Comparison of Cities' Homicide Rates Over Time (2014 Data)

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This paper summarizes data showing how Rochester, NY's homicide rates have changed in the last fourteen years, with the ultimate goal of using this data in community violence-reduction planning. It compares the homicide rates of cities of different and similar population sizes, demographics, and poverty concentration to homicide rates in Rochester, NY. We compare Rochester to other cities to study which cities have and have not achieved significant reductions in homicide rates. A closer analysis of cities that have done well in lowering homicide rates will be the goal of future papers.

The analysis relies on data from the U.S. Census from 2000 and 2010 for each city, the number of homicides as recorded by the FBI (for 2000 through 2013), and local sources such as newspapers (for 2014 and some from 2013). The data is displayed in different formats to facilitate the comprehension of any changes in the data's patterns since 2000, with a focus on the Rochester area. We used the FBI Uniform Crime Reporting (UCR) data for the number of homicides in each year in every city from 2000 to 2013. Because yearly UCR data is not published until the Fall of the following year, we used homicide counts published in local newspapers for 2014 rates. Census data from 2000 and 2010 allowed us to have an approximation of the population for calculating the homicide rates.

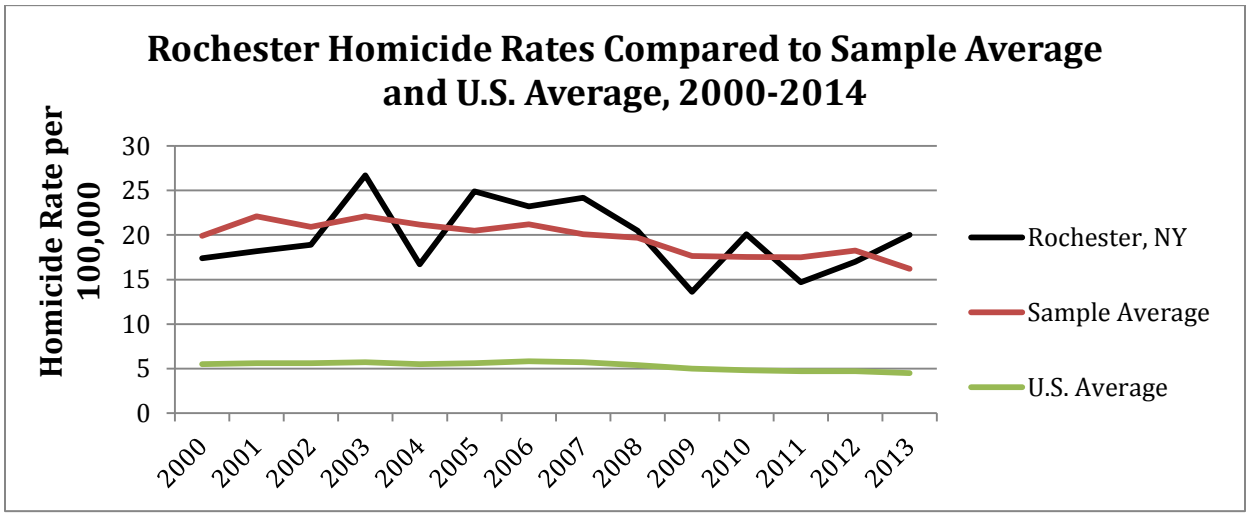
It is important to note that there is a technical difference between the terms "murder" and "homicide." The legal definition of homicide includes justifiable homicides, which may not necessarily be criminal in nature (Legal Dictionary, 2013). Therefore, homicide is a broad category. Murder is a type of criminal homicide. The FBI's Uniform Crime Report uses the term "murder" to describe "murder and no negligent manslaughter as the willful (non-negligent) killing of one human being by another" (Federal Bureau of Investigations, 2011).

Comparing the frequency (or raw number) of any crime without mentioning the differences in the cities' populations would be misleading; therefore the rates of crimes must be compared. Most often, when comparing large metropolitan areas, rates are calculated as the number of homicides per 100,000 people who live in the city. The formula used here is: [(number of homicides/population) x 100,000]. Rates are calculated out of 100,000 rather than as percentages (out of 100) because homicide is rare, and percentages are therefore very low.

Data have shown that U.S. homicide and violence rates in general have been steadily dropping since the early 1990's. The overall rate of homicides in the United States has been declining from 9.5 homicides per 100,000 people in 1993 to 4.5 per 100,000 in 2014 (Siegel,

2011). Figure 1 shows the pattern of how homicide rates have changed from 2000 to 2014 for our sample on average compared to Rochester and the national average. (Rochester has a much more irregular pattern because the curves get "smoothed out" when you average cities' rates, as is done for the U.S. average and our sample's average.) Also, the sample's average is higher than the U.S. average because our sample includes only cities, and homicide rates are higher in cities than in suburban or rural areas. Rochester's homicide rate since 2007 has been decreasing, and the peaks in 2010 and 2013 do not reach the peak in 2002.

Figure 1: Rochester, NY Homicide Rate Compared to the Sample Average and U.S. Average



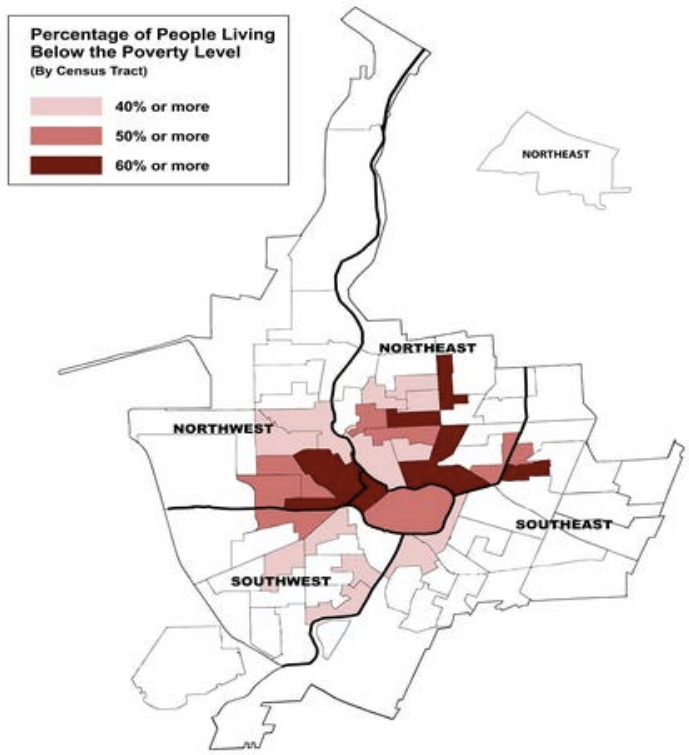
Although no studies have been able to determine a definitive reason why homicide rates have been dropping since the early 1990's in the U.S. overall, we can make some assumptions based on the data. To test our hypothesis that there was a significant drop in the U.S. homicide rate in 2008, we conducted a two-sample t-test. We found that the average number of victims from 2008 to 2014 is significantly different from the average number of victims from 2000 to 2007 ($p<0.02$). However, notice that this does not explain why a drop occurred; more variables like the ones we address next can help determine why the homicide rate has declined.

In Rochester, NY, we looked at what may have happened in 2007 to lower the homicide rate. Some of the potential factors may include the implementation of evidence-based strategies by the Rochester Police Department, such as problem orientated policing, hot spot policing, street outreach, procedural justice, focused deterrence, and crime prevention through environmental design (CPTED). Also, in 2007, Federal authorities in Rochester dismantled a gang (called Murder Unit) operating in the 800 block of Joseph Avenue after neighborhood

complaints triggered a three year investigation involving Rochester Police, the Monroe County District Attorney's Office, and the Bureau of Alcohol, Tobacco, and Firearms. It ended with eleven members of the gang being sentenced to federal prison terms of up to 16.5 years on conspiracy charges. Two other Murder Unit members were prosecuted and convicted in state courts. Lastly, political changes may have influenced the homicide rates and the functioning of the police department. For example, in 2006, Robert Duffy became the city's Mayor. Mayor Duffy had worked in the Rochester Police Department since 1976 and was the deputy chief from 1992 to 1998 and the chief of police from 1998 to 2005. His governance may have addressed homicide prevention differently than prior administrations.

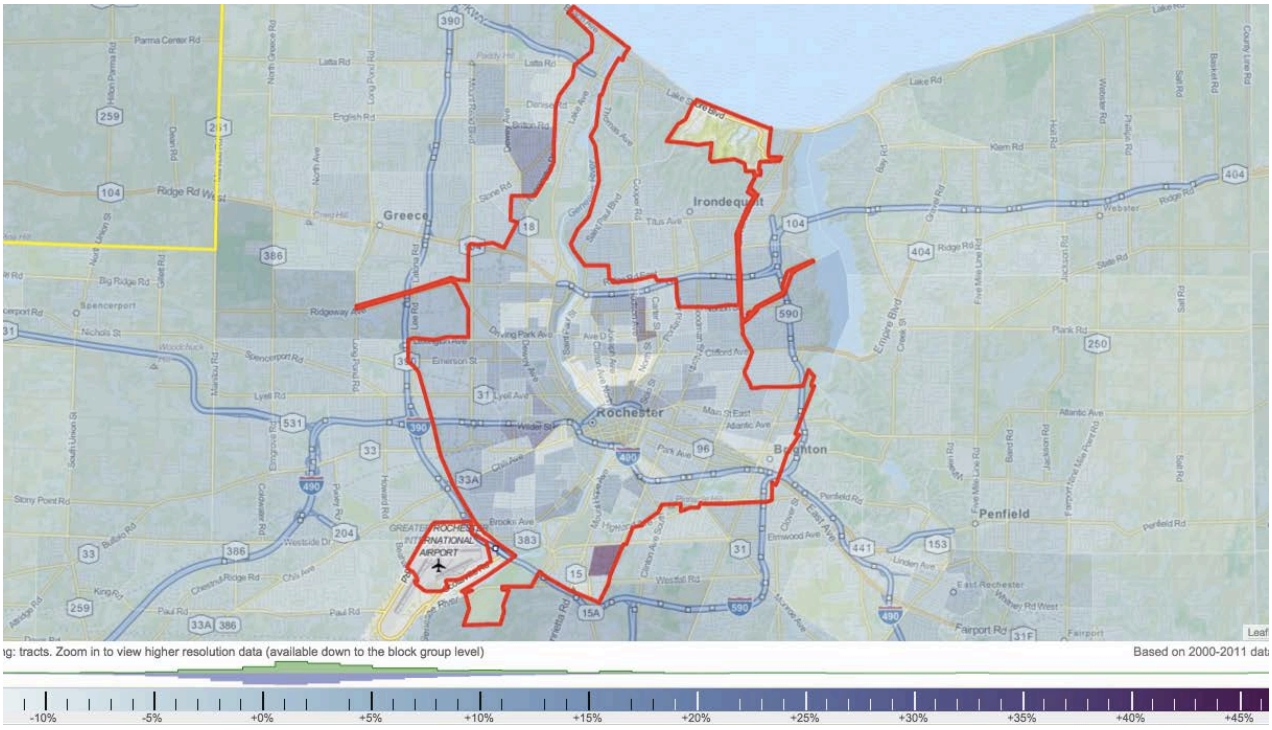
It is well-known that higher rates of poverty often correlate to higher homicide rates. According to the website City-Data, 25.9% of Rochester residents had income below the poverty level in 2013, contrasting with 14.6% of New York State residents overall being below the poverty level. Figure 2 shows the census tracts in Rochester that have the highest levels of poverty. However, when we compare data from the 2010 and 2000 census, we see that there were not significant changes in the poverty level in Rochester.

Figure 2: Percentage of People Living Below the Poverty Level in 2013 (Source: Rochester Area Community Foundation)



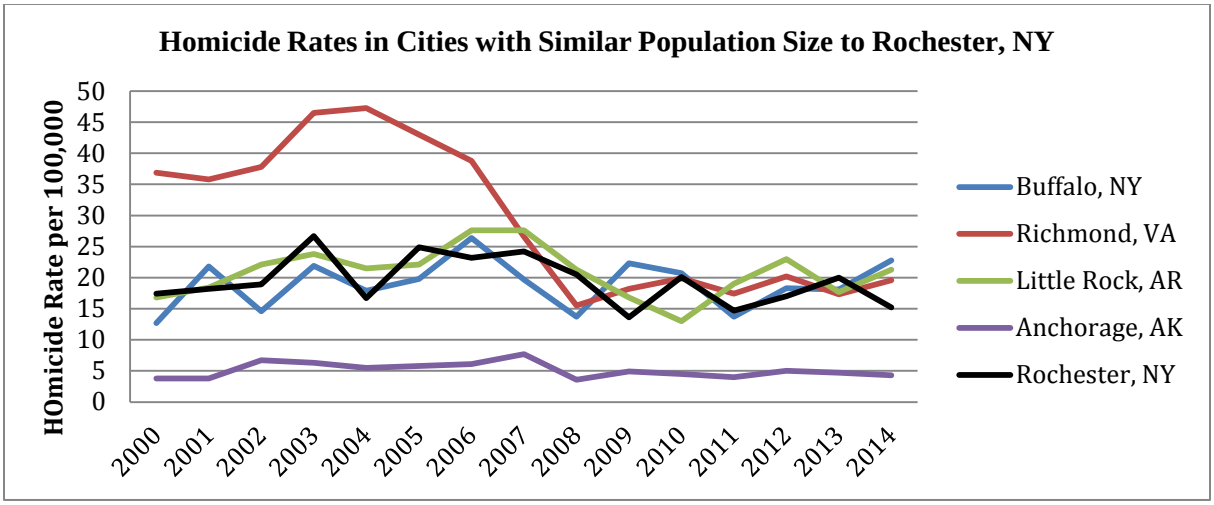
While there was no variation in the city's overall poverty level, Figure 3 shows the variation in the percent change in poverty level by census tract across the city. Depending on the area, poverty level changes ranged from a 10% decrease to a 45% increase in poverty rates. Darker spots indicate areas census tracts that have seen an increase in poverty levels from 2000 to 2010. The map shows that the poverty rate from 2000 to 2013 has not changed or only had small changes in some areas, but overall, significant changes are not evident. Therefore, it is unlikely that changes in the city's homicide rates can be attributed to changes in the poverty level. If anything, Rochester's poverty rates have increased while the homicide rates have decreased. However, an in-depth analysis (beyond the scope of this paper) would have to be done to show whether census tracts that have had an increase in poverty rates have also seen an increase in homicide rates compared to other areas of the city.

Figure 3: Percent change in the Rochester, NY Population Living Below the Poverty Level from 2000 to 2010 (City-data.com)



The next figure shows Rochester's homicide rate compared to cities similar in population size to Rochester. A similar pattern in Buffalo, NY; Little Rock, AR; and Rochester, NY can be appreciated, telling us that homicide rate changes over time may have a similar pattern in cities that have similar population sizes. Nonetheless, other factors that we did not consider may also take place that affect these patterns within these cities.

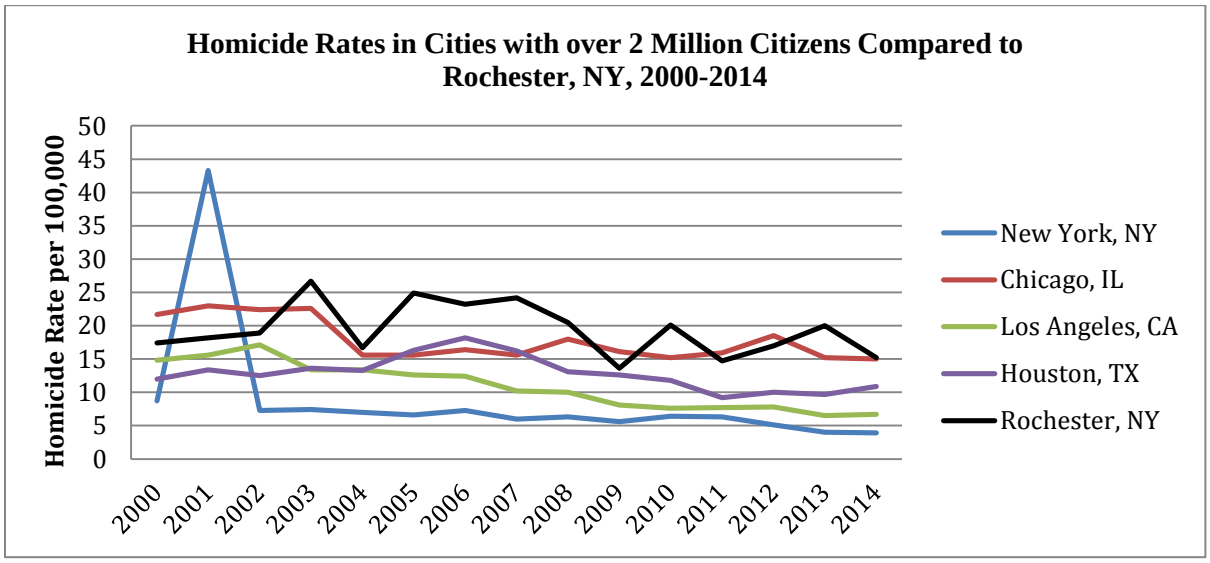
Figure 4: Rochester's Homicide Rates from 2000 to 2014 Compared to Cities with Similar Population Size within our Sample



Besides Anchorage, AK and Richmond, VA, all the cities that we choose for this graph had homicide rates average between 12 and 25 homicides per 100,000 residents in each year from 2000 to 2014. Richmond clearly had the largest change in homicide rates among these cities. Richmond, VA started a homicide reduction program in 2005 that may account for the significant change shown in the data set. This program is a strategic/tactical intelligence-based approach for reducing homicides that aimed to use data related to homicides to create predictive crime reports. Data included time, day, holidays, weather, moon phases, city events, paydays, and crime records, and they collected data for at least the prior five years (Russel, 2009). However, some other key factors surely contributed to the drop in homicides rates in Richmond, but such analysis is beyond the scope of this paper.

The next figure shows Rochester, NY's homicide rate compared to cities with over 2 million citizens, including Chicago, IL; Los Angeles, CA; and Houston, TX. We decided to make this comparison to observe how the rates may be different in bigger cities that may have differences in geographies, demographics, and resources for policing.

Figure 5: Rochester's Homicide Rates Compared to Cities with Over 2 Million Citizens



Rochester's homicide rates seem to be slightly higher than all the cities used for this comparison. The reason may be that bigger cities often include suburban-like areas within their borders as well as corporate business districts, where homicides are not usually common, lowering the overall city's homicide rate. However, Rochester, NY has a high proportion of high-crime areas compared to these larger cities, creating a much higher rate for the city overall. Many other factors are likely to affect these numbers in larger cities, but more research would be needed to examine which ones are significant.

It is also important to note that the 2001 peak in New York, NY is due to the terrorist attacks on September 11, 2001. The approximate number of homicides without including this incident is about 495, or 6.2 homicides per 100,000 for that year, which is similar to other years in the sample for New York City.

There appears to be a drop in Chicago's homicide rates between 2003 and 2004. Chicago, IL implemented Violence Reduction Initiatives in 2003 which had as key components intelligence-led policing, sharing information, and crime prevention tactics The Chicago police department claims that their initiatives have resulted in a raw number of less than 500 since 1964, although we did not conduct further research on the topic (Chicago Police Department, n.d.). However, it definitely should be consider one of the factors that may explain the drop shown in data from 22.6% to 16.7%, but many other factors may have also had a role.

The 2006 peak in homicides in Houston, TX may be caused by increased levels of violence among evacuees from the Katrina disaster, which had place within the days of August

23th and August 30th from 2005. Almost 250,000 refugees from Louisiana came to Houston after the Katrina disaster (Moreno, 2006). It is not clear whether the evacuees are included in the population counts, so if there were more uncounted people in the city and more violence, then this would raise the homicide rate in Houston.

Figure 6 shows the percent change in homicide rates for each of our sample cities between 2000 and 2014. We calculated the percent change by subtracting each city's 2000-2003 average homicide rate from its 2011-2014 average. A range of three years for the start and end dates was used to decrease the influence of any one year, if that year happened to have an unusually high or low rate of homicide. This calculation was done to appreciate how the cities have improved or decreased their performance regarding homicide control.

Figure 6: Average Homicide Rates and Percent Change for Sample Cities, 2000-2014

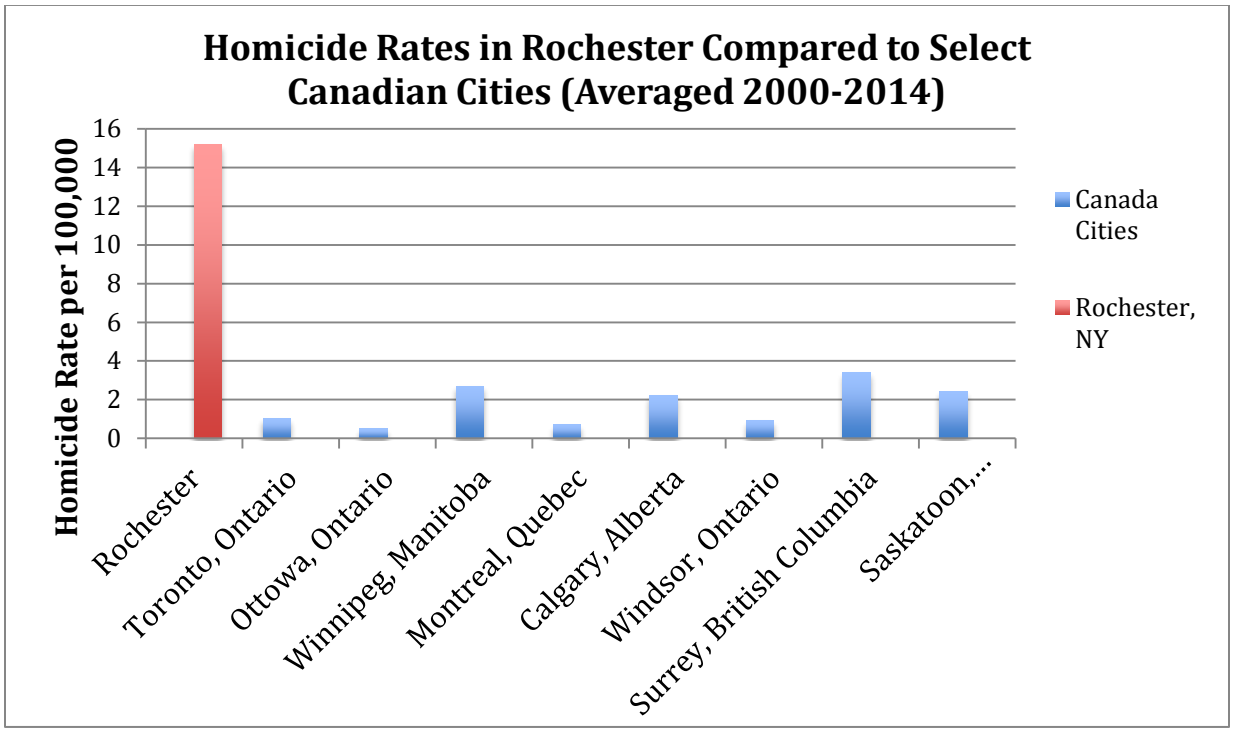
City	Percent Change	Average
New York, NY	-78%	8.7
Washington, DC	-64%	29.6
Los Angeles, CA	-56%	10.9
Richmond, VA	-48%	29.4
Atlanta, GA	-44%	23.9
Dallas, TX	-41%	14.9
Seattle, WA	-31%	4.3
Chicago, IL	-27%	17.8
Boston, MA	-18%	9.7
New Orleans, LA	-5%	49.8
Rochester, NY	-4%	19.4
Anchorage, AK	-2%	5.1
Colorado Springs, CO	6%	4.9
Syracuse, NY	6%	12.2
Newark, NJ	8%	29.8
St. Louis, MO	12%	37.7
Detroit, MI	17%	42.6
Buffalo, NY	21%	19.0
Pittsburgh, PA	27%	16.4
Cleveland, OH	36%	18.1

The city with the largest decrease in homicides shown by the table is New York, NY, but the percent change is strongly influenced by the 2001 peak resulting from 9/11. Next on the list is Washington D.C., which experienced a 64% reduction in their homicide rates during this time.

Rochester, NY only shows a small decrease in its homicide rates. Other cities have experienced increases in their homicide rates. The city in our sample with the largest increase is Cleveland, OH with a 36% of increase in their homicide rate.

Lastly, we compared Rochester, NY's homicide rates to that of some of the bigger cities in Canada, shown in Figure 7.

Figure 7: Rochester, NY's Homicide Rates compared to Canadian Cities



The U.S. in general has unusually high homicide rates compared to other Western countries. Canada consistently has lower homicide rates than the U.S. Canada differs from the U.S. in many potentially-relevant ways, including welfare policies, gun policies, and overall culture. Nonetheless, it happens to be a neighbor of the U.S. If they are able to have such low homicides rates, it must be possible in the U.S., and our goal should be to be able to reach that level too, perhaps by emulating some policies used in Canada or other countries. We encourage the research and implementation of initiatives that fit the needs of American populations and

demographics to help to reach the goal of having low rates both as an overall country and in every single city.

To summarize, the main purpose of this paper is to examine the most recent homicide rates across many cities and understand the basic changes and patterns over time. We focus on comparing Rochester to other cities to examine whether Rochester's changes in homicide rates is similar or different to changes in other cities. We showed the pattern of how homicide rates have changed from 2000 to 2014 for our sample of cities on average compared to Rochester and the national average. It is well-known that higher rates of poverty often correlate to higher homicide rates, but it is unlikely that changes in the Rochester's homicide rates can be attributed to changes in the poverty level. If anything, Rochester's poverty rates have increased while the homicide rates have decreased.

The changes in Rochester's homicide rates have a similar pattern to that of Buffalo, NY and Little Rock, AR, two cities with similar population size to Rochester. Other cities with similar population sizes, however, had either consistently lower homicide rates (Anchorage, AK) or a significant decrease in homicides (Richmond, VA). Rochester's homicide rates are generally higher than all the cities with larger populations in our sample. However, Rochester, NY has a high proportion of high-crime areas compared to these larger cities, creating a much higher rate.

It is evident, however, that some cities have achieved significant reductions in homicide rates between 2000 and 2014, while others have seen increases in homicide rates; Rochester's rates have not changed very much over that time.

This paper encounters some if not many limitations regarding to the reasons why some patterns are appreciated. We did not attempt to include all the possibilities as to why changes in homicide rates may have occurred, and we did not do an extensive research in each of the cities. Therefore, conclusions can only be tentatively drawn, and more research is needed to look into the other possibilities for the changes.

For next steps regarding to this project, we may look into why some cities have had significant reductions in homicide rates to understand what they did, if anything, to have the rates that they are currently having. We could also examine how this information may correlate with the demographics and other important factors and see how that compares to Rochester, NY. The ultimate goal would be to add to local knowledge about what Rochester could do to reduce its homicide rates, building on the successes of other cities.

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