**Data Visualization**

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**Final Project Report**

**The Biggest Problem – Gun Shootings at Schools**

By

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**Introduction**:

Gun violence in schools has become a pressing issue in many countries around the world, particularly in the United States. School shootings are defined as any incident in which a firearm is discharged inside a school building or on school grounds, resulting in injury or death. These incidents have increased in recent years, with devastating consequences such as loss of life, physical injuries, and psychological trauma.

The impact of gun violence in schools is not limited to those directly affected by the incidents, as it can also lead to fear, anxiety, and trauma in the wider community. There are numerous factors that contribute to gun violence at schools, including access to firearms, mental health issues, bullying, and societal issues such as racism and discrimination.

As a researcher or analyst using tools such as Tableau, it would be important to gather and analyze data related to school shootings, such as the location, date, number of casualties, and other relevant details. This data can then be visualized to identify patterns and trends in school shootings, such as whether certain regions or types of schools are more prone to these incidents.

By analyzing the data using Tableau, it may be possible to gain insights into the factors that contribute to school shootings, such as access to firearms, mental health issues, or other societal factors. These insights could then inform potential policy solutions aimed at reducing the incidence of these tragic events and keeping students and staff safe.

Some of the questions which we are going to answer through the project are as follows:

1. What are the demographics of the perpetrators of school shootings, such as age, gender, and background, and are there any common risk factors or warning signs that can be identified?
2. Are there any commonalities in the weapons used or the methods of attack in school shootings, and how can this information be used to prevent future incidents?
3. What is the breakdown of casualties by shooting type in school shootings, such as mass shootings, targeted shootings, and accidental shootings, and how do these statistics vary across different regions or demographics?
4. What is the number of students killed in school shootings in different states, cities, and types of school locations?

**Methodology:**

The data for this project is taken from two different data sources.

https://github.com/washingtonpost/data-school-shootings/blob/master/school-shootings- https://www.gunviolencearchive.org/reports

For the project, I have cleaned the datasets as they have some missing values using Excel and Tableau Prep Builder.

Below is the explanation of different column labels of my Main Dataset **(Gun Shootings at school)**.

**Uid:** It contains Unique identifier.

**nces\_school\_id**: it contains National Center for Education Statistics unique school ID.

**school\_name:** Name of school.

**nces\_district\_id:** National Center for Education Statistics unique district ID.

**district\_name:** Name of school district.

**Date:** Date of shooting.

**school\_year:** School year of shooting.

**Year:** Year of shooting.

**Time:** Approximate time of shooting.

**day\_of\_week:** Day of week of shooting.

**City:** City where school is located.

**State:** State where school is located.

**school\_type:** Type of school (public or private).

**Killed:** Number killed in shooting (excludes shooter).

**Injured:** Number injured in shooting (excludes shooter).

**Casualties:** Number killed and injured in shooting (excludes shooter).

**shooting\_type:** Type of shooting.

**age\_shooter1:** Age of first shooter.

**gender\_shooter1:** Gender of first shooter.

**race\_ethnicity\_shooter1:** Race or ethnicity of first shooter.

**shooter\_relationship1:** First shooter's relationship to school.

**Analysis:**

**What is the number of students killed in school shootings in different states, cities, and types of school locations?**

The data shows that Texas, Florida, and Connecticut have had the highest number of student deaths in school shootings, while Oregon, Nebraska, North Dakota, and Illinois have had the least. There may be various factors that contribute to these differences, such as differences in gun laws, school security measures, access to mental health resources, and societal factors. For example, some states may have more permissive gun laws, which could make it easier for individuals to obtain firearms, including those who may use them for violent purposes. In contrast, other states may have more stringent gun laws or robust school security measures in place, which may act as deterrents to potential attackers or make it more difficult for them to carry out their plans. Additionally, there may be cultural or societal factors that contribute to a higher or lower prevalence of violence in different states. It is important to recognize that each state is unique, and there may be a complex interplay of factors that contribute to the number of student deaths in school shootings.

**No. of Students Killed by State:**

**Map

Description automatically generated**

**No. of Students Killed by City:**

**Map

Description automatically generated**

**School Shootings Locations (Casualties):**

**Chart, scatter chart

Description automatically generated**

The dashboard shows that Uvalde City, located in Texas, has the highest number of student fatalities in school shootings and, we can see that most causalities happened at latitude 26.30 and longitude-80.27 which is nearly 34 and followed by 33 causalities at latitude 29.20 and longitude -99.79 rephrase the above.

**2.What are the demographics of the perpetrators of school shootings, such as age, gender, and background, and are there any common risk factors or warning signs that can be identified?**

**Chart

Description automatically generated**

**Chart, bar chart

Description automatically generated**

Based on the information provided in the dashboard, it can be concluded that male students have been responsible for most school shootings, accounting for approximately 97% of perpetrators. In contrast, female students account for only about 3% of school shooting incidents. Additionally, the age range for attackers is typically between 13 and 18 years old, with 14 to 19-year-olds being particularly involved in school shootings. Studies have revealed that several perpetrators of school shootings have a prior history of mental health problems and/or disciplinary issues at school. Nevertheless, it is crucial to recognize that each case of school shooting is distinct, and there is no universal profile for the perpetrators of such acts. However, the demographics of previous attackers provide some valuable insights into the characteristics of those who have committed these crimes in the past, which can help to inform prevention and intervention strategies in the future.

**Chart, pie chart

Description automatically generated**

Based on the data provided by the dashboard, it can be observed that white students were responsible for most school shootings, accounting for approximately 66% of the incidents. Black students were involved in 17% of the school shooting incidents, followed by Hispanic students at around 11%, and American Indian/Alaska Native students at 5%. It is crucial to acknowledge that each case of school shooting is unique, and there may be multiple underlying factors contributing to the involvement of students from different racial backgrounds in such incidents. Therefore, further research is needed to gain a deeper understanding of this issue and to develop effective strategies to prevent such tragic events.

**Chart, pie chart

Description automatically generated**

Based on the data provided by the dashboard, it is evident that there were no incidents of school shootings or casualties reported on weekends as schools are typically closed on these days. While there is no clear pattern or conclusive proof to suggest that school shootings are more prevalent on any day of the week, it is noteworthy that Tuesday witnessed the highest number of shootings and casualties, accounting for roughly one-third of all incidents.

**3**. **Are there any commonalities in the weapons used or the methods of attack in school shootings, and how can this information be used to prevent future incidents?**

Chart, pie chart

Description automatically generated

According to the dashboard, public schools in the United States have a higher incidence of gun shootings compared to private schools, accounting for approximately 96% of incidents. The reasons for this disparity are not entirely clear, but some possible factors include the larger and more diverse student populations in public schools, as well as potentially limited resources for implementing security measures. Furthermore, public schools are obligated to enroll all students within their district, including those with behavioral or mental health issues, which can increase the risk of violence. It is important to note that while every school shooting is a complex and unique situation, most schools, both public and private, remain safe and secure.

Chart

Description automatically generated

The dashboard indicates that handguns were the most used firearm in school shootings, followed by 9mm handguns and pistols. Preventing these incidents requires a comprehensive approach that addresses multiple factors, including gun access, mental health concerns, and school safety measures. Possible measures that could be taken include stricter gun control regulations, increased funding for mental health services, and the implementation of school security measures like metal detectors and trained staff. It is important to acknowledge that there is no single solution to this issue and that ongoing research and collaboration are necessary to effectively prevent school shootings.

1. **What is the breakdown of casualties by shooting type in school shootings, such as mass shootings, targeted shootings, and accidental shootings, and how do these statistics vary across different regions or demographics?**

**Chart, pie chart

Description automatically generated**

Upon analyzing the pie chart above, it is evident that the highest percentage of casualties resulted from indiscriminate shooting incidents, accounting for approximately 53% of all incidents. Targeted shootings accounted for approximately 36% of incidents, while accidental shootings accounted for approximately 9%. Both targeted and indiscriminate shootings were responsible for approximately 2% each of the total incidents. It is important to note that each type of shooting incident presents its own unique challenges and requires a tailored approach to prevention and intervention.

**Graphical user interface, application

Description automatically generated**

Upon examining the above dashboard, it is evident that most school shooting incidents involve a shooter who has a student relationship with the injured or deceased individuals. Former students, resource officers, police officers, and expelled former students were also involved in a significant number of incidents. Interestingly, a few incidents were committed by resource officers and police officers themselves.

**Chart, scatter chart

Description automatically generated**

The graph indicates that there is no apparent correlation between mass shootings and school shootings in certain states. For example, there were no reported incidents of mass shootings in schools in New Jersey, the District of Columbia, and Mississippi etc. Furthermore, there have been very few incidents of mass shootings in schools reported in states such as Texas and Illinoisbut not significant.

**Chart, scatter chart

Description automatically generated**

The first graph presented data on the number of injured individuals in both mass shootings and school shootings, while the second graph shows the number of deaths in these types of incidents. Both graphs aim to provide insights into the severity and impact of mass shootings and school shootings in the United States.

The below graph displays the top 15 incidents by casualties, categorized by the gender of the shooter, school name, race of the shooter, shooter relationship, and city. The results align with the previous findings that most of the shooters were male and white, and that most incidents involved a student shooter. The graph also highlights that the incidents with the highest casualties occurred in public sector schools, such as the 34 casualties at Columbine High School in Littleton City, followed by Marjory Stoneman Douglas High School in Parkland City, and Robb Elementary School in Uvalde. It is important to note that while these incidents are statistically significant, most schools, both public and private, are safe and secure. Preventing school shootings requires a multifaceted approach, including addressing issues such as access to firearms, mental health, and school safety measures.

**Table

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**Shooting time by number of casualties:**

**Chart, bar chart

Description automatically generated**

Based on the graph, we can observe that there is no definitive time when these incidents occur, although it is not possible to predict when they will occur with certainty. However, it appears that most incidents, approximately 20, occur around midday at 12pm. But we can observe that most of these incidents occur between 9am to 3pm, with majority of the concentration between 10am to 12:30pm. This is followed by 16 incidents at 9am.

**School population affected by shootings:**

**Chart, scatter chart

Description automatically generated**

The scatter plot indicates that there may be a correlation between the total school population and the number of casualties in a school. In general, we observe that as the school population increases, there tends to be a higher number of casualties in the school. However, there are some exceptions to this trend. For instance, some states such as Texas, Colorado, and California, have a higher number of casualties than other states, despite having a relatively lower population size. This suggests that other factors beyond school population may play a role in the frequency and severity of school casualties.

**School Population affected by shootings:**

By analyzing the above dashboard, we can determine the percentage of students affected by school casualties in each state relative to their total state population. Oklahoma has the highest percentage with 5%, followed by Missouri with approximately 3.5%. This analysis suggests that while states like Florida and Texas have experienced the highest number of school casualties, other states may have a greater proportion of their student population affected by school casualties.

**Map

Description automatically generated**

**Dashboards:**

**Graphical user interface, map, scatter chart

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**Chart, pie chart

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**Chart, waterfall chart

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**Conclusion:**

We have already justified the research questions in the Analysis part. The data presented in the dashboard provides valuable insights into the prevalence and characteristics of school shootings in the United States. The information indicates that several factors contribute to the number of student deaths in school shootings, including differences in gun laws, school security measures, access to mental health resources, and societal factors. Additionally, the data reveals that male students and white students are more likely to be involved in school shooting incidents. Moreover, public schools have a higher incidence of gun shootings compared to private schools, and handguns are the most used firearm in school shootings. It is also essential to recognize that each school shooting is unique, and there is no single solution to prevent such events. Therefore, it is necessary to take a comprehensive approach that addresses multiple factors, including gun access, mental health concerns, and school safety measures.

The data suggests that limiting access to firearms and enforcing existing laws regulating the sale and distribution of firearms may be effective in reducing the incidence of school shootings. Additionally, identifying and providing support to students who may be at risk of becoming a target of violence and providing training to school staff on how to respond to targeted attacks can help prevent future incidents. Further research is needed to gain a deeper understanding of the complex interplay of factors that contribute to school shootings, and to develop effective strategies to prevent these tragic events.

**Additional Research Questions:**

1. What is the average response time of law enforcement and emergency services in the aftermath of a school shooting?
2. Are there any effective policy solutions that have been implemented to reduce the incidence of school shootings?
3. How does the incidence of school shootings in the United States compare to other countries around the world?
4. What is the psychological impact of school shootings on survivors and the wider community?

**References:**

https://github.com/washingtonpost/data-school-shootings/blob/master/school-shootings- <https://www.gunviolencearchive.org/reports>

<https://www.washingtonpost.com/education/interactive/school-shootings-database/>

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