

Assessing the efficacy of N.C.'s Opioid Action Plan

Introduction

An estimated five people die every day from an opioid overdose in North Carolina, slightly more than the number killed in car crashes (North Carolina Department of Justice, 2020). The number of unintentional opioid overdose deaths in the state has more than doubled in the past decade, and in 2018, North Carolina health care providers wrote about 11 more opioid prescriptions for every 100 people the average U.S. rate; an estimated 79% of drug overdoses in North Carolina that year involved opioids (National Institutes of Health, 2020). These numbers have been difficult for me to comprehend and contextualize, but when a loved one was hospitalized earlier this year after overdosing on prescription medication, the issue became impossible for me to ignore, and I began researching what steps North Carolina is taking to curb its opioid epidemic. In June 2017, North Carolina Gov. Roy Cooper introduced the North Carolina Opioid Action plan, which promised to fight the epidemic by focusing on three areas: prevention, harm reduction and connecting individuals to care (Porter, 2017). This report analyzes national, state and county data on opioid overdose deaths, illicit opioid use, rates of opioid prescriptions and access to treatment programs to gauge the success of these three areas. After analysis, I found limited success on all three fronts, as opioid overdose deaths in North Carolina have decreased slightly since the enactment of the plan, more North Carolina residents are seeking treatment and less opioid prescriptions are being written.

Problem Formulation

Cooper has touted his introduction of the North Carolina Opioid Action Plan as a key factor to “turn the tide” of the crisis in the state (Porter, 2017). Among the plan’s strategies are promises to reduce the oversupply of prescription opioids, divert the flow of illicit drugs and expand treatment and recovery systems. Two years later, however, a 2019 study published by the Journal of the American Medical Association classified 41 of North Carolina’s 100 counties as “opioid high-risk” counties, meaning they have “high rates of opioid overdose mortality and low capacity to deliver medications for opioid use disorder” (Haffajee et al., 2019). In this report, I seek to assess the success of these three action plan promises. Starting broadly, I will first examine North Carolina’s opioid epidemic in relation to the rest of the United States. Narrowing the scope, I will then assess Alamance County’s crisis compared to the rest of North Carolina to see if the implementation of the action plan impacted overdose rates, prescriptions and the number of residents seeking help in treatment centers.

Data collection, storage, cleaning, and analysis

Before looking at North Carolina specifically, I feel it is important to contextualize the crisis within the rest of the United States. To do this, I visited the Kaiser Family Foundation’s website, which keeps a database of drug overdose numbers by state using data from the Centers for Disease Control and Prevention (CDC, 2021). It has the rate of opioid overdose deaths per 100,000 residents for each state from 1999 to 2019, so I downloaded 20 data tables, one for each year of data available. I copied and pasted all of the data into one sheet titled “National Raw Data” to consolidate all of the information. I decided first to make four different map graphs to show the nationwide rise in opioid overdose death rates per 100,000 residents since 1999. I

decided to pick four years of data, so I chose 2001, 2007, 2013 and 2019 to appropriately represent variations over equal amounts of time. In a new sheet titled “Map Data,” in column A, I listed every U.S. state, in column B, I copied and pasted the data for 2001 opioid overdose rates and added a column titled “Range” in column C. I repeated this three more times for 2007, 2013 and 2019. I sorted each of the data sets from smallest to largest, then I filled in the range column using the intervals of 0-7.99, 8-15.99, 16-23.99, 24-31.99, 32-39.99, 40+ and No Data. I used the state columns and their corresponding range columns to create four different map graphs using the map feature on Excel.

I also wanted to use the Kaiser Foundation’s data to compare North Carolina’s rate of opioid overdoses per 100,000 residents to the national average. To do this, I created a new sheet called “National Data,” and in column A, I listed every year from 1999 to 2019. In column B, I copied and pasted the U.S. opioid overdose death rate from the raw data and in column C, I copied and pasted the N.C. opioid overdose death rate from the raw data. I used these three columns to create a line graph with two lines representing the U.S. rate and the N.C. rate.

Next, I examined North Carolina data specifically using a large data set from the North Carolina Department of Health and Human Services (NCDHHS, 2021). I first downloaded the Opioid Action Plan Data Dashboard CSV file, then imported the data using delimiter filters. I decided to look at four different topics: the number of unintentional opioid related deaths among N.C. residents, the percentage of those overdoses involving illicit opioids, the total number of N.C. residents receiving opioid pills and the number of residents being served by treatment programs. Because this was such a large data set, I copied the raw data into three new sheets so I could filter out only the topics I am interested in.

I named the first sheet “Overdose Data,” filtered the measure column by “Opioid overdose deaths” and “Illicit opioid overdose deaths” and filtered the place type column by “Counties.” This left me with the number of unintentional opioid-related deaths in every N.C. county from 1999 to 2019 as well as the percent of those opioid-involved deaths that involved heroin, fentanyl and/or fentanyl analogues. Using custom sorting, I sorted this data first by measure, then by location and finally by year. I created a table with column A listing all of the years from 1999 to 2019, labeled column B for the number of overdoses in Alamance County, labeled column C for the number involving illicit opioids, labeled column D for the number involving legal opioids, labeled column E as the percentage involving illicit opioids and labeled column F for the average number of overdoses per N.C. county, as I thought that was a better reference than comparing Alamance County to North Carolina as a whole. From the data set, I copied and pasted data to fill in column B and E. To find the number of overdoses involving illicit opioids in cell C5, I multiplied cell B5 by cell E5 and used flash fill to apply the formula to the entire column C and get my values. To find the number involving prescription opioids in cell D5, I subtracted cell B5 by cell C5 and used flash fill to apply the formula to the entire column D and get my values. For the average number for counties as a whole in column F, I filtered my data set again to just include opioid overdoses for all 100 counties for the 20-year range, selected all the data for every year individually and used Excel’s average function to calculate the mean of the data. I then filled in column F with this data. I used this information to create a line graph tracking overdose numbers and a stacked bar graph breaking down overdoses involving prescribed medication and illicit opioids.

I named the second sheet “Patient Data,” filtered the measure column by “patients receiving opioid pills,” filtered the place by “NC” and “Alamance” and filtered the place type by

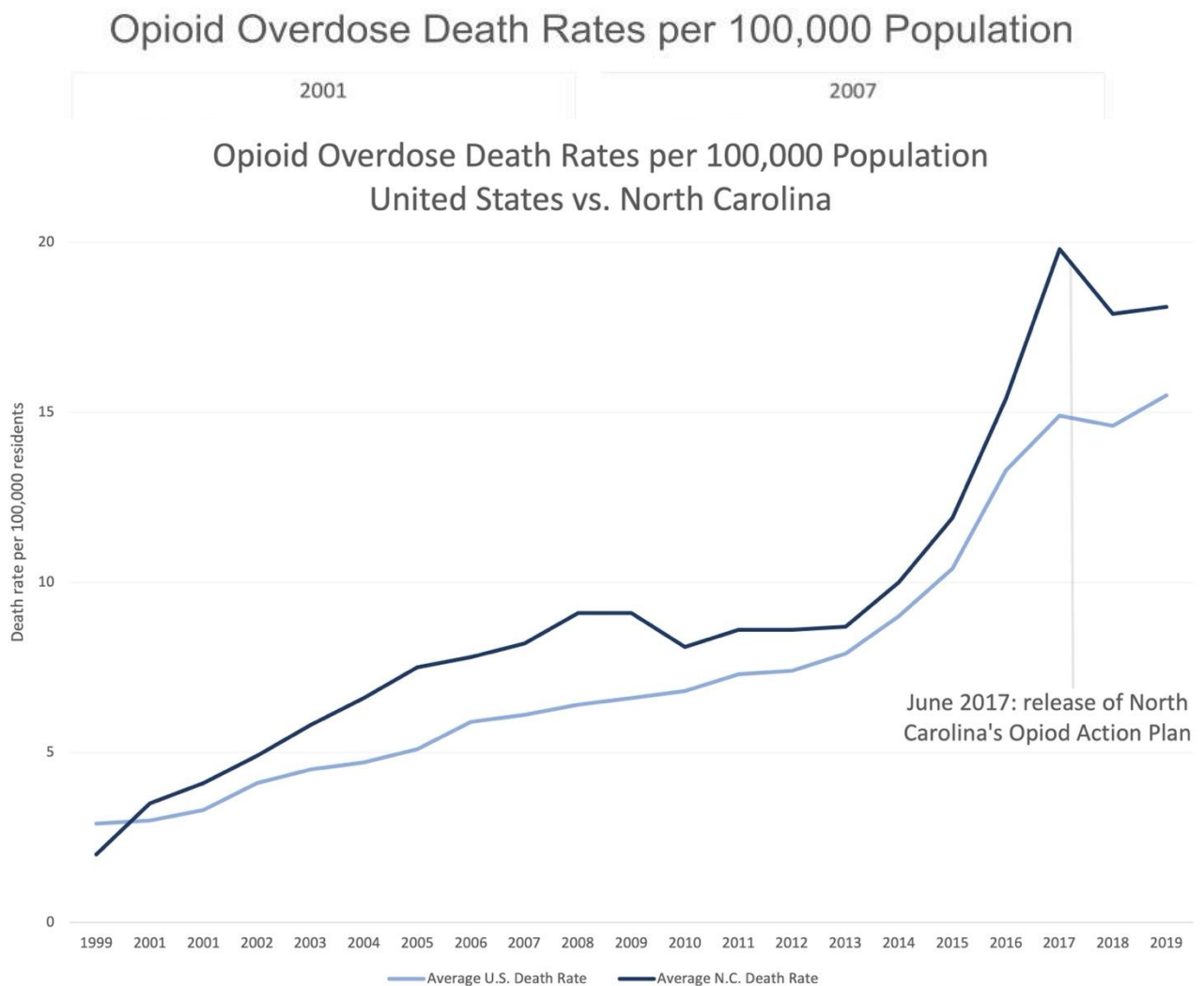
“Counties.” This left me with the percentage of residents receiving pills both in North Carolina and Alamance County from 2013 to 2020. From there, I used a custom sort to sort my data by location and then by year. I created a table with column A listing every year, column B for North Carolina and column C for Alamance County. I copied and pasted by data into the table and applied a percentage format to my numbers. I used this data to create a line graph charting the number of residents receiving prescriptions over time.

I named the third sheet “Treatment Program Data,” filtered the measure column by “People served by treatment programs” and filtered the place type by “Counties.” This left me with the average rate per 100,000 residents being served by treatment programs in every county in North Carolina from 2013 to 2020. From there, I used a custom sort to sort my data by location and then by year. I created a table with column A listing every year, column B for Alamance County and column C for the average rate per county. I copied and pasted the numbers from my filtered data set for Alamance County into the table, but I needed to find the average number per county, because I believe this is a better comparison than comparing Alamance County to North Carolina as a whole. To do this, I highlighted all of my data year by year and used Excel’s average calculator to find the mean of the data set. I then copied the results into column C of my table. I used that data to create a double bar graph comparing the rate per 100,000 residents seeking treatment in North Carolina as a whole and Alamance County.

Data visualization

To contextualize my report, I first chose to create four different maps to visualize the rate at which opioid overdoses have increased nationwide, particularly on the East Coast and

particularly within the past decade. I used different shades of green for contrast and included a legend to show that the darker the states become, the more deaths have been reported there.

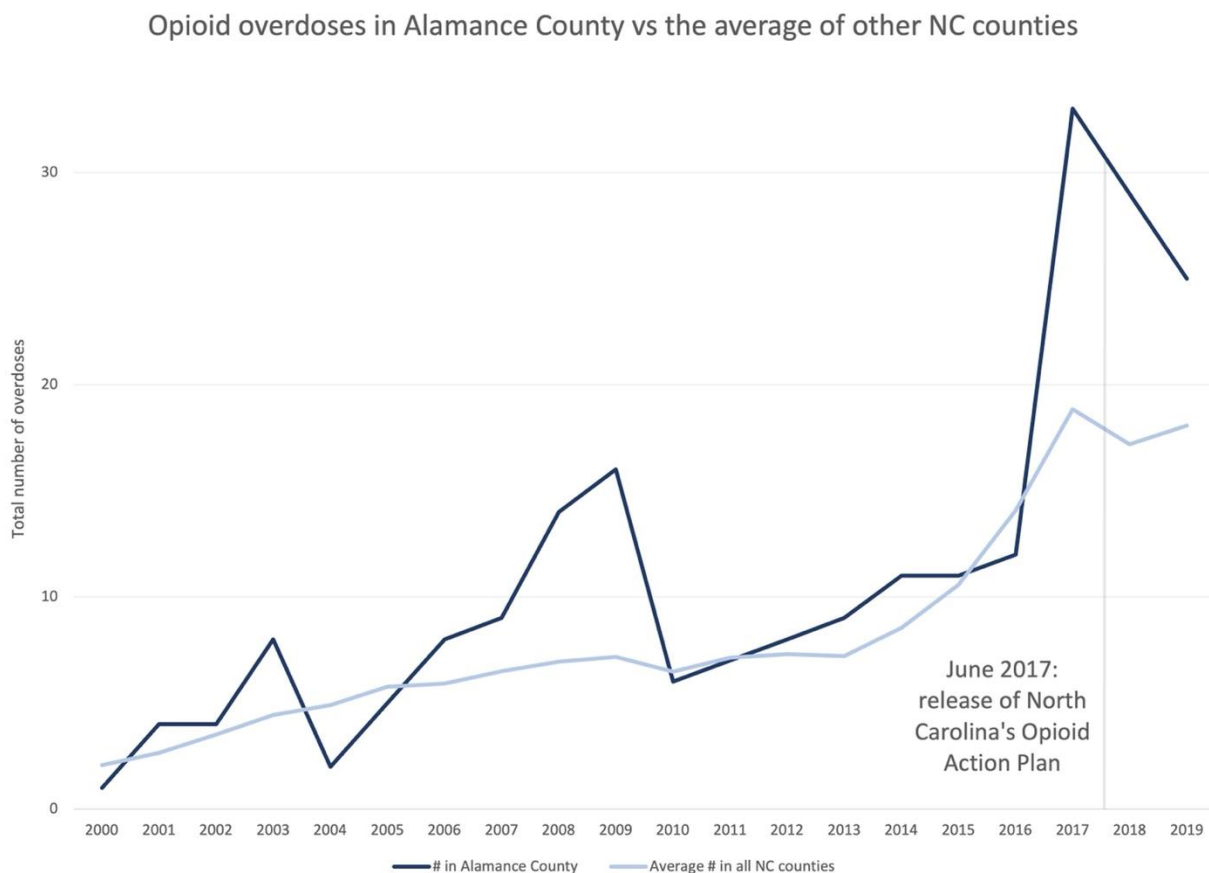


My next visualization is a line graph comparing the overdose death rate per 100,000

residents in North Carolina to the total United States. I decreased the original scale of the y-axis

Figure 2: Comparing the rate of opioid overdoses per 100,000 people in the total United States and North Carolina

to make it clear that though the North Carolina death rate was originally lower than that of the United States, it rose faster and has remained above the U.S. since 2001, even after the introduction of the Action Plan in 2017. I chose a line graph to best display changes over time, and I used two different shades of blue to ensure contrast even if my audience has visual impairments. Finally, I labeled the date at which North Carolina introduced its Opioid Action Plan.



For my next visualization, I similarly used a line graph to compare overdoses in North Carolina and Alamance County, but this time, I chose to display the raw numbers rather than the

Figure 3: Comparing the total number of opioid overdoses in Alamance County to the average of all 100 of North Carolina's counties

rate, as in this case, I find the raw numbers easier to comprehend. I chose a color scheme similar to Figure 2 to imply that these charts visualize similar ideas. And like in Figure 2, I decreased the scale of the y-axis to better display any trends and labeled the date at which North Carolina introduced its Opioid Action Plan.

My next graph is a stacked bar chart. Each bar represents the total number of opioid overdoses in Alamance County that year, but they are divided by the number involving illicit opioids (represented in blue) and the number involving prescribed opioids (in green). I chose a stacked bar chart with contrasting colors to best compare these two values as parts of a whole. I also labeled the year during which North Carolina introduced its Opioid Action Plan.

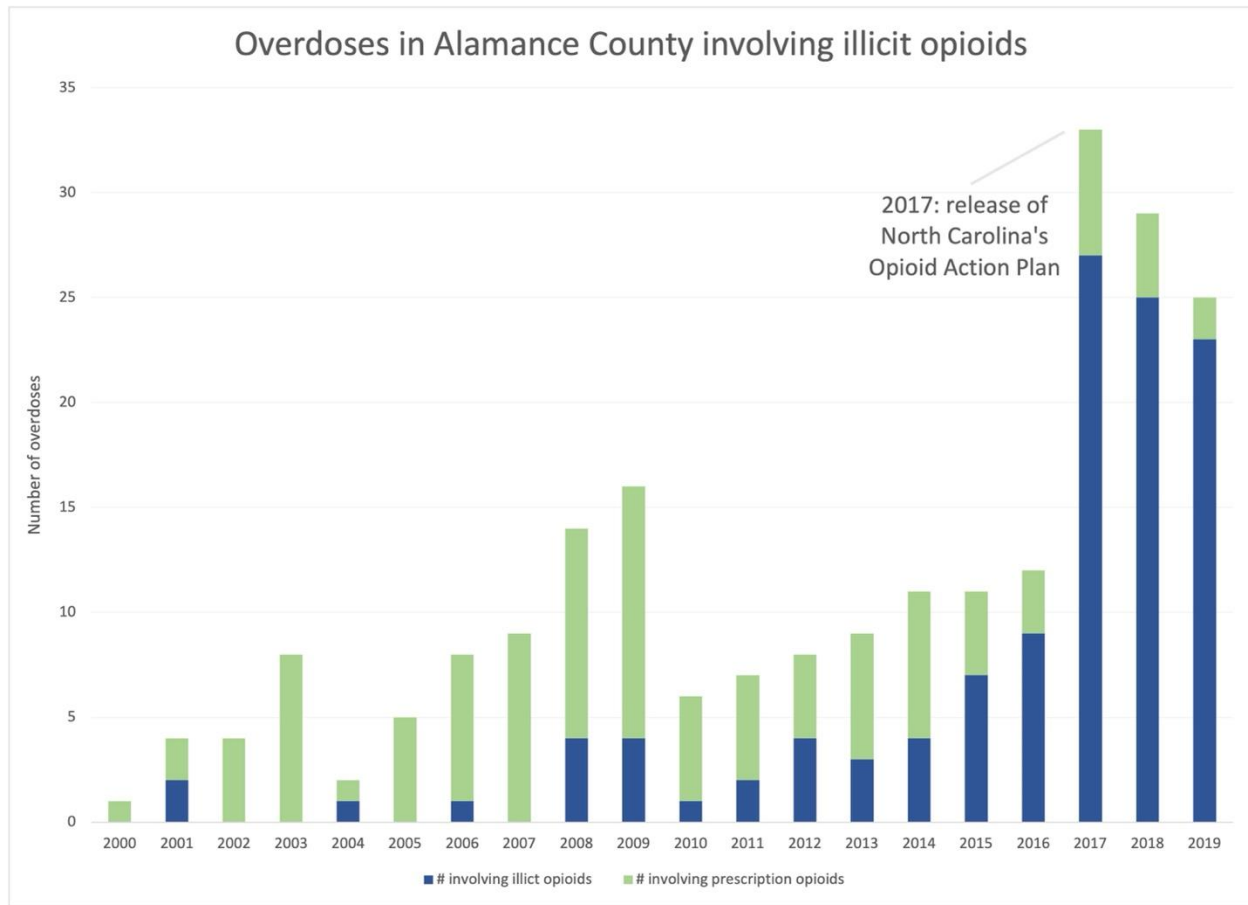


Figure 4: Breakdown of opioid overdoses in Alamance County between 2000 and 2019

Next, I created a line graph representing the percent of the Alamance County's population and the percent of the entire North Carolina population who had been dispensed prescription opioids within that year. I chose a line graph because I found it best visualized the overall downward trend and divergence between the two data sets over time, but to convey this divergence as clearly as possible, I had to decrease the range of the y-axis. I also labeled the date at which North Carolina introduced its Opioid Action Plan.

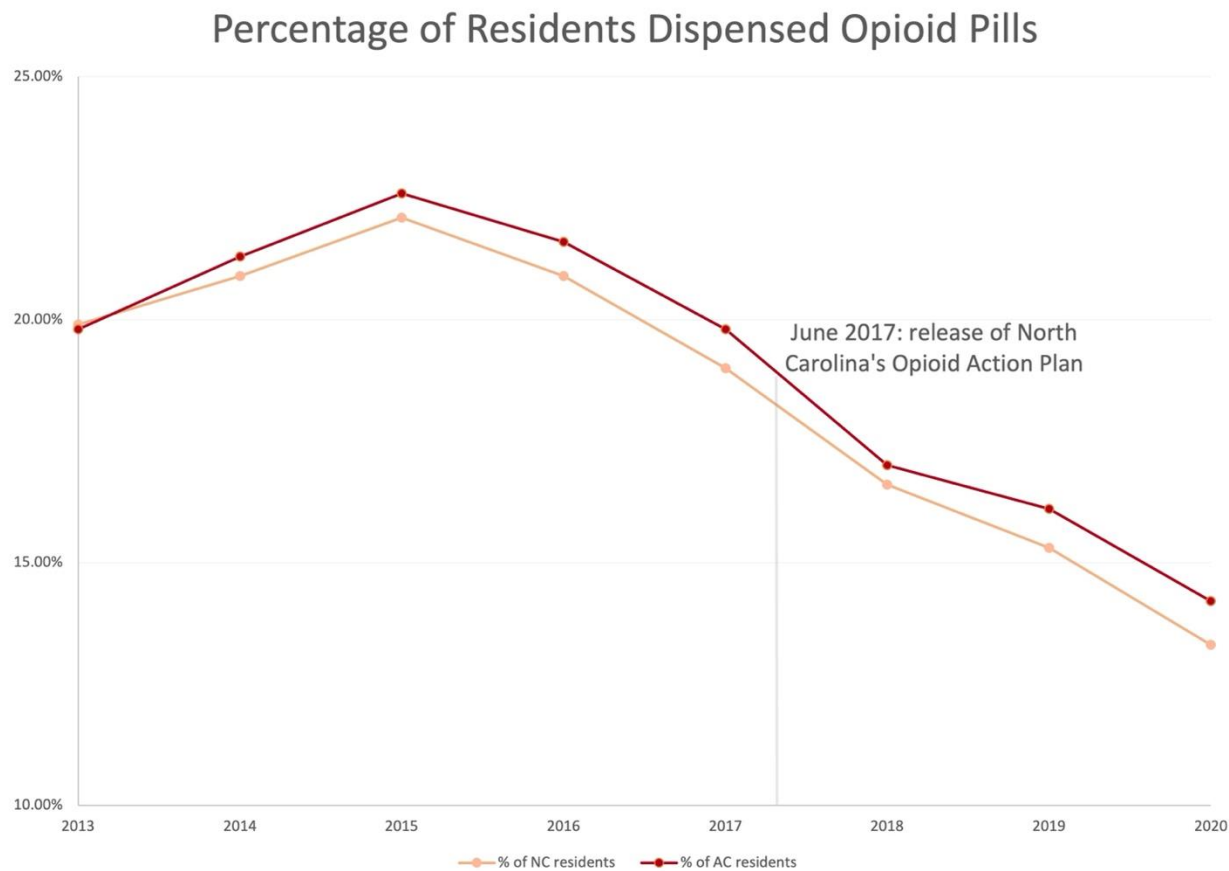


Figure 5: Percentage of total residents prescribed opioid medication

My final visualization is a double bar graph displaying the number of North Carolina residents per 100,000 in Alamance County and other counties who are in treatment programs for an opioid use disorder. I used different shades of purple for sufficient contrast. I chose to use a bar graph to show trends over time, and to do this, I had to decrease the range of the y-axis.

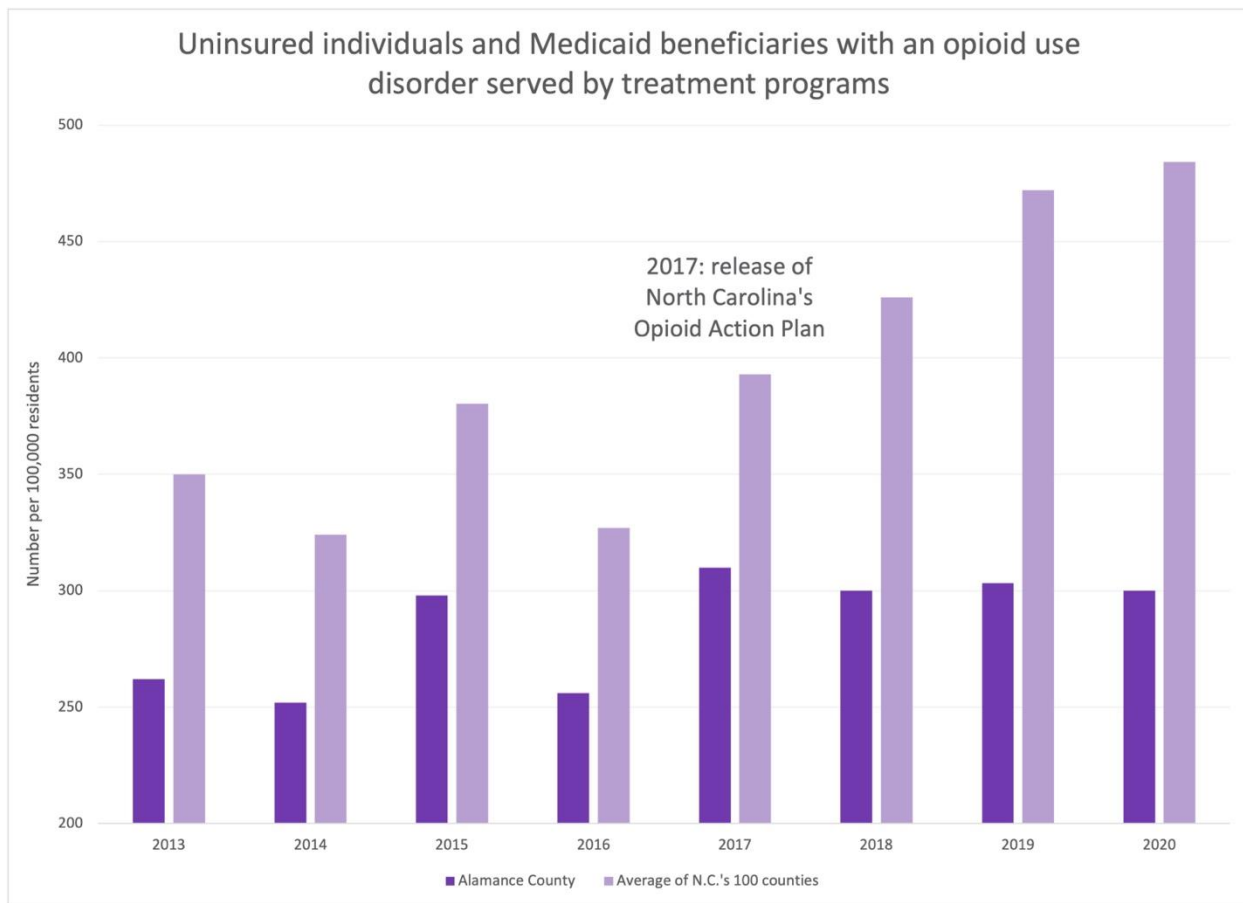


Figure 6: Rate per 100,000 people with an opioid use disorder served by treatment programs in North Carolina

Conclusion

From Figures 1 and 2, I conclude that due to the alarming rise of accidental opioid-related overdoses across the United States, an intervention by the North Carolina government was not only justified, but perhaps overdue. In Figure 2 in particular, I notice that when data collection began in 1999, the death rate in North Carolina was lower than that of the total United States, but it only took two years for North Carolina's death rate to surpass the United States', and it has remained higher ever since. The widest gap in death rates occurred at the beginning 2016, as the death rate in North Carolina was rising more exponentially than in the United States as a whole. But after the implementation of North Carolina's Opioid Action Plan in June 2017, the number of overdoses in North Carolina dropped slightly, and as a result, so did the gap. The negative slope between 2017 and 2018 displays the first decrease in overdoses in North Carolina since 2010, though the decrease is rather small and lasted only one year.

A similar trend emerged in Figure 3, which compares overdose rates in Alamance County to the average of all 100 counties in North Carolina. For much of the time span, Alamance County's death rate dips both above and below the average of other counties, but between 2016 and 2017, the number of overdoses in Alamance County more than doubled, creating the widest gap between the death rates at the beginning 2017, when Alamance County recorded over 30 deaths per 100,000 residents and other counties recorded, on average, less than 20 per 100,000 residents - unfortunately, I am unsure of exactly why this occurred but as a next step, it would be beneficial to understand. However, the gap began to decrease halfway through 2017, when in June, North Carolina implemented its Opioid Action Plan. The death rate in Alamance County sharply declined in the following two years, but the average in all counties dipped slightly and began rising again in 2018, mirroring the trend of North Carolina in Figure 2.

After establishing that both North Carolina and Alamance County saw a slight decrease in the number of deadly opioid overdoses following the implementation of North Carolina's Opioid Action Plan, I wanted to look at Alamance County data and evaluate three strategies within the plan: diverting the flow of illicit drugs, reducing the oversupply of prescription opioids and expanding treatment and recovery systems. Figure 4 addresses the plan's claim that it will work to divert the flow of illicit opioid drugs in North Carolina. In Alamance County, the opposite effect seems to have occurred since the plan was enacted. As seen in Figure 3, Alamance County saw a huge surge of opioid overdose deaths in 2017, and Figure 4 reveals that unlike in most previous years, more than 75% of deaths involved illicit opioids. 2015 marked the first year that illicit opioids made up more than half of overdoses, and since the enactment of the plan, they have consistently been involved in more than 75% of overdoses.

Figure 5 may provide some insight as to why. Beginning in 2015, North Carolina in its entirety, including Alamance County, began prescribing opioid medication to less patients. The decrease in Alamance County residents receiving opioid medication beginning in 2015 aligns exactly with the increase of illegal opioids involved in overdose deaths in Alamance County, also beginning in 2015. One claim of the Opioid Action Plan was that North Carolina would reduce the oversupply of prescription opioids, and while the supply has been reduced in both North Carolina as a whole and Alamance County, the trend actually began two years earlier in 2013, as seen in Figure 5. Therefore, I hesitate to credit the plan entirely for this observation. Moreover, the plan's strategy to divert the flow of illicit drugs has outright failed in Alamance County, as seen in Figure 4. This finding is particularly interesting to me, as it is an insight into how addicting opioids are, as once they are no longer being prescribed, people will seek them out

on the streets. Due to the time constraints of this project, I was unable to see if this trend is reflected in other counties, but it could serve as an interesting next step.

One success of the Action Plan, however, seems to be increasing the number of residents recovering in treatment programs. In Figure 6, the average number of residents with an opioid use disorder being served by state treatment programs in all North Carolina counties has steadily increased since 2017 when the plan was enacted. Unfortunately, though, this trend is not reflected in Alamance County specifically, as the number of residents in treatment programs has remained stagnant and far below the average of all North Carolina counties since 2017. I conclude that through the implementation of policies intended to decrease the number of patients being prescribed opioid medication in North Carolina and expand recovery systems, North Carolina and Alamance County have seen a slight decrease in the number of deaths from opioid overdoses. However, I would argue that, in 2021, Roy Cooper’s vision of “turn[ing] the tide” of the crisis has not yet been realized, and as a smaller, rural county, Alamance is yet to see many results promised by the 2017 plan; adversely, overdoses in the county are now far more likely to involve illicit drugs, proving how dangerous of an epidemic the opioid crisis is.

Works Cited

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