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The Growing Burden of Firearm Violence in the United States

Dinah M. Limiri

ABSTRACT

Gun violence is a significant public healthcare challenge that continues to pose a problem in the US. Despite the number of regulations and policy recommendations in place, the burden is still prevalent, affecting over 40,000 Americans annually with the majority of these being gun suicides and homicides. For instance, in 2022, the Johns Hopkins Center for Gun Violence Solutions reported at least 48,204 deaths attributed to gun violence. 27,032 of these deaths were suicides, 19,651 homicides, 463 unintentional discharges, 643 from legal interventions, and 415 were undetermined. Gun violence also disproportionately affects young people, with children and adolescents aged 1 to 19 bearing the brunt of this violence. In 2022 for example, 2,526 deaths in this population group were caused by gun violence. Gun violence also causes a lot of fear, anxiety, and stress among children and adolescents. Gun violence is attributed to a number of factors such as socioeconomic disadvantage, availability and access, storage practices, mental health problems, and structural and institutional racism. Considering the negative effects of gun violence in communities, there is a need for comprehensive measures that can address the problem. Regulatory reforms that emphasize more on strict measures such as carrying out background checks, gun control laws, and policy changes can help to address gun violence. Measures can also be implemented at the community level with different community interventions that have been proven to have positive effects. Such measures can help to tackle the complex factors that increase the risk of gun violence in communities. The aim of this review is to explore the growing burden of firearm violence and the impact it is having on the communities affected. The review will explore the statistical trends of gun violence over the past five years by looking at the recent number of firearm cases. The review will also explore measures that can be put in place to address the problem including stricter laws and community interventions.

Keywords: Firearm violence, Gun suicides, Socioeconomic disparities, Community interventions, Mental health impact

Introduction

Firearm or gun violence is a serious public health challenge in the US despite the measures and policies that have been put in place over the years to address the same.¹ For instance, in 2020, 79% of all homicides and 53% of all suicides reported in the country were attributed to firearms.² Besides, the number of suicides attributed to firearms increased by 35% between 2019 and 2020. These numbers continue to rise as evident in the 2022 report where approximately 48,204 lives were lost to firearm violence.³ Of this, 27,032 were suicides and 19,651 were homicides.³ Firearm deaths also occurred from accidental discharges and encounters

with law enforcement officers. Firearm violence does not only contribute to death. It also accounts for thousands of non-fatal injuries every year. Although these injuries are difficult to measure because of difficulty collecting data, they have a significant impact on survivors and their loved ones. According to Kaufman et al.⁴ non-fatal injuries were twice as prevalent as fatal injuries in the US between 2009 and 2017 with an average of 85,694 emergency department visits due to these types of injuries. These injuries were mainly a result of assaults and unintentional discharges.

Addressing firearm violence is vital because of the impact it has on communities and healthcare systems in general. Research has shown that gun violence contributes to a lot of trauma with mass shootings being linked to high levels of psychological distress among the communities affected.⁵ For children and adolescents, gun violence contributes to a lot of fear and worry. According to a nationally representative survey done in 2023, more than half of the participants aged between 15 to 17 years old were worried about school shootings.⁶ The recent statistics on how gun violence affects children and adolescents show why this fear and worry are justified. According to the report, firearms accounted for the highest number of deaths in this demographic with 2,526 lives lost to firearm violence in 2022.³ The deaths were even higher than those attributed to cancer, motor vehicle accidents, poisoning, and even suffocation.

In addition to the widespread trauma, firearm violence puts a lot of strain on healthcare systems. Billions of dollars are used to treat gun wounds and provide gun-injury-related care every year. In addition to treatment costs, gun-related injuries, and more so fatal injuries, require hospitalization and long-term care. These injuries also put a lot of pressure on emergency departments. For instance, the average cost of hospital admission for gun-related injuries was \$170,030 in 2020.⁷ Firearm violence also put a lot of strain on healthcare systems by contributing to physical and mental health problems such as post-traumatic stress disorder (PTSD).⁸ All these contribute to substantial costs with research showing that gun-related violence costs the country an average of \$557 billion annually in economic costs.⁹ Economic costs, in this case, are attributed to lost wages due to leave of absence, lost productivity, and lost revenue.

Considering the burden associated with firearm violence, there is a need for measures that can adequately address the problem and reduce this burden. However, coming up with effective measures is challenging because firearm violence is complex and multifactorial in nature. Also, there is limited research on firearm violence which makes it challenging to fully understand the problem and address it. Therefore, the aim of this review is to examine the growing burden of firearm

violence in the US and why the problem continues to persist despite the measures and regulations in place to deal with the same. The review will explore the multifactorial nature of firearm violence including the different factors that are contributing to the growing problem and the impact the problem is having on the communities affected. The review will also explore different measures that can be put into place to ensure the burden is minimized.

Statistical Trends and Epidemiological Data of Firearm Violence

Overall, there were approximately 48,204 deaths from firearms in 2022.³ Of this, 27,032 were suicides, 19,651 were homicides, 463 were unintentional discharges, 643 were legal interventions, and 415 were undetermined (Figure 1).³ Demographically, young adult males are the most impacted by gun violence, with youths aged between 15 to 34 being disproportionately affected compared to other population groups. According to the 2022 Center for Gun Violence Solutions report, young Black males aged between 15 and 34 were the most affected by gun violence, specifically gun homicide.³ This population accounted for 34% of all firearm homicides besides being approximately 2% of the total country's population. The rate was significantly higher (24 times) than that of White males of the same age group. Besides, age-adjusted homicide rates for this group reached 27.0 per 100,000 which was significantly higher than 6.2 per 100,000 reported among other races and ethnicities.¹ Homicide rates attributed to firearm violence were not only high among Black males. Other ethnicities such as Hispanic and American Indian/Alaskan Native (AI/AN) also report an increase in firearm homicide. For instance, between 2013 and 2022, the rate of firearm homicide among Hispanics/Latinos increased by 70%.³

Similarly, AI/AN were five times more likely to die from gun homicide compared to their White counterparts.³

For gun-related suicides, White males aged 45 years and older were the most affected. According to the Center for Gun Violence Solutions report, of all the 27,032 gun suicides reported in 2022, 70% of those were by White males.³ The rate of gun suicide in this population group was 14.8 per 100,000 compared to 11.1 per 100,000 reported among other races and ethnicities.¹ Another group that accounted for high rates of gun suicide (1.14 times higher) were AI/AN males.³ An increase in gun-related suicide was also reported among Hispanics/Latinos. The rates increased by 54% from 2013 to 2022.³ Another group that was disproportionately affected by firearm suicide was veterans. The 2023 National Veteran Suicide Prevention Report stated that firearm suicide was the most preferred method of suicide among veterans, accounting for 72% of all suicides.¹⁰ The rate of firearm suicide among veteran men was 62.4% higher than the general male population while that of veteran women was 281.1% times higher than that of non-veteran women.¹⁰ One of the reasons why firearm suicide is the most preferred method of suicide in this population is because of the high level of gun ownership in this group.

Disparities are also reported based on gender/sex with males being more affected than women. This is particularly the case for firearm homicides and suicides. According to the National Vital Statistics Report data, the number of males who died from firearm-related injuries in 2021 was six times higher than females, accounting for 41,866 deaths compared to 6,964 female deaths.¹¹ These numbers were reflected across all races and ethnicities. For both genders, suicide by firearms was the leading means of suicide based on the CDC data. However, for males, the rate was significantly higher (13.5) than that of females (2.0).¹²

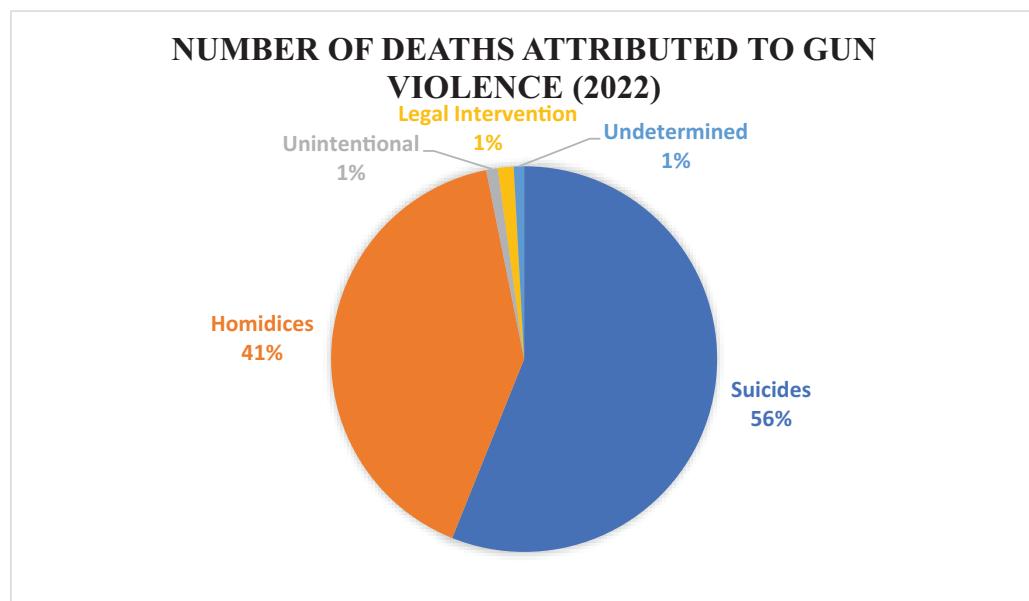


Fig 1 | Number of deaths attributed to gun violence in 2022

It is pivotal to note that despite males accounting for the highest cases of gun-related homicides and suicides, females still bore a significant burden of firearm violence.⁸ Females were disproportionately affected by firearm violence, particularly through intimate partner violence.¹³ Firearms are the most commonly used weapons to perpetuate intimate partner violence including intimidation, threatening, or even coercing women to certain decisions or situations.

Significant racial and socioeconomic disparities have also been reported when it comes to gun violence. Young Black males tend to bear a significant burden when it comes to firearm-related deaths. Research shows that this group is up to six times more likely to be affected by gun violence compared to any other ethnic group.³ According to Mariño-Ramírez et al.¹⁴ of the 4,357 deaths attributed to firearm violence in 2020, 47.1% were Black youths. Crudely, deaths by firearms among young Blacks was 17.40 per 100,000, compared to 9.05 per 100,000 among AI/AN, 4.01 among Hispanics, 3.40 among Whites, and 1.32 among Asian or Pacific Islanders (Figure 2).¹⁴ This accounted for all manner of firearm-related deaths including gun assaults, suicides, accidental discharges, legal interventions, and unknown causes. The young Black population is not the only group disproportionately affected by firearm violence. The data also reflects across the whole ethnic group. For instance, in 2020, Black people were the most affected by firearm violence (26.6 per 100,000) compared to 8.1 per 100,000 for AI/AN, 2.2 per 100,000 for non-Hispanic Whites, and 4.5 per 100,000 for Hispanics (Figure 3).² Different factors explain why racial minority groups are disproportionately affected by firearm violence. Socioeconomic disparities play a significant role with income inequality and neighborhood disadvantage featuring significantly among contributors to gun violence.¹⁵

Geographically, the rates of firearm violence and firearm-related injuries vary significantly by region and state. Different factors account for the differences

in firearm-related injuries across states. For instance, states that have stricter gun laws when it comes to firearm ownership tend to have lower rates of violence. Besides, firearm violence also varies with rural states accounting for the highest suicide rates while urban and metropolitan areas accounting for the highest rates of homicides.¹ Areas that have higher levels of poverty, inequality, and limited economic opportunities also tend to report higher rates of firearm violence. For instance, states such as Mississippi, Louisiana, New Mexico, Alabama, Montana, Alaska, Arkansas, and Wyoming accounted for the highest rates of murders and suicides. States such as Massachusetts, Hawaii, New York, New Jersey, Connecticut, and Hawaii accounted for the lowest rates.¹⁶ States such as Mississippi, Louisiana, Alabama, the District of Columbia, and New Mexico accounted for the highest gun homicide rates while Montana, South Dakota, Wyoming, Idaho, and Alaska accounted for the highest gun suicide rates.^{3,16} As evident from data, metropolitan states had the highest rates of gun homicides while rural states had the highest rates of gun suicides. Similar findings are reported by Rees et al.¹⁷ who note that homicide rates are higher in metropolitan states with 6.6 fatalities per 100,000 reported compared to 4.8 fatalities in nonmetropolitan states.

Factors that Contribute to the Growing Burden of Firearm Violence

Socioeconomic Disadvantage

One of the factors that has been linked to the growing burden of firearm violence is socioeconomic disadvantage. Areas with social, economic, and concentrated disadvantages are disproportionately affected by firearm violence.¹⁸ Some of the characteristics that define such areas are housing instability, low social capital, inequality when it comes to healthcare access, shared housing, limited safe public spaces, abandoned properties that are used for criminal activities, poor maintenance of infrastructure, and increased levels of chronic stress.¹⁹ Research has shown an association between

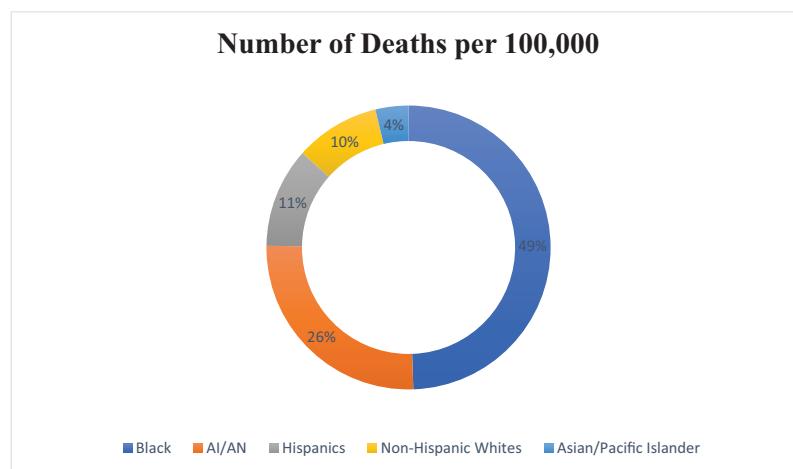


Fig 2 | Number of deaths per 100,000 among youths in 2020

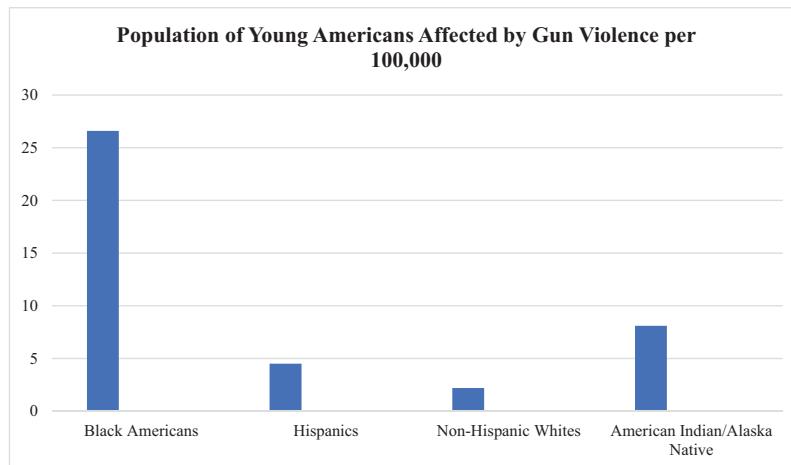


Fig 3 | Population of young Americans affected by gun violence per 100,000 in 2022

socioeconomic disadvantage and increased levels of firearm violence. Areas that tend to have unequal distribution of resources and increased availability of firearms are more likely to have higher levels of gun violence.²⁰ For instance, Zebib et al.²¹ found an association between single-parent households and a high concentration of Black people in one area with significant rates of firearm injury. Similarly, poverty, high levels of unemployment, poverty, segregation, and lower levels of education increased the risk of gun violence in Indiana and California.^{22,23} An increase in income inequality also led to a 9% increase in the rates of firearm homicide.²⁴ Firearm violence has devastating effects on such communities. They are left to deal with the aftermath of firearm violence despite socioeconomic disadvantage which makes it difficult to have access to resources to address this violence.

Availability and Access

Availability to and access to firearms also contribute to the high risk of firearm violence. This is supported by research where access is linked to higher suicide and homicide rates.^{25,26} Some researchers have linked the presence of a firearm in the home to high suicide risk.^{27,28} The association between firearm presence at home and increased suicide risk can be attributed to a number of factors. For instance, the presence of a firearm in a home increases quick access during crisis moments which increases one's risk of committing the act. When it comes to suicide attempts, some researchers have established a rapid transition between thought and action with those who attempt the act being likely to end their lives within minutes or hours of making this decision.²⁹ When a firearm is easily accessible, they are likely to proceed with the attempt quickly compared to when the firearm is not available. The presence and availability of a firearm in the home also likely lead to higher suicide completion rates and reduce intervention time. Additionally, access to and availability of firearms increase the risk of homicide and other violent crimes.³⁰ Having access to firearms

increases the lethality of violent crimes and leads to escalation. This could explain why counties that have more firearms ownership have higher cases of firearm homicides.

Storage Practices

Another aspect of firearm access and availability that is linked to violence is storage practices. Unsafe storage practices also increase the risk of firearm violence. Unsafe storage practices lead to unauthorized access, child access, risk of accidental discharges, and even risk of theft. The association between firearm storage and increased risk of violence could also be attributed to the presence of a firearm at home.³¹ Unlocked firearms and storing loaded firearms increases the risk of firearm-related injuries particularly injuries due to unintentional firearm discharge.¹ This is particularly the case for children and adolescents under the age of 18 where accidental discharge of firearms occurs during play.³² Such risks can be minimized if firearms are stored safely or stored unloaded.

Mental Illness

Another factor that has been linked to firearm violence is mental illness. Mental illness, particularly psychotic disorders and depression, is linked to an increased risk of suicide.³³ For instance, one study found that individuals who had bipolar disorder, depression, schizophrenia, and borderline personality disorder had higher suicide rates than the general population.³⁴ Similarly, CDC National Violent Death Reporting System data showed that a significant number of suicide victims (21%–44%) had some mental health problems with a sizeable number being treated for psychiatric disorders (16%–33%).³⁵ However, it is important to note that although mental health disorders are associated with an elevated risk of suicide, there are other factors that come into play that may influence a person's decision to commit suicide. For instance, when it comes to increased suicide risk linked to firearms, factors such as availability and

accessibility also come into play. This means that if individuals who have mental illness do not have access to firearms, then the risk of committing suicide using firearms reduces significantly.

When it comes to mental illness and the risk of committing homicides and mass shootings, the available research does not support this association. Instead, most of the available research links this assumption to media sensationalism of the same despite research showing that most of those who perpetrate these acts do not have any mental illnesses.³⁶ Swanson et al.³⁷ argue that the way media reports mass shootings committed by people living with mental health problems tends to draw a lot of attention and reinforce the belief that mental illness increases the risk of gun violence. However, the available epidemiological data does not support this assumption and instead denotes that individuals with mental illness are mostly the victims of this violence. Ramchand et al.³⁸ add that although some types of mental illness such as psychosis and schizophrenia increase the risk of committing violent crimes, less than 1% of this population is likely to commit firearm-related crimes. Therefore, although mental illness is a risk factor for gun violence, the risk is mainly self-harm and not homicide.

Structural and Institutional Racism

The disproportionate burden of firearm violence among minority groups is mainly attributed to structural and institutional racism. There are different reasons why structural and institutional racism increases the risk of firearm violence. For example, structural racism contributes to socioeconomic disadvantage which has been shown to contribute to increased risk of violence. Also, structural racism has been shown to drive disparities in community gun-related violence.³⁹ Gun violence is also highly concentrated in areas that have economic disadvantages. According to Uzzi et al.,⁴⁰ neighborhoods that had higher levels of racial capitalism had higher shooting rates. Racial capitalism in this case refers to racial dispossession where resources are removed from marginalized communities and racialized spatial stigma where racial hierarchies are justified contributing to neglect and exploitation.⁴⁰ For these communities, such discrimination and dispossession lead to economic disadvantage and increased risk of violence.

Impact of Firearm Violence on the Affected Communities

Firearm violence is a significant public health burden that puts a lot of strain on public healthcare systems and affects the health and well-being of all Americans. The effects of firearm violence are widespread to patients, families, and communities in general. Overall, firearm violence contributes to more than 40,000 deaths annually with an average of 134 lives being lost each day to gun violence.⁴¹ Most of these deaths are gun-related suicides and homicides. Other gun-related deaths are attributed to legal interventions, unintentional deaths, and undetermined deaths. Gun-related injuries put a lot of strain on public healthcare systems. The cost of

treating firearm wounds is significantly high, with the U.S. Government Accountability Office approximating the cost to be over \$1 billion between 2016 and 2017.⁴² The cost of hospital admissions for gun-related injuries is also significantly high. For instance, the average cost of admission for gun-related injuries in 2020 was \$170,030.⁷ In addition to the substantial costs of care associated with gun-related injuries, people and communities that are affected are left to deal with mental health challenges such as PTSD.

Additionally, firearm violence disproportionately impacts children and young people. The Center for Gun Violence Solutions reported firearms to be the leading cause of death for children and adolescents aged 1 to 19 in both 2021 and 2022.^{41,3} For instance, in 2021, 4,733 young lives were lost to firearm violence.⁴¹ Although this number declined to 2,526 in 2022, the number still remained significantly high.³ The impact of gun violence on children and adolescents goes beyond the reported deaths. Gun violence leaves youths with physical injuries and long-term disabilities. In case of serious injuries, amputations may be necessary. Gun-related injuries can also lead to traumatic brain injuries and disfigurement. There is a lot of mental trauma that is associated with gun violence.⁴³ Children and young people report fear, anxiety, and stress following a gun violence incident. Gun violence also increases the risk of PTSD, self-harm, substance abuse, and suicidal ideation. Gun violence also results in lost productivity.

For communities, gun violence leads to a reduced sense of safety and contributes to widespread community trauma. There is an association between gun violence and high levels of stress and mental health problems.⁵ Some of the mental health problems reported in communities exposed to gun violence are depression, severe psychological distress, anxiety, PTSD, and suicidal ideation.⁴⁴ Also, gun violence contributes to generational trauma and cycles of violence in these communities. For instance, communities that are affected by mass shootings are likely to report more distress and fear over the same events repeating themselves. Also, there is an eroded sense of social cohesion in such communities.

Recommendations to Address the Growing Burden of Firearm Violence

Addressing the growing burden of firearm violence in the US requires comprehensive strategies that take into account the complex nature of the problem and the numerous factors that account for the growing cases of violence. Community-based interventions that take into account different intervention measures are more effective in addressing violence. Such measures can include education, mental health and social support services, violence interrupting programs, and risk reduction strategies.

Community-Based Interventions

Community education and engagement can be used to address the growing burden of violence. Community

education and engagement can focus on a number of measures. For instance, offering education on safe and secure firearm storage can have a positive effect on overall violence prevention. Researchers show that these community-based education interventions are effective in reducing gun-related violence.⁴⁵ Education on secure firearm storage can be provided in a number of ways. For instance, public health campaigns over time can lead to long-term positive behavior change.⁴⁶ There have been several public education campaigns over the years related to safe and secure firearm storage. Examples include the Project ChildSafe which was a program created to encourage safe storage of firearms and the Brady Campaign designed to prevent gun violence through education materials.⁴⁶ Education on safe and secure firearm storage can also be provided by healthcare professionals. These professionals have an opportunity to provide education to patients while providing care. Community education and engagement should feature partnerships and involvement of community leaders to ensure they are more effective. Involving community leaders ensures these programs are more credible and likely to receive a positive welcome from the community.

Community-based interventions should also feature violence interruption programs. Violence interruption programs are interventional strategies that aim to interrupt the cycle of retaliatory violence.⁴⁷ These programs seek to de-escalate conflict in these communities, provide mediation, and build supportive relationships among communities that are at higher risk of retaliatory violence. Different violence interruption programs have been implemented across the country with varying success rates. The Chicago Cure Violence program established in 1995 was among the first form of violence interruption programs to be implemented in the country. The program aims to reduce violence through behavior change by relying on community-based efforts. These efforts are carried out by outreach workers and violence interrupters who work with the community to dissuade individuals and neighborhoods from engaging in violence.⁴⁸ Cure Violence program has been implemented across the country with varying success rates. An additional violence interruption program that has been implemented to dissuade gun violence is the South Bronx's Save Our Streets Program. The program has shown a lot of success in reducing violence in South Bronx.⁴⁷ However, for violence interruption programs to be effective in addressing gun violence, there is a need to work with trusted community members who can work as outreach workers or violence interrupters. These individuals are key to ensuring successful program implementation within the community because they build trust with community members, which is key to dissuading people from violence. Such programs also require adequate funding and resources to run effectively.

Involving violence reduction councils commonly known as homicide review commissions can also have a positive effect on gun violence. These councils

address firearm violence by bringing together stakeholders to address firearm violence. Examples of such stakeholders are community members, law enforcement, members of the criminal justice system, service providers, and public health agencies. The councils work by examining data to address the gun problem and brainstorm solutions by developing comprehensive interventions that are informed by data.⁴⁹

This happens through the sharing of information and experiences openly with different stakeholders to understand factors that are contributing to gun violence. An example of such an intervention is that of the Milwaukee Homicide Review Commission, which has contributed to a significant reduction in firearm-related homicides since its inception.⁵⁰

Providing mental health and social support services to communities that have faced violence can also have a positive effect in addressing the mental trauma associated with gun violence. As evident from research, gun violence leaves the affected communities with a lot of mental trauma. As such, there is a need for mental health and social support services to help these communities deal with the trauma. Mental health and social support services can be provided in a number of ways. They include providing these communities with the needed mental care resources, increasing access to affordable care, providing treatment for mental health problems, providing substance use treatment, and providing counselling services.¹ Healthcare workers can also ensure patients have access to care on a continuous basis, more so for those disproportionately affected by gun violence, such as children and adolescents. Referring patients and communities to the needed care on a timely basis can also have a positive impact in addressing gun-related violence.

Legislative and Regulatory Reforms

Continued legislative and regulatory reforms regarding firearm licensing can also have a positive effect on gun violence. For instance, secure firearm storage laws can reduce the risk of unintentional discharges mostly among children and adolescents. Research has linked firearm storage practices to increased risk of unintentional injuries among youths.⁵¹ For instance, having more lenient gun laws has been linked to higher incidents of suicide attempts and accidental firearm injuries.⁵² Young children are the most affected by accidental discharges while older children are more likely to attempt suicide by guns. Having secure firearm storage laws can reduce the risk of unintentional injuries and discharges. For instance, states that have Brady Grade A, which are stricter gun laws, have the lowest rates of unintentional gun injuries compared to those with Brady Grade F lenient laws.⁵² Similarly, states that have child access prevention laws and better legislation on gun storage and ownership have fewer cases of unintentional discharges and injuries.^{53,54}

Permit-to-purchase laws, which prohibit people who are not permitted to purchase guns, can also help to minimize firearm violence.⁴¹ These laws encourage

background checks before purchase, which makes it easier to identify people who are prohibited from carrying firearms. Other interventions that can help to minimize firearm violence are banning the purchase of assault weapons, removing firearms from people who are determined to be at a higher risk of violence, and regulating the carrying of guns in public.³

Conclusion

The growing burden of firearm violence in the US requires comprehensive strategies that can address the problem effectively. Considering the complex nature of the problem and the factors that contribute to the increasing burden of firearm violence, these strategies can ensure the problem is adequately addressed. The strategies can combine both community intervention measures and regulatory reforms. Having policies that take into account both the community's needs and regulatory reforms can be more effective in addressing the root cause of the problem. Besides, factors that increase the risk of firearm violence are more deeply rooted in issues such as structural and institutional racism and socioeconomic disadvantage, which are complex to address. As such, comprehensive strategies that take this into account can be more effective.

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