The Firearms Data Gap

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Introduction

How many people in the United States are accidently shot each year? What percentage of gun owners in North Dakota store at least one gun loaded and unlocked? What percentage of gun owners in Louisiana have carried a concealed loaded handgun in the past month? How many Americans have openly carried a handgun, or any gun? We lack the answers to these and a multitude of other basic questions, specifically because the U.S. currently lacks systems to effectively collect the relevant data and distribute them to researchers.

Gun violence is a pervasive challenge in the United States,[1] yet our firearms data infrastructure is severely limited in scope and fragmented in nature.[2] Better data systems should be beneficial to gun owners and non-owners alike. Experts agree that these data gaps stymy productive conversation about gun policy and undermine gun violence prevention efforts.[3]

The federal government's traditional role in collecting firearms-related criminal and health data has stalled in recent decades, and significant improvements to these efforts remain difficult given the present political landscape. In response, we believe states should levy their powers to legislate, incentivize, and lobby to enhance firearms data collection.

This article proceeds in three parts. Part I describes the current federal and state firearms data infrastructure, noting that publicly available data are largely siloed and inadequate. Part II explains why firearms data are necessary to support both public health and litigation. Part III presents two policy prescriptions.

I. Current Firearms Data Landscape

A. Development of the Federal Firearms Data Infrastructure

In 1938, Congress passed the Federal Firearms Act, requiring gun manufacturers, importers, and dealers to register for federal licenses and mandating that dealers keep records of gun transactions. However, in the late 20th Century, as firearms policy increasingly became part of the culture wars — driven most notably by the National Rifle Association — Congress began limiting federal data gathering and research efforts.

In 1986, Congress legislatively forbade the establishment of a federal firearms registry. Although Congress in 1994 began requiring that federally licensed dealers (but not private sellers) conduct background checks of all handgun purchasers, the data benefits of those requirements were minimized by the 2004 Tiahrt Amendments (see below). The 1996 Dickey Amendment chilled gun violence research by prohibiting the Centers for Disease Control and Prevention (CDC) from using funds "to advocate or promote gun control." Federal funding through the National Institute for Health (NIH) and the National Institute of Justice (NIJ) has also been extremely limited for decades, particularly when compared to funding for diseases with similar mortality.[4] The 2004 Tiahrt Amendments: prohibited the Bureau of Alcohol, Tobacco & Firearms (ATF) from releasing firearms trace data, except for limited purposes; prevented requiring gun dealers to send firearms inventory data to law enforcement; and required the FBI to destroy firearms purchase background check records within 24 hours. In 2005, the

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annual CDC health survey known as the Behavioral Risk Surveillance System (BRFSS) — which was the only source of data to track household gun ownership and storage at the state level — ceased asking about firearms.[5] Perhaps marking a reverse of the tide, in December 2019, Congress modestly funded firearms research for the first time in almost a quarter century, and fully funded the National Violent Death Reporting System (NVDRS).

B. State Firearms Data Infrastructure

State-driven firearms-related data gathering efforts often lack standardization. However, states do gather some consistent information from two key contexts: crime reports and public health systems. These contexts are not easily separated conceptually, but government agencies often characterize these data as distinct, and collect and store these data separately. Consequently, these databases tend to be fragmented and lack relationships to one another, stymieing cross-database analyses. To illustrate state-based data collection, we studied in depth three states with contrasting approaches to firearms policy, and provide examples from each below.[7] Our analyses of Connecticut, New York, and Texas reveal that all three states lack data collection components necessary to sufficiently guide efforts to reduce gun violence.

1. public health data on firearms fatalities

The CDC's NVDRS provides consistent and comparable demographic and circumstantial information on all firearms deaths in all 50 states.[8] NVDRS aggregates state data on violent deaths from state-based medical examiner and coroner reports, death certificates, and law enforcement reports.

The NVDRS databases allow for causal evaluations by identifying decedent demographics, and the circumstances and mechanisms of death, including use of firearms. The CDC makes summary-level statistics publicly available and also provides free access to case-level databases for qualified researchers. Specific data are collected on the firearms when known (type, make, model, caliber/gauge, whether stolen), and on post-mortem toxicologic screen results, type of place where incident occurred, part of the body injured, number of wounds, mental health information about the victim, detailed precipitating circumstances, and victim-offender relationship.

Though state-level NVDRS data have led to important changes in policies and programs,[9] the database is limited in the data it collects. Because the data are drawn from existing reports, the system does not impose a new reporting burden on medico-legal death investigators but rather pays states to gather and cen-

tralize data from existing reports. States have generally not made efforts to improve on the NVDRS system by proactively collecting data on variables not included in the standard federal NVDRS mold, despite leeway to do so.

In addition to the NVDRS, state health departments can collect and publish data independently. However, where these publications exist, they are often redundant or limited in their ability to explain phenomena. For example, New York State publishes data about firearms usage in suicides, but these data are limited in terms of their historical scope and the range of variables available.[10]

2. public health data on firearms injuries

In contrast to the data on firearms fatalities, the U.S. lacks quality data on non-fatal firearms injuries. In 2019, the CDC acknowledged that its estimates of non-fatal firearms injuries, which are based on a small unrepresentative sample of the nation's hospitals, are "unstable and potentially unreliable."[11] Likewise, individual states generally do not publish high quality data on non-fatal firearms injuries. For example, while the New York Department of Health collects injury and violence data, the information published rarely includes information regarding firearms.[12] In Connecticut, state law mandates that hospitals provide incident-level discharge data, but the usefulness of these data are limited by inconsistent publication and the divergent ways that hospitals collect specific data, like race and ethnicity inputs.[13] States such as Connecticut and Texas will make additional information available only to researchers upon application. The main problem is that hospitals collect data primarily for billing purposes, not for public health analyses. Burdens at the point of data collection can also reduce data quality. Some examples of these burdens include inadequate diagnosis codes, privacy laws, and restrictions on the information medical providers may gather while acting in emergent situations. Additionally, health care personnel are not typically required to ask about firearms, and absent explicit requirements they may not do so due to time constraints.

3. crime data

In the crime context, each state gathers and reports summary-level data, including firearms-related details, through the FBI's standardized Uniform Crime Report System (UCR).[14] These data provide the basis for annual state crime reports, but these data are currently of limited use to researchers, both because the federal UCR reporting system provides little detail on the circumstances of firearms assaults (e.g., precipitants, victim/offender relationship) or specific gun crimes

and because the UCR is built from and presented as summary-level data. The lack of incident-level crime data limits researchers' ability to employ dynamic statistical methods that can identify causal relationships between independent variables (e.g., firearms safety policies or programs); covariates (e.g., location or person-based variables including perpetrator and victim demographics); and gun violence. While the National Incident-Based Reporting System (NIBRS) gathers incident-level data that could hypothetically be used in causal analyses,[15] only summary-level statistics are

intervention, and assess the effectiveness of interventions."[19] The United States has used a public health approach to greatly reduce deaths and harms due to a variety of other causes, including tobacco, STIs, and motor vehicles.[20]

In 1999, the CDC recognized the reduction in motor vehicle deaths per mile driven as one of the great public health accomplishments of the 20th century.[21] The national public health data system for motor vehicles that was created by the National Highway Traffic Safety Administration in 1975 was crucial to this success. The

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made available to researchers and the public at the federal level. Connecticut, New York, and Texas choose not to publicize incident-level data for firearms-related crimes occurring within their own jurisdictions.

While Connecticut and New York provide supplementary firearms-related data in state-based reports, Texas does not.[16] Connecticut has also made efforts to supplement the UCR's homicide reports by gathering and publishing incident-level family homicide information, and making these data directly available to the public.[17] By collecting and publishing supplemental incident-level data, the Connecticut and New York family violence reports illustrate the capacity of states to take the lead in expanding data gathering efforts.

The National Crime Victimization Surveys (NCVS) provide some information about gun crime from a large, nationally representative sample of the public and is the best source for crimes not reported to police. Individual-level NCVS data are readily available to researchers, and the NCVS is beginning to incorporate a variety of procedures to provide state-level and local-level crime victimization estimates.[18]

II. Need for Improved Firearms Data

A. A Public Health Approach Is Needed to Alleviate Gun Violence

Under a public health approach to gun violence, "[e]ffective strategies are built on research to identify patterns of risk, illuminate productive targets for

Fatality Analysis Reporting System (FARS) collects detailed, consistent and comparable data across states and over time for every motor vehicle-related death. The specificity of the data from FARS has enabled prevention specialists to identify and evaluate many promising interventions. For example, FARS data identified that 16-year-old drivers were at very high risk, and at the highest risk when driving at night and with only other teenagers in the car. Policies supporting graduated drivers' licenses, that restrict the youngest drivers from driving under these circumstances, have been credited with saving thousands of lives.[22] Additionally, FARS data and analyses support drunk driver legislation, child restraint laws, mandatory belt use laws, revised speed limits, vehicle crash survivability standards, right-turn-on-red laws, and airbag regulations, among others.[23] FARS data are available online at no cost. In addition, there is also a nationally representative data system of police-reported crashes, and states have data on licensed drivers, registered vehicles, and safety inspection results, among other information. Knowing what is needed, and then what policies actually work, has been crucial for reducing motor vehicle deaths.

To mimic the reduction in violence seen in the motor vehicle context, the national firearms violence data system requires much improvement to help researchers propose and evaluate effective strategies for preventing harm. This includes both expanded

public health surveillance data and original research. Without these data, researchers lack answers to basic questions, such as the effects of gun usage on various health outcomes, and the laws most effective for reducing gun violence regionally or nationally. Possessing data on these kinds of metrics would make it easier to know how to best channel resources, enact reforms, and tailor firearms policy to local circumstances.

B. Developing Constitutionally Permissible Firearms Safety Reforms

In addition to providing evidence-driven methods for addressing gun violence, improved and expanded firearms-related databases would provide legislatures with more information about how to devise effective and constitutional legal interventions. In the past decade, courts have increasingly assessed the constitutionality of gun laws and evaluated empirical evidence of their effectiveness in promoting governmental interests.

The Supreme Court has provided little concrete guidance on what constitutes constitutionally permissible gun safety policy. However, lower courts have consistently interpreted the Supreme Court's current Second Amendment jurisprudence[24] to mean that firearms-related laws should be evaluated in a manner consistent with laws burdening other constitutionally defined rights such as free speech. Under this approach, courts evaluate the constitutionality of federal, state, and local firearms-related policies under a two-part test.[25] First the courts ask whether the policy burdens Second Amendment rights. If it does, the courts then determine whether the policy is constitutionally justified by virtue of its importance to achieving government interests. The weight of the burden on the Second Amendment is therefore weighed against the strength of the countervailing government interest and the specific policy's individual importance to achieving those interests.

Although courts do not require empirical evidence to sustain a government program,[26] many courts have considered database evidence when weighing the policy's burden on Second Amendment rights, compared with its connection to furthering important rights or interests.[27] First, federal appeals courts have relied upon data in cases establishing categorical limits on individuals who use firearms. In upholding a law that prohibited those convicted of a misdemeanor crime of domestic violence from possessing firearms,[28] the Seventh Circuit relied on empirical studies that demonstrated high recidivism rates for those who commit domestic abuse, heightened homicide rates where firearms are present in the home, and high risk of violence to law enforcement officers responding to domestic violence.[29]

Second, federal appeals courts have relied on empirical evidence when considering laws that place conditions on firearms ownership. For example, in a case about firearms registration requirements, the D.C. Circuit remanded and vacated several of the provisions for their evidentiary weaknesses.[30] By contrast, the Ninth Circuit upheld a California law that established a 10-day waiting period before a buyer may take possession of a lawfully purchased firearm.[31] The court cited empirical studies demonstrating the effectiveness of waiting period laws in supporting the state's interest in "prevent[ing] or reduc[ing] impulsive acts of gun violence or self-harm."[32]

Third, federal appeals courts have evaluated empirical evidence when assessing governmental regulations on access to firearms or ammunition. For example, the Second Circuit upheld an assault weapon ban for furthering a substantial governmental interest in "public safety and crime prevention," based on evidence of the lethality of assault weapons, and their disproportionate use in crime, mass shootings, and law enforcement officer killings.[33]

Because courts rely on available data in determining the constitutionality of firearms-related laws, gathering robust firearms-related data should be a priority for policymakers in all states. Empirics will empower the courts to uphold meaningful public safety programs and dispose of policies that unnecessarily burden the right to bear arms. Legislatures and courts can best make these evaluations when data incorporates the consistent and the unique aspects of gun violence across all states and localities.

III. State-Based Policy Prescriptions

We argue that states can and should do more to fill federal gaps and focus some data collection efforts on their own unique needs. While federal leadership in systematic firearms data collection would be invaluable, we suggest that states with the political will can proactively advance firearms data collection rather than waiting on federal consensus. States are well-positioned to act in this domain for several reasons: (1) state legislators can bypass the federal legislative logjam and implement meaningful data reform; (2) states regularly collect data, including from hospitals and the police, so data regarding firearms is merely an expansion of existing infrastructure; and (3) states can use their powerful platforms to advocate for necessary improvements at the federal level.

We propose that states first perform a data gap analysis, to evaluate what data they presently collect and what data they do not. Next, we suggest that states

levy their strengths to address gaps in data collection, storage, and reporting.

A. Perform a Data Gap Analysis

As a first step, we propose that each state conduct a data gap analysis to understand how firearms data are collected and stored. The goal is to identify not only "what data is currently available and what the gaps are," but also what "missed opportunities" might exist.[34] To conduct this analysis, state should assess "data collection and infrastructure in key substantive domains (criminal justice, health, and public health), including both administrative and survey data as well as compilations and systems of data integration."[35] States may wish to rely on state agencies and interviews with researchers and practitioners.[36] States might consider commissioning an independent body to make these evaluations.

In assessing existing data collection, it is important to consider what an ideal data infrastructure might look like. For an example of a data gap report, see the Stanford Criminal Justice Center and Measures for Justice's analysis of California's criminal justice databases.[37] We suggest that states publish data gap analyses to the public.

Even where data are available, states should attend to the quality and timeliness of the data, including whether it appears to contain inaccuracies, inconsistencies, or absences. The CDC recently acknowledged that its estimates for non-fatal firearms injuries have become "unstable and potentially unreliable"[38] due to unrepresentative sampling.[39] In conducting data gap analyses, states should consider whether particular reporting requirements are attached to incentives for compliance.

B. Fill Data Gaps: Improve Data Scope, Presentation, and Availability

After conducting a data gap analysis, states can levy their capacities to legislate, incentivize, and lobby in order to remedy these gaps. Below we discuss how states can (1) expand data collection and (2) improve data presentation and availability.

1. EXPAND THE SCOPE OF FIREARMS DATA COLLECTION

States should consider how they can expand their current information gathering systems to supplement federal firearms databases. Where databases exist, states should become strong advocates for data system maintenance and improvements. For example, as discussed in Section I.B, the CDC's NVDRS is the nation's best source of firearms fatality data, but it took two decades for the system to be fully funded. States need to lobby to ensure that NVDRS is maintained and expanded. The most pressing need is more uniform documentation across medico-legal death investigation systems at the local level. Presently, if one county coroner routinely documents suicide decedents' mental health treatment status and another never does, the resulting NVDRS data will imply that decedents in one county have far greater mental health service use than another, when no such gap exists. Other aspects of NVDRS could also improve, such as intimate partner violence categorizations[41] and circumstance data for police shootings.[42]

Other existing state databases could incorporate additional covariates and contextual data. Information regarding the individuals involved in gun violence, such as demographics, criminal background, or mental health profile, could guide efforts to keep firearms from those at risk of harming themselves or others. Data relating to the weapons involved in gun violence — including the model of firearms used, or when, where, or how a firearm was obtained — could inform key restrictions on firearms sales. Data regarding the circumstances of individual incidents of gun violence, such as timing, geospatial location, or whether the shooting occurred in a family violence, hate crime, schooling, or mass shooting context can also bolster efforts to explain and alleviate gun violence.

States should expand data gathering and reporting for firearms injuries. States can proactively gather and report emergency department and inpatient hospital discharge datasets, thereby facilitating research on the human and monetary consequences of firearms injuries and other detriments to health. As an example, in 1989 the Massachusetts Department of Public Health created a data system of all knife and gunshot wounds seen in the emergency department. The system revealed that pellet gun injuries to children can cause serious injuries and were common in western Massachusetts. The system also showed that the rapid decline in firearms injuries in Boston in the 1990s — the "Boston Miracle," which has served as a model for many other cities trying to reduce youth gun violence — was not unique to Boston.[43] This model exemplifies how states can facilitate research through improved injury data collection.

States should also lobby for or create a source of state- and national-level estimates of firearms ownership and storage, such as on the Behavioral Risk Factor Surveillance System (BRFSS) or the National Survey on Drug Use and Health (NSDUH). In 2017, a half dozen states used an optional BRFSS firearms safety module, but a national system would allow for better cross-state comparisons. State-level BRFSS coordinators should support restoration of firearms modules to the BRFSS. As an initial step, states lacking records of firearms sales could initiate data collection either

through legislation or incentives, including distribution of state surveys, and make these records available to researchers.

California demonstrates how records of firearms ownership can improve research and shape policy. California has probably the best firearms data system of any state, including a permanent record of virtually every legal firearms transfer. Studies using California data have shown that violent crime was or could be reduced by making it illegal for individuals with a violent misdemeanor conviction[44] or a DUI conviction[45] to purchase firearms. Another California study showed that handgun purchases were associated with substantially elevated risks of suicide in the subsequent week.[46]

2. ENHANCE FIREARMS DATA STORAGE AND PRESENTATION

State leadership can also take steps to ensure that data are available in a format that is conducive to analyses by researchers and viewing by the public. For researchers to independently analyze data, the information should be in a format analyzable by a machine. To ensure that databases can be compared, states can implement state-wide data dictionaries requiring consistent use of variables. In order to perform regression analysis and draw causal conclusions, researchers need access to historical and incident-level data, rather than summary statistics. For example, the Massachusetts public health data system of knife and gunshot wounds, discussed above, would be even more useful if the raw data were more readily available to researchers. States can use their lobbying power to promote the dissemination of individual-level federal data for research as well. States should help ensure that the raw ATF tracing data are available — as they were in the late 1990s — and ensure that state-level concealed carry permit databases and ICD-10 diagnosis data are also available to all researchers, with the appropriate safeguards.

States should take the lead in providing cross-references between crime and public health datasets, in order to integrate the databases and give researchers fuller context when running statistical analyses. Utah provides a model of the value of implementing these measures. In 2018, the state of Utah funded a suicide study and authorized the linking of suicides with medical ED and inpatient records, and also authorized the determination of who originally bought the suicide firearms and how long ago, whether the decedent ever had a concealed carry permit, and whether they could have passed a background check the day they died. Results galvanized policy initiatives including: an online video and discounts for gun safes for concealed carry applicants; state laws requiring the distribution of locking devices for the sale of long guns; and state grants to rural communities to support outreach on suicide prevention.

Because of the findings, some private groups, including the Church of the Latter Day Saints and Intermountain Healthcare, Utah's largest hospital, contributed funds to support public education on safe firearms storage and modified some of their programs and institutional policies.[47] Collaboration between the public health and the pro-gun communities promoted the rapid response to address the firearms suicide problem. This example demonstrates how states can bypass political gridlock to collect robust firearms data that researchers currently lack.

For the public to access firearms information, states should make data easily accessible. Some online databases, such as the CDC's Web-based Injury Statistics Query and Reporting System (WISQARS), incorporate data visualization or statistical analysis software directly in their interface. In response to the COVID-19 pandemic, many state health departments created interactive visuals displaying their state data surveillance.[48] State leadership might fund and support similar efforts for firearms.

Conclusion

The firearms data infrastructure in the United States is extremely limited, hindering the capacity to identify and promote effective strategies to reduce gun violence. To remedy the data gap, we propose that states first conduct a data gap analysis in their own states to identify the strengths and weaknesses of their firearms data collection. Second, states should stitch gaps in the data infrastructure through legislation, incentives, and lobbying. In the wake of growing gun violence and persistent federal inaction, state action is critical. Robust firearms data collection has the potential to promote evidence-based solutions to this growing public health crisis.

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