

Insights from AVERT:

Trends and Comparisons in Firearm Data

Presentation Overview

- Data Sources
- Syndromic Surveillance
Validation & Results
- Intentional Self-Directed
Firearm Data
- SyS vs. HDD
- Firearm Deaths in Arizona
- Key Takeaways
- Looking Ahead



About AVERT

AVERT = **A**dvancing **V**iolence **E**pidemiology in **R**ead **T**ime

Initiative funded by the CDC, intends to integrate, expand, and enhance previous data sharing efforts with public health departments. AVERT will support states to conduct routine monitoring our electronic health data via syndromic surveillance to identify ED visits related to firearm injury, other violence-related injury, and mental health conditions.

More Questions? Email us at:

baeval@azdhs.gov



DATA

SOURCES



Syndromic Surveillance (SyS) Data



ADHS Hospital Discharge Data (HDD)

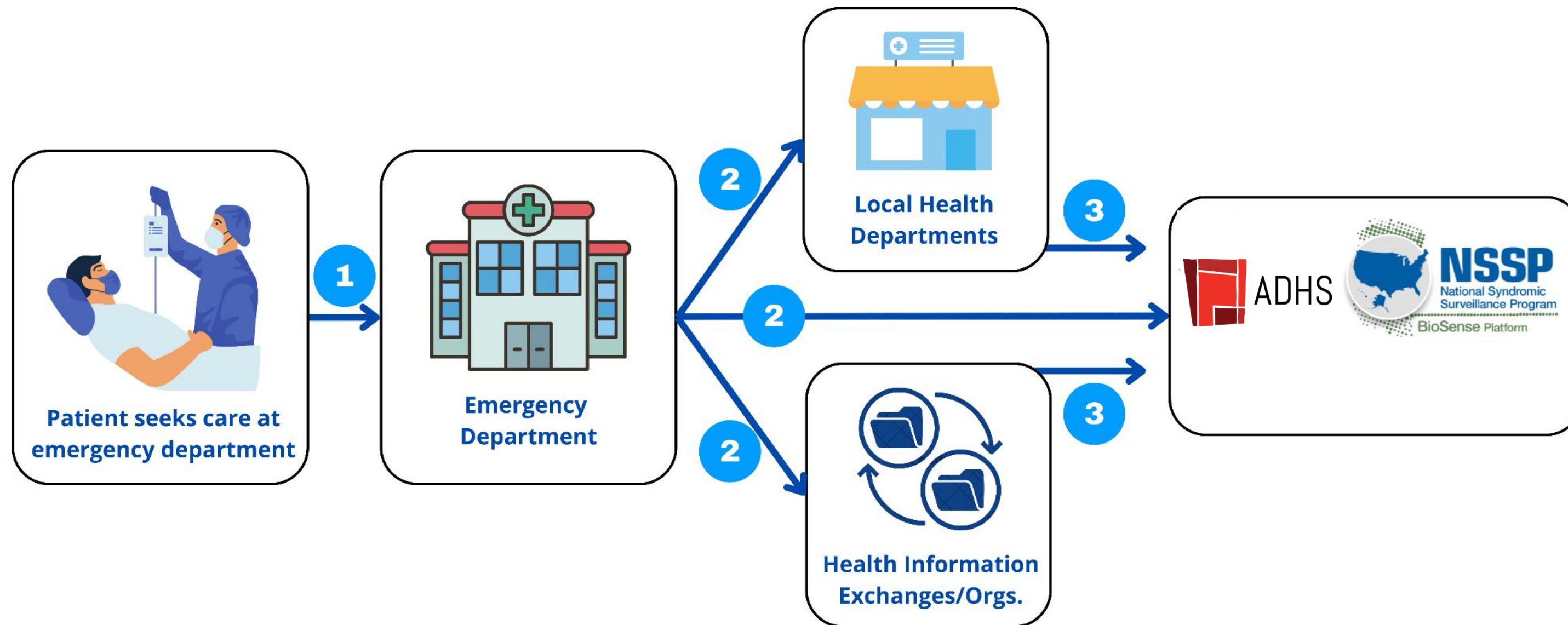


Vital Statistics, Death Data



What is Syndromic Surveillance Data?

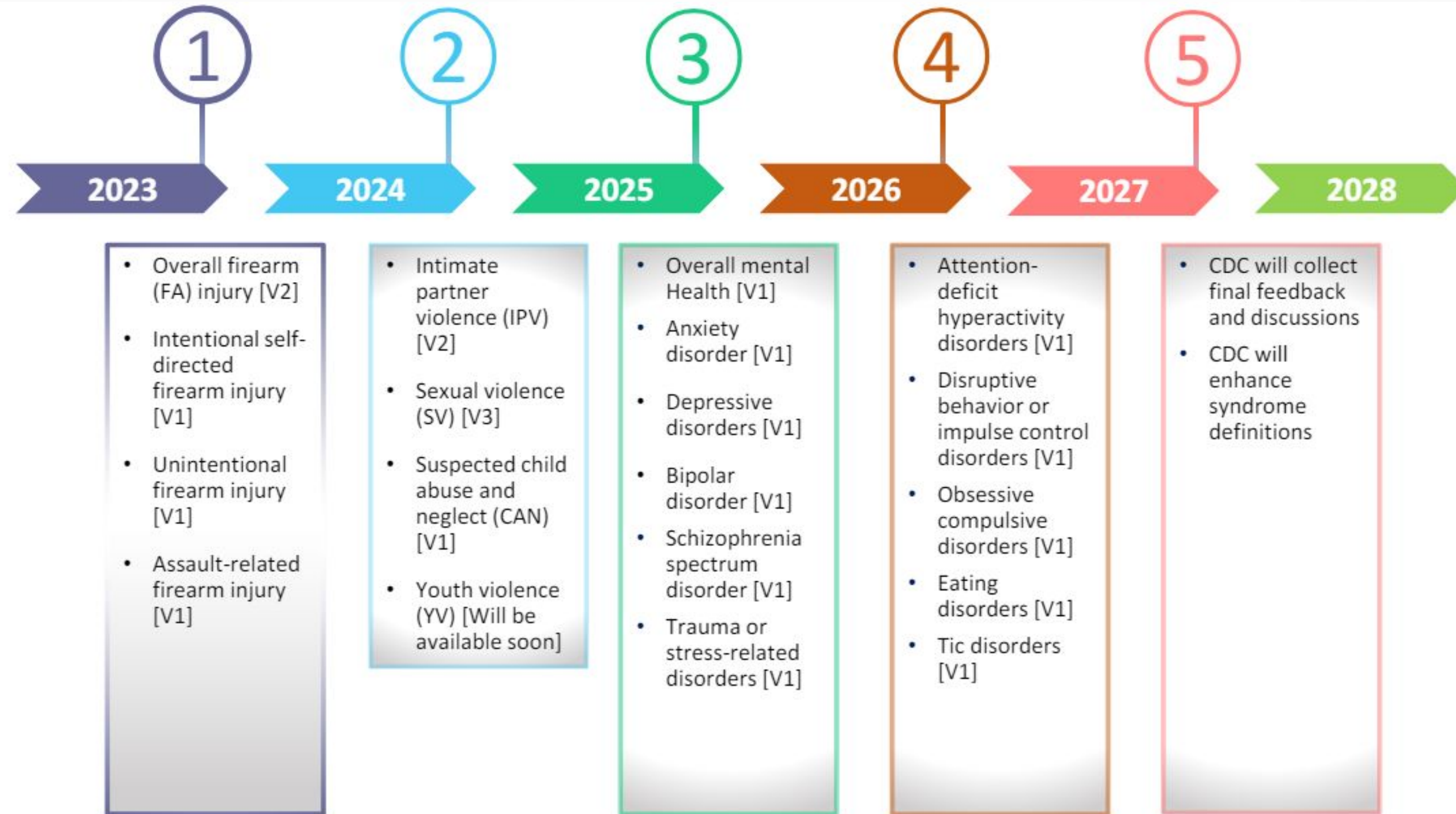
Data Exchange in Syndromic Surveillance



How is Hospital Discharge Data Different?

- All Arizona licensed hospitals, regardless of license type, are required to report inpatient and emergency department discharge records to ADHS
- Data is reported bi-annually
- Review process is very thorough and can take up to six months

Syndrome Validation Schedule



Validation Parameters

Data Source: ESSENCE Syndromic Surveillance

Years: 2020–2023

Site: Arizona

Has been emergency: Yes



Findings

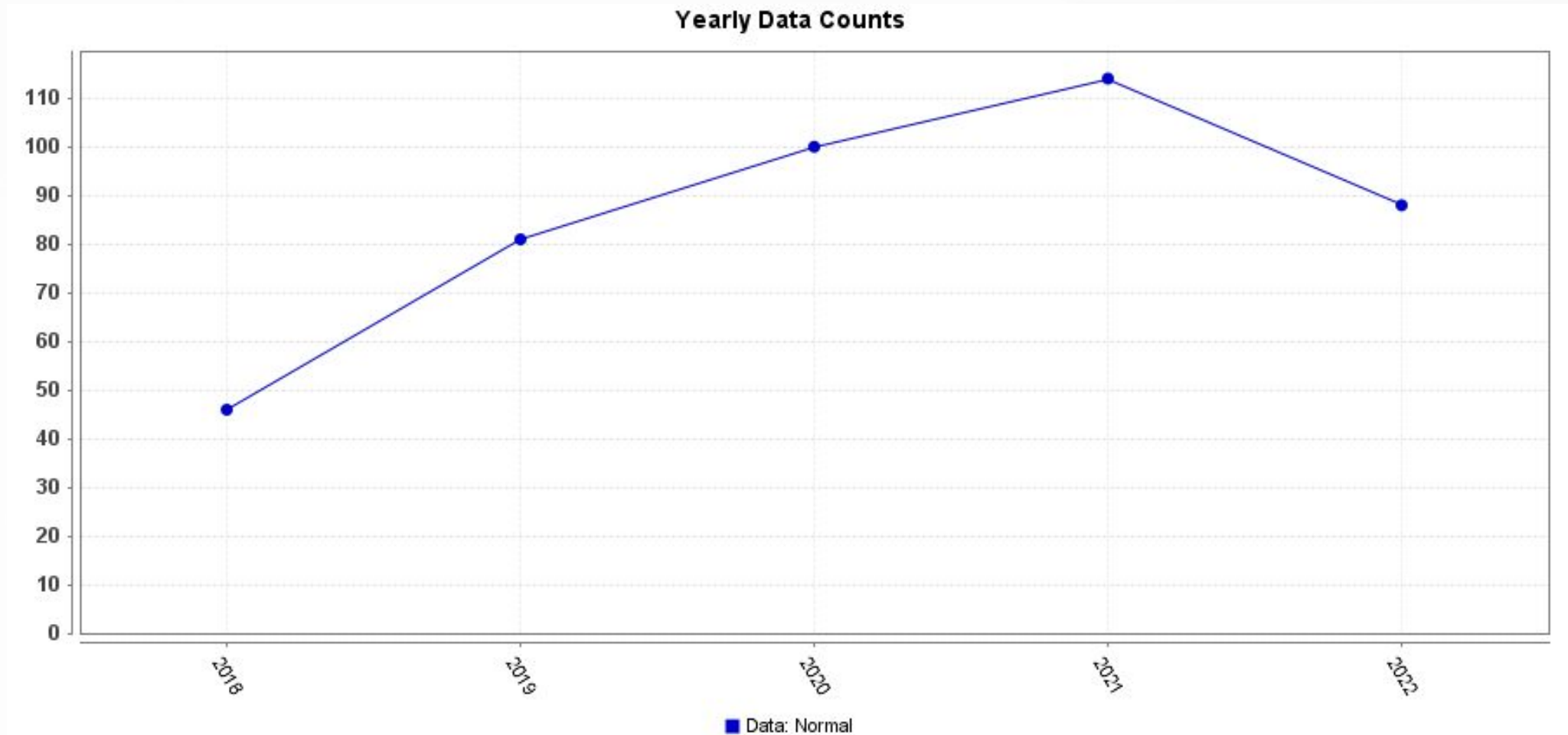
Positive Predictive Value (PPV) =
(# Probable records identified/ # Total records identified) * 100

1. Overall Firearm Injury v2= **93.14%**
 - a. Average Monthly Count = 215
 - b. Total Visits Reviewed = 510
2. Unintentional Firearm v1= **73.62%**
 - a. Average Monthly Count = 131
 - b. Total Visits Reviewed = 527
3. Intentional Self Directed Firearm v1= **88.27%**
 - a. Average Monthly Count = 80
 - b. Total Visits Reviewed = 392
4. Assault Firearm Injury v1 = **85%**
 - a. Average Monthly Count = 31
 - b. Total Visits Reviewed = 536

1. **Yes**, query broadly captured overall firearm injuries. Triage notes were helpful if available. Recommend excluding terms such as “wound check”, “bb gun”, “suicide ideation”
2. **No**, syndrome definition was too broad. There were visits that were clearly assault and suicide related identified in query. Conflicting coding. Recommend excluding terms such as “assault”, “drive by”, “point blank”.
3. **Yes**, query broadly captured intentional self directed firearm injuries. Coding error ‘X72’ shorthand for nurses but also ICD-10 code. Some visits only included ideation, but no injury.
4. **No**, there was not enough information to determine intent based off ICD-10 and free text fields. Contradicting codes, accidental and assault. Query had significantly less triage notes compared to intentional firearm syndrome.

Intentional Self-Directed Firearm Injury

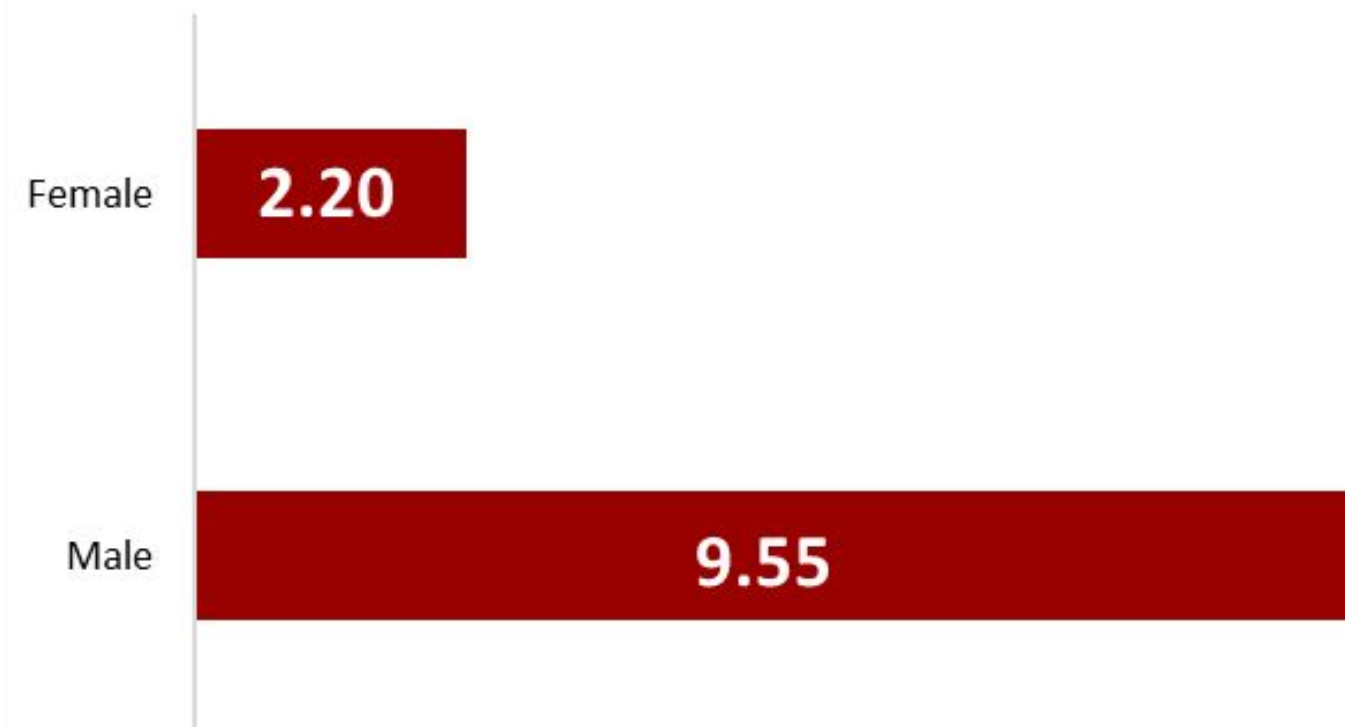
- From 2018-2022, a total of 429 fatal and non-fatal intentional self directed firearm injuries were seen according to ESSENCE



SEX

- From 2018-2022, there were a total of 343 injuries (80.0%) amongst males and 80 (18.6%) among females.
- Males are 4 times more likely to experience an intentional self directed firearm injury

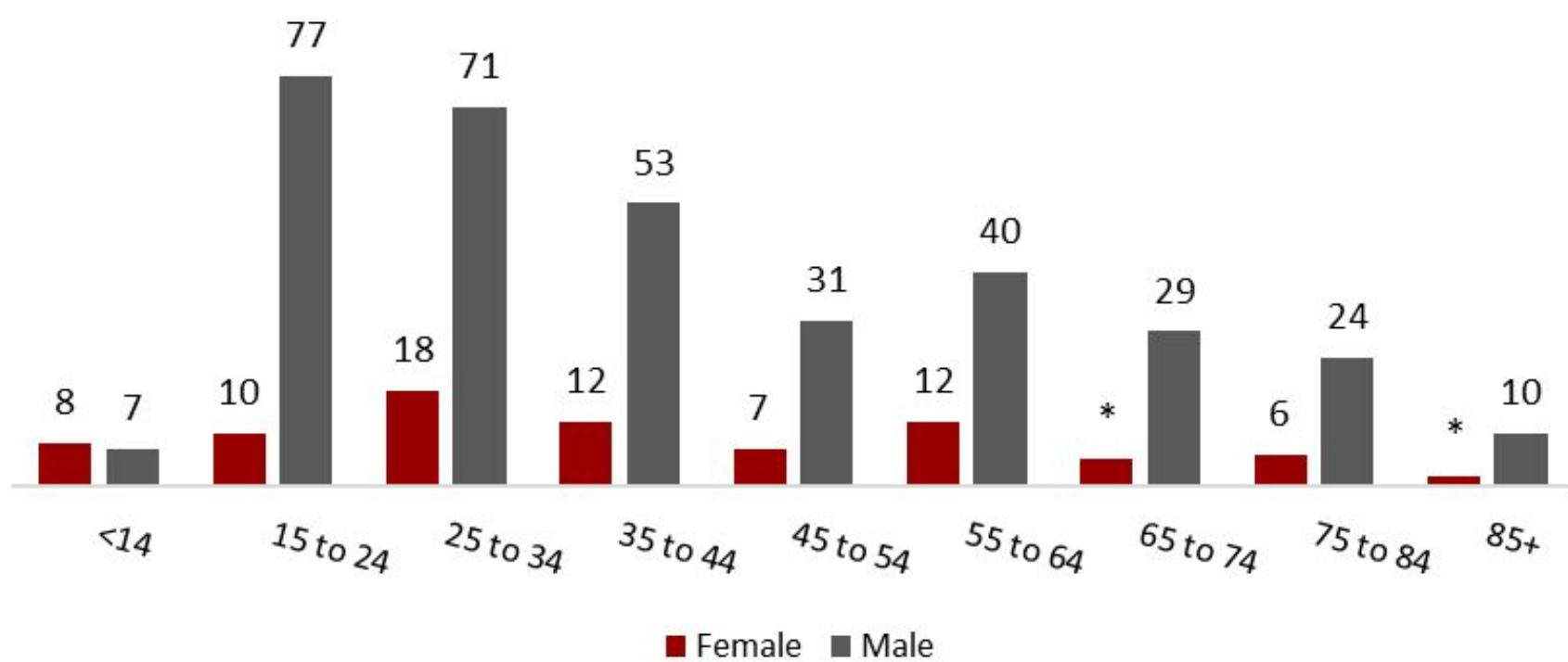
Rate of Intentional Firearm Injuries and Fatalities
by Sex, 2018-2022



AGE GROUP & SEX, 2018-2022

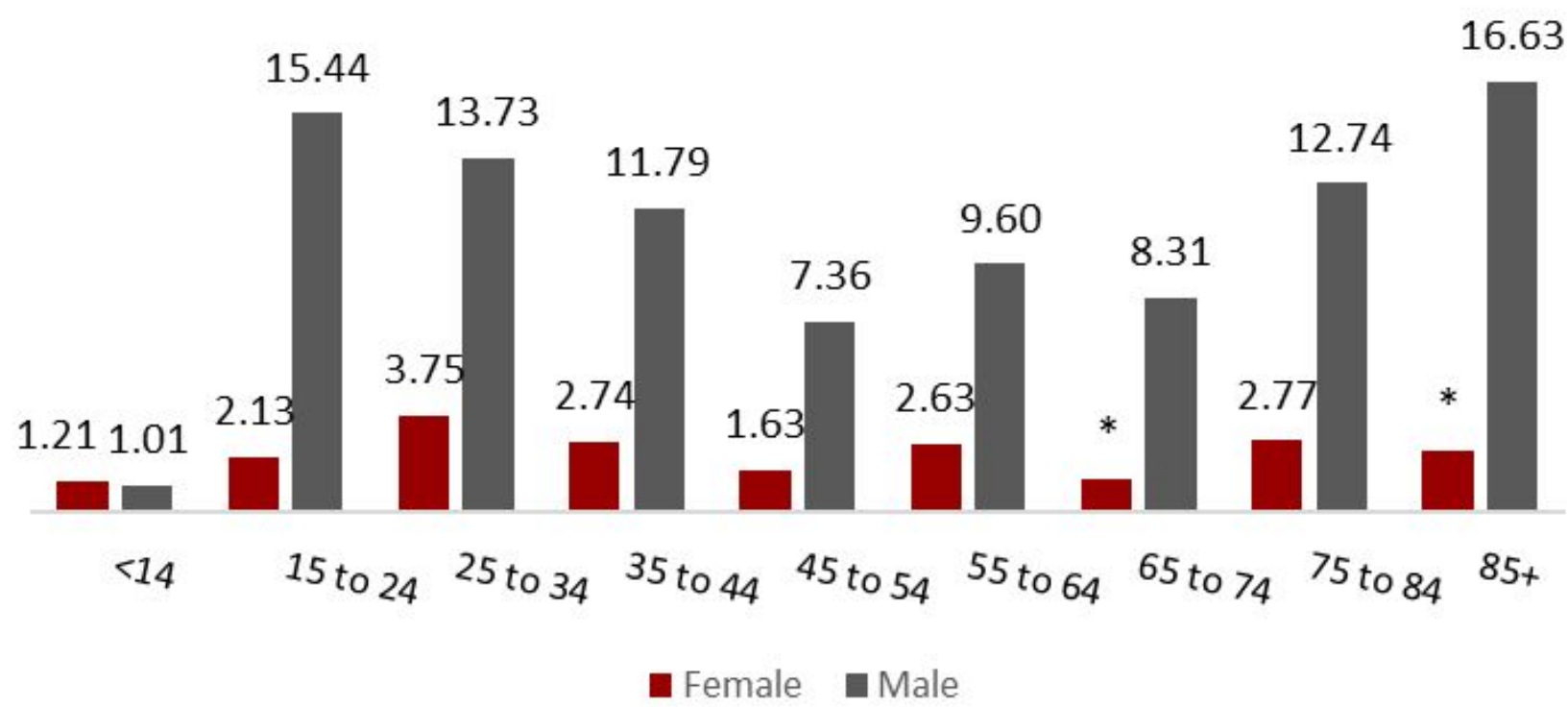
The age group with the highest count of intentional self directed injuries are males aged 15 to 24 (n=77), followed by males aged 25 to 34 (n=71).

Total Number of Intentional Firearm Injuries and Deaths by Age Group and Sex, 2018-2022



Males aged 85+ (16.63 per 100,000 population) and between the ages of 15-24 (15.44 per 100,000 population) have the highest rate of intentional self directed firearm injuries

Rate of Intentional Firearm Injuries and Deaths by Age Group and Sex

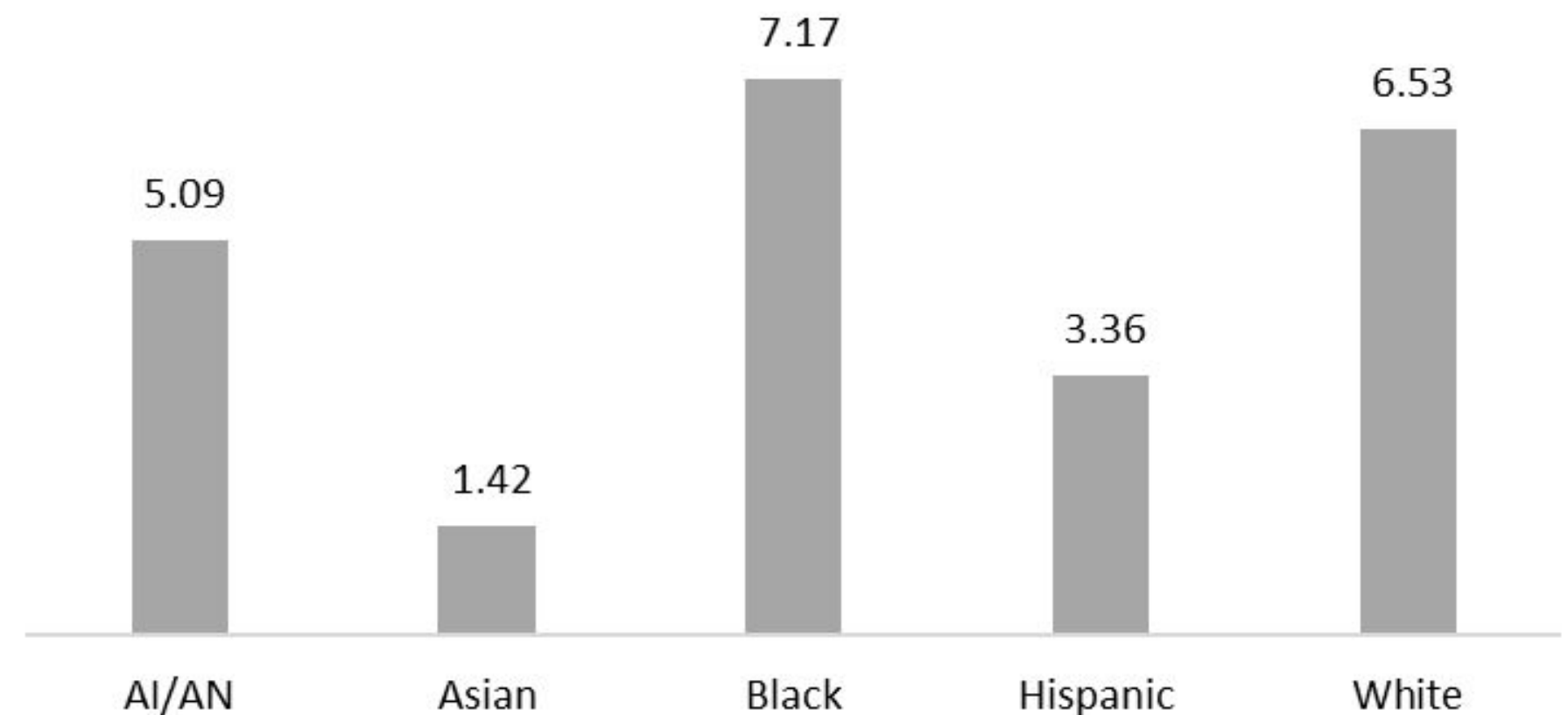


RACE & ETHNICITY, 2018-2022

Those who identified as Black/African American saw the highest rate of intentional firearm injury (7.17 per 100,000 population) followed by those who identified as White (6.53 per 100,000 population).

There are discrepancies in the race categorization, 11% of cases were categorized as missing, unknown, or mixed race.

Rate of Intentional Firearm Injuries and Fatalities
by Race and Ethnicity, 2018-2022



FUTURE

CONSIDERATIONS

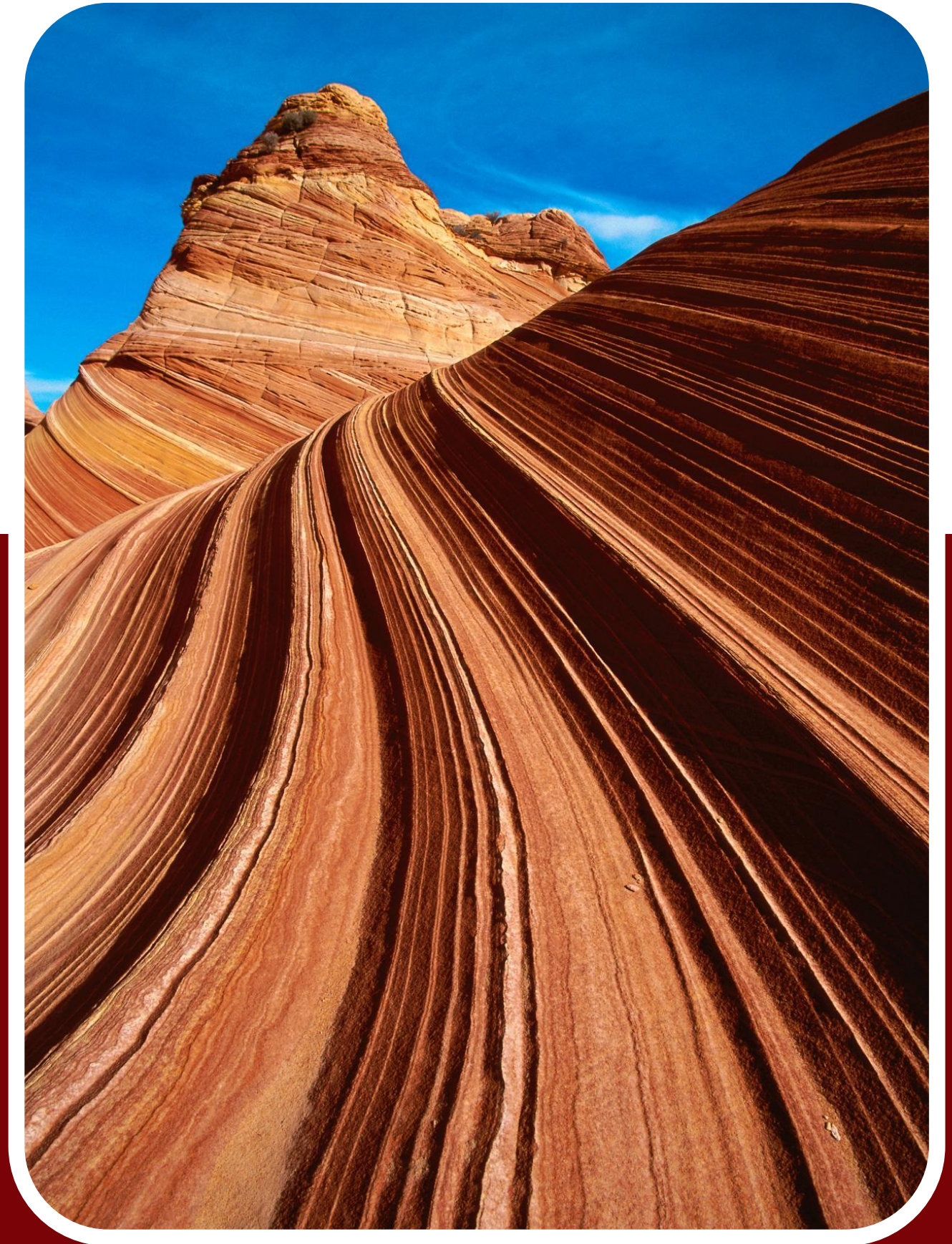
- An improved syndrome definition will lead to more accurate identification of cases
- Free text fields were crucial in determining intent (Triage notes)
- Many cases had Chief Complaint and Discharge Diagnosis coded with intentional and unintentional firearm injury, more education and training for coders



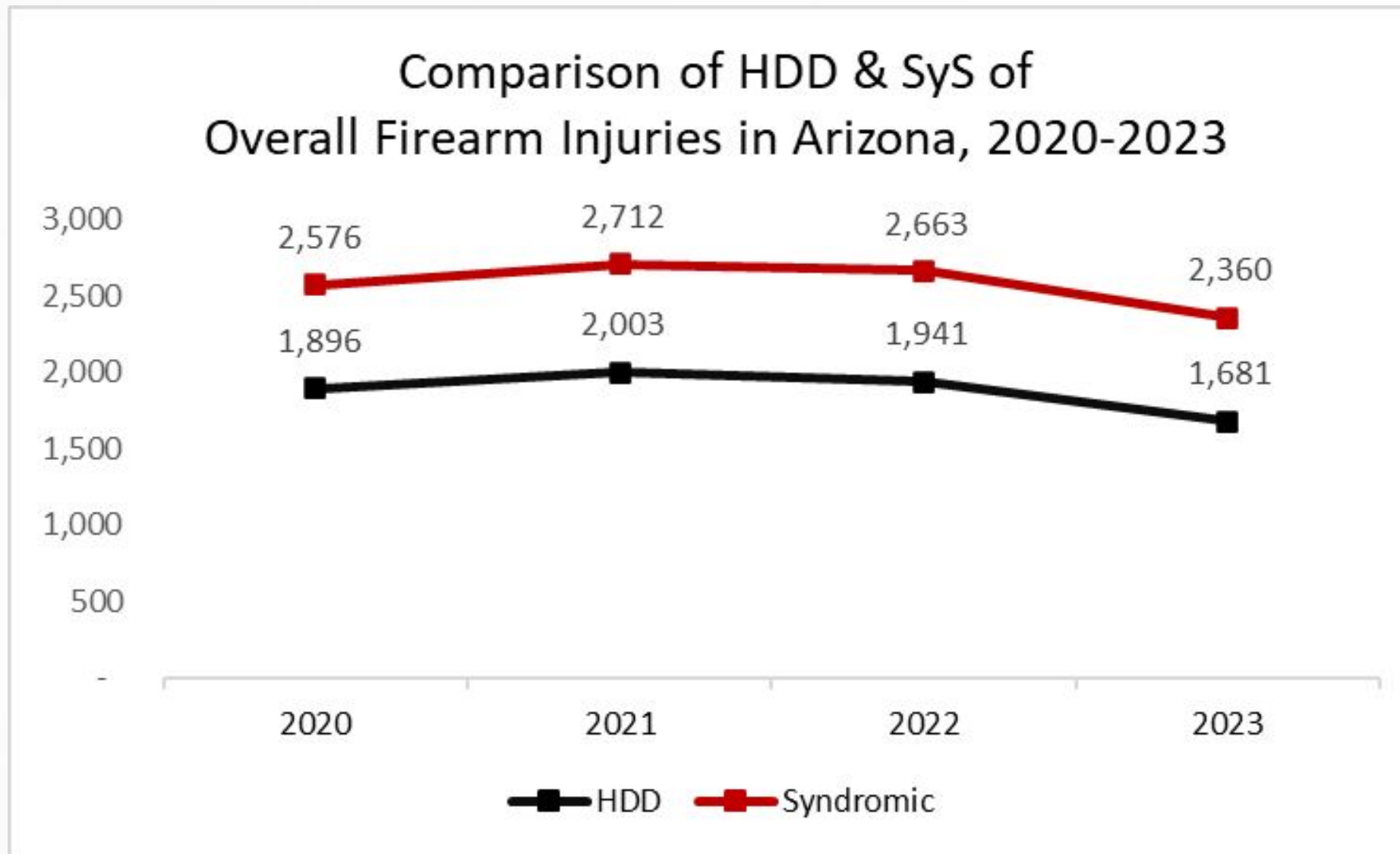
Data Linkage:
SyS with HDD



Utilize CDC SyS case
definitions to write
code and identify
cases



Hospital Discharge Data vs. Syndromic Surveillance for Overall Firearm Injuries in Arizona



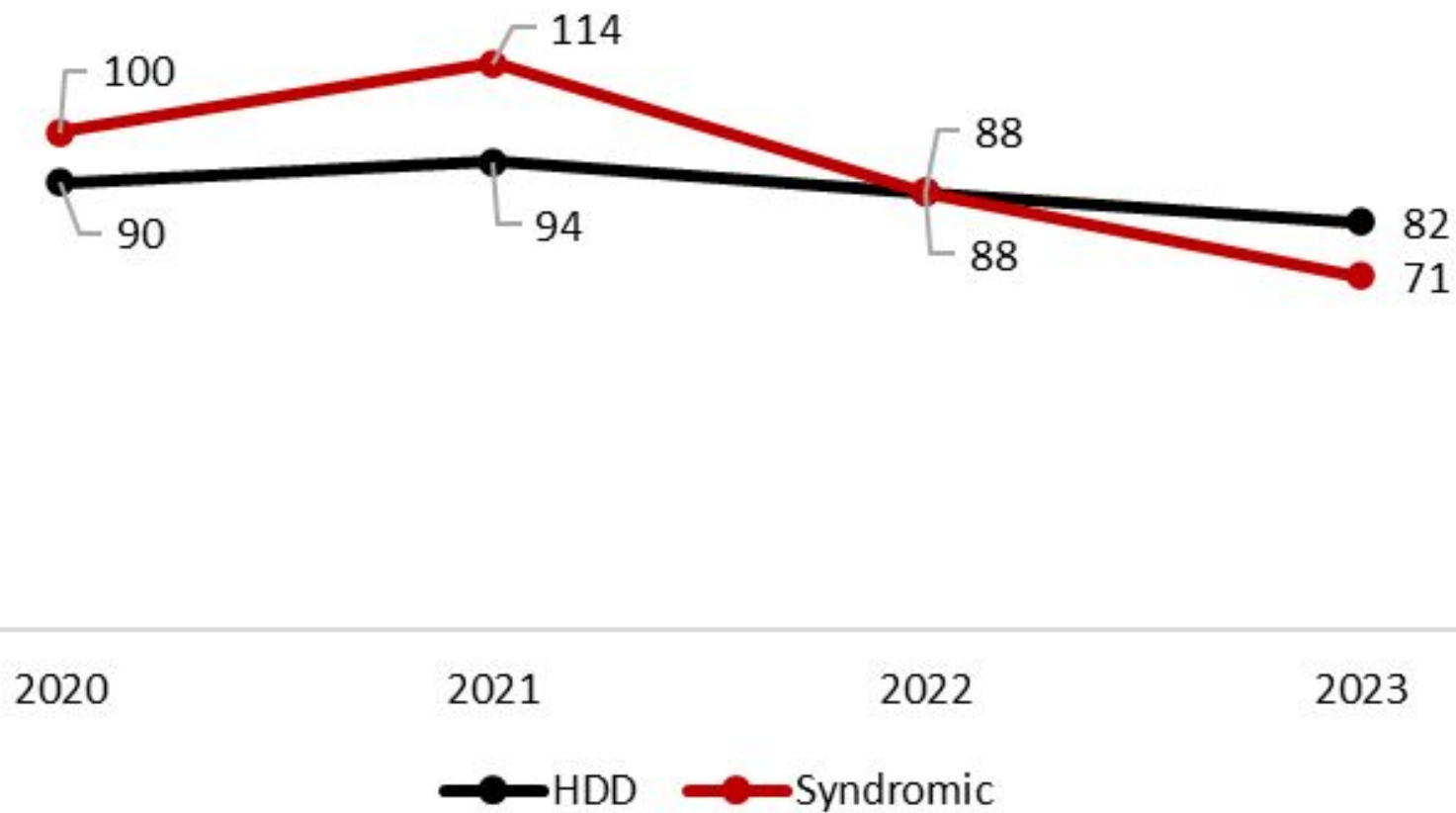
- SyS data shows higher numbers than HDD data across all years
- Injury trendline is parallel
- PPV=93%

Differences may be due to:

- Different ICD-10 codes in definitions
- HDD lacks free text fields
- False positives
- Duplicates & transfers

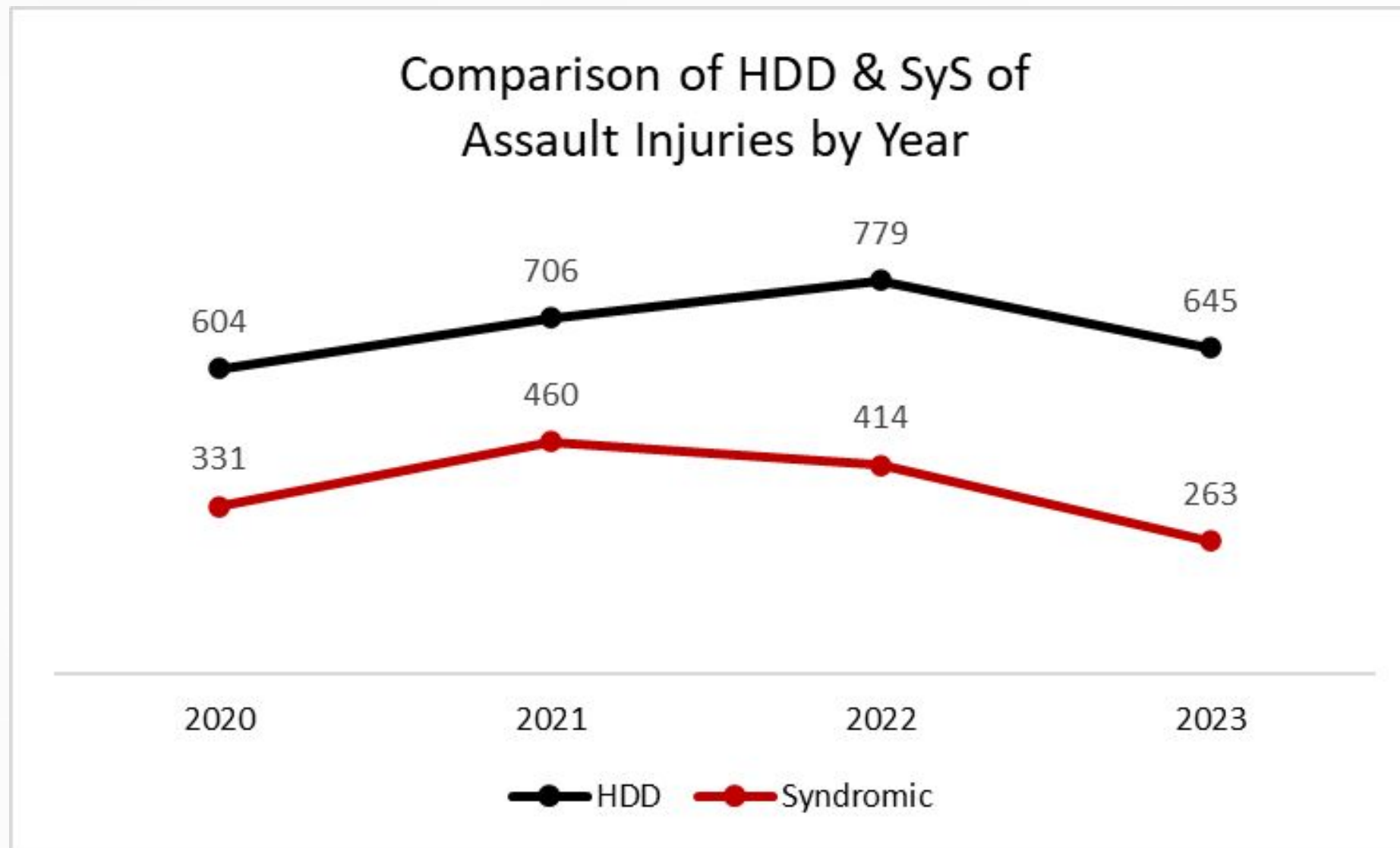
HDD vs. Sys for Intentional Self-Directed Injuries in Arizona

Comparison of HDD & Sys of
Intentional Self-Harm Firearm Injuries by Year



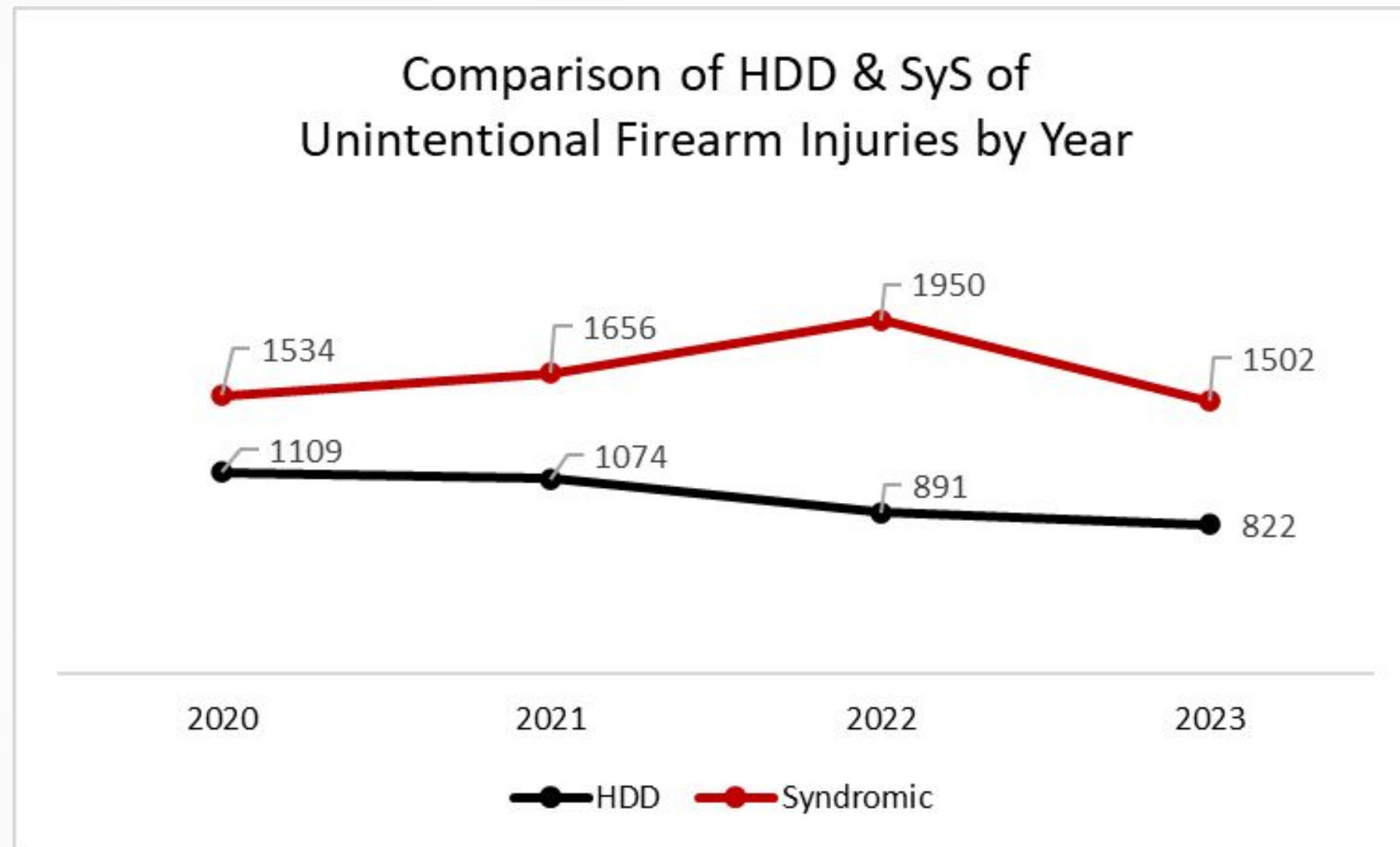
- Little variation between the two data sources
- HDD more consistent than Sys which shows more fluctuation
- Both data sources show a slight decline in number of non-fatal intentional self-directed injuries
- PPV=88%

HDD vs. Sys for Assault Firearm Injuries in Arizona



- HDD values are consistently higher compared to SyS
- PPV=85%

HDD vs. Sys for Unintentional Firearm Injuries in Arizona



- The values for HDD show a decrease over time
- SyS are consistently higher, showing an increasing trend from 2020-2022
- PPV=73%

HDD & SyS In Review

- Syndromic Surveillance data provides fast, close to real time, generalized data, with low specificity
- Intentionality is difficult to determine in SyS
- With syndrome definitions being reviewed and tested, specificity should be improved
- HDD has a slower turnaround time, more specific; limited qualitative data

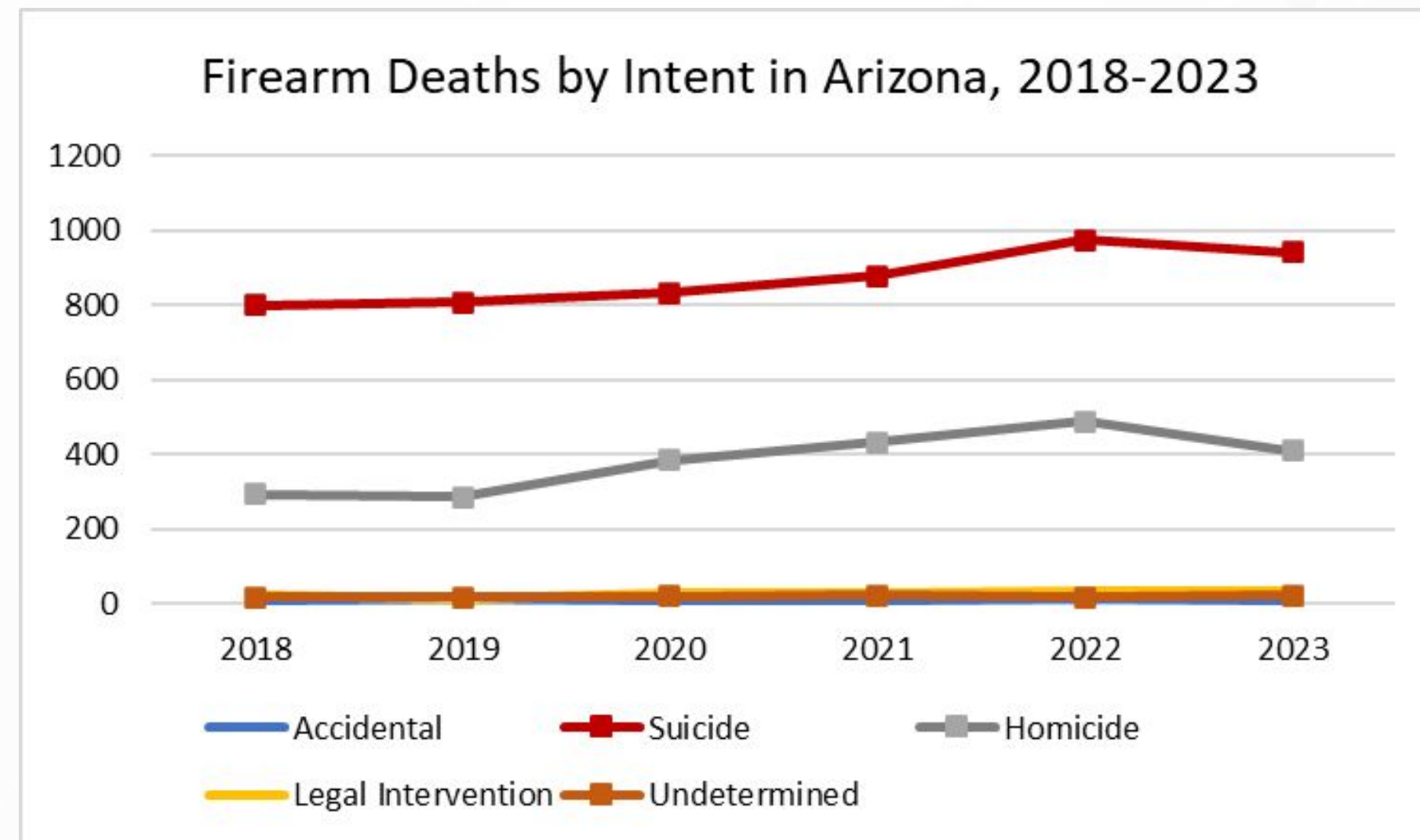


Firearm Deaths in Arizona



Firearm Deaths

- Suicide and homicide intents are the most frequent and show a generally increasing trend
- Suicide deaths accounted for 66.7% of all firearm deaths in 2023
- Firearm deaths due to accidental, legal, and undetermined intents accounted for 4% of all firearm deaths



Firearm Deaths by County of Residence, 2022

- The counties with the highest rates of firearm deaths were
 1. Gila (55.72 per 100,000)
 2. La Paz (47.45 per 100,000)
 3. Mohave (44.32 per 100,000)
- 53% of all firearm deaths occurred in Maricopa County

County	Count	Rate
Apache	18	26.93
Cochise	24	18.95
Coconino	31	20.72
Gila	30	55.72
Graham	9	23.07
Greenlee	*	*
La Paz	8	47.45
Maricopa	808	17.62
Mohave	98	44.32
Navajo	31	28.55
Pima	221	20.61
Pinal	114	25.11
Santa Cruz	*	*
Yavapai	85	34.64
Yuma	31	14.77

* Indicates count less than 6

Data Source: ADHS Vital Statistics, 2018-2023

Key Takeaways

Firearm Injury Demographics:

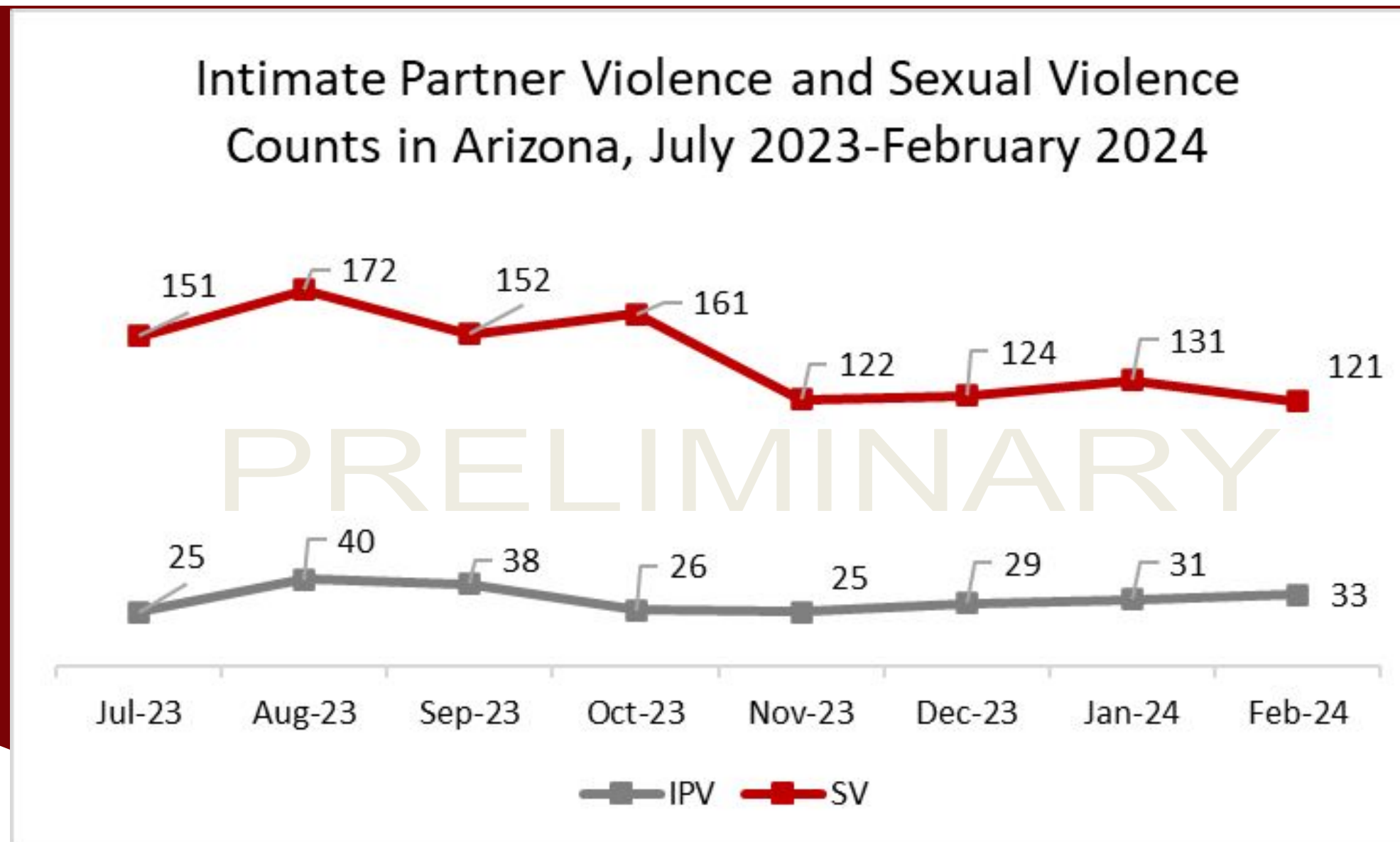
- **Sex:** Males are four times more likely to experience intentional self-directed firearm injuries compared to females.
- **Age:** The highest rates of intentional self-directed firearm injuries are among males aged 15–24 and 25–34.
- **Race and Ethnicity:** Higher rates of injury are observed among Black/African American and White populations, with significant missing or unknown race data.

Firearm Deaths in Arizona:

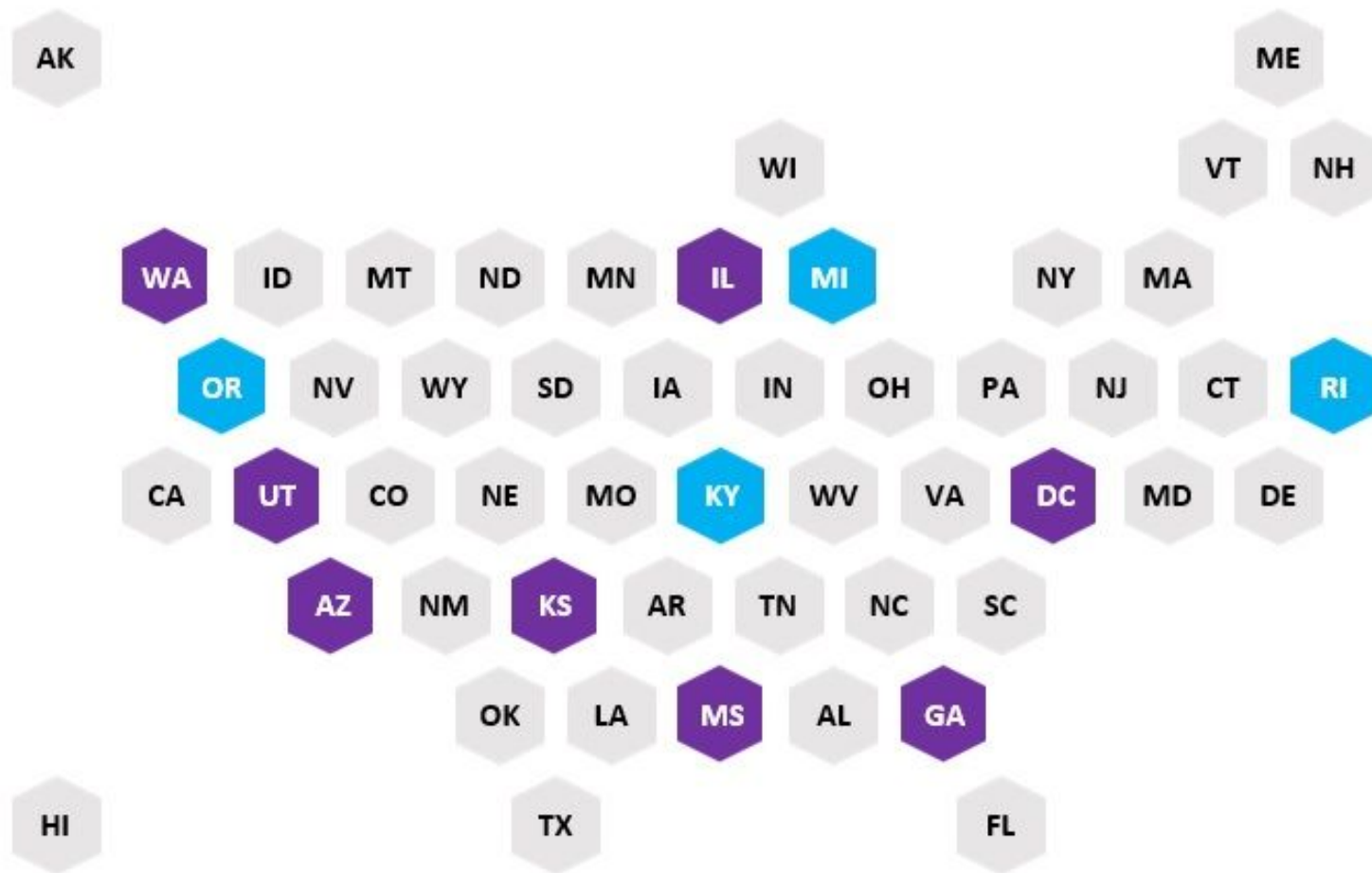
- **Trends:** Suicide accounts for 66.7% of firearm deaths, with a generally increasing trend.
- **Geographic Variation:** Highest firearm death rates are observed in Gila, La Paz, and Mohave counties, with Maricopa County accounting for 53% of all deaths.

Looking Ahead

- AVERT team will be validating intimate partner violence, sexual violence, suspected child abuse and neglect, and youth violence definitions in 2024
- Mental health conditions will be validated starting in 2025



Advantages of AVERT



AVERT Core Funding
AVERT Core and Data Linkage Funding

Key advantages to AVERT compared to initiating a new ED data collection are:

- Can be rapidly implemented and scaled to all states with minimum burden on state health departments
- Leverages instead of duplicating existing CDC work
- Ensures that state and local health departments are involved in the collection, ownership and use of ED data



THANK YOU

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Injury & Violence Epidemiologist

Bureau of Assessment & Evaluation



ARIZONA DEPARTMENT
OF HEALTH SERVICES