What Should I Know Before Using Firearm Injury Data?

NCDHHS Division of Public Health, Injury and Violence Prevention Branch (IVPB), Epidemiology, Surveillance, and Informatics (ESI) Unit

DATA CONSIDERATIONS

The Injury and Violence Prevention Branch (IVPB) firearm injury data can be used in many ways, from identifying risks, tracking trends, and developing effective prevention strategies, to supporting advocacy, funding decisions, and public awareness campaigns.

This document outlines what you should know and consider before using IVPB firearm injury data resources.

Using Provisional Data

Provisional data are early numbers with the information that is available now.

- These data have not yet been fully checked.
- They don't have all the information they normally would have before being considered final.

The Quarterly NC-FASTER Reports use provisional data to:

- Access information quickly
- Spot changes in firearm injury trends before the final data are available
- See patterns that help us know when to take action

Provisional numbers can change as more information becomes available.

- Provisional data should be used carefully because there may be missing information or delays in reporting.
- Provisional data become available at different times for different data sources.
  - There are longer delays for death certificate data (at least 6 months).
  - This is because of the time it takes to investigate deaths and assign a cause of death (ICD-10 code).

For more information on provisional data and when they become available, visit Using Provisional Data for Monitoring Injuries.

Differences Between IVPB Data and Data from Other Sources

There can be differences between data IVPB shares and data shared by CDC, as well as data shared by other NC agencies.

These differences can be caused by:

- Differences in case definitions being used
- Different sources of data
- The time period of data being used
- If data are provisional or final

Injury epidemiologists with IVPB consult with national leaders, state data providers, and other experts to be sure they are counting firearm injuries as accurately as possible using NC data.

- For more information on why there are differences and specific examples, visit Understanding Differences in Data Reported by IVPB and Data Reported by Other Sources.

How Firearm Injuries are Measured

Who Is Included in Firearm Injury Data?

Occurrence vs Residence When Measuring Firearm Injury

Occurrence describes where something happened. Residence describes the area where someone has reported that they live.

Residence Rates

Most firearm injury data are limited to firearm injuries among NC residents.

County-level data are limited to county residents, except for the NC Violent Death Reporting System (NC-VDRS) county-level factsheets, which use occurrence rates (see below for more information).

- Limiting to residents allows for rate calculations using NC resident population estimates.
  - This ensures that the information used to calculate rates is consistent.
  - Limiting to residents allows for more accurate comparisons across groups and between counties.
- This excludes people that experience a firearm injury in a county but are not residents of that county.
  - Someone living there but who has not yet updated their residence status to that county would also be excluded.
- While limiting to county residents works well for most counties, there are some counties where this has a large impact on the local firearm injury rate.
  - For these counties, using occurrence rates can be helpful to fully understand firearm injuries in their county.

Occurrence Rates

The county-level NC-VDRS fact sheets include data on unintentional firearm deaths, as well as how often firearms are used in homicides and suicides. These fact sheets use occurrence rates and include firearm injuries that happened in a county, regardless of whether the individuals were residents of that county.

- For counties with lots of people coming and going, the occurrence rate is often higher than the resident rate. This is especially true for:
  - Counties with college towns

    - Counties that have popular tourist destinations, or mountain/beach towns
    - Counties or areas with large populations of people experiencing homelessness
- Limiting to residents would exclude these transient populations and can underestimate the burden of firearm injury on local systems.
- Counting cases based on where they happen rather than where people live helps us understand how firearm injury affects local systems and services and informs local firearm injury prevention planning.

Injury Location

Where a firearm-related death occurs can be different from where the injury occurred. This distinction can also impact differences in occurrence vs resident rates of firearm injury and death.

- This distinction is especially true in rural areas where a single hospital or healthcare facility may serve a large area across multiple counties.
- Someone may experience a firearm injury in one county and then be transported and later die in a hospital in another county.
    - This transfer of care to another county is common for people with serious injuries that require treatment at a designated trauma center.

For more information on case definitions, visit Understanding Injury Surveillance Case Definitions.

What is Counted in Firearm Injury Data?

How Many Firearm Injuries Occur

Firearm injuries are injuries caused when a gun (like a handgun, shotgun, hunting rifle, or machine gun) is fired:

On purpose (homicide or suicide)	By accident (unintentional injury)	Because the gun didn't work right (firearm malfunction)

These injuries can lead to a visit to the emergency department (ED), a hospital stay, or death.

Each of these events is counted to understand the burden of firearm injury in NC.

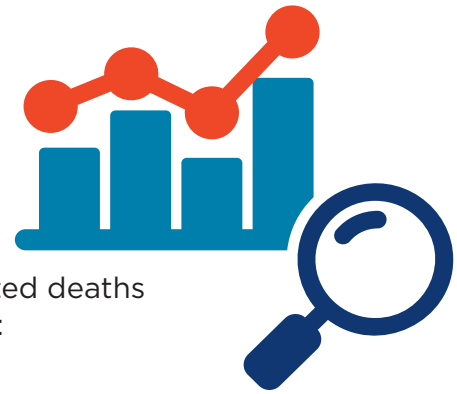
- Firearm injury data are used to count injury events rather than the number of people impacted by firearm injury.
- A single person may be counted more than once for firearm injury. For example:
    - If they experienced more than one firearm injury during a given time frame (e.g., within a calendar year)
    - If they were seen in the ED and then admitted to the hospital or later died from their firearm injury.
        - They would be counted once within each of the data sources used to monitor firearm injuries (ED visit data, hospital discharge data, death certificate data).
    - See ED Visits with Multiple Firearm Injury ICD-10-CM Codes in the Firearm injury ED Visit Data section below for more information.

Firearm Ownership and Storage Practices in North Carolina

Understanding how many people own firearms in NC, and how they store them, is essential to designing effective firearm injury prevention strategies.

- Survey data offer valuable insights to shape prevention strategies that are aligned with how firearms are stored and accessed across the state.
- For more information, see the Firearm Survey Data section below.

Considerations for Using Firearm Injury Data by Data Source



Firearm Injury Death Data

Differences Between Death Certificate and NC-VDRS Data

There may be some small differences in the number of firearm-related deaths identified using death certificate data and NC-VDRS data based on:

- Who is included in the data
  - NC-VDRS data include deaths that happened in NC.
  - Death certificate data also include deaths among NC residents that happened outside of the state.
- Differences in case definitions
  - The intent of the firearm injury may be grouped differently in NC-VDRS than in the death certificate data.
  - For example: NC-VDRS includes firearm deaths caused by law enforcement officers in the line of duty as legal intervention deaths. In the death certificate data, these deaths are grouped in with homicides.

IVPB uses NC-VDRS to monitor firearm-related deaths.

Final NC-VDRS data are the preferred source for monitoring firearm-related deaths. This is because:

- NC-VDRS connects information across multiple sources (death certificates, medical examiner reports, and law enforcement reports) for a more complete understanding about violent deaths in the state.
- NC-VDRS collects data on the circumstances surrounding firearm-related deaths.
  - These data are useful for informing firearm-injury prevention activities and describing the circumstances of:
    - Firearm homicides
    - Firearm suicides
    - Unintentional firearm injury deaths
- For more information, visit the NC-VDRS Data Users Toolkit.

IVPB uses death certificate data to monitor firearm-related deaths before NC-VDRS data are finalized.

- NC-VDRS data take longer to finalize than death certificate data because it takes time to gather and review all the details across the multiple data sources that feed into the system.
- For more information on when death certificate and NC-VDRS data become available each year, visit Using Provisional Data for Monitoring Injuries.

Firearm Injury ED Visit Data

Data Quality

- Trends may be impacted by missing data.
- There was a large drop in the number of people going to the ED for any reason (ED utilization) around March 2020 after the COVID-19 stay at home order was implemented. ED utilization slowly increased but remained lower than normal throughout most of 2020.

Identifying Firearm Injuries in ED Visit Data

ICD-10-CM codes are used to group and classify diagnoses and reasons for health care visits in administrative healthcare systems, including ED visit data.

- ED visits with an ICD-10-CM code for a firearm injury listed anywhere in the record are included as firearm injury ED visits.
  - For more detailed information on how these cases are identified, see Injury Surveillance Technical Notes.
- IVPB does not exclude ED visits where the patient is admitted to the hospital or visits that result in death.
  - Including ED visits resulting in hospitalization or death helps us understand the full burden of firearm injury and other types of injuries on the NC healthcare system.
  - These records are excluded in national case definitions. This variation in case definitions can contribute to differences in the number of overdose ED visits IVPB identifies compared to those shared by CDC or other sources.
- ICD-10-CM codes are intended for administrative and billing purposes, not public health surveillance.
  - External cause of injury codes used to identify firearm injuries and other types of injuries are not required for billing.
  - This purpose can affect which codes are or are not assigned to a record, and therefore which events are included or excluded as injury cases.
- In addition to using ICD-10-CM codes, the NC Firearm Injury Surveillance Through Emergency Rooms (NC-FASTER) ED visit case definitions search the chief complaint and triage note fields for keywords to identify ED visits related to firearm injury.
  - Because NC-FASTER definitions also use keywords, they identify more ED visits related to firearm injury than when using ICD-10-CM codes alone.
  - For more information on NC-FASTER, visit NC DETECT Firearm Quarterly Reports.
- ICD-10-CM codes used to identify firearm injuries have changed over time. See the Changes in Firearm Injury ED Visit Data section below for more information.

For more information on case definitions, visit Understanding Injury Surveillance Case Definitions.

ED Visits with Multiple Firearm injury ICD-10-CM Codes

Some ED visits for firearm injury may receive multiple ICD-10-CM codes related to the firearm injury event, or codes for other types of injuries.

Multiple Firearm injury Intents

- In some cases, there may be multiple codes with conflicting firearm injury intent information, like a code for unintentional firearm injury and another for self-inflicted firearm injury or firearm assault.
  - For example, if a patient was holding a firearm when they were shot by someone else (firearm assault), then fell and accidentally shot themselves in the foot (unintentional firearm injury).
- IVPB handles these records differently for ICD-10-CM code-based firearm injury case definitions and for NC-FASTER definitions that also consider key words.
  - For ED visits identified with only ICD-10-CM codes, the visit is counted once in each intent category that applies (such as for total firearm assaults or total unintentional firearm injuries), but only once in the total number of firearm injury ED visits.
  - For ED visits identified using NC-FASTER definitions, intent defaults to an intentional category (e.g., self-inflicted, assault) if an ED visit includes information for intentional firearm injury and another intent category.

- Before October 2025, the ICD-10-CM coding guidance defaulted to unintentional injuries.
  - This contributed to conflicting codes when multiple codes are added to describe aspects of the ED visit.
  - Coding guidance now defaults to undetermined intent. For more information visit the Changes in Firearm Injury ED Visit Data section below.

Multiple Injuries Identified

- There may be codes included in a record that describe multiple types of injuries, like firearm injury and a fall.
- A visit with multiple ICD-10-CM codes is counted once in each injury category that applies to that ED visit, but only once in the total number of injury ED visits. For example:
  - An ED visit with codes for both **an unintentional firearm injury and a firearm assault** would be counted one time each in:
    - The total number of unintentional injury ED visits
    - The total number of assault injury ED visits
    - The total number of firearm ED visits
    - The total number of injury ED visits
  - An ED visit with codes for both **an unintentional firearm injury and an unintentional fall** would be counted one time each in:
    - The total number of unintentional injury ED visits
    - The total number of firearm injury ED visits
    - The total number of fall injury ED visits
    - The total number of injury ED visits

	Injury ICD-10-CM Codes in the ED Visit Record	How IVPB Counts the Injury ED Visit (each box represents the visit being counted once in the number of injuries by intent, mechanism, and total injury)		
		Intent	**Mechanism**	**Total Injury**
ED Visit A	**Multiple Intents** • **Unintentional** Firearm Injury • **Assault** Firearm Injury	Unintentional Assault	Firearm	Injury ED Visit
ED Visit B	**Multiple Types of Injuries** • Unintentional **Firearm Injury** • Unintentional **Fall**	Unintentional	Firearm Fall	Injury ED Visit
ED Visit C	**Multiple Injuries and Intents** • **Unintentional** Firearm Injury • **Assault** Firearm Injury • Unintentional **Fall**	Unintentional Assault	Fall Firearm	Injury ED Visit

Firearm Survey Data

IVPB uses data from the NC Behavioral Risk Factor Surveillance System (BRFSS) and the NC Youth Risk Behavior Survey (YRBS) to better understand and prevent firearm injury.

- Survey data provide insights into firearm ownership, access, and storage behaviors that are useful for firearm injury prevention.

- Questions about firearms may not be included every year that BRFSS and YRBS are implemented.
    - For information on the specific questions included in these surveys and when firearm questions were asked, visit:
        - BRFSS: NC State Center for Health Statistics, BRFSS
        - NC YRBS: NC Department of Public Instruction, NC Healthy Schools Data
    - Visit Data Sources IVPB Uses for Injury Surveillance for more information on how IVPB uses BRFSS and YRBS data and considerations for using these data.

Considerations For Using Survey Data

Survey data are self-reported and may show different results from what people are actually experiencing. Survey data related to firearms can be affected by:

- **Social Desirability Bias –** People may report owning fewer or more firearms than they actually do, not having access to firearms when they do, or report storing their firearm differently then they actually do.
    - People may not want others to know about their firearm access or ownership.
    - People may respond with what they think will make them look good.
- **Recall Bias –** People may not remember how their firearms are stored during the survey.
- **Nonresponse Bias –** People may not respond to the survey questions about firearm ownership, access, and storage.
    - They may feel uncomfortable and skip the question.
    - Some respondents may have stopped participating in the survey before getting to that question.
    - They may choose not to participate in the survey at all.

Firearm Injury and COVID-19

There have been many implications from the COVID-19 pandemic that began in 2020, including changes to the numbers and rates of firearm injuries and deaths.

- Firearm-related deaths have increased since the start of the pandemic.
    - The number of firearm-related deaths increased by 29% from 2019 to 2021 and have stayed at around that level through 2023.
    - Increases in firearm-related death varied by the intent of firearm injury.
        - Firearm suicides have continued to increase steadily from 2019 through 2023.
        - Firearm homicides increased by 50% from 2019 to 2021. The number of deaths have since decreased but remains higher than before the pandemic.
        - Unintentional firearm-related deaths have remained elevated since the start of the pandemic.
- There were large impacts to ED visits during the pandemic.
    - There was a large drop in the number of people going to the ED for any reason (ED utilization) starting in March 2020 when the COVID-19 stay-at-home order was implemented.
        - ED utilization slowly increased but remained lower than normal throughout most of 2020.
        - This drop in ED utilization also impacted the number of ED visits for specific injuries, including firearm-related injuries in 2020.

- Despite the drop in ED utilization, ED visits for firearm-related injuries increased by 28% from 2019 to 2020.
    - The number of firearm-related ED visits has since dropped, but remains higher than before the pandemic.

Changes in Firearm Injury Metrics Over Time

When changes are made to firearm injury surveillance case definitions, those changes are also applied to historical data whenever possible.

- The changes are applied retroactively so that firearm injuries can be counted the same way across multiple years of data.
    - This allows IVPB to accurately monitor firearm injury trends.

  Because of this, data IVPB shared before a change was implemented can be different from data shared for the same time-period today.
    - Use the data resources posted to the Preventing Firearm Injury and Death webpage to be sure you are accessing the most up-to-date information on firearm injury in NC.
    - If you have questions about data you have received from IVPB previously, email us at InjuryData@dhhs.nc.gov.
- Some changes, like those caused by updates to how injury events are coded, cannot be applied to historical data.

Changes in Firearm Injury ED Visit Data

ICD-10-CM Coding Transition

The system used to code diagnoses and other information in ED visit, hospital discharge, and other outpatient data was updated in 2015.

- The codes used previously (ICD-9-CM codes) do not align directly with the new codes (ICD-10-CM codes).
- Since the data are not directly comparable, data from before 2016 usually are not shared.

For more information on this coding transition and impacts to injury surveillance, visit ICD-10-CM Coding Transition.

Changes to ICD-10-CM Coding Guidance for Firearm Injury Intent

The national guidance for coding non-fatal firearm injuries was updated as of October 1, 2025.

- Before October 1, 2025, the intent for all injuries, including firearm-related injuries, defaulted to unintentional injury.
- After October 1, 2025, the intent of firearm injuries defaults to undetermined.
- This change caused the number of unintentional non-fatal firearm injuries to decrease and the number of non-fatal firearm injuries of undetermined intent to increase.
    - Data on unintentional firearm injuries and firearm injuries of undetermined intent from before and after October 1, 2025 should not be directly compared.

For more information on updates to firearm injury intent coding and its impacts to firearm-related injury surveillance, visit Differences in Firearm Injuries by Injury Intent.

Firearm Injury Equity Considerations

Interpersonal firearm violence affects communities of color more than others. Some of this difference is because of how our society has been built over time.

Systems and structures like racism, lack of investment in certain communities over time, and discriminatory policies have contributed to firearm-related outcomes over many decades.

- These factors have led to differences in firearm ownership and firearm-related injuries among groups of people, especially based on race and ethnicity.
- When interpreting data, it is crucial to recognize this historical context and consider these systemic, avoidable, and unjust factors.
- The language used to describe firearm injuries matters.
  - Be thoughtful about how racial and ethnic differences in firearm injuries are described.
  - Avoid language that blames victims or communities that are most impacted by firearm violence.
- Often, data about the root cause of firearm injury, or social drivers of health, are not collected alongside health outcome data.
  - Special research studies and surveillance initiatives that link datasets and systems, like NC-VDRS, can offer some insights.

How data are collected and grouped can also impact differences in firearm injuries, especially by race and ethnicity.

The most reliable way to collect information on race and ethnicity is when it is self-reported, where individuals choose the race and ethnicity they use to describe themselves.

In some cases, race and ethnicity may not be self-reported and may instead be assigned based on someone's name or how they look. Asking someone to report their own race and ethnicity ensures the data are accurate.

- For example: If a person was unresponsive from a firearm injury when EMS responded or when they arrived at the emergency department (ED).
- This assumption can result in misclassification of race and ethnicity, when someone is categorized into a racial or ethnic group that they do not identify with.

For more information on how race and ethnicity are collected in the data sources IVPB uses, and how IVPB groups race and ethnicity, visit Using Injury Data by Race and Ethnicity.

Monitoring Firearm Injuries by Demographic Groups

IVPB uses rates to compare the burden of firearm injuries across groups, including by age group, sex, and race/ethnicity.

This approach allows IVPB to identify groups that are experiencing the greatest burden of firearm injury.

- Rates account for the size of the population and allow us to compare injuries that happened in small populations to injuries in larger groups.
- This approach helps us understand different experiences of firearm injury between groups.
- For more information, visit Understanding Counts and Rates.

The populations and groups impacted by firearm injury are very different than for other causes of Injury.

- Firearm injuries impact younger ages, creating a larger impact on society.
  - Firearm injury is a leading cause of death for younger age groups in NC and nationally.
  - Firearm injuries result in more years of potential life lost (YPLL) than most other causes of injury.
    - Visit Understanding Counts and Rates for more information on YPLL.
- Rates of firearm injuries are highest among young adult males.
  - Males are six times more likely to die from firearm violence than females.
- Some racial groups experience a much higher rate of firearm injury.

It is important to look across multiple groups or identities in firearm injury data.

- People's experience with firearm violence can be influenced by the many parts of who they are, including their sex, age, race, and ethnicity, and where they live, among other factors.
- When looking at firearm-injury data, it is important to also consider demographic factors like sex, age, and race/ethnicity together.
  - These factors can overlap and influence how likely someone is to be affected by firearm violence.
  - Disaggregating, or breaking out the data out across multiple groups helps to identify patterns and more accurately understand who may be at risk of firearm injury and why.
    - For example, younger black males experience a much higher burden of firearm-related violence than older white females, and residents of rural counties experience higher rates of firearm injury than those of urban counties.
  - More specific data can help focus prevention efforts.
- Differences in firearm injury between groups also vary by the intent of firearm injury (e.g., suicide, homicide, unintentional injury).
  - For more information visit, Differences in Firearm injuries by Injury Intent.

Breaking data out across multiple groups can make it harder to share data.

- The more you separate data into specific groups, the smaller the numbers you are working with can get.
- When there are only a few cases of firearm injury across multiple groups:
  - It can be hard to tell if patterns in the data are real or meaningful.
  - It can become easier to tell who is included in the data.
    - The data may need to be suppressed to protect people's privacy and ensure only reliable data are being shared.
- For more information, visit Data Suppression and Working with Small Numbers.

FOR MORE RESOURCES:

Visit our Injury Data Users Toolkit