Data Visualization

ISM6419 Fall 2023

Prof. Johannes Reichgelt

Project Report on

Gun Violence In USA

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Introduction:

The United States has been grappling with the issue of mass killings and gun violence, a topic that has incited significant public debate and policy considerations. This project aims to elucidate the patterns and trends of specifically for Gun Violence incidents in the U.S., exploring their evolution over time and examining their potential correlation with political factors, such as the party in power. By analyzing comprehensive data from various sources, this report seeks to offer insights into the dynamics of Gun violence and contribute to the broader conversation on gun control and public safety.

This report is anchored on the extensive dataset titled "Mass Killing in America - 2006 to Present," which meticulously documents multiple homicides involving four or more victims within the United States. The dataset serves as a comprehensive repository of information on incidents, including details about offenders, victims, and the weapons used, and spans from 2006 up to the current year. The primary aim of this project is to distill this extensive information into accessible and intelligible visual formats, leveraging Tableau's robust capabilities to bring forth discernible trends and patterns from the data related to Gun Violence. The visual presentations are designed to be intuitive, allowing users to effortlessly navigate and interpret the landscape of Gun killings across various geographic and demographic spectrums.

To enhance the depth of the analysis, this central data set has been fortified with additional sources, enabling a multifaceted exploration of the topic. The overarching objective is to excavate correlations within the data, such as the prevalence of homicide categories in certain states or the demographics of offenders and victims. The visual arsenal for this endeavor includes a variety of charts, geographical maps, and dynamic filters, which collectively empower users to dissect temporal trends and probe the nexus between the gravity of gun-related crimes and the weaponry employed.

I have formulated a few research questions before doing the project.

1. Which states have the highest percentage of shooting deaths in the period between 2006 and 2023?
2. In what ways has the gun violence rate fluctuated throughout the last decade?
3. Is there a significant difference in gun death rates between states with predominantly Republican (Red) versus Democratic (Blue) governance from 2008 to 2020?
4. What are the most common situational factors that contribute to incidents of gun violence?

5. What types of firearms are most frequently used in gun violence incidents?

6. How does the rate of gun violence offenders per million people vary across states from 2008 to 2023?

7. Is there a correlation between the number of registered weapons per million people and the number of gun deaths per million in the same population?

8. What is the relationship between victims and offenders and how do these rank in term of number of incidents?

9. What are the demographics, in terms of gender and race, of gun violence offenders on a per-million-people basis?

This project is driven by the critical need to understand gun-related violence within the United States and seeks to reveal important findings that could guide the development of preventive measures to reduce firearm-related fatalities in targeted regions.

Methodology:

Mass Killings Data:

In the execution of this project, I have meticulously interconnected eight distinct datasets, each of singular nature, to construct a comprehensive analytical framework. The foundational dataset, sourced from the data.world platform, was published by The Associated Press and encompasses extensive details on mass killings.

Data Source Link: https://data.world/associatedpress/mass-killings-public

This dataset is partitioned into four subsets: incidents (548 entries), offenders (693 entries), victims (2,851 entries), and weaponry (859 entries), each dataset being discrete and rich with unique information, making a merger into a single file infeasible.

Population Data:

I gathered state-wise population data of the U.S. from the repository to provide a demographic context to the mass killings data.

Data Source link: https://worldpopulationreview.com/states

YPLL Data:

For an in-depth analysis of Years of Potential Life Lost (YPPL) due to gun violence, I extracted data filtered by State and Year from the CDC's database, providing a vital perspective on the premature mortality impact.

Data Source Link: https://wisqars.cdc.gov

Political Data:

The electoral dataset was integrated with the mass killings data to examine the political landscape over the years, delineating the parties in power from 2006 to 2023.

Data Source link: https://www.kaggle.com/datasets/tunguz/us-elections-dataset

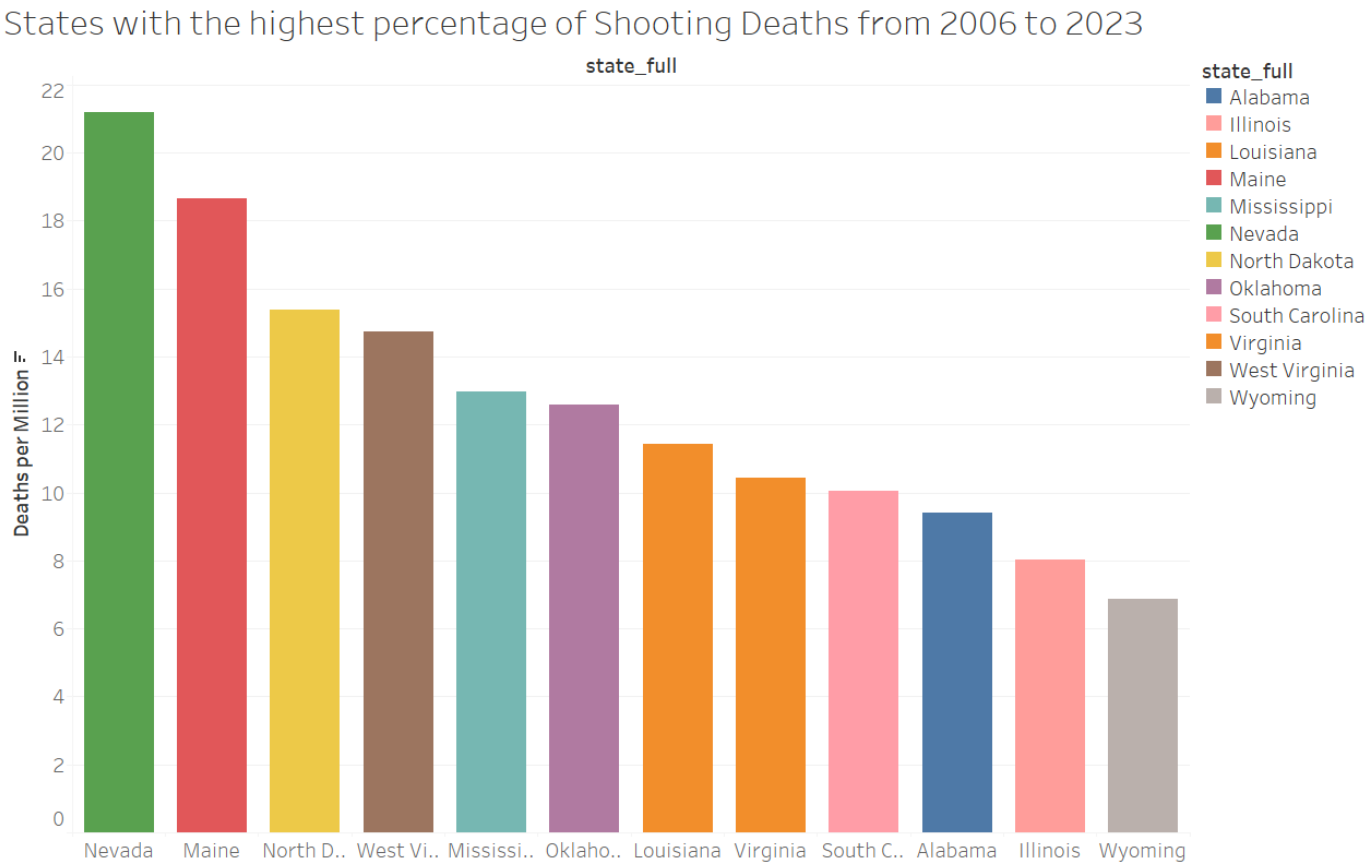
Gun Registrations Data:

Finally, I consulted data on the number of Registered Weapons per 1,000 residents to correlate with the mass killings statistics, offering insights into the proliferation of firearms in relation to the incidents of violence.

Data Source link: https://worldpopulationreview.com/state-rankings/guns-per-capita

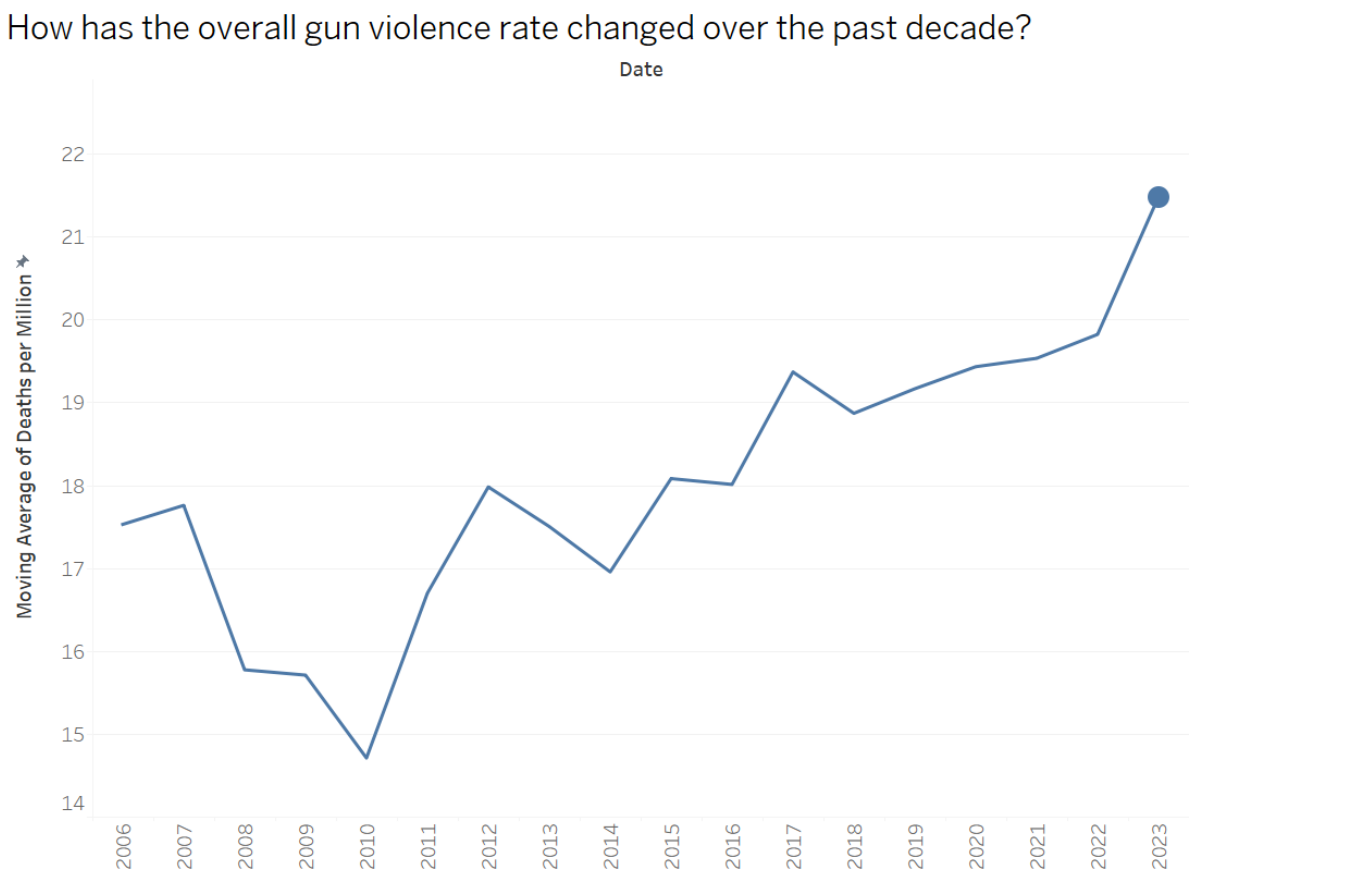
Analysis:

1. Total Number of Gun-related Deaths state-wise per million population with Top States filter:



This chart provides a stark comparison of gun-related deaths across states when adjusted for population size. It highlights the discrepancy in death rates, with Nevada reporting 21 deaths per million people—a number significantly higher than the national average—while Massachusetts represents the lower end of the spectrum with 1 death per million. This suggests a possible link between state-specific legislation and the effectiveness of gun control measures.

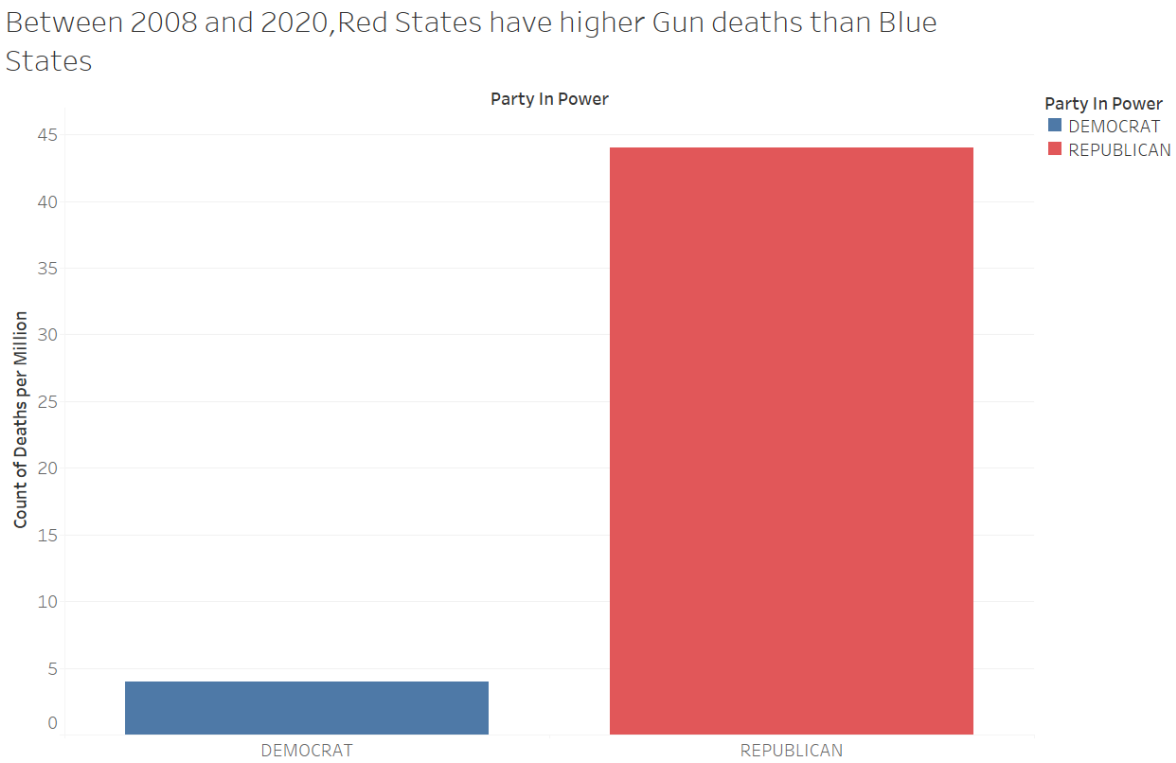
2. How has the overall gun violence rate changed over the past decade? with Animation over the years:



The line chart presents a moving average analysis of gun-related deaths per million people in the United States, tracking data from 2006 through 2023. It employs a 14-point moving average to smooth short-term fluctuations and highlight longer-term trends.

The line chart's 14-point moving average clearly delineates an upward trend in gun-related deaths since 2010, culminating in a peak in 2023. This trend is indicative of an escalating problem of gun violence, underlining the urgency for policy intervention and prevention strategies.

3. How did the Violent Gun Deaths look in terms of Governments in Power?

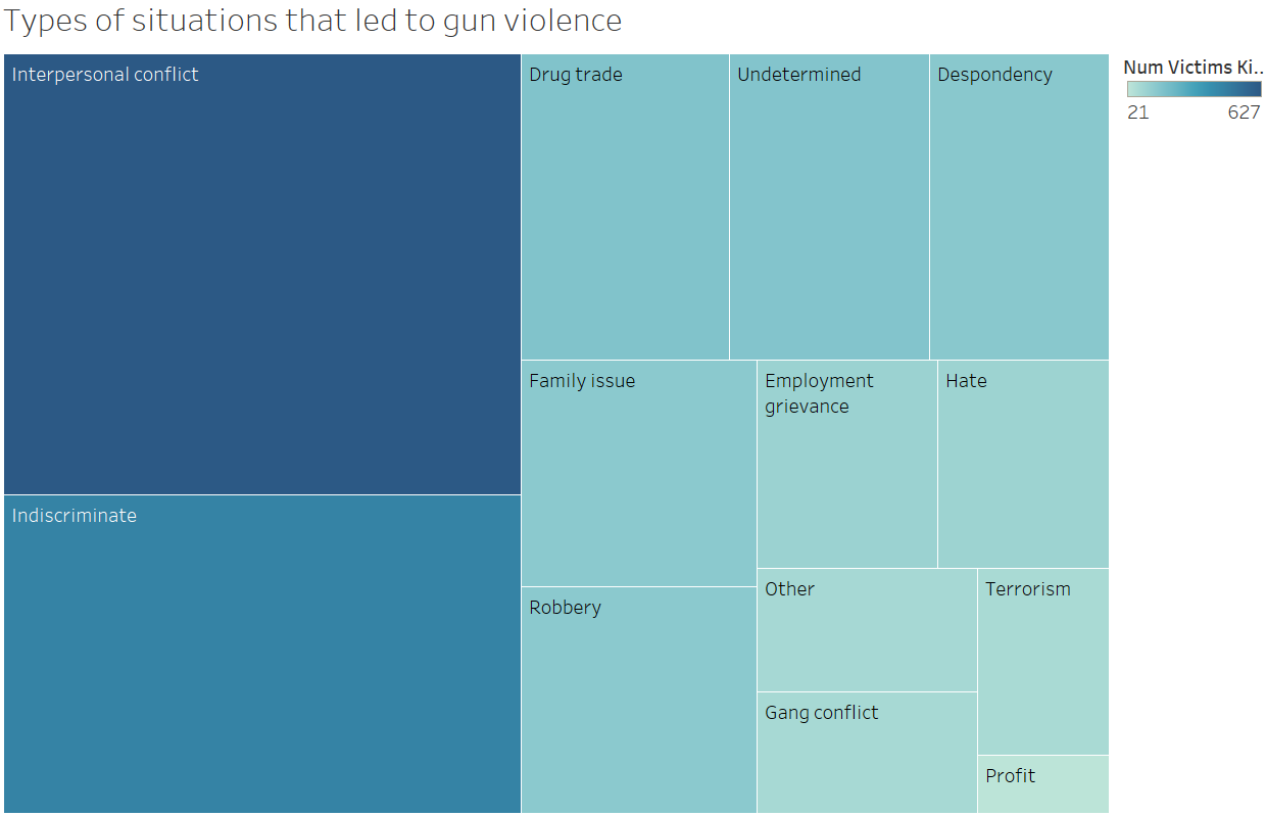


The above visual depicts a clear distinction between the number of gun violence deaths per million among the two governments in power over the last decade. Republican-Voting States Account for 8 out of the 10 Highest Murder Rates in 2020.

Reference: [The Red State Murder Problem – Third Way]

The bar chart correlates gun violence death rates with political party governance, showing a prevalence of higher gun death rates in Republican-led states. This pattern may reflect differing political philosophies on gun control measures and their enforcement.

4. Types of situations that led to gun violence.

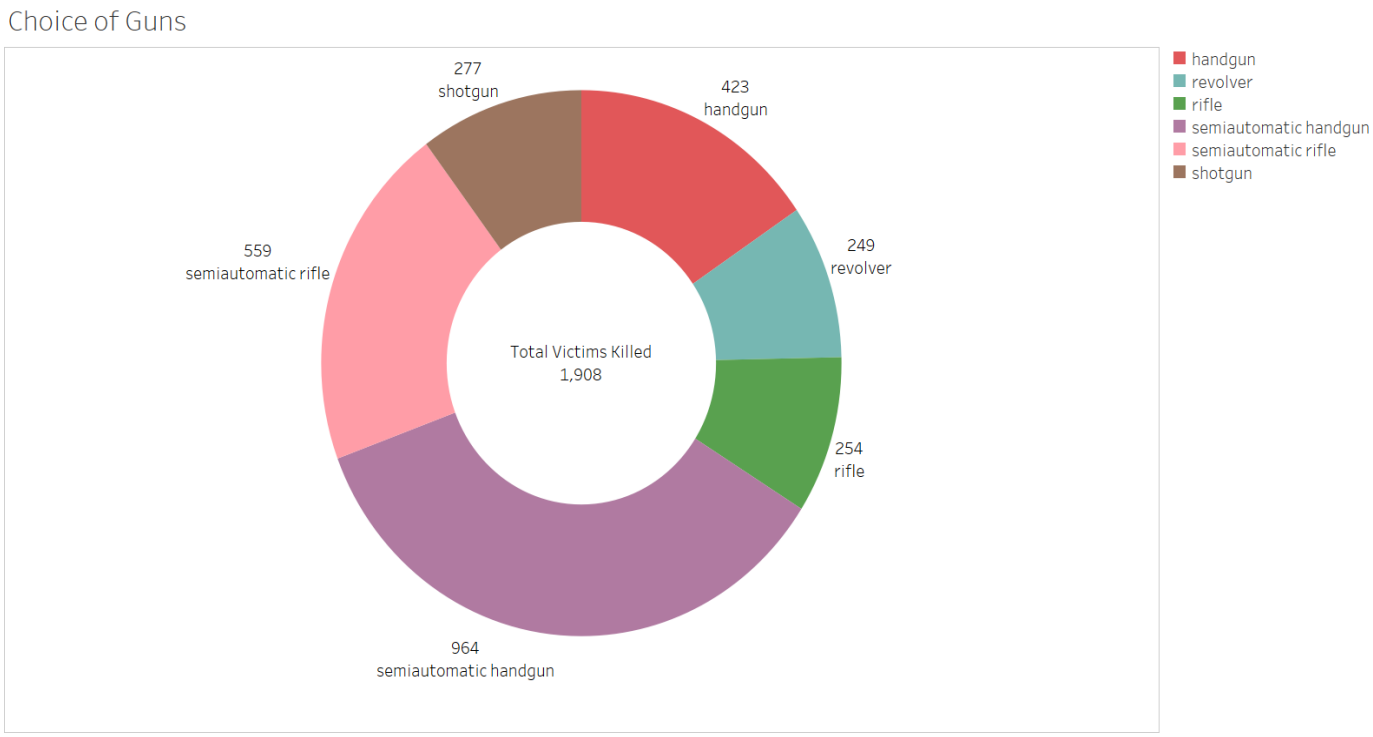


Interpersonal conflicts and Indiscriminate attacks account for most of the situations that lead to gun related deaths.

Interpersonal conflicts might include a range of scenarios from domestic altercations to arguments that escalate into violence. The prominence of this category indicates that personal relationships and the emotions involved can often lead to tragic outcomes when firearms are accessible.

Indiscriminate attacks are characterized by their lack of specific targets, where the assailant's motive may be less clear, and victims are often chosen at random. This can include mass shootings in public spaces where the primary intent is to inflict harm on as many people as possible without any personal connection to the victims.

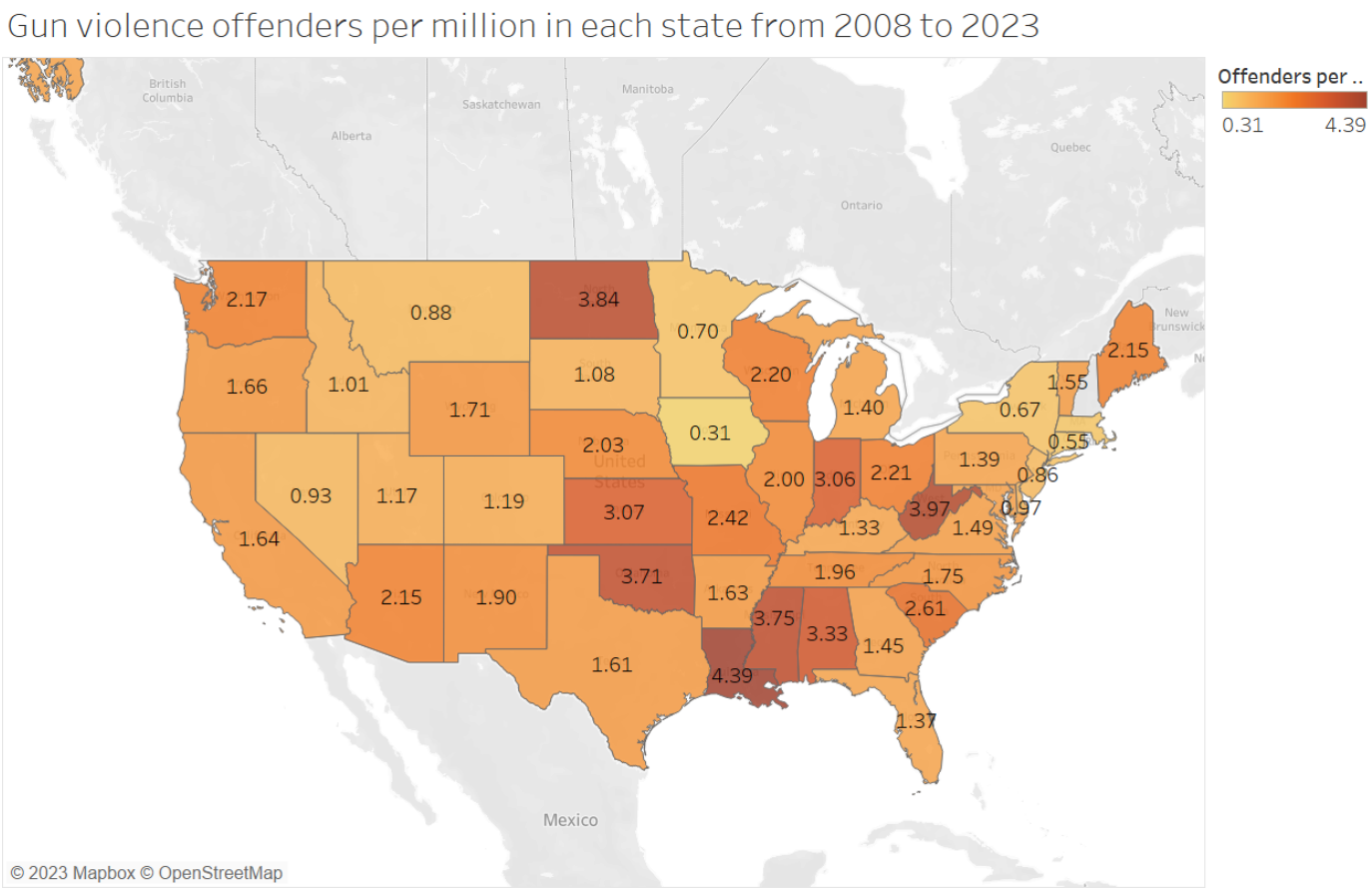
5. Offender's Choice of Gun in these attacks



The data on gun violence incidents reveals a clear pattern in the choice of weaponry, with semiautomatic handguns and rifles being the predominant types used. This preference for semiautomatic firearms can be attributed to several factors, including their widespread availability, ease of use, and the capability to fire multiple rounds quickly.

Semiautomatic handguns are often chosen for their compact size and portability, allowing them to be easily concealed and carried. This makes them a favored choice for crimes that occur in urban settings or in situations where discretion is desired by the perpetrator. Their extensive use in gun violence underscores the need for targeted strategies to regulate and monitor the sale and ownership of these types of firearms. Semiautomatic rifles, on the other hand, are often associated with higher-profile mass shootings due to their high capacity for ammunition and the ability to inflict mass casualties in a short period. The lethality of these weapons in such incidents has spurred ongoing debates about the accessibility of rifles designed for rapid firing and the potential impact of their restriction on reducing gun violence.

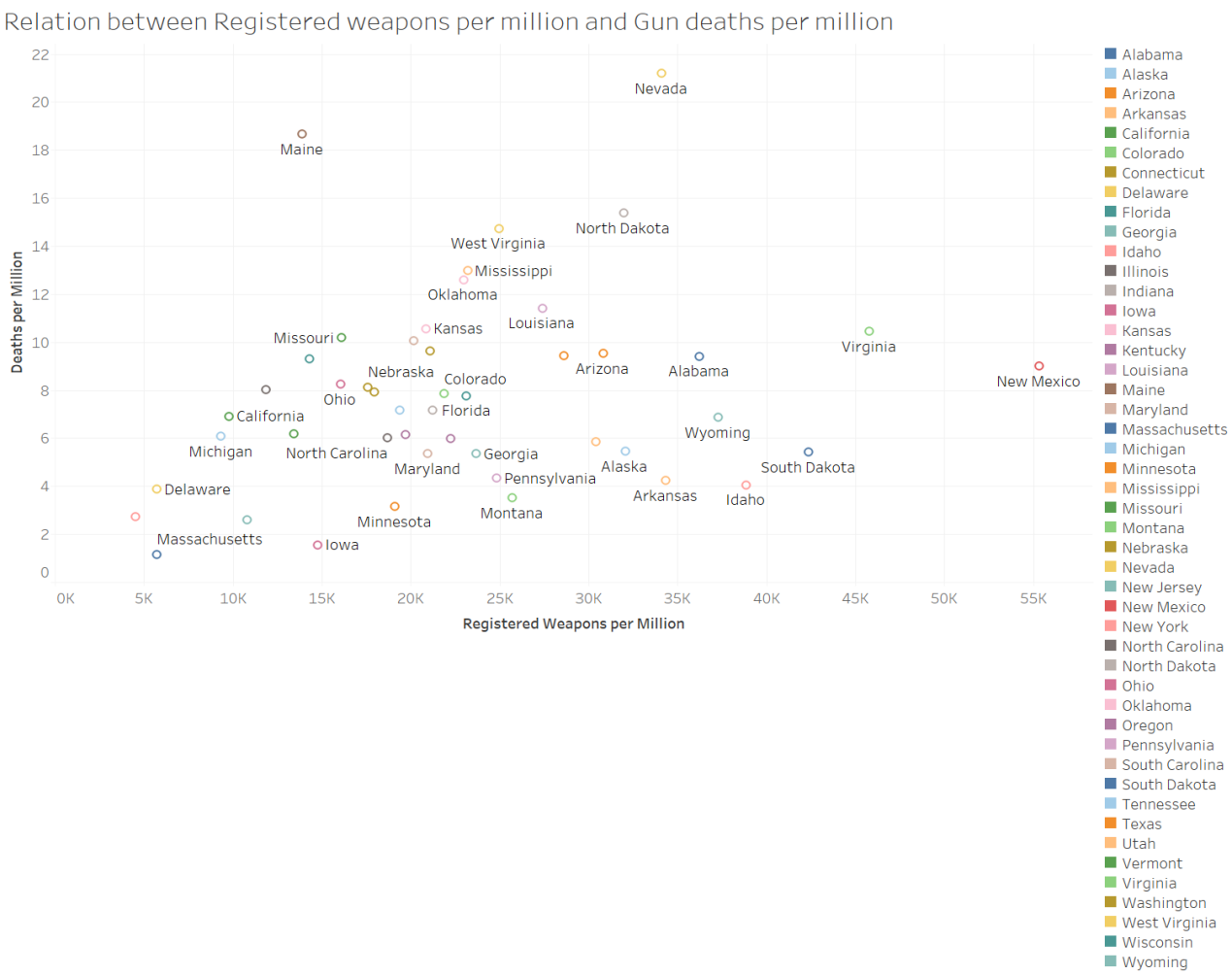
6. Gun violence offenders per million in each state from 2008 to 2023



The geographical visualization underscores the prevalence of gun violence offenders across various regions from 2006 to the present, expressed as a ratio per million inhabitants. This representation allows for an immediate visual assessment of which areas have higher concentrations of gun-related offenses, possibly indicating regions where gun violence is more of a concern.

Areas with a higher number of offenders per million might suggest underlying issues such as socio-economic challenges, cultural factors, or gaps in law enforcement effectiveness. Conversely, regions with lower ratios may indicate successful preventative strategies, stronger community relations, or more stringent gun control measures.

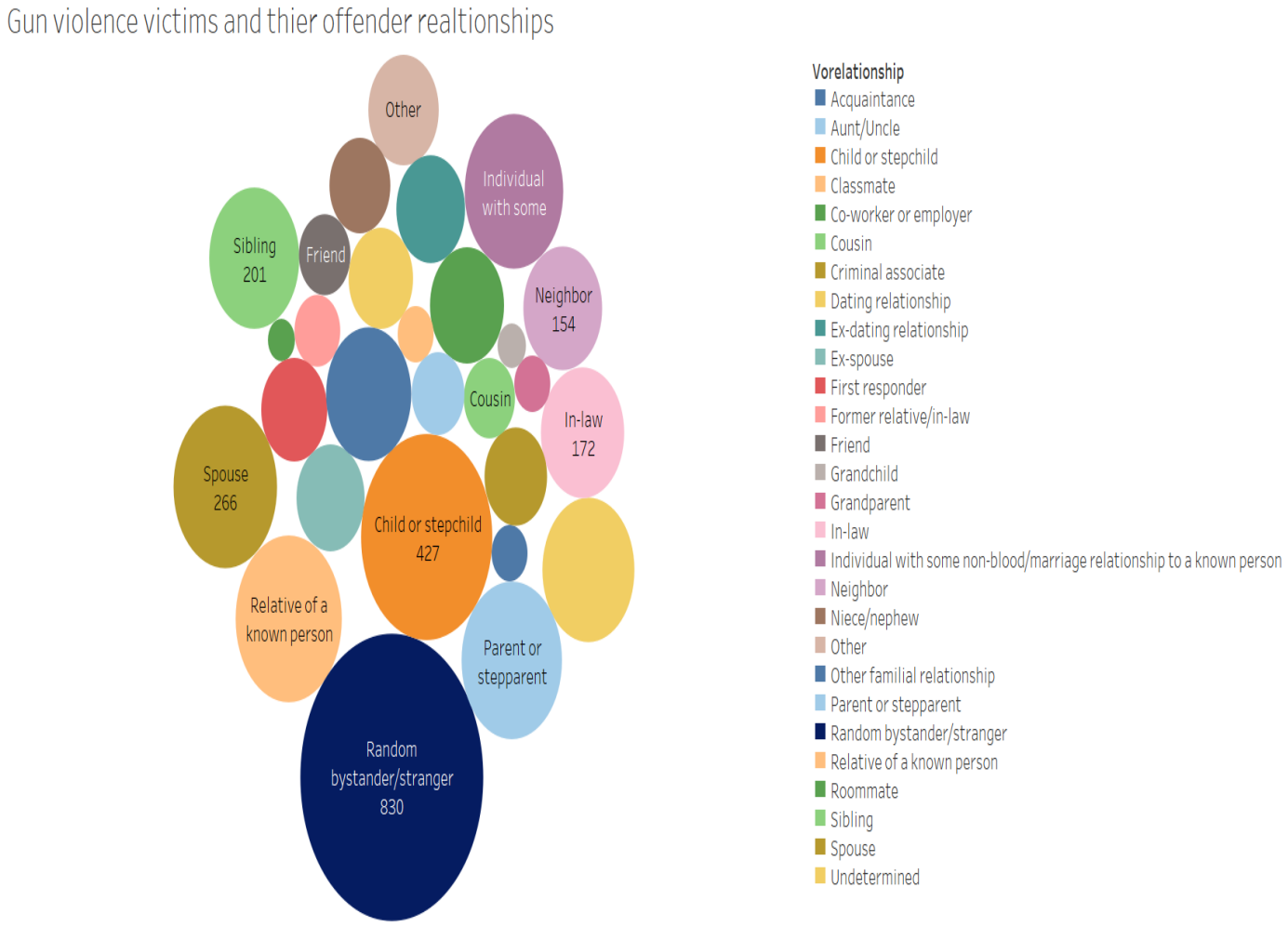
8. Gun violence victims and their offender realtionships



There seems to be a positive correlation between the number of gun related deaths and the number of registered weapons.

The presence of such a correlation could imply that states with higher numbers of registered weapons might also experience higher rates of gun-related fatalities. However, it's crucial to note that correlation does not imply causation. Many factors can influence gun-related deaths, including but not limited to gun ownership rates, state laws regarding gun control, socioeconomic factors, and more.

8. Gun violence victims and their offender realtionships

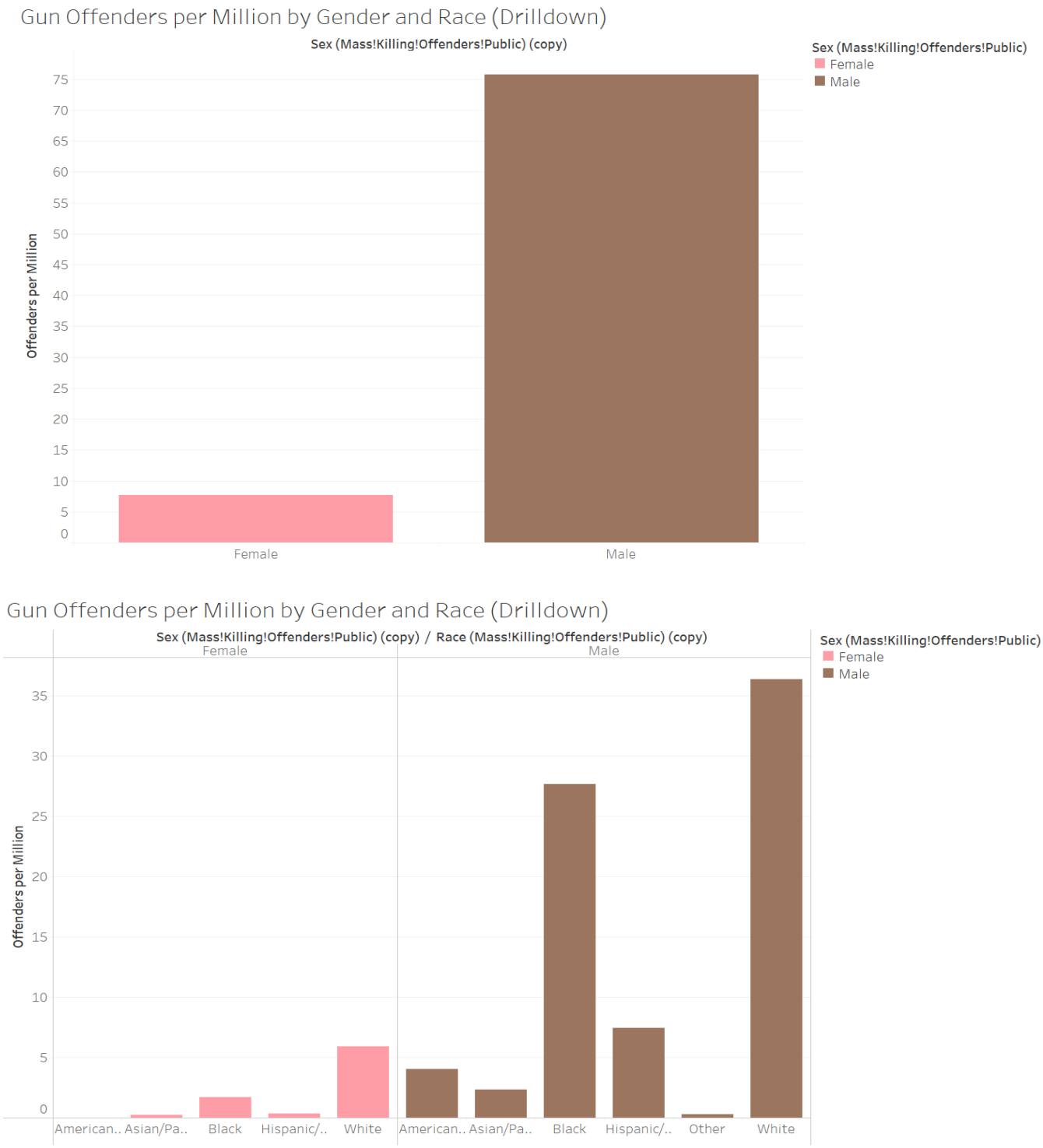


The bubble chart indicates that most gun violence victims are attacked by strangers, which points to the unpredictable nature of such incidents.

It also shows a significant number of cases involving family members, like children or spouses, suggesting that domestic violence is a critical factor in gun-related deaths.

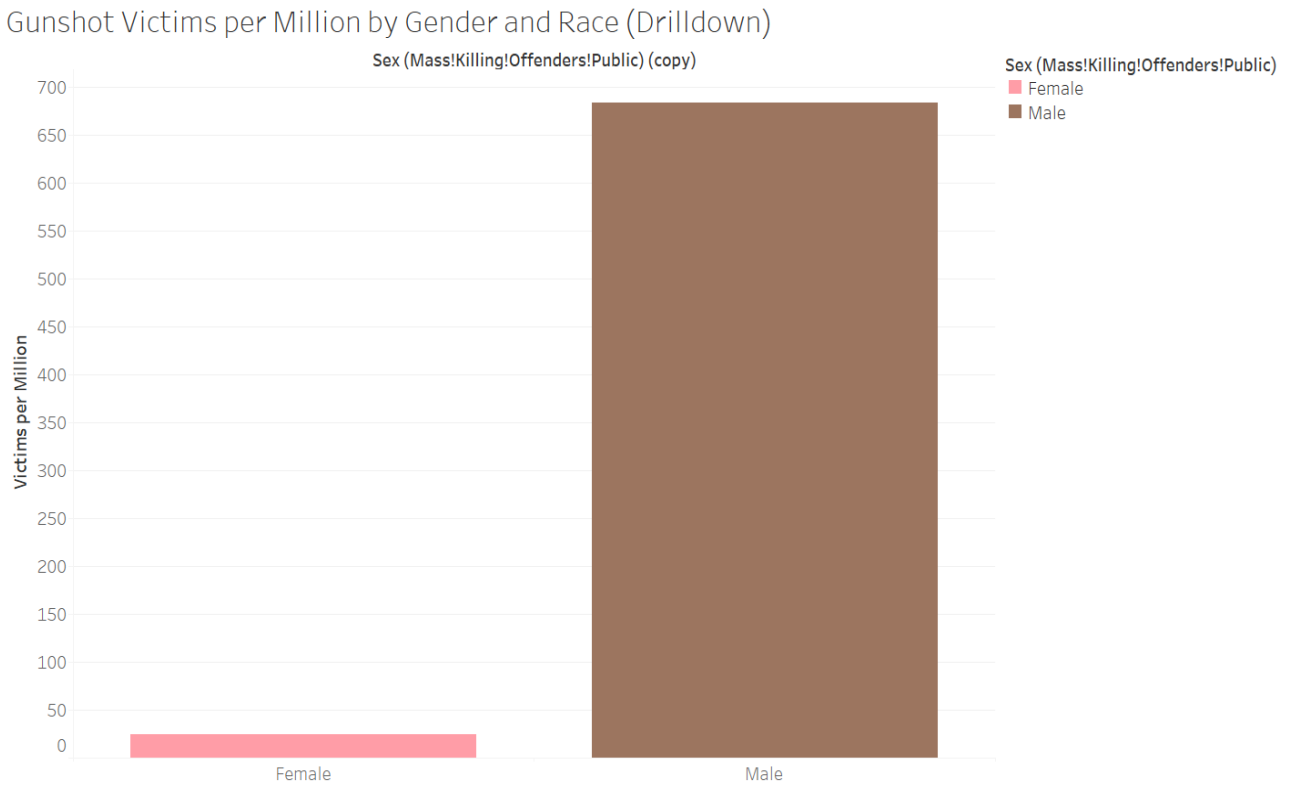
This data calls for a range of prevention strategies, from community policing to domestic violence programs and secure gun storage, to address the different contexts in which gun violence occurs.

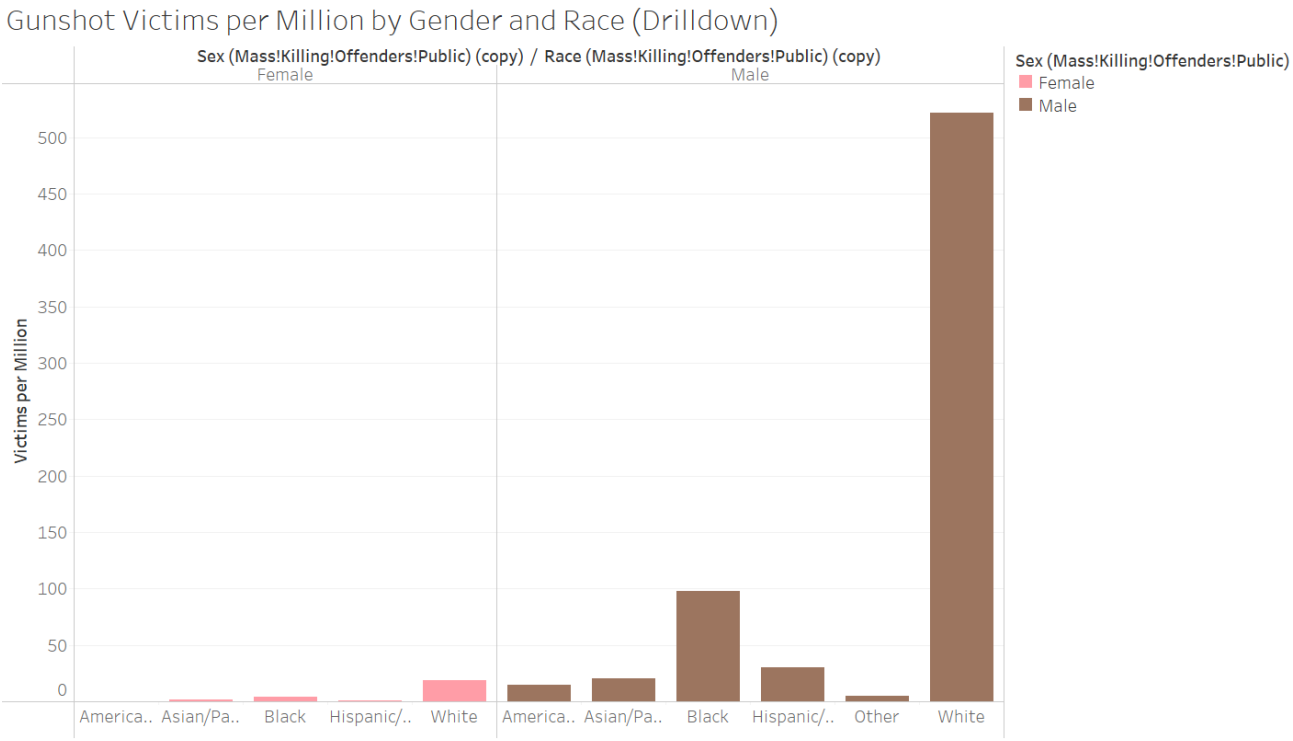
11. Gun Offenders per Million by Gender and Race (Drilldown)



This visualization breaks down offenders by gender and race, showing white males as the most frequent offenders per million. This demographic data could be instrumental in developing targeted prevention and education programs.

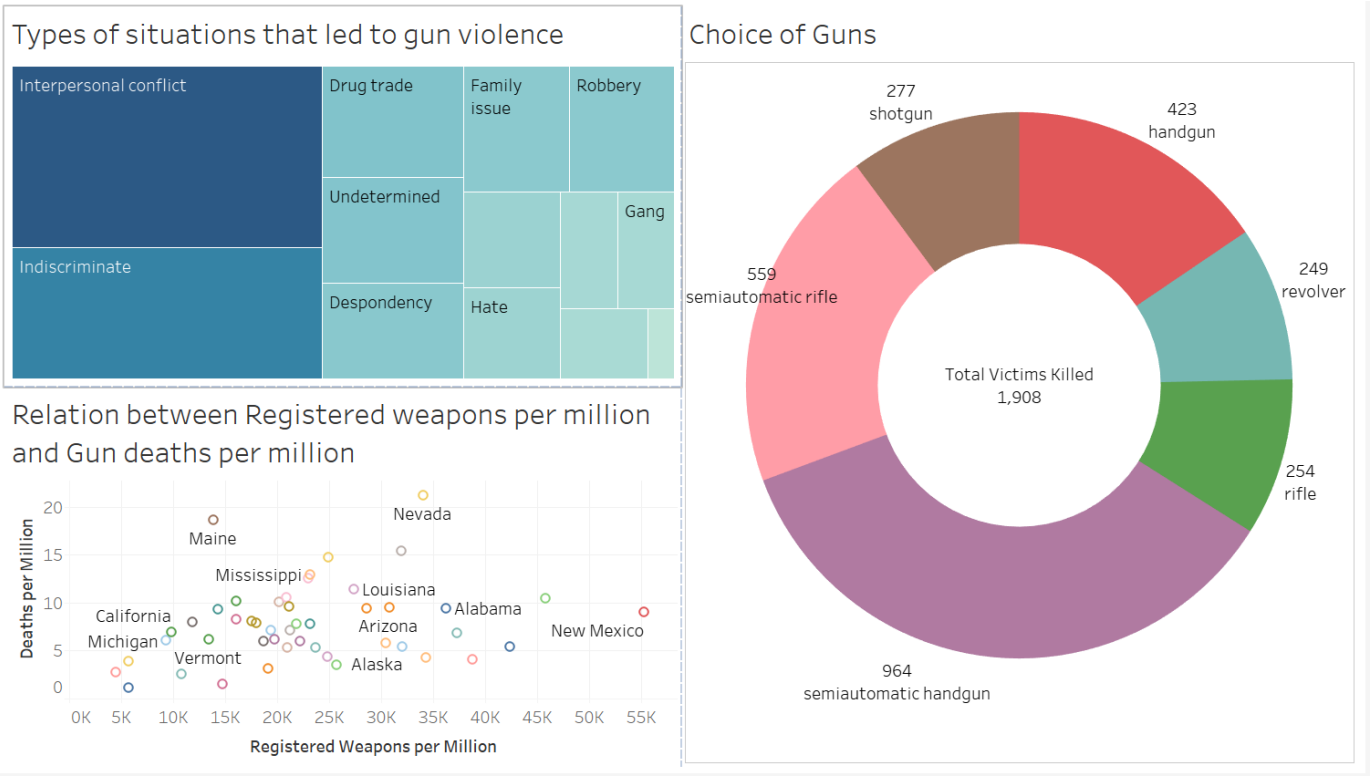
12. Gunshot Victims per Million by Gender and Race (Drilldown)

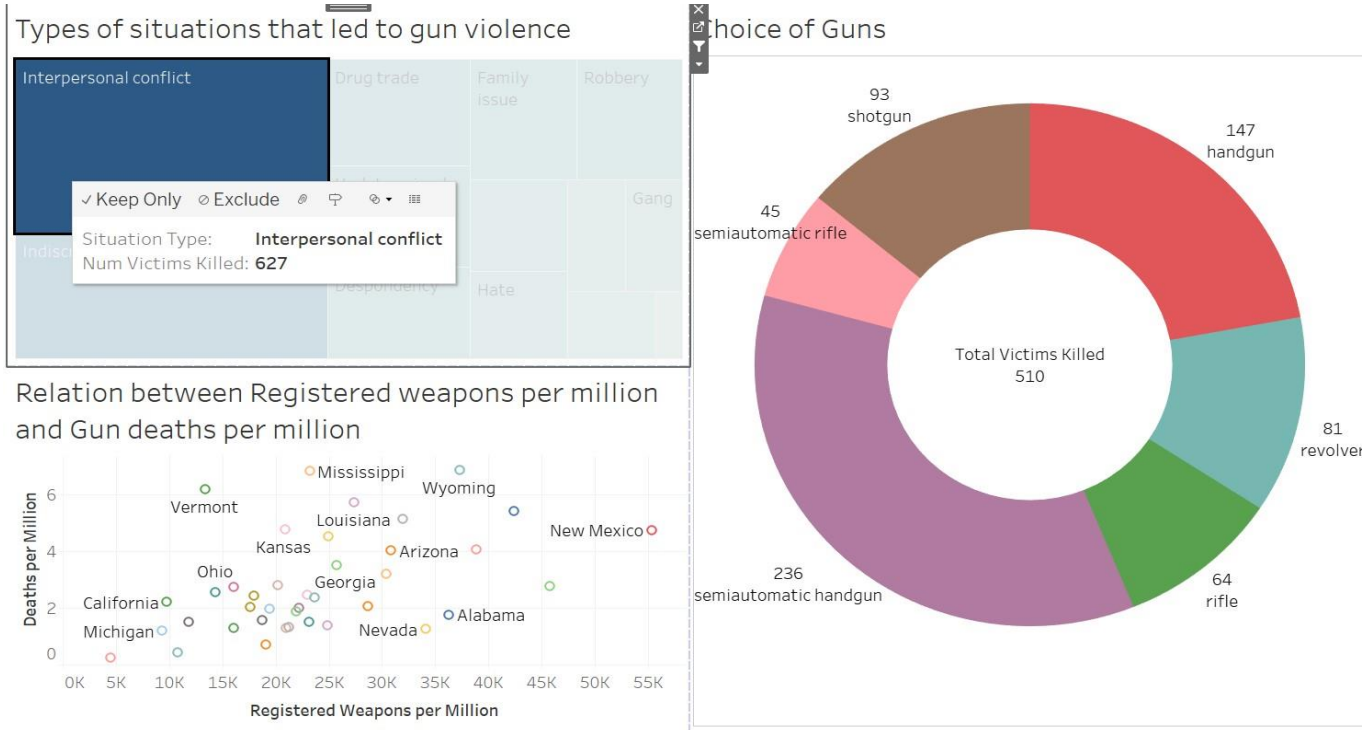




Reflecting the offenders' data, white males also constitute the highest number of victims per million, followed closely by Black individuals, highlighting potential racial disparities in gun violence impact.

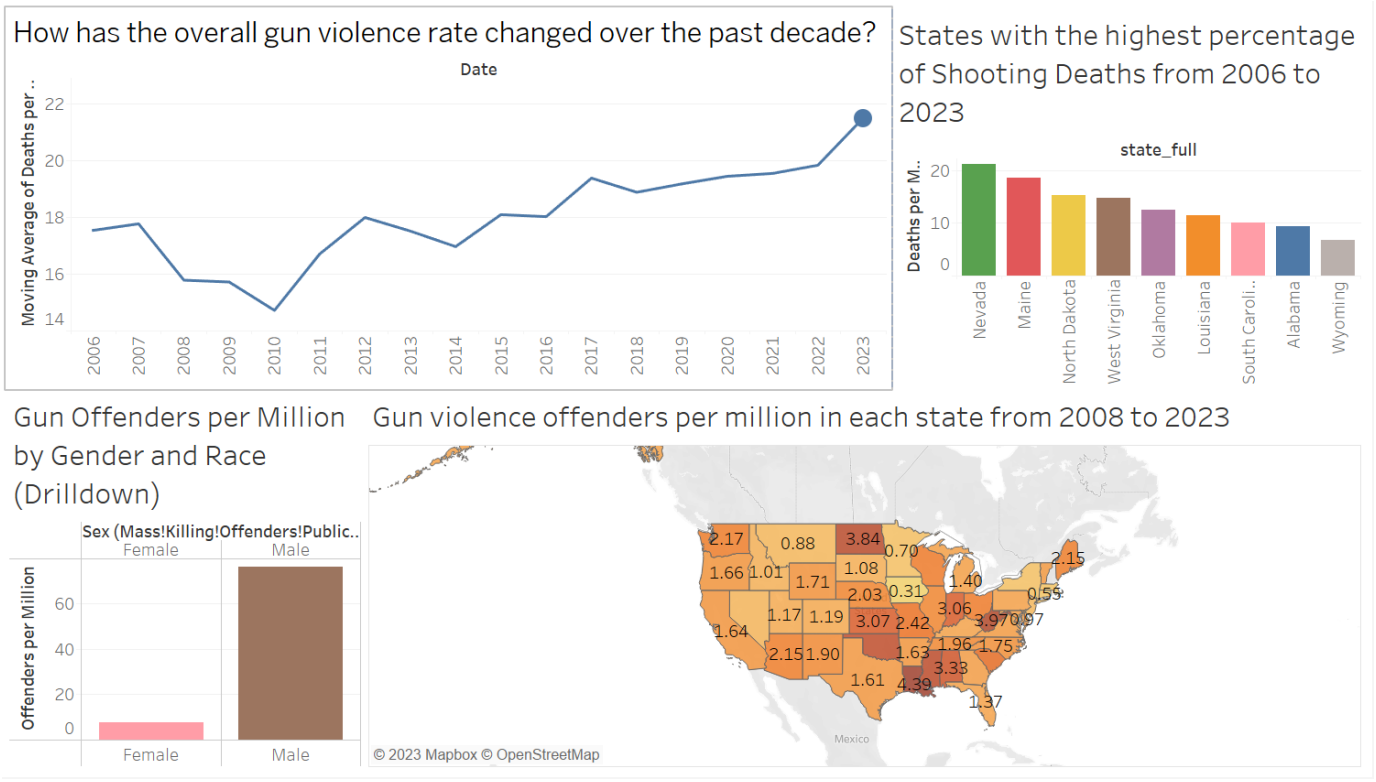
13. Dashboard 1

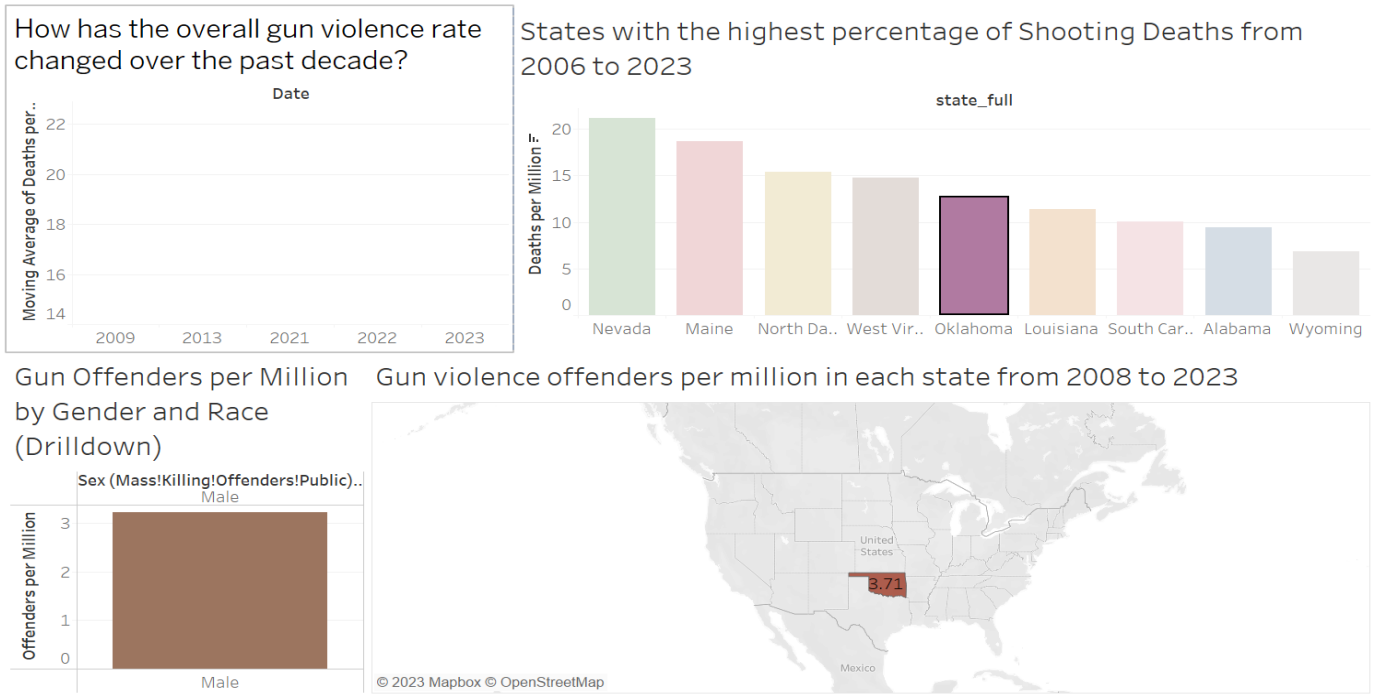




The above dashboard interactively changes when we click on any type of situation and we can see in the above example, it adjusts the choice of gun in an interpersonal conflict is a semiautomatic handgun and how the registered semiautomatic handgun counts per million is related to deaths per million.

14. Dashboard #2





In the similar fashion, this second dashboard also can be used to visualize how the states with highest percentage of shooting deaths, when clicked, change the geographic visual and the drill down my Sex and race. This can be quite useful when looking at all these 3 factors at a time.

Conclusion:

The investigation into gun violence in the United States, conducted through this project, has yielded a multi-dimensional view of an issue that remains a persistent and growing concern. By examining data from 2006 through 2023, several key findings have emerged:

1. States like Nevada and Illinois exhibit notably high rates of gun violence when normalized for population size, indicating specific regional challenges that require targeted intervention strategies.

2. The overall rate of gun violence has not remained static over the past decade. Data from 2010 onwards shows an alarming rise in gun-related deaths, reaching a peak in 2023, which suggests that the efforts to curb this violence need to be re-evaluated and intensified.

3. A significant disparity in gun death rates has been observed between states with Republican versus Democratic governance, with Republican states showing a higher rate of gun-related murders. This could be reflective of different gun control policies, cultural attitudes towards firearms, or socio-economic factors that are unique to these states.

4. The most common situations of gun violence are interpersonal conflicts and indiscriminate attacks, emphasizing the need for conflict resolution initiatives and public awareness campaigns to prevent such tragedies.

5. The preference for semiautomatic handguns and rifles in gun violence incidents underscores the necessity for stringent regulations and effective enforcement around these specific types of firearms.

6. The rate of gun violence offenders per million people varies significantly across states, pointing towards the need for state-specific policies and programs to address the root causes of this issue.

7. A correlation between the number of registered weapons per million and gun-related deaths per million suggests a complex relationship that warrants further investigation into gun

Conclusion:

ownership and its implications on public safety.

8. Relationships between victims and offenders reveal that strangers commit most gun violence acts, followed by family members, indicating that public and domestic environments are both critical areas for intervention.

These findings contribute to an informed dialogue on gun control and public health policy, highlighting the multifaceted nature of gun violence and the various levers that could be adjusted to mitigate it.

Future Research Questions:

1. Emergency costs and medical bills associated with gunshot wounds and procedures need to be obtained to look at the cost side of the problem.
2. What are the long-term psychological impacts on communities and individuals living in high gun violence areas?
3. How do gun control laws compare across states with high and low rates of gun violence, and what can be learned from their differences?
4. What role do education and community outreach programs play in reducing the number of gun-related incidents?
5. How effective are gun buyback and amnesty programs in reducing the number of firearms in circulation and associated violence?
6. What is the relationship between gun violence and other forms of social violence, such as police brutality or hate crimes?

By pursuing these avenues of research, the government can develop a holistic approach to addressing the scourge of gun violence, ensuring that all aspects of the issue are explored and understood.