON", "HORTON", NA, "BA~
$ BEGIN_LAT          <dbl> 31.7000, 38.5367, NA, 34.2000, 34.2000, NA, 37.1988~
$ BEGIN_LON          <dbl> -83.8900, -80.5887, NA, -86.3000, -86.3000, NA, -82~
$ END_LAT            <dbl> 31.7000, 38.5186, NA, 34.2000, 34.2000, NA, 37.2685~
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$ EPISODE_NARRATIVE  <chr> "As is typical during summer, scattered afternoon t~
$ EVENT_NARRATIVE    <chr> "A power line was blown down on Highway 32W.  Hail ~
$ DATA_SOURCE        <chr> "CSV", "CSV", "CSV", "CSV", "CSV", "CSV", "CSV", "C~
```

```r
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                         delim = "-",
                         names = c("incident_begin_year",
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                                   "incident_begin day"),
                         too_many = "error",
                         too_few = "align_start"
  )
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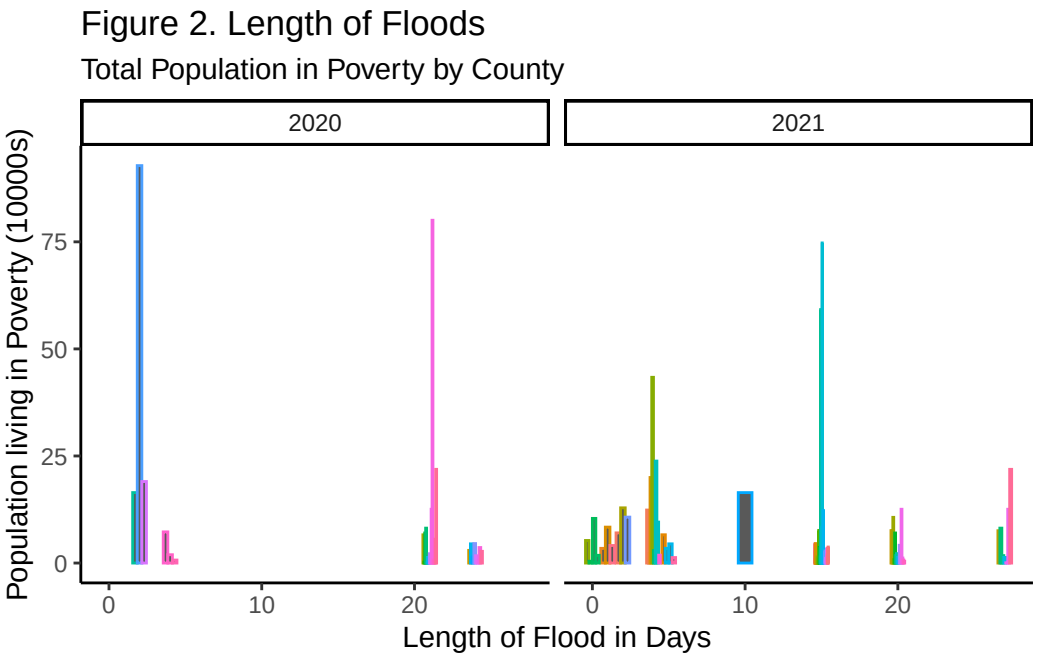


Figure 2. Length of Floods
Total Population in Poverty by County
2020
2021
Population living in Poverty (10000s)
0
25
50
75
0
10
20
Length of Flood in Days

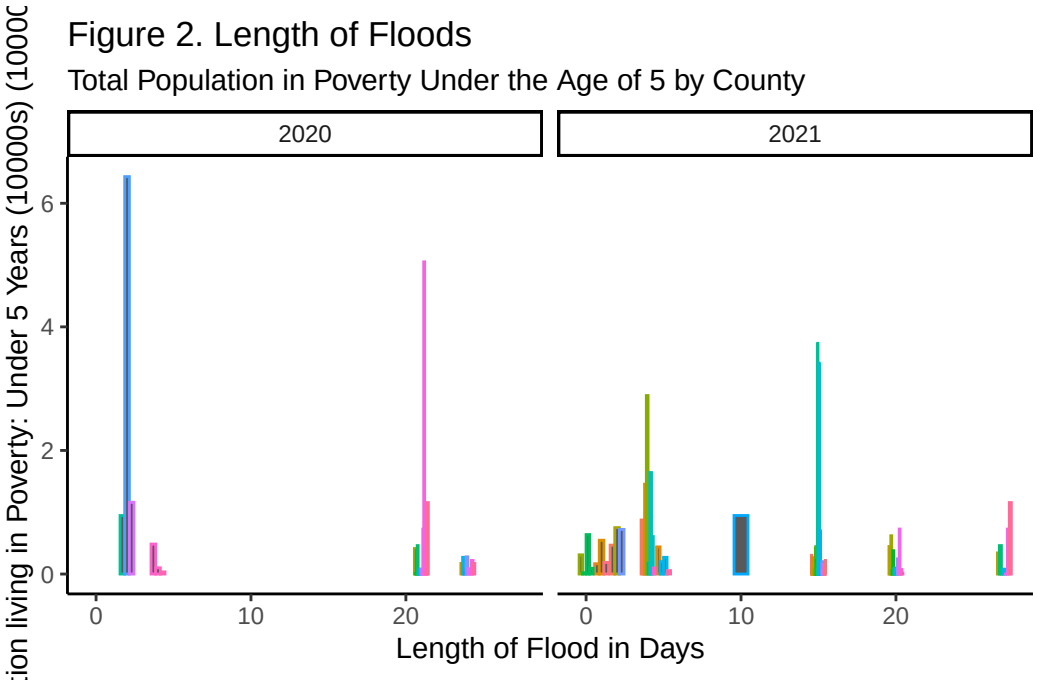


Figure 2. Length of Floods
Total Population in Poverty Under the Age of 5 by County
2020
2021
:ion living in Poverty: Under 5 Years (10000s) (10000
6
4
2
0
0
10
20
Length of Flood in Days

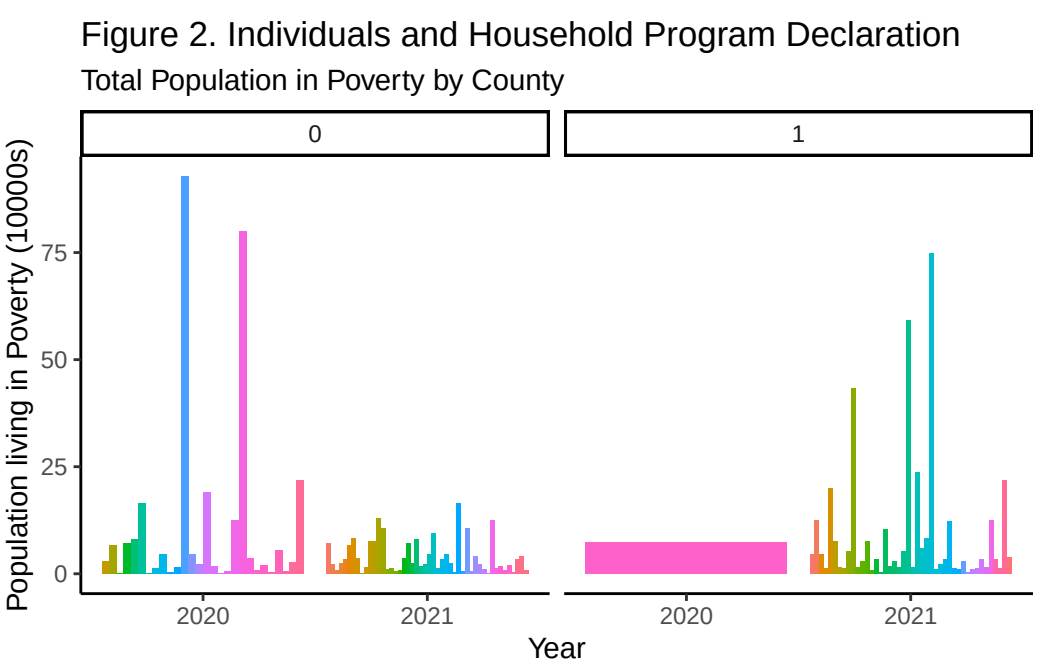


Figure 2. Individuals and Household Program Declaration
Total Population in Poverty by County
0
1
Population living in Poverty (10000s)
75
50
25
0
2020
2021
Year

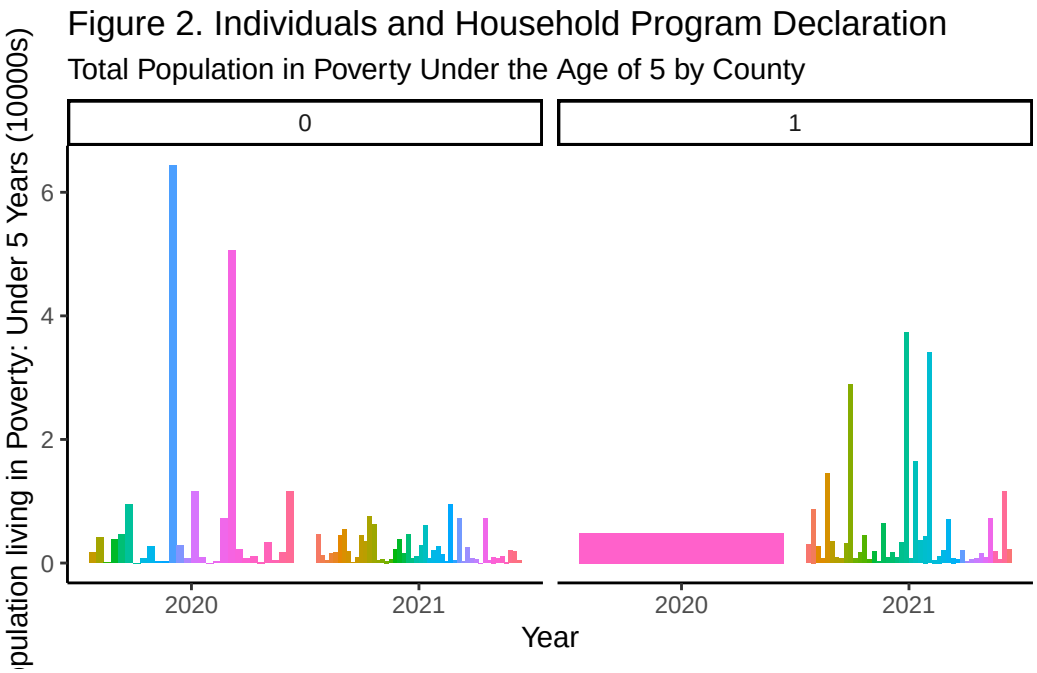


Figure 2. Individuals and Household Program Declaration
Total Population in Poverty Under the Age of 5 by County
0
1
6
4
2
0
2020
2021
2020
2021
Year
pulation living in Poverty: Under 5 Years (10000s)

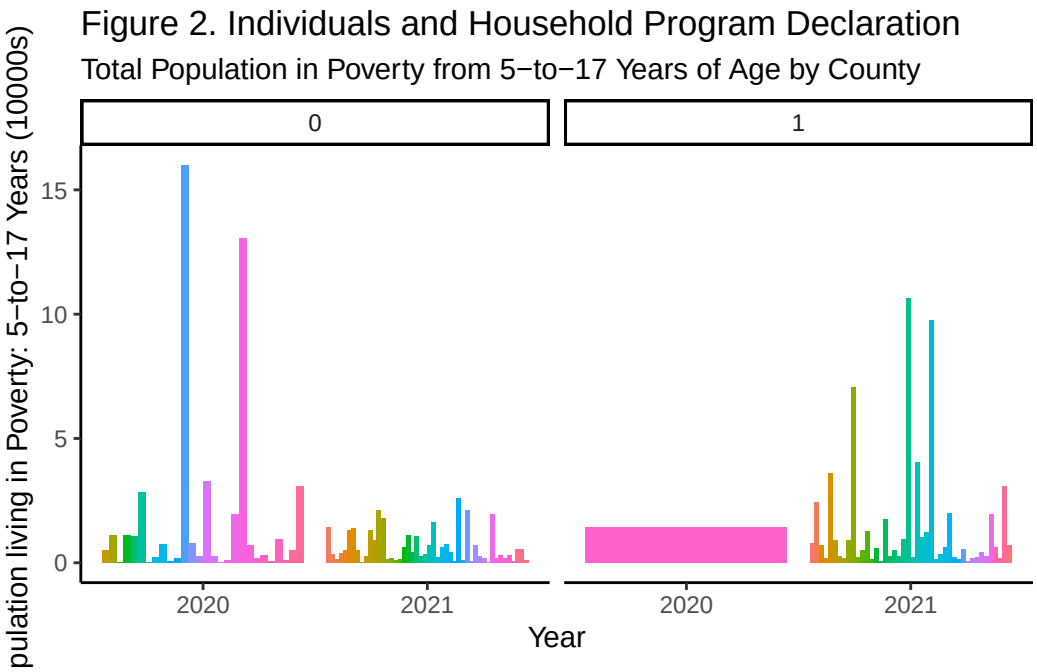


Figure 2. Individuals and Household Program Declaration
Total Population in Poverty from 5−to−17 Years of Age by County
0
1
15
10
5
0
2020
2021
2020
2021
Year
pulation living in Poverty: 5−to−17 Years (10000s)

Figure 2. Individuals Assistance Program Declaration

Total Population in Poverty by County

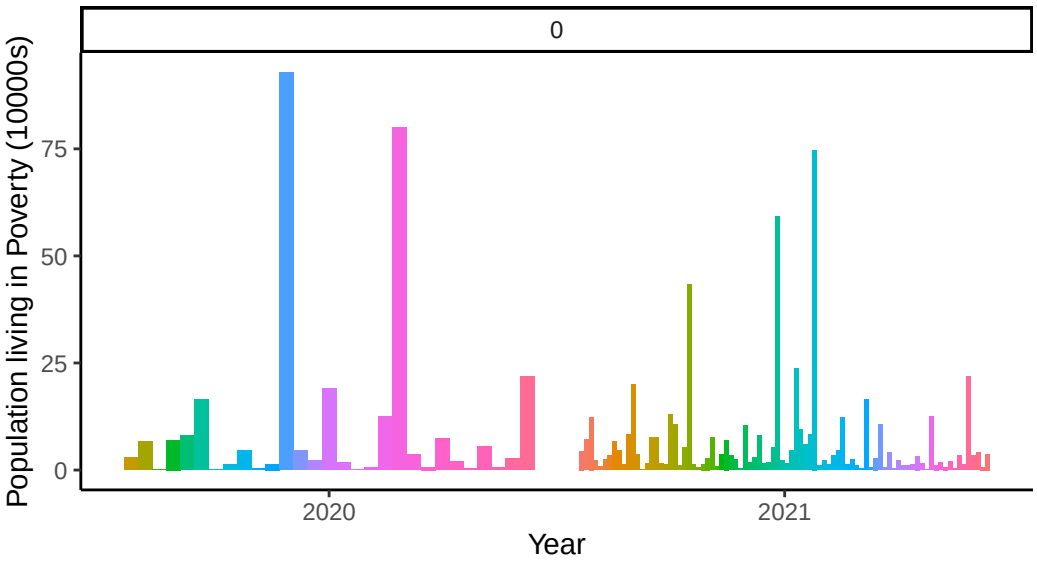


Figure 2. Individuals Assistance Program Declaration

Total Population in Poverty Under the Age of 5 by County

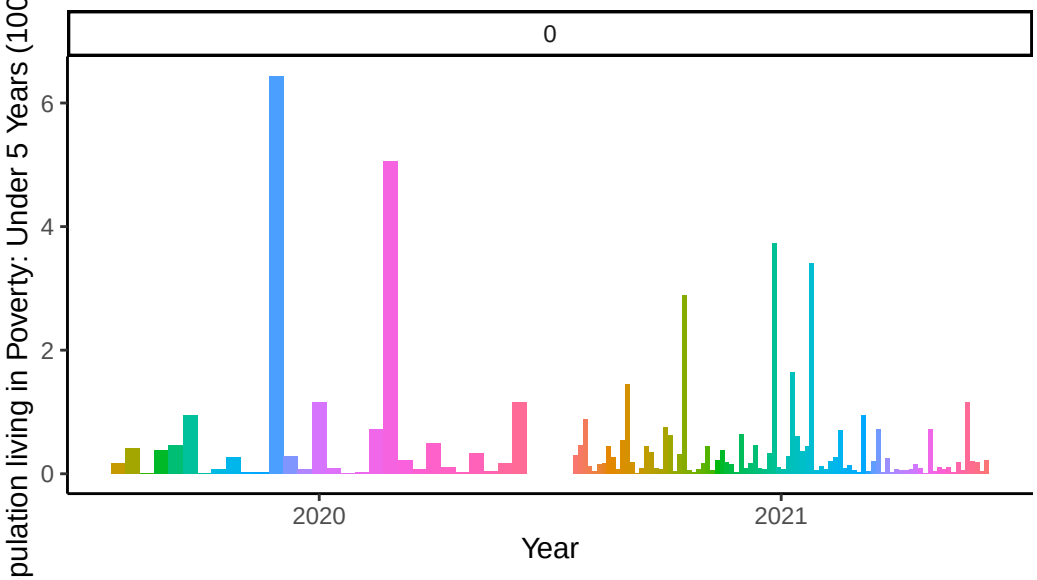


Figure 2. Individuals Assistance Program Declaration

Total Population in Poverty from 5−to−17 Years of Age by County

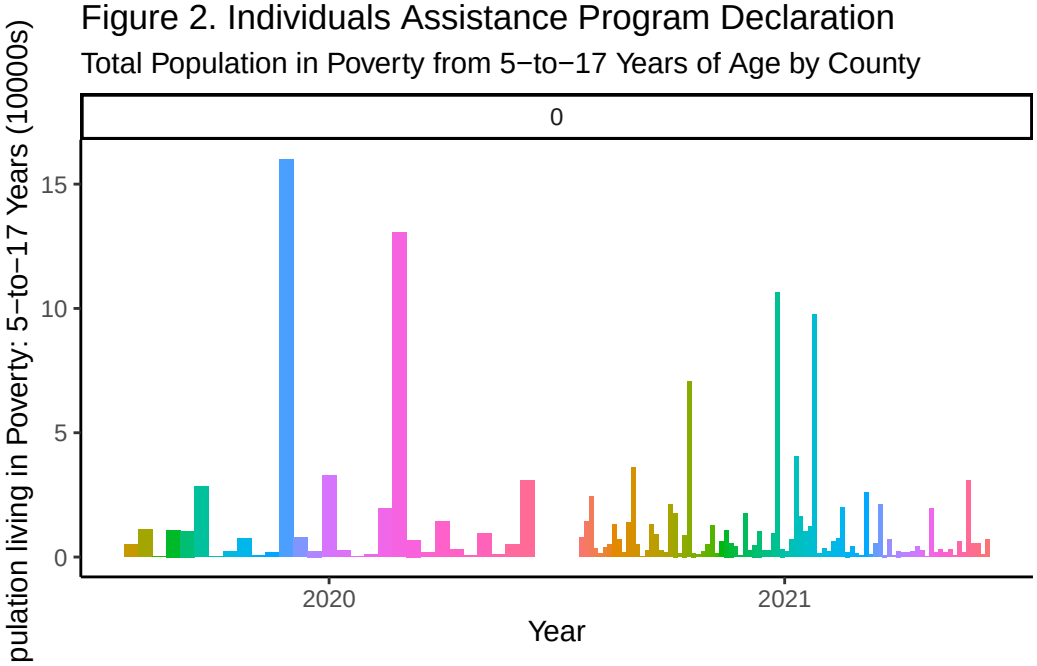
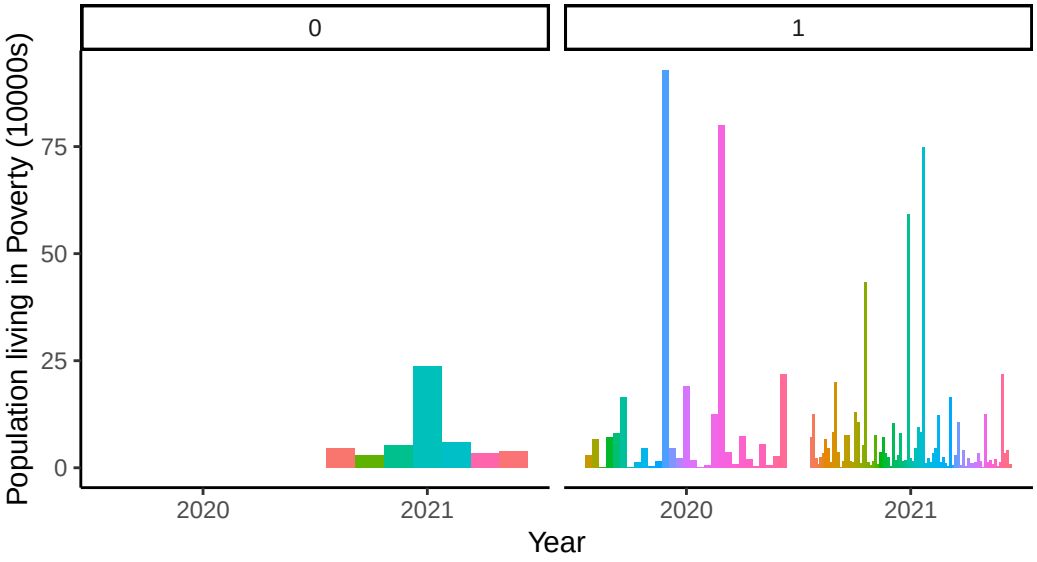


Figure 2. Public Assistance Program Declaration

Total Population in Poverty by County



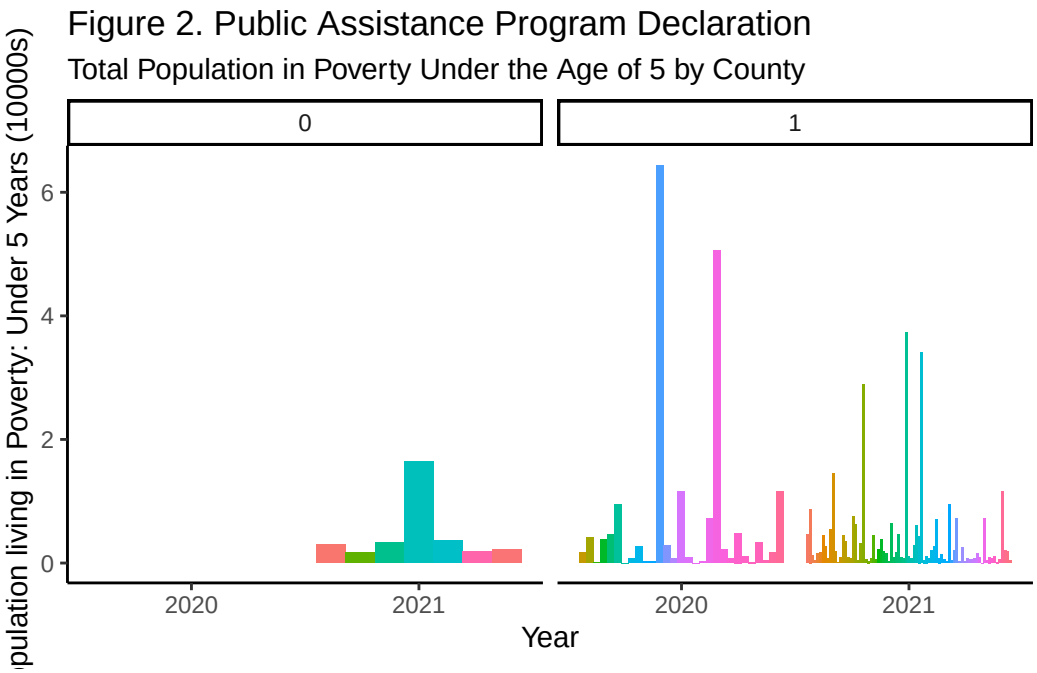


Figure 2. Public Assistance Program Declaration
Total Population in Poverty Under the Age of 5 by County
0
1
6
4
2
0
2020
2021
2020
2021
Year
pulation living in Poverty: Under 5 Years (10000s)

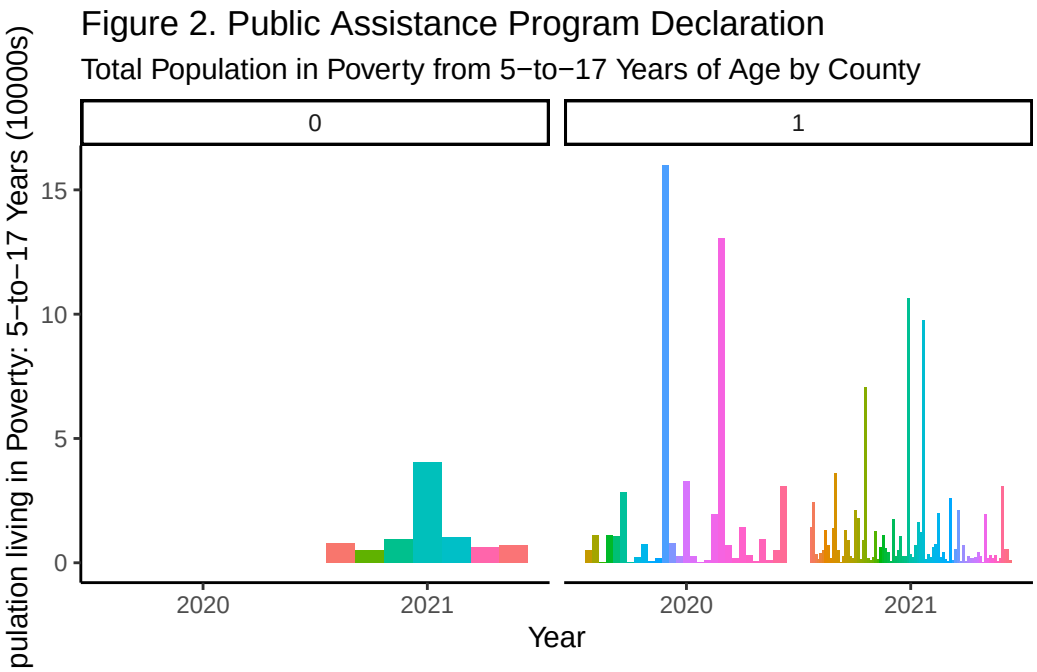


Figure 2. Public Assistance Program Declaration
Total Population in Poverty from 5−to−17 Years of Age by County
0
1
15
10
5
0
2020
2021
2020
2021
Year
pulation living in Poverty: 5−to−17 Years (10000s)

Figure 2. Hazard Mitigation Program Declaration

Total Population in Poverty by County

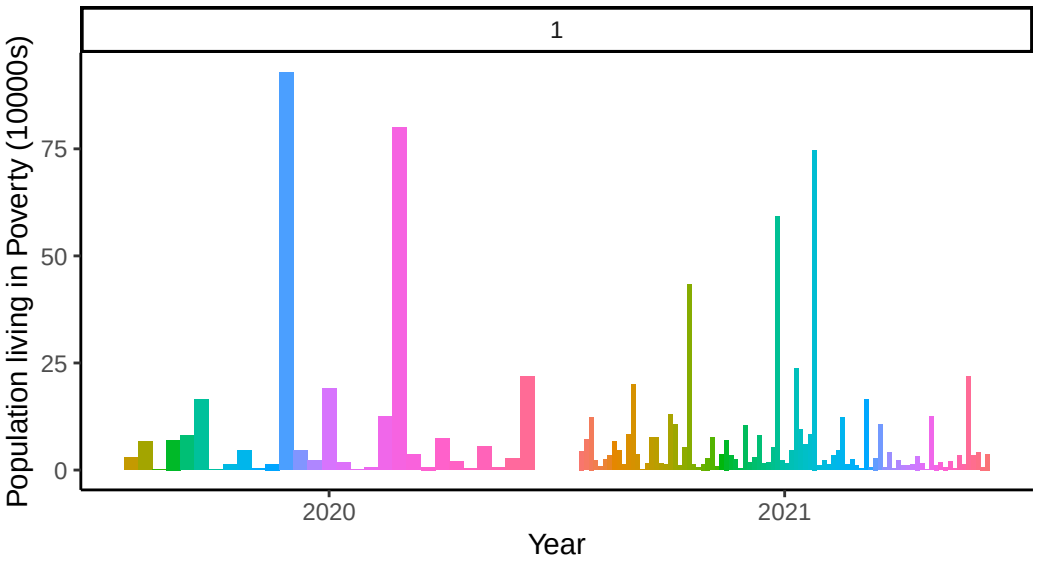
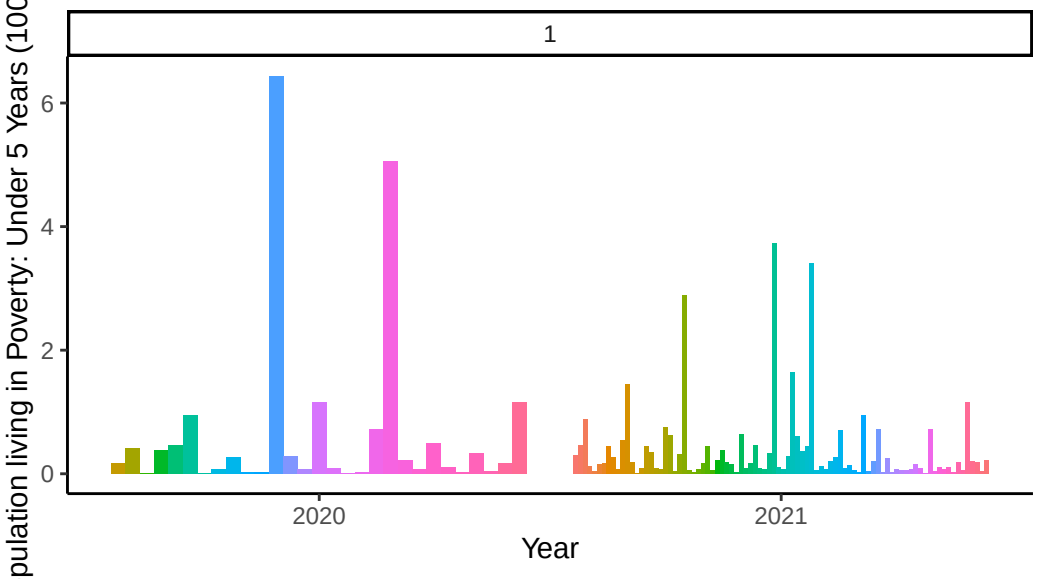
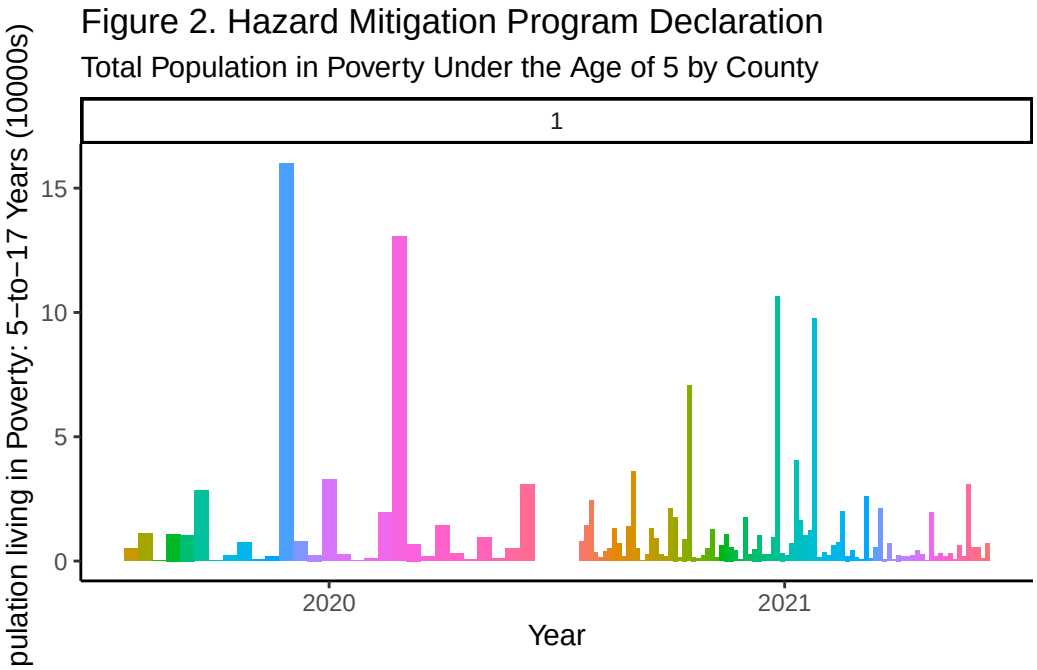


Figure 2. Hazard Mitigation Program Declaration

Total Population in Poverty Under the Age of 5 by County





References

Mijs, Jonathan J. B., and Elizabeth L. Roe. 2021. "Is America Coming Apart? Socioeconomic Segregation in Neighborhoods, Schools, Workplaces, and Social Networks, 1970–2020." *Sociology Compass* 15 (6). https://doi.org/10.1111/soc4.12884.

Varela Varela, Ana. 2023. "Surge of Inequality: How Different Neighborhoods React to Flooding." *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4396481.