

Epi-Aid: Increase in Fatal and Nonfatal Assaults: Jackson, Mississippi

FINAL REPORT

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MISSISSIPPI STATE DEPARTMENT OF HEALTH



UMMCTM

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for Violence Research

Table of Contents

Table of Contents	2
Abbreviations	5
Executive Summary	6
Key Findings.....	6
Recommendations.....	7
Background	9
Objective #1	11
1. National Vital Statistics System (NVSS) Data.....	11
Background	11
Methods.....	11
Results.....	11
Conclusions.....	16
2. National Violent Death Reporting System (NVDRS) Data	17
Background	17
Methods.....	17
Results.....	17
Demographics	17
Method and location of homicide injury	20
Incident characteristics of homicide injury	21
Victim–suspect relationship of homicide injury	21
Precipitating circumstances of homicide injury.....	23
Conclusions.....	25
3. Advancing Violence Epidemiology in Real-Time (AVERT) data	27
Background	27
Methods.....	27
Data source	27
Definitions and data analysis	27
Results.....	28

Conclusions.....	36
4. Emergency Medical Services (EMS) data	37
Background	37
Methods.....	37
Results.....	38
Conclusions.....	44
5. Youth Risk Behavior Surveillance System data.....	45
Background	45
Methods.....	45
Data source	45
Definitions	45
Data analysis	45
Results.....	46
Conclusions.....	47
Objective #2	48
Background.....	48
Methods	48
Results	48
Strengths	53
Weaknesses.....	54
Expanding usefulness.....	54
Integration with other data sources	54
Lack of standardization across datasets.....	54
Representativeness and data coverage	54
Reporting issues	55
Threats	55
Opportunities	55
Conclusions and Recommendations	58
Objective #3	60

Background.....	60
Methods	60
Results	61
Current violence landscape in Jackson	62
What works in Jackson’s violence prevention and why.....	62
Barriers to implementation and sustainability	63
Community engagement, partnerships and information flow	63
Recommendations and priority opportunities	64
Data systems, gaps, and coordination opportunities	64
Using these findings: Practical opportunities for MSDH and UMMC	65
Opportunities for MSDH	65
Opportunities for UMMC.....	65
Shared opportunities for MSDH and UMMC.....	66
Conclusions.....	66
Overall Conclusions	67
Recommendations	67
References.....	69
Appendices.....	70
Appendix 1. Firearm Violence Syndrome Definition	71
Appendix 2. Youth Violence Syndrome Definition	78
Appendix 3. Data User Interview Guide	89
Appendix 4. Key Informant Interview Guide	93
Appendix 5. Mississippi Data Linkage Toolkit.....	97
Appendix 6. Organizations Interviewed	101

Abbreviations

	ATF Bureau of Alcohol, Tobacco, Firearms and Explosives
	AVERT Advancing Violence Epidemiology in Real-Time
	CCID Capitol Complex Improvement District
	CDC Centers for Disease Control and Prevention
	CI / CIs Confidence interval / Confidence intervals
	CBO Community-based organization
	CM Credible messenger
	ED Emergency Department
	EMS Emergency Medical Services
ESSENCE	Electronic Surveillance System for the Early Notification of Community-based Epidemics
	FBI Federal Bureau of Investigation
	GPS Global Positioning System
	ICD-10 International Classification of Diseases, Tenth Revision
	ICD-10-CM International Classification of Diseases, Tenth Revision, Clinical Modification
	JPD Jackson Police Department
	MSDH Mississippi State Department of Health
	MS-VIP Mississippi Violence Injury Prevention Program
	MSVDRS Mississippi Violent Death Reporting System
	MRN Medical Record Number
	NEMSIS National EMS Information System
	NIBRS National Incident-Based Reporting System
	NVDRS National Violent Death Reporting System
	NVSS National Vital Statistics System
	NSSP National Syndromic Surveillance Program
	PHI Protected Health Information
	PRAMS Pregnancy Risk Assessment Monitoring System
	TIGER Topologically Integrated Geographic Encoding and Referencing
	UMMC University of Mississippi Medical Center
	WONDER Wide-ranging Online Data for Epidemiologic Research
	YRBSS Youth Risk Behavior Surveillance System

Executive Summary

Mississippi had the nation's highest homicide and firearm homicide mortality rates in 2022, and Jackson's 2022 homicide rate (92.1 per 100,000) far exceeded state and national levels; UMMC, the state's only Level I trauma center, treated 1,129 firearm-injury patients that year and experienced a 35% increase in such cases from 2019–2023. In response, CDC's National Center for Injury Prevention and Control deployed an Epi-Aid team of four EIS officers to (1) characterize epidemiology and recent trends in fatal and nonfatal assaults by mechanism in Jackson, (2) assess and recommend improvements to data sources and linkage opportunities to enhance timeliness and utility for public health action, and (3) evaluate ongoing and planned prevention activities and recommend evidence-based supplemental strategies. Between November 2025 and February 2026, the Epi-Aid team analyzed five data sources—NVSS, NVDRS, AVERT syndromic data, EMS incident records, and YRBSS—to characterize fatal and nonfatal assaults in Jackson and statewide. We complemented these quantitative analyses with six data-user interviews covering nine distinct data systems and 23 key-informant interviews (29 participants total) spanning community organizations, public health, healthcare, law enforcement, and criminal justice partners.

Key Findings

- Mississippi and Jackson remain national outliers for homicide and firearm homicide mortality despite post-2021 declines; Hinds County rates are 6–8 times the U.S. average.
- NVDRS data show homicides are overwhelmingly firearm-related, concentrated among Black males aged 15–34, and often occur in homes or on streets; intimate partner violence is a dominant driver for female victims.
- Syndromic (AVERT) and UMMC ED data show certain groups at greater risk: males, individuals ages 15–24, and Black residents have the highest firearm and youth-violence visit rates; statewide firearm injury visits are trending down, but youth-violence visit rates remain flat.
- EMS hotspot maps place most assault responses north and south of I-20 between I-220 and I-55, with peaks on weekend evenings.
- YRBSS data show Mississippi high-school students report higher levels of weapon carrying, physical fights, feeling unsafe, and forced sex than national peers.
- Data systems are rich but siloed: some CBOs rely on manual logs, institutional datasets are guarded, and no unique identifiers exist to track individuals across systems that might allow for data linkage.

- Interviews highlight that community-based violence interruption works when paired with economic supports, but programs face unstable funding, limited staffing, and a need for greater collaboration with law enforcement.
- Partners want shared infrastructure, clearer data-sharing rules, better data literacy, and coordinated messaging; MSDH and UMMC are positioned to convene, fund, and model these changes.

Recommendations

- Stand up a shared data hub that houses aggregate trends plus de-identified, location-specific feeds so MSDH, UMMC, law enforcement, and community partners can coordinate in real time.
- Standardize core variables, definitions, and collection protocols across systems to reduce duplication and enable future linkage.
- Map governance barriers, develop common data-use agreements, and pilot pseudonymized unique identifiers so individuals can be followed through prevention, care, and recovery without exposing PHI.
- Invest in community-based organizations' data infrastructure, training, and evaluation support so frontline teams can document impact, meet funder requirements, and plug into the broader data ecosystem.
- Increase funding for community-based violence intervention so trusted local programs can retain staff, expand into high-risk areas, and maintain consistent engagement.
- Pair violence interruption with wraparound supports—employment, education, behavioral health, and basic-needs services—especially for youth and young adults.
- Strengthen hospital–community handoffs by expanding UMMC's efforts to include hospital-based violence intervention programming for youth, extend follow-up, and formalize referral pathways to trusted CBO partners.
- Use MSDH–UMMC joint leadership to align funding timelines, co-develop dashboards, convene routine cross-sector coordination meetings, and launch demonstration projects that integrate trauma care, community outreach, and prevention.
- Improve transparency on nonfatal violence by encouraging timely public reporting of aggravated assaults, robberies, and EMS trends so communities and partners can calibrate responses beyond homicide counts.

Background

Based on information shared by the Mississippi State Department of Health (MSDH), the state of Mississippi had the nation's highest homicide mortality and firearm homicide mortality rates (20.7 and 29.6 per 100,000 residents, respectively) in the year 2022. Jackson, the state's capital, had a 2022 homicide rate of 92.1 per 100,000 residents – more than three times higher than the state, and 15 times higher than the national average. According to information shared by Mississippi, during the same year, the state's only Level 1 Trauma Center, the University of Mississippi Medical Center (UMMC) located in Jackson, cared for 1,129 patients with firearm injuries. Despite a trend towards reduction in these injuries from 2019 to 2023 in some cities across the country, the trauma center in Jackson experienced a 35% increase during this period.

Violence prevention organizations within the city have been working to address this increase in fatal and nonfatal assaults. Through the recent creation of Jackson's Office of Violence Prevention and Trauma Recovery, efforts are underway to link data from key health systems, law enforcement, and community-based stakeholders to better support the State of Mississippi in their health information and prevention work.

In response to the state's request, an Epi-Aid team was assembled by CDC's National Center for Injury Prevention and Control, consisting of four EIS officers, Emilia Pawlowski, Nhia Vang, Nimit Shah, and Alessandra Lochen. The objectives of the Epi-Aid were to:

1. Characterize the epidemiology and recent trends in fatal and nonfatal assaults, by mechanism of injury, in Jackson, Mississippi.
2. Assess current data sources that capture fatal and nonfatal assaults impacting the Jackson community; make recommendations related to improving data quality, acceptability, and timeliness for the purpose of enhancing the utility of data for public health action. This could include identifying potential data linkages and data enhancements across fatal and nonfatal data systems, as well as developing a model by which stakeholders can share data on an ongoing basis to guide public health action.
3. Assess ongoing and planned prevention activities and protocols to address fatal and non-fatal assaults in Jackson, Mississippi, and recommend supplemental evidence-based strategies.

To accomplish the objectives of this investigation, between November 16 and November 21 2025, and between January 20 and February 6 2026, Emilia Pawlowski, Nhia Vang, Nimit Shah, and Alessandra Lochen used several data sources including National Vital Statistics System data, National Violent Death Reporting System data (NVDRS), Advancing Violence Epidemiology in Real-Time (AVERT) data, emergency medical services (EMS) data, and conducted key informant interviews with data users and partners on behalf of MSDH and UMMC. While in the field, the

Epi-Aid team met with key partners involved in violence-related data collection and prevention efforts. These partners included data analysts and/or leaders from Mississippi government agencies including health departments, law enforcement and criminal justice agencies, UMMC (Level I Trauma Center), and multiple community-based organizations that provide programming for firearm violence victims or communities in Jackson, Mississippi affected by firearm violence.

Objective #1

1. National Vital Statistics System (NVSS) Data

Background

This section summarizes assault-related mortality using data from the NVSS accessed through the CDC WONDER “Multiple Cause of Death” database. Death counts, population totals, and crude mortality rates were compared across MS, the U.S, and Hinds County in MS—which contains most of Jackson and its population—as well as the city of Jackson. Comparisons cover the period from 2019 through 2024.

Methods

We used NVSS multiple-cause mortality data accessed through CDC WONDER. Injury deaths were identified using ICD-10 codes corresponding to assault and homicide, including firearm-related injuries and other forms of intentional violence and their sequelae (X85–Y09, U01.0–U01.02, Y87.1).¹ Both underlying and contributing causes of death were included. Annual crude mortality rates and 95% confidence intervals (CIs) were extracted for all homicide and firearm-related homicide and compared across regions from 2019 through 2024. We also calculated the proportion of firearm-related homicides among all homicides by region and year. Data for 2025 were provisional and incomplete and thereby excluded. In some instances, counts or rates were suppressed or statistically unreliable, particularly in counties with smaller populations.

Results

Homicide Mortality Trends

From 2019 through 2024, crude homicide mortality rates were consistently higher in Mississippi and Hinds County than in the United States (Figure 1.1). National rates increased from 5.8 per 100,000 in 2019 to a peak of 7.8 in 2021, followed by a decline to 5.9 in 2024.

Mississippi showed a similar trend, increasing from 14.6 per 100,000 in 2019 to 22.2 in 2021 and decreasing to 18.6 in 2024.

Hinds County experienced substantially higher homicide rates than both the state and national levels across all years. Rates increased from 31.1 per 100,000 in 2019 to 62.0 in 2021, followed by a decline to 46.7 in 2024. In contrast, rates in Madison and Rankin counties were lower than Hinds county rates and more variable, with some years suppressed or statistically unreliable (data not shown).

Firearm-Related Homicide Mortality Trends

Patterns for firearm-related homicide mirrored those observed for all homicides (Figure 1.2). National firearm-related homicide rates increased from 4.4 per 100,000 in 2019 to 6.3 in 2021, then declined to 4.5 in 2024. Mississippi rates increased from 12.3 in 2019 to 19.8 in 2021 and decreased to 15.9 in 2024. Hinds County again had higher rates than both the state and nation, rising from 28.9 in 2019 to 56.6 in 2021 before declining to 41.5 in 2024.

Across all geographies and years, firearm-related homicides accounted for the majority of homicide deaths (Figure 1.3). The proportion of homicides involving firearms increased from 2019 to 2021 and remained high thereafter. In Hinds County, firearm involvement exceeded 90% in most years, peaking at approximately 95% in 2020. Mississippi showed similarly high proportions (approximately 85%–91%), while national proportion estimates were approximately 75%–81%.

Figure 1.1

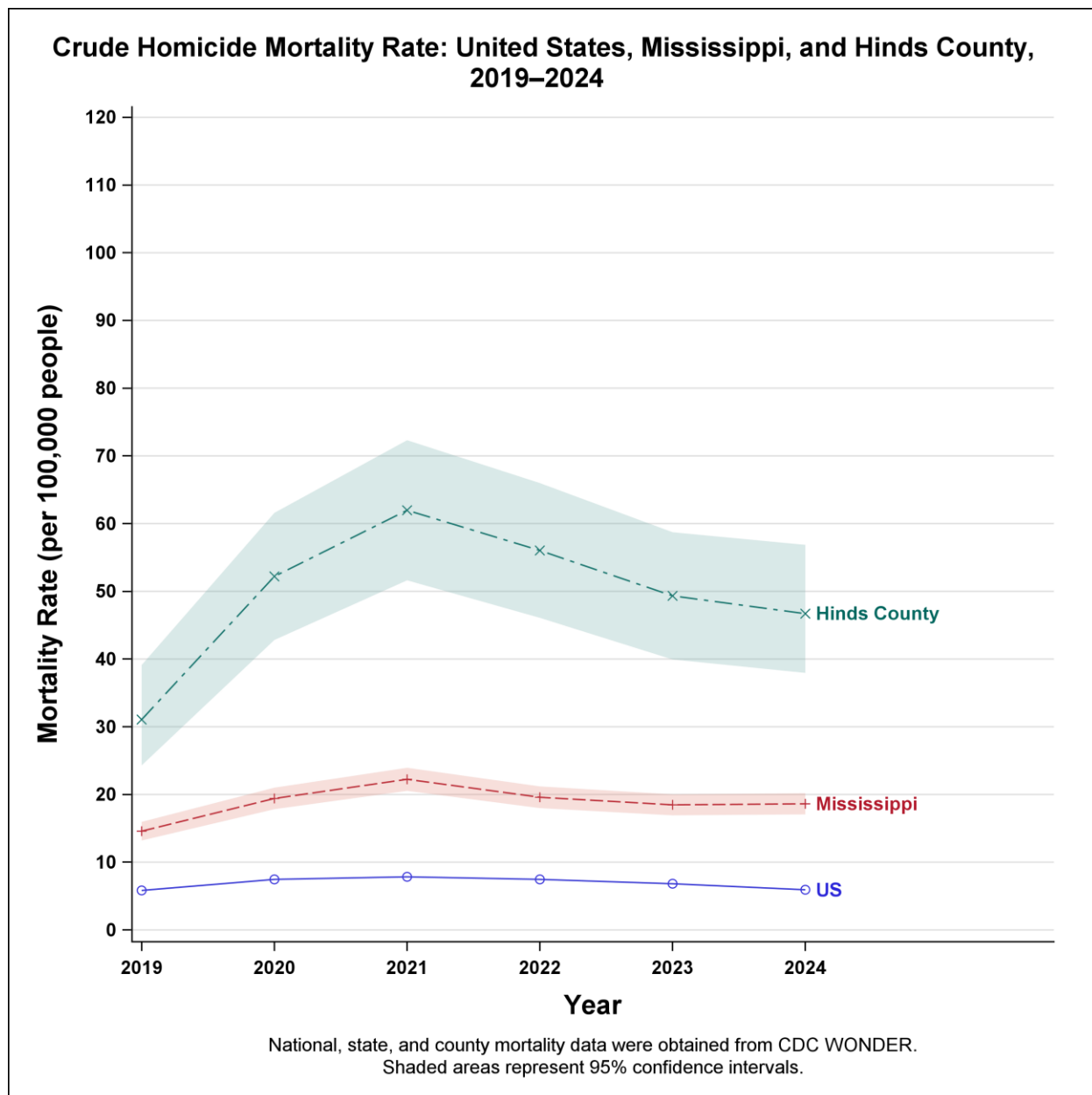
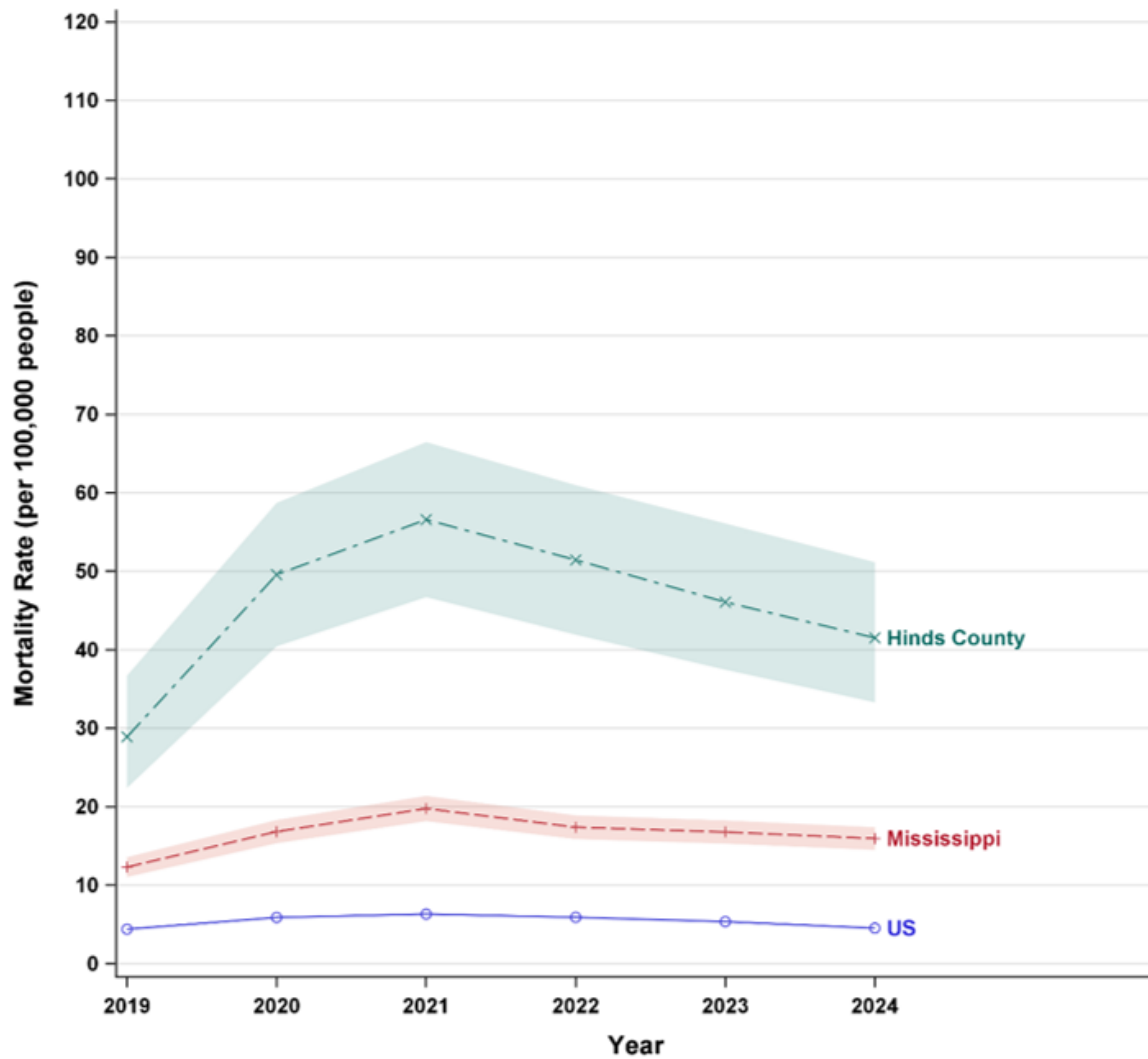


Figure 1.2

Crude Firearm-Related Homicide Mortality Rate: United States, Mississippi, and Hinds County, 2019–2024



National, state, and county mortality data were obtained from CDC WONDER.
Shaded areas represent 95% confidence intervals.

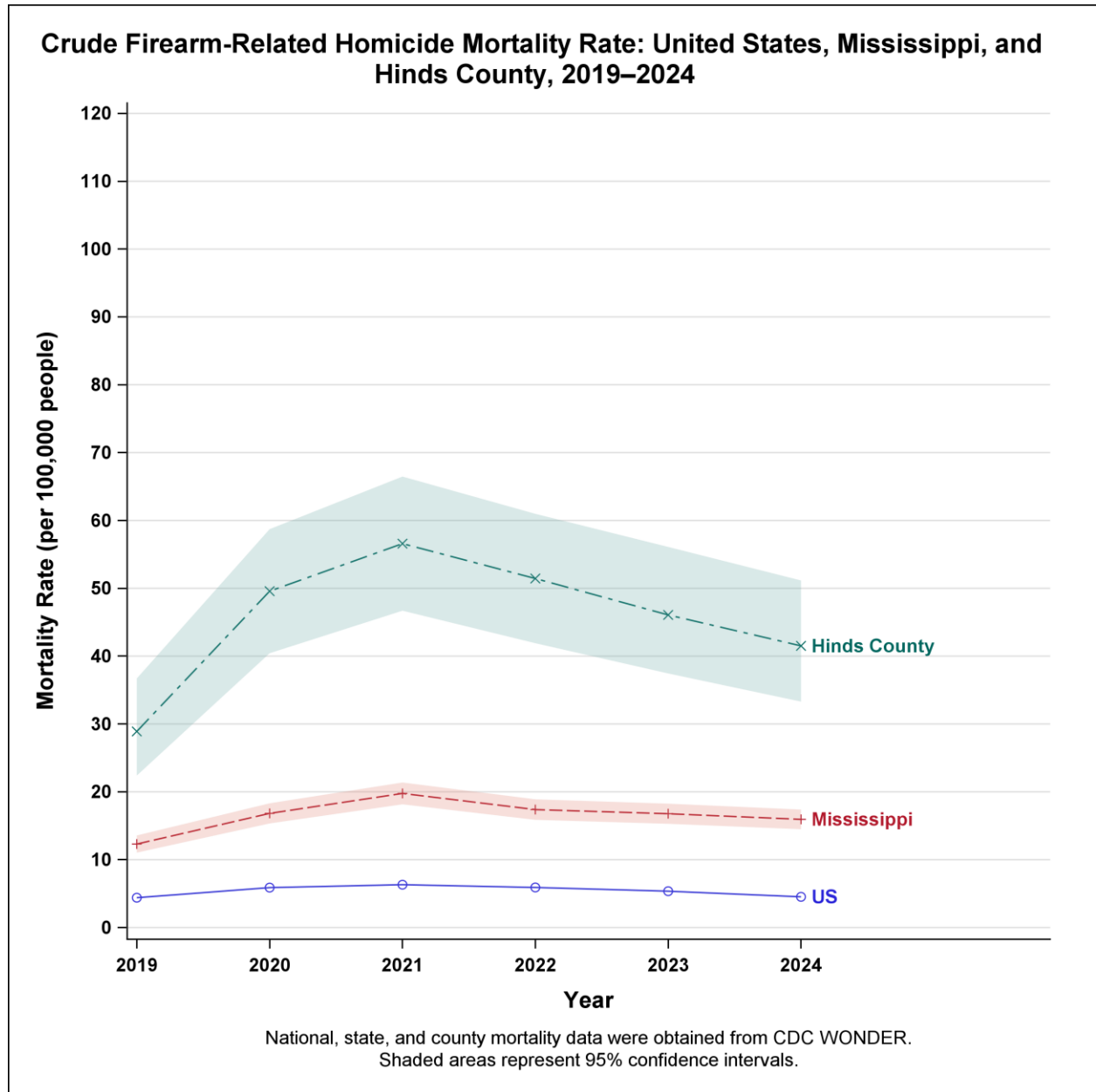
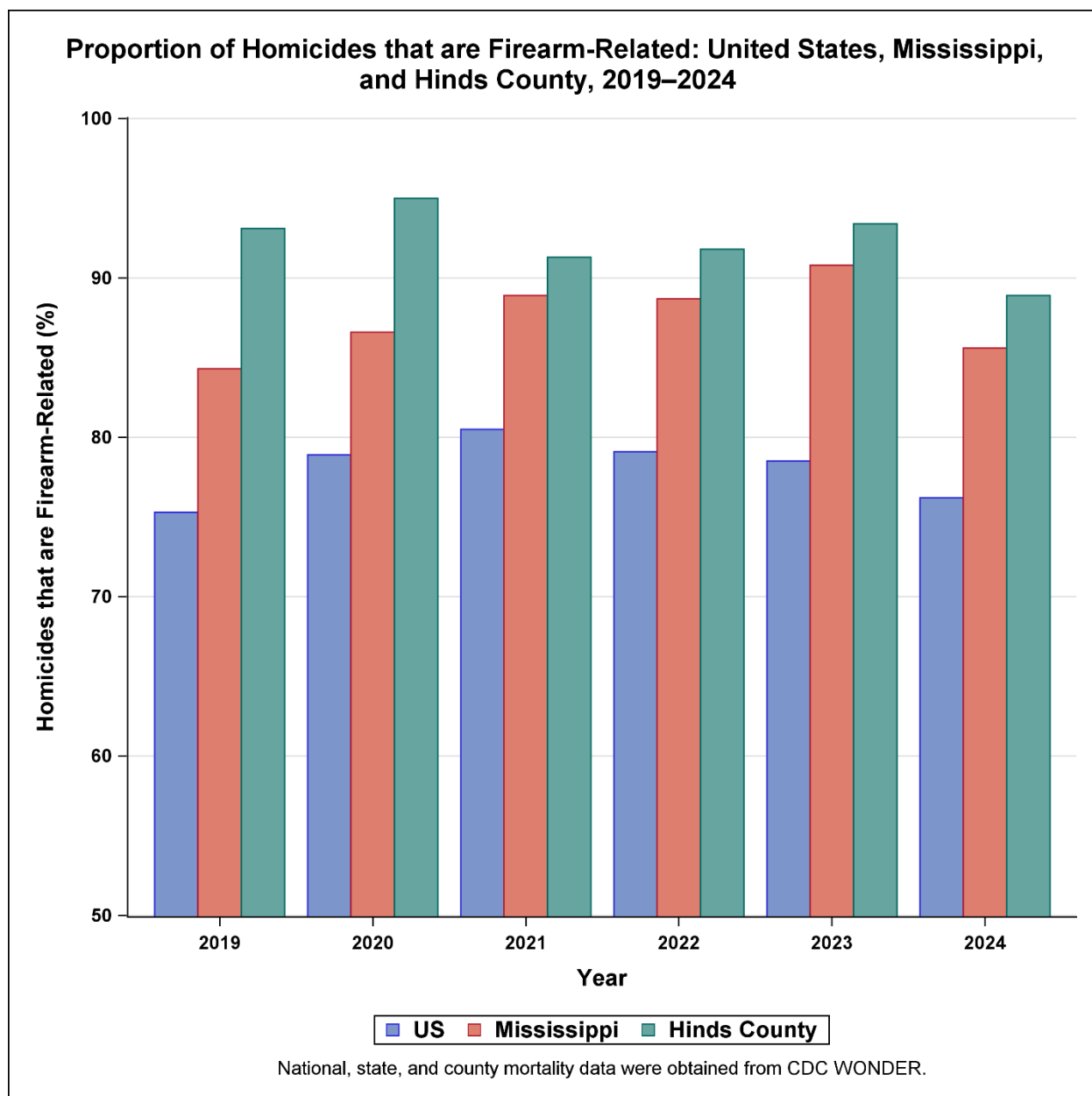


Figure 1.3



Conclusions

The aim of this analysis was to characterize trends in assault-related mortality and assess the burden of homicide in Jackson, Mississippi, in comparison with state and national patterns. Homicide rates were consistently higher in Mississippi and Hinds County than in the United States, with firearm-related homicides comprising the majority of deaths. Overall, these findings highlight a persistently elevated and predominantly firearm-related homicide burden in the Jackson area, with results robust to alternative geographic definitions despite differences in magnitude.

2. National Violent Death Reporting System (NVDRS) Data

Background

This section summarizes characteristics of homicides using data from NVDRS. NVDRS compiles nationwide information on violent deaths from multiple sources, including death certificates, coroner/medical examiner records, and law enforcement reports, capturing occurrence-based data on homicides, suicides, legal intervention deaths, unintentional firearm fatalities, and deaths of undetermined intent involving firearms.² Homicide is defined as a death resulting from the intentional use of force or power, threatened or actual, against another person, group or community. Overall, NVDRS enables understanding of the circumstances and characteristics associated with violent deaths to inform local prevention efforts.

Methods

We analyzed NVDRS homicide data for Mississippi, 2019–2025, pooling data to characterize statewide and Jackson homicide trends. Although 2019 data include only a few reporting counties, representing a subset of the state population, and 2024–2025 data are provisional and may be incomplete, we included these years to provide a more comprehensive characterization of homicides. Homicide cases were defined per NVDRS classification; legal intervention and undetermined deaths were excluded. Jackson cases were identified by incident location within city boundaries. Descriptive statistics were calculated and stratified by sex to characterize homicide deaths, including distributions by demographic characteristics (age group, education level, marital status, and race/ethnicity), injury method, location of injury, and other incident characteristics. Observations with unknown or missing values were excluded from analyses for each characteristic; therefore, denominators may vary. Precipitating circumstances were examined among deaths with at least one circumstance variable coded. All analyses were conducted in SAS Version 9.4.

Results

Demographics

From 2019–2025, demographic trends are consistent across years, with a higher proportion of male than female homicide victims (Table 2.1). There were 588 homicides in Jackson, representing 21.4% of homicides reported in NVDRS. Homicides resulting in a single death accounted for 95.7% of cases, while 2.1% involved multiple deaths, including incidents followed by suicide. Black and non-Hispanic persons accounted for 80.9% of male homicide victims and 66.2% of female homicide victims. The most common victim age groups were 20–24 years (17.1%), 30–34 years (13.0%), 25–29 years (12.7%) and 15–19 years (11.8%). The most common education levels among homicide victims were high school or GED completion (41.3%) followed by 9th–12th grade with no diploma (29.0%), and some college credit without a degree (11.9%).

The majority were never married (69.8%). Among women homicide victims where pregnancy status was known, 6.2% were pregnant at the time of their death. Jackson trends generally reflected larger statewide trends. Sex stratified visualizations are presented in Figure 2.1.

Table 2.1. Number and percentages of homicides, by decedent’s selected demographics — National Violent Death Reporting System, Jackson and Mississippi, 2019–2025

Characteristic	Jackson						Statewide (incl. Jackson)					
	Victim Sex				Total		Victim Sex				Total	
	Male		Female				Male		Female			
	n	%	n	%	n	%	n	%	n	%	n	%
Incident year (n = 2,748)												
2019	—	(—)	—	(—)	33	(5.6)	50	(2.2)	10	(2.0)	60	(2.2)
2020	74	(14.8)	14	(16.1)	88	(15.0)	291	(12.9)	65	(13.1)	356	(13.0)
2021	106	(21.2)	15	(17.2)	121	(20.6)	443	(19.7)	107	(21.5)	550	(20.0)
2022	101	(20.2)	21	(24.1)	122	(20.7)	458	(20.4)	92	(18.5)	550	(20.0)
2023	96	(19.2)	11	(12.6)	107	(18.2)	428	(19.0)	76	(15.3)	504	(18.3)
2024	75	(15.0)	12	(13.8)	87	(14.8)	430	(19.1)	110	(22.1)	540	(19.7)
2025	—	(—)	—	(—)	30	(5.1)	150	(6.7)	38	(7.6)	188	(6.8)
Total	501	(100)	87	(100)	588	(100)	2,250	(100)	498	(100)	2,748	(100)
Incident category (n = 2,748)												
Single death	500	(99.8)	84	(96.6)	584	(99.3)	2220	(98.7)	462	(92.8)	2682	(95.7)
Multiple deaths	—	(—)	—	(—)	—	(—)	30	(1.3)	36	(7.2)	66	(2.1)
Age group, years (n = 2,748)												
<1	0	(0.0)	0	(0.0)	0	(0.0)	—	(—)	—	(—)	19	(0.7)
1-4	—	(—)	—	(—)	—	(—)	13	(0.6)	11	(2.2)	24	(0.9)
5-9	0	(0.0)	—	(—)	—	(—)	—	(—)	—	(—)	15	(0.5)
10-14	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	36	(1.3)
15-19	54	(10.8)	10	(11.5)	64	(10.9)	280	(12.4)	43	(8.6)	323	(11.8)
20-24	87	(17.4)	23	(26.4)	110	(18.7)	393	(17.5)	76	(15.3)	469	(17.1)
25-29	—	(—)	—	(—)	87	(14.8)	303	(13.5)	45	(9.0)	348	(12.7)
30-34	70	(14.0)	11	(12.6)	81	(13.8)	298	(13.2)	58	(11.6)	356	(13.0)
35-39	—	(—)	—	(—)	67	(11.4)	229	(10.2)	42	(8.4)	271	(9.9)
40-44	—	(—)	—	(—)	58	(9.9)	220	(9.8)	53	(10.6)	273	(9.9)
45-49	—	(—)	—	(—)	41	(7.0)	123	(5.5)	31	(6.2)	154	(5.6)
50-54	—	(—)	—	(—)	15	(2.6)	104	(4.6)	31	(6.2)	135	(4.9)
55-59	—	(—)	—	(—)	18	(3.1)	83	(3.7)	22	(4.4)	105	(3.8)
60-64	—	(—)	—	(—)	17	(2.9)	60	(2.7)	23	(4.6)	83	(3.0)
65-69	—	(—)	—	(—)	—	(—)	42	(1.9)	14	(2.8)	56	(2.0)
70-74	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	31	(1.1)
75-79	—	(—)	—	(—)	—	(—)	16	(0.7)	10	(2.0)	26	(0.9)
80-84	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	12	0.4)
85+	0	(0.0)	0	(0.0)	0	(0.0)	—	(—)	—	(—)	12	0.4)

Characteristic	Jackson						Statewide (incl. Jackson)					
	Victim Sex				Total		Victim Sex				Total	
	Male		Female				Male		Female			
	n	%	n	%	n	%	n	%	n	%	n	%
Race and ethnicity (n = 2,741)*												
Black and non-Hispanic	448	(89.8)	70	(80.5)	518	(88.4)	1,815	(80.9)	329	(66.2)	2,144	(78.2)
White and non-Hispanic	38	(7.6)	12	(13.8)	50	(8.5)	369	(16.4)	153	(30.8)	522	(19.0)
Hispanic	—	(—)	—	(—)	17	(2.9)	42	(1.9)	12	(2.4)	54	(2.0)
Multiracial/Other [†]	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	21	(0.8)
Education level (n = 2,732) [§]												
<8th grade or less	36	(7.2)	14	(16.1)	50	(8.5)	193	(8.6)	50	(10.1)	243	(8.9)
9th-12th grade, no diploma	196	(39.3)	19	(21.8)	215	(36.7)	691	(30.9)	102	(20.5)	793	(29.0)
High school graduate or GED completed	180	(36.1)	26	(29.9)	206	(35.2)	955	(42.7)	173	(34.8)	1,128	(41.3)
Some college credit, no degree	60	(12.0)	20	(23.0)	80	(13.7)	243	(10.9)	81	(16.3)	324	(11.9)
Associate’s degree	—	(—)	—	(—)	20	(3.4)	99	(4.4)	43	(8.7)	142	(5.2)
Bachelor’s degree	—	(—)	—	(—)	14	(2.4)	46	(2.1)	31	(6.2)	77	(2.8)
Higher degree [¶]	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	25	(0.9)
Marital status (n = 2,701)**												
Married, Civil Union, Domestic Partnership	—	(—)	—	(—)	70	(12.1)	310	(14.0)	100	(20.7)	410	(15.2)
Never Married	373	(75.7)	59	(70.2)	432	(74.9)	1,606	(72.4)	279	(57.6)	1,885	(69.8)
Other	57	(11.6)	18	(21.4)	75	(13.0)	301	(13.6)	105	(21.7)	406	(15.0)
Pregnancy status (n = 275) ^{††}												
Not pregnant at time of death or within last year			—	(—)					247	(89.8)	247	(89.8)
Pregnant at time of death			—	(—)					17	(6.2)	17	(6.2)
Pregnant within 42 days to 1 year before death			—	(—)					11	(4.0)	11	(4.0)

* Race/ethnicity unknown for 7 decedents.

† Includes American Indian or Alaska Native, Asian, Native Hawaiian/Pacific Islander, multiracial or other/unspecified. All race and ethnicity are non-Hispanic, except for Hispanic.

§ Highest education level unknown for 16 decedents.

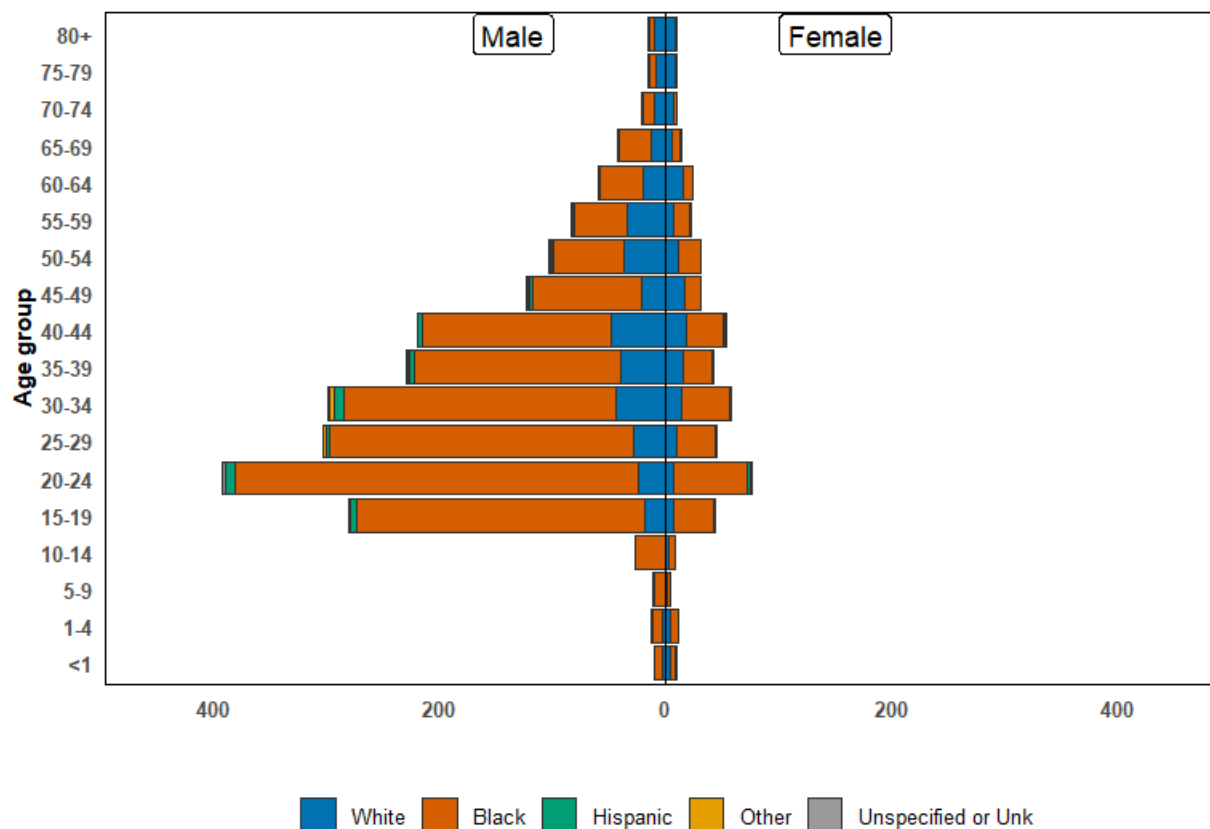
¶ Includes Master's, Doctorate or other professional degree.

** Marital status unknown for 47 decedents

†† Pregnancy status unknown for 223 decedents.

Dashes indicate cell data are suppressed because number of decedents is <10.

Figure 2.1. Demographics of homicides in Mississippi — number of victims by age, sex and race/ethnicity, National Violent Death Reporting System, 2019–2025



Method and location of homicide injury

Statewide, firearms were the most common weapon used (88.8%), followed by sharp instruments (4.6%) and blunt instruments (2.9%) (Table 2.2). Among decedents with known firearm type, handguns accounted for 90.2% of firearms used, including pistol-bolt action, semi-automatic, and revolver types. The most common injury locations were houses or apartments (43.6%), streets, roads, sidewalks or alleys (25.2%), motor vehicles (8.4%), and commercial or retail areas (6.7%). Among female homicides, 63.3% occurred at a house or apartment and 39.3% of male homicides occurred in these locations. Among male homicides, 28.2% occurred on a street, road, sidewalk or alley and 11.4% in female homicides occurred in these locations.

In Jackson, firearms were also the most common weapon used (93.9%), with handguns accounting for 93.8% of firearms used. The most common injury locations were houses or apartments (35.7%), street, roads, sidewalks or alleys (30.3%), motor vehicles (10.9%), and parking lot, public garage or public transport (6.7%). Similar to state trends, 51.7% of female homicides occurred at a house or apartment and 32.9% of male homicides occurred in these

locations; 32.3% of male homicides occurred on a street, road, sidewalk or alley and 19.5% of female homicides occurred in these locations.

Incident characteristics of homicide injury

Statewide, EMS responded to the scene for a large percentage of homicide victims (81.3%) (Table 2.2). Over a quarter of all homicides occurred at the victim's residence (28.7%). Among females, 51.5% occurred at the victim's home and 8.6% involved a child present or witnessing the incident. Among males, 23.7% occurred at the victim's home and 2.3% involved a child present or witnessing the incident. A similar trend was observed in Jackson, where 39.1% of homicides among females occurred at the victim's home and 16.5% of homicides among males. Statewide, a small proportion of homicide victims were suspected of alcohol use preceding the incident (2.9%), injured at work or while working (1.8%), in public custody when the injury occurred (1.2%), or were experiencing housing instability (0.9%), or homelessness (0.5%).

Victim–suspect relationship of homicide injury

Statewide, the relationship of the victim to the suspect was known for 9.1% of homicides (6.1% of males and 22.3% of females) (Table 2.2). Among males with known relationships, the suspect was most often a current or former intimate partner (28.3%), another person known to the victim, but the exact nature of the relationship was unclear (24.6%), or another relative (16.7%), such as a sibling, cousin, or in-law. Among females, when the relationship was known, the suspect was most often a current or former intimate partner (72.1%), followed by a parent (9.0%), or a child (7.2%). In Jackson, the victim–suspect relationship was most often a current or former intimate partner (53.8%).

Table 2.2. Number and percentages of homicides, by decedent's method of injury, location of injury, incident characteristics and victim–suspect relationship — National Violent Death Reporting System, Jackson and Mississippi, 2019–2025

	Jackson						Statewide (incl. Jackson)					
	Victim Sex				Total		Victim Sex				Total	
	Male		Female				Male		Female			
	n	%	n	%	n	%	n	%	n	%	n	%
Method of injury (n = 2,583)*												
Firearm	468	(95.3)	73	(85.9)	541	(93.9)	1,917	(90.4)	377	(81.6)	2,294	(88.8)
Handgun [†]	119	(93.0)	16	(100)	135	(93.8)	575	(91.0)	133	(86.9)	708	(90.2)
Rifle [†]	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	40	(5.1)
Other ^{†§}	—	(—)	0	(0.0)	—	(—)	24	(3.8)	13	(8.5)	37	(4.7)
Sharp instrument	—	(—)	—	(—)	14	(2.4)	93	(4.4)	27	(5.8)	120	(4.6)
Blunt instrument	—	(—)	—	(—)	11	(1.9)	51	(2.4)	23	(5.0)	74	(2.9)
Personal weapons (e.g., hands, fists, or feet)	—	(—)	—	(—)	—	(—)	31	(1.5)	15	(3.2)	46	(1.8)

	Jackson						Statewide (incl. Jackson)					
	Victim Sex				Total		Victim Sex				Total	
	Male		Female				Male		Female			
	n	%	n	%	n	%	n	%	n	%	n	%
Hanging, strangulation, suffocation	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	18	(0.7)
Other method of injury¶	—	(—)	—	(—)	—	(—)	19	(0.9)	12	(2.6)	31	(1.2)
Location of injury (n = 2,612)**												
House, apartment	162	(32.9)	45	(51.7)	207	(35.7)	845	(39.3)	293	(63.3)	1,138	(43.6)
Street, road, sidewalk or alley	159	(32.3)	17	(19.5)	176	(30.3)	606	(28.2)	53	(11.4)	659	(25.2)
Motor vehicle	—	(—)	—	(—)	63	(10.9)	179	(8.3)	40	(8.6)	219	(8.4)
Commercial or retail area††	28	(5.7)	0	(0.0)	28	(4.8)	151	(7.0)	23	(5.0)	174	(6.7)
Parking lot, public garage, or public transport	—	(—)	—	(—)	39	(6.7)	110	(5.1)	10	(2.2)	120	(4.6)
Natural area	—	(—)	—	(—)	—	(—)	50	(2.3)	10	(2.2)	60	(2.3)
Service station	—	(—)	—	(—)	18	(3.1)	—	(—)	—	(—)	49	(1.9)
Hotel or motel	—	(—)	—	(—)	15	(2.6)	31	(1.4)	10	(2.2)	41	(1.6)
Bar or nightclub	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	40	(1.5)
Highway or freeway	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	25	(1.0)
Jail, prison or detention facility	0	(0.0)	0	(0.0)	0	(0.0)	20	(0.9)	0	(0.0)	20	(0.8)
Abandoned house, building, or warehouse	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	15	(0.6)
Park, playground, or sports or athletic area	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	19	(0.7)
Other location§§	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	33	(1.3)
Incident characteristic												
EMS present (n = 2,036)	324	(79.2)	50	(71.4)	374	(78.1)	1,374	(82.0)	281	(78.1)	1,655	(81.3)
Injured at victim’s home (n = 2,565)	80	(16.5)	34	(39.1)	114	(20.0)	500	(23.7)	236	(51.5)	736	(28.7)
Child present or witnessed incident (n = 1,927)	—	(—)	—	(—)	—	(—)	36	(2.3)	29	(8.6)	65	(3.4)
Victim suspected of alcohol use preceding incident (n = 2,266)	—	(—)	—	(—)	—	(—)	55	(2.9)	10	(2.5)	65	(2.9)
Victim was experiencing homelessness (n = 2,545)	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	13	(0.5)
Victim was injured at work or while working (n = 2,721)	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	50	(1.8)
Victim was experiencing housing instability (n = 1,915)	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	17	(0.9)
Victim was recently released from institutional setting (n = 2,627)	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	17	(0.6)
Victim was in public custody when injury occurred (n = 2,604)	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	32	(1.2)
Relationship of victim to suspect (n = 249)¶¶												
Spouse or intimate partner (current or former)	—	(—)	—	(—)	14	(53.8)	39	(28.3)	80	(72.1)	119	(47.8)

	Jackson						Statewide (incl. Jackson)					
	Victim Sex				Total		Victim Sex				Total	
	Male		Female				Male		Female			
	n	%	n	%	n	%	n	%	n	%	n	%
Other person, known to victim***	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	38	(15.3)
Other relative+++	0	(0.0)	0	(0.0)	0	(0.0)	—	(—)	—	(—)	29	(11.6)
Parent\$\$\$	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	18	(7.2)
Child\$\$\$	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	18	(7.2)
Acquaintance or friend	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	16	(6.4)
Other relationship¶¶¶	—	(—)	0	(0.0)	—	(—)	—	(—)	—	(—)	11	(4.4)

* Includes deaths with a known method of injury.

† Denominator includes those decedents with method of injury by firearm, with known firearm type (n = 785).

§ Includes (in descending order): shotgun and submachine gun.

¶ Includes non-powder gun, fall, explosive, drowning, fire, shaking, motor vehicle or other transport, biological weapons, or tasers, nail gun.

** Includes deaths with a known location of injury.

†† Includes grocery store, retail outlet, laundromat, and liquor store.

§§ Includes (in descending order): other unspecified location; hospital or medical facility; industrial or construction areas; railroad tracks; farm; bridge; supervised residential facility (e.g., shelter); synagogue, church, or temple; college or university; childcare center, daycare or preschool; and office building.

¶¶ Includes deaths with a known victim-to-suspect relationship (n = 249 [9.1%]; 138 males and 111 females); victim-suspect relationship was unknown for 2,499 decedents.

*** Includes (in descending order): unspecified person known to victim, new partner of suspect's ex-partner, ex-partner of suspect's current partner, current/former work relationship, intimate partner of suspect's parent, and child of suspect's boyfriend/girlfriend.

††† Other relative includes siblings, grandchild, grandparents, cousin, uncle, in-laws.

§§§ Includes adoptive (e.g., adopted child) and stepfamily member (e.g., stepparent).

¶¶¶ Other victim-suspect relationship includes (in descending order): stranger, and victim was law enforcement officer injured in the line of duty.

Dashes indicate cell data are suppressed because number of decedents is <10.

Precipitating circumstances of homicide injury

Statewide, precipitating circumstances were identified in 44.1% of homicides (n = 1,212; 43.1% of males and 48.7% of females) (Table 2.3). Among homicides with known circumstances, 31.3% were precipitated by an argument or conflict, 12.3% were a victim killed by a random act of violence, and 10.4% were related to intimate partner violence. Other common precipitating circumstances included precipitation by another crime (9.5%), a physical fight between two persons (7.5%), drug involvement (e.g., relating to drug use or illegal drug trafficking [5.6%]), drive-by shooting (5.0%) and a family relationship problem (4.9%). The most frequent types of precipitating crimes were robbery (26.3%), burglary (18.0%), and assault or homicide (18.0%). Other precipitating crimes (37.7%) included motor vehicle theft, rape and sexual assault, gambling, or witness intimidation.

Multiple differences were noted by decedent's sex, with intimate partner violence having the largest percentage difference. Intimate partner violence was a precipitating circumstance for 22.1% of homicides among females but only 5.8% among males. Other differences included homicides resulting from family relationship problems (8.7% of females, 3.9% of males), other life stressors (3.8% of females, 1.3% of males), and caregiver abuse or neglect (3.1% of females,

0.9% of males). Additionally, among males, 34.0% of homicides were precipitated by an argument or conflict, 13.8% by random violence or 11.0% by another crime. Among females, 22.1% were precipitated by an argument or conflict, 6.9% by random violence, and 4.4% by another crime.

In Jackson, among homicides with known circumstances, 29.0% were precipitated by an argument or conflict, 20.7% involved a victim killed by a random act of violence, and 10.7% were precipitated by another crime. Other common precipitating circumstances included drug involvement (8.7%), intimate partner-related (6.7%), a physical fight between two people (5.2%) and a drive-by shooting (4.6%). Among female homicides, 16.9% resulted from intimate partner violence. Among male homicides, 4.0% resulted from intimate partner violence. Among male homicides, 23.0% were precipitated by random violence or an argument or conflict (31.0%). For females, 13.0% of homicides were precipitated by random violence or an argument or conflict (22.1%).

Table 2.3. Number* and percentages* of homicides, by decedent's precipitating circumstances — National Violent Death Reporting System, Jackson and Mississippi, 2019–2025

	Jackson						Statewide (incl. Jackson)					
	Victim Sex				Total		Victim Sex				Total	
	Male		Female				Male		Female			
	n	%	n	%	n	%	n	%	n	%	n	%
Mental health, substance use, and other additions†	—	(—)	—	(—)	10	(3.0)	29	(2.1)	11	(2.8)	40	(2.3)
Interpersonal factors												
Intimate partner violence-related§	10	(4.0)	13	(16.9)	22	(6.7)	79	(5.8)	104	(22.1)	183	(10.4)
Family relationship problem	—	(—)	—	(—)	—	(—)	53	(3.9)	34	(8.7)	87	(4.9)
Other interpersonal factors¶	—	(—)	—	(—)	—	(—)	41	(3.0)	12	(3.1)	53	(3.0)
Life stressor												
Argument or conflict	78	(31.0)	17	(22.1)	95	(29.0)	465	(34.0)	86	(22.1)	551	(31.3)
Physical fight between two individuals, not a brawl	—	(—)	—	(—)	17	(5.2)	113	(8.3)	19	(4.9)	132	(7.5)
Other life stressors**	—	(—)	—	(—)	—	(—)	18	(1.3)	15	(3.8)	33	(1.9)
Crime and criminal activity												
Precipitated by another crime	—	(—)	—	(—)	35	(10.7)	150	(11.0)	17	(4.4)	167	(9.5)
Robbery††	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	44	(27.3)
Burglary††	—	(—)	0	0.0	—	(—)	—	(—)	—	(—)	30	(18.6)
Assault or homicide††	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	30	(18.6)
Other††§§	—	(—)	—	(—)	14	(40.0)	—	(—)	—	(—)	63	(35.4)
Drug involvement	—	(—)	—	(—)	28	(8.5)	82	(6.0)	17	(4.4)	99	(5.6)
Gang-related	0	(0.0)	0	(0.0)	0	(0.0)	15	(1.1)	0	(0.0)	15	(0.9)
Homicide event												

	Jackson						Statewide (incl. Jackson)					
	Victim Sex				Total		Victim Sex				Total	
	Male		Female				Male		Female			
	n	%	n	%	n	%	n	%	n	%	n	%
Random violence	58	(23.0)	10	(13.0)	68	(20.7)	189	(13.8)	27	(6.9)	216	(12.3)
Drive-by shooting	—	(—)	—	(—)	15	(4.6)	71	(5.2)	17	(4.4)	88	(5.0)
Victim was bystander	—	(—)	—	(—)	—	(—)	15	(1.1)	10	(2.6)	25	(1.4)
Caretaker abuse or neglect led to death	—	(—)	—	(—)	—	(—)	12	(0.9)	12	(3.1)	24	(1.4)
Other homicide event ^{¶¶}	—	(—)	—	(—)	—	(—)	—	(—)	—	(—)	45	(2.6)
Total***	252		77		328		1,368		390		1,758	

* Includes homicides with one or more precipitating circumstances. Jackson circumstances were known for 255 decedents (209 males, 46 females) and unknown for 333 decedents (292 males, 41 females); total number of homicide decedents=588 (501 males, 87 females). Statewide circumstances were known for 1212 decedents (970 males, 242 females) and unknown for 1536 decedents (1280 males, 256 females); total number of homicide decedents=2748 (2250 males; 498 females). Denominator includes those homicides with one or more precipitating circumstances. The sums of percentages in columns exceed 100% because more than one circumstance could have been present per decedent.

† Includes current diagnosed mental health problem, current depressed mood, alcohol problem, other substance use problem, and other addiction.

§ Includes immediate or ongoing conflict or violence between current or former intimate partners and jealousy (lover's triangle).

¶¶ Includes non-intimate and non-family relationship problems, and perpetrator of interpersonal violence during past month.

** Includes any crisis, including crisis during previous or upcoming two weeks; household known to authorities; family stressor; and history of child abuse or neglect.

†† Denominator includes those decedents involved in an incident that was precipitated by another crime (n = 161).

§§ Includes (in descending order): other unspecified crimes, motor vehicle theft, gambling, rape and sexual assault, and witness intimidation. ¶¶ Includes victim used weapon, walk-by assault, justifiable defense, brawl, victim was intervener assisting crime victim, stalking, victim was police officer on duty, and mercy killing.

*** Total numbers do not equal the sums of the columns because more than one circumstance could have been present per decedent.

Dashes indicate cell data are suppressed because number of decedents is <10.

Conclusions

Analysis of 2019–2025 homicides showed consistent NVDRS trends, with peaks in 2021 and 2022 and a higher proportion of male than female victims. In both Jackson and statewide, victims were most often male, Black and non-Hispanic, and aged 15–34 years. Firearms were the most common weapon used, and injuries most frequently occurred in houses or apartments. For both females and males, in Jackson and statewide, when the victim-suspect relationship was known, it was most often a current or former intimate partner. Additionally, among homicides with known circumstances, nearly a third were precipitated by an argument or conflict, followed by random violence and intimate partner violence.

Differences were observed by sex, however. For example, 28.2% of homicides among males occurred on streets, roads, sidewalks, or alleys, as well as was 34.0% were precipitated by an argument or conflict. For females, 11.4% of homicides occurred on streets, roads, sidewalks or alleys and 22.1% were precipitated by an argument or conflict. Additionally, when the relationship was known, 22.1% of female homicides involved suspects who were current or former intimate partners. Among male homicides, this was 5.8%.

These findings should be interpreted with some limitations. Data for certain years were incomplete or provisional, and analyses excluded observations with unknown or missing values, which may underestimate counts and percentages. More complete data on pregnancy status, victim–suspect relationships, and precipitating circumstances, could improve identification of intervention points, inform prevention and response programming, as well as support the work of community-based organizations.

3. Advancing Violence Epidemiology in Real-Time (AVERT) data

Background

This section focuses on summarizing trends in youth violence and firearm injuries using syndromic data from the Mississippi AVERT program. Firearm and youth violence injuries are significant public health concerns in the United States. In Mississippi, the prevalence of firearm injuries among youth has been particularly alarming, reflecting broader national trends.

The National Syndromic Surveillance Program (NSSP), which is the program where AVERT data sit, provides near real-time data on ED visits, which is crucial for identifying and responding to emerging public health threats. By leveraging the NSSP data, we identified trends and differential risk in firearm-related injuries and youth violence emergency department visits, enabling targeted interventions to reduce these incidents (Appendix 1, Appendix 2). The findings from the NSSP data on firearm-related emergency department visits and youth violence-related emergency department visits emphasize the need to prioritize prevention efforts for these public health issues.

Methods

Data source

We used data shared by the Mississippi AVERT program. This syndromic data is from the NSSP, a collaboration among the CDC, local and state health departments, and federal, academic, and private sector partners. The NSSP receives electronic health record data from approximately 85% of EDs nationwide, often within 24 hours. About 85% of EDs in Mississippi report data to NSSP.

Definitions and data analysis

Firearm-related injury ED visits and youth violence-related ED visits were identified using Firearm Injury v2 and Youth Violence v1 syndrome definitions. These query definitions are a combination of International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes, SNOMED codes, and free-text search terms.^{3,4} Injury intents identified by the firearm injury–related ED visit syndrome definition include unintentional, intentional self-directed, assault, undetermined intent, legal intervention, and terrorism. Definitions were developed and validated by the CDC in partnership with state and local health departments. The visit proportion, defined as the number of firearm-related or youth violence-related ED visits per 10,000 total ED visits, was calculated overall and by sex (female and male), age group (11-14 and 15-24 years for youth violence; 25-34, 35-44, and 45+ years for firearm-related injuries), and race and ethnicity (non-Hispanic American Indian, non-Hispanic Asian/Pacific Islander, non-Hispanic Black, Hispanic, Multiracial/Other/Unknown, non-Hispanic White). Monthly

proportions were reported for Mississippi and quarterly proportions were reported for UMMC using AVERT data, due to low frequencies.

Visit ratios, with corresponding Wald 95% confidence intervals (CIs), were calculated as the visit proportion of a given group divided by the visit proportion of a specified referent group. We considered visit ratio differences significant when the 95% CI did not contain 1 or when 95% CIs did not overlap in group comparisons. Because data quality and coding practices can vary by facility and over time, analyses were restricted to EDs that more consistently reported complete data (coefficient of variation $\leq 40\%$ and average weekly informative discharge diagnosis $\geq 75\%$ complete during 2019-2025). After this restriction, 81% of all ED visits and 82% of all firearm-related and youth violence-related ED visits were used. Analyses were conducted using R (version 4.2.2; Posit).

Results

During January 2019–December 2025, there were a total of 8,781 firearm-related ED visits in Mississippi identified from NSSP meeting the inclusion criteria noted above, with an overall visit proportion of 18.80 per 10,000 visits (Table 3.1). Proportions have steadily decreased since 2022 (Figure 3.1). Males had a significantly higher visit proportion (35.59 per 10,000 visits) compared to females (5.51 per 10,000 visits), with a visit ratio of 6.46 (95% CI: 6.45-6.48). The highest visit proportion was observed among individuals aged 15-24 years (67.03 per 10,000 visits), followed by those aged 25-34 years (42.74 per 10,000 visits). Non-Hispanic Black individuals had the highest visit proportion among racial and ethnic groups (31.68 per 10,000 visits), with a visit ratio of 5.06 (95% CI: 5.05-5.07) compared to non-Hispanic White individuals (6.26 per 10,000 visits).

Figure 3.1

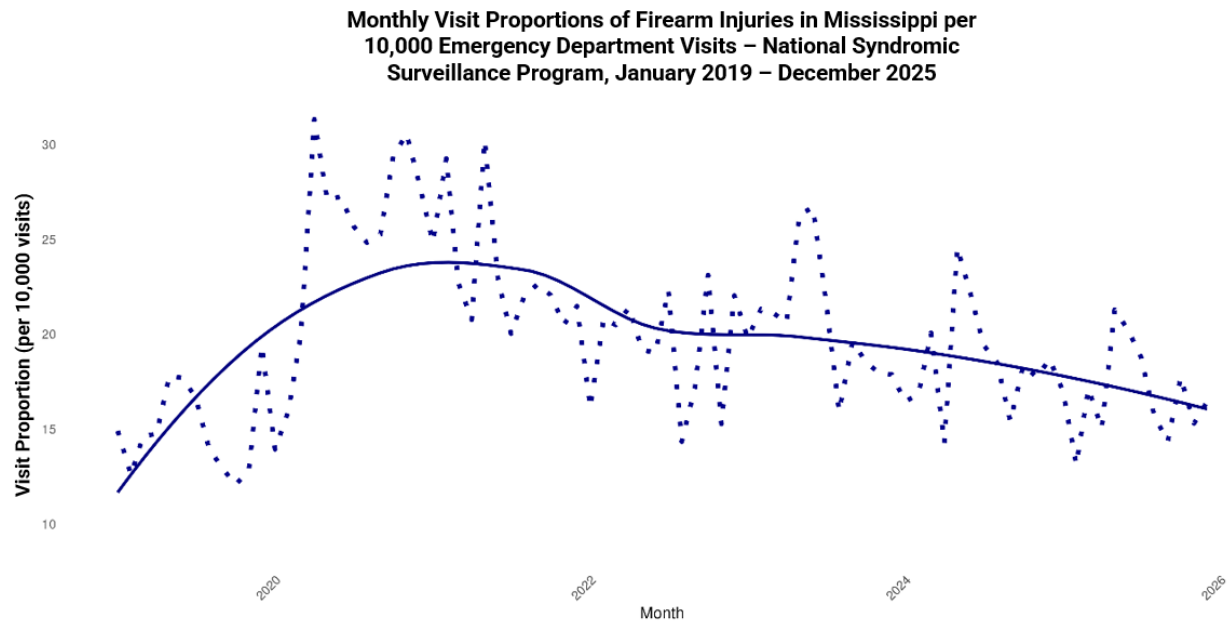


Table 3.1 Visit Proportion and Visit Ratios for Firearm-Related Emergency Department Visits, National Syndromic Surveillance Program, Mississippi, 2019-2025

Characteristic	Total Count	Visit Proportion (per 10,000 visits)	Visit Ratio	95% CI Lower	95% CI Upper
Overall	8,781	18.80			
Sex					
Female	1,448	5.51	Ref		
Male	7,265	35.59	6.46	6.45	6.48
Age Group					
15-24	3,077	67.03	8.96	8.9375	8.9849
25-34	2,041	42.74	5.71	5.6954	5.7324
35-44	1,189	26.77	3.58	3.5637	3.5941
45+	1,185	7.48	Ref		
Race/Ethnicity					

Table 3.1 Visit Proportion and Visit Ratios for Firearm-Related Emergency Department Visits, National Syndromic Surveillance Program, Mississippi, 2019-2025

Characteristic	Total Count	Visit Proportion (per 10,000 visits)	Visit Ratio	95% CI Lower	95% CI Upper
Non-Hispanic Black	6,579	31.68	5.06	5.0530	5.0684
Hispanic	113	11.42	1.82	1.8032	1.8453
Multiracial/Other	209	35.95	5.74	5.6941	5.7915
non-Hispanic White	1,162	6.26	Ref		

Overall, proportions of youth violence-related ED visits remained steady over the study period (Figure 3.2). From January 2019 to December 2025, there were 5,762 youth violence-related ED visits in Mississippi, with an overall visit proportion of 105.32 per 10,000 visits (Table 3.2). Males had a higher visit proportion (127.79 per 10,000 visits) compared to females (90.26 per 10,000 visits), with a visit ratio of 1.42 (95% CI: 1.37-1.46). The visit proportion was highest among individuals aged 15-24 years (112.61 per 10,000 visits), with a visit ratio of 1.53 (95% CI: 1.50-1.56) compared to those aged 11-14 years (73.65 per 10,000 visits). Non-Hispanic Black individuals had the highest visit proportion among racial and ethnic groups (135.64 per 10,000 visits), with a visit ratio of 1.73 (95% CI: 1.68-1.77) compared to non-Hispanic White individuals (78.59 per 10,000 visits).

Figure 3.2

Monthly Visit Proportions of Youth Violence Related Emergency Department Visits in Mississippi per 10,000 Emergency Department Visits – National Syndromic Surveillance Program, January 2019 – December 2025

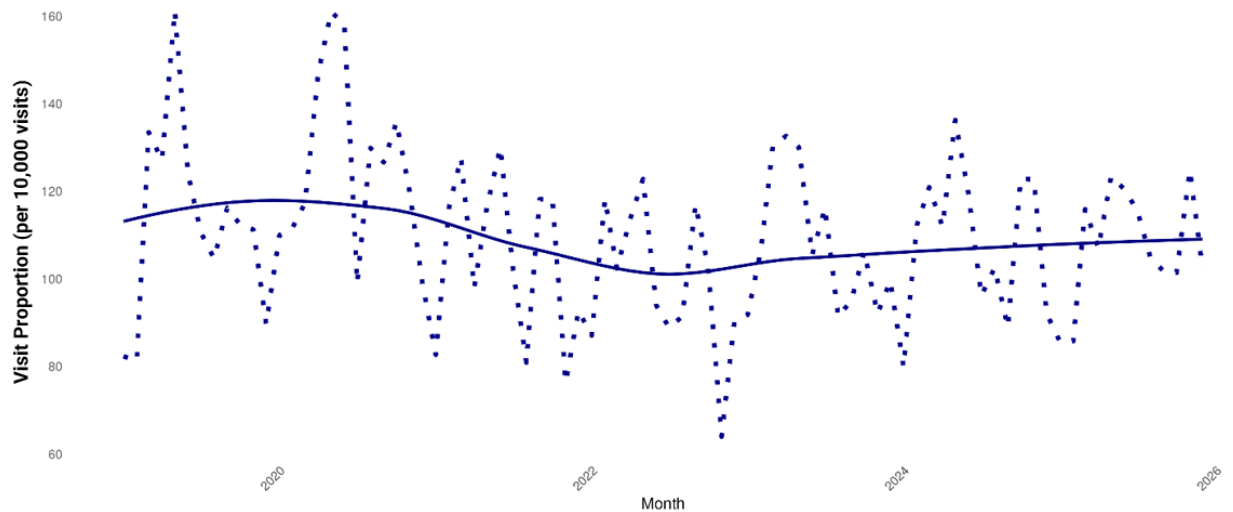


Table 3. 2 Visit Proportions and Visit Ratios for Youth Violence-Related Emergency Department Visits Using the National Syndromic Surveillance Program Data for Mississippi, 2019-2025

Characteristic	Total Count	Visit Proportion (per 10,000 visits)	Visit Ratio	95% CI Lower	95% CI Upper
Overall	5,762	105.32			
Sex					
Female	2,952	90.26	Ref		
Male	2,809	127.79	1.42	1.37	1.46
Age Group					
11-14	754	73.65	Ref		
15-24	5,008	112.61	1.53	1.50	1.56
Race/Ethnicity					
non-Hispanic Black	3,523	135.64	1.73	1.68	1.77
Hispanic	118	70.99	0.90	0.78	1.03

Table 3. 2 Visit Proportions and Visit Ratios for Youth Violence-Related Emergency Department Visits Using the National Syndromic Surveillance Program Data for Mississippi, 2019-2025

Characteristic	Total Count	Visit Proportion (per 10,000 visits)	Visit Ratio	95% CI Lower	95% CI Upper
Multiracial/Other	70	67.23	0.86	0.70	1.01
non-Hispanic White	1,398	78.59	Ref		

At the University of Mississippi Medical Center (UMMC), Mississippi’s only Level 1 Trauma Center, there were 7,443 firearm-related ED visits during the study period, with an overall visit proportion of 101.95 per 10,000 visits (Table 3.3). Proportions peaked in 2021 and have declined since (Figure 3.3). Males had a significantly higher visit proportion (125.00 per 10,000 visits) compared to females (22.80 per 10,000 visits), with a visit ratio of 5.48 (95% CI: 5.16-5.83). The highest visit proportion was among individuals aged 15-24 years (213.40 per 10,000 visits), followed by those aged 25-34 years (156.40 per 10,000 visits). Non-Hispanic Black individuals had the highest visit rate among racial and ethnic groups (93.60 per 10,000 visits), with a visit ratio of 3.08 (95% CI: 2.87-3.31) compared to non-Hispanic White individuals (30.40 per 10,000 visits).

Figure 3.3

Quarterly Visit Proportions of Firearm-Related Emergency Department Visits at University of Mississippi Medical Center per 10,000 Emergency Department Visits – National Syndromic Surveillance Program, January 2019 – December 2025

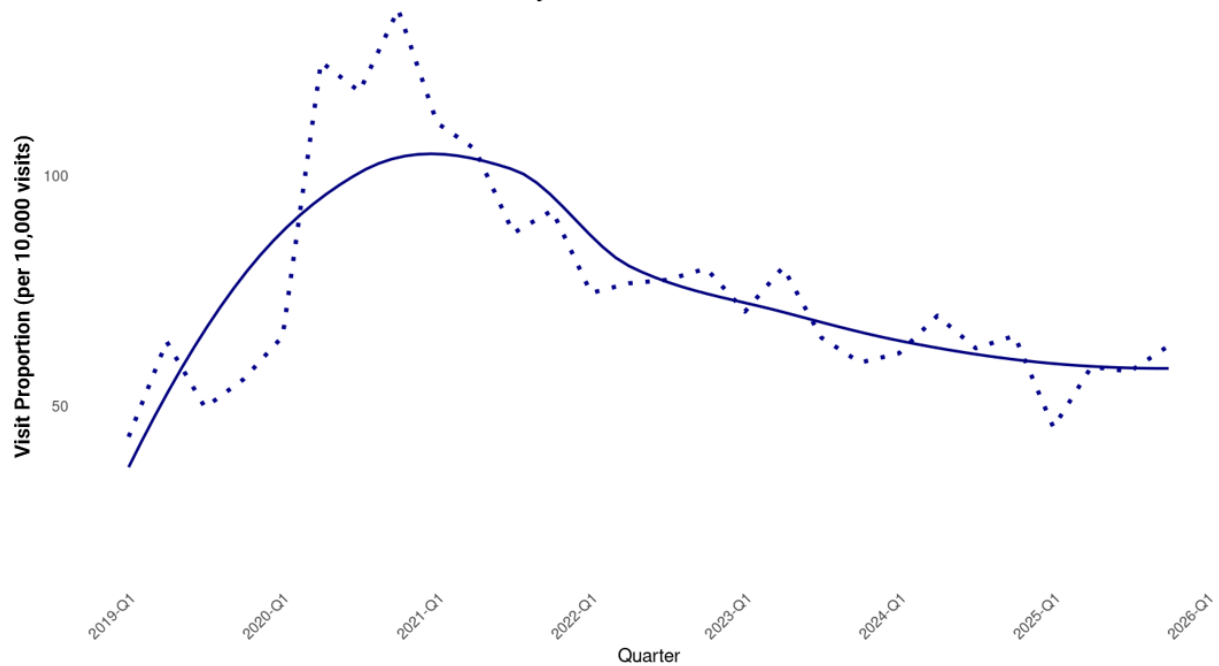


Table 3.3 Visit Proportions and Visit Ratios for Firearm Violence-Related Emergency Department Visits at the University of Mississippi Medical Center, 2019-2025

Category	Total Count	Visit Proportion (per 10,000)	Visit Ratio	95% CI Lower	95% CI Upper
Overall	7,443	101.95			
Sex					
Female	1,201	22.80	Ref		
Male	6,242	125.00	5.48	5.16	5.83
Age Group					
15-24	2,802	213.40	6.68	6.22	7.17
25-34	1,942	156.40	4.89	4.54	5.27
35-44	1,178	105.30	3.29	3.03	3.58
45+	1,071	32.00	Ref		

Table 3.3 Visit Proportions and Visit Ratios for Firearm Violence-Related Emergency Department Visits at the University of Mississippi Medical Center, 2019-2025

Category	Total Count	Visit Proportion (per 10,000)	Visit Ratio	95% CI Lower	95% CI Upper
Race/Ethnicity					
Non-Hispanic Black	6,192	93.60	3.08	2.87	3.31
Hispanic	73	45.60	1.50	1.18	1.90
Multiracial/Other/Unknown	374	72.70	2.39	2.12	2.70
Non-Hispanic White	854	30.40	Ref		

During the same period, there were 1,770 youth violence-related ED visits at UMMC, with an overall visit proportion of 101.95 per 10,000 visits. Males had a higher visit proportion (118.80 per 10,000 visits) compared to females (88.40 per 10,000 visits), with a visit ratio of 1.34 (95% CI: 1.23-1.48). The visit proportion was highest among individuals aged 15-24 years (121.90 per 10,000 visits), with a visit ratio of 2.60 (95% CI: 2.25-2.99) compared to those aged 11-14 years (46.90 per 10,000 visits). Hispanic individuals had the highest visit proportion among racial and ethnic groups (515.50 per 10,000 visits), with a visit ratio of 4.28 (95% CI: 3.01-6.08) compared to non-Hispanic White individuals (120.60 per 10,000 visits).

Figure 3.4

Quarterly Visit Proportions of Youth Violence Related Emergency Department Visits at University of Mississippi Medical Center per 10,000 Emergency Department Visits – National Syndromic Surveillance Program, January 2019 – December 2025

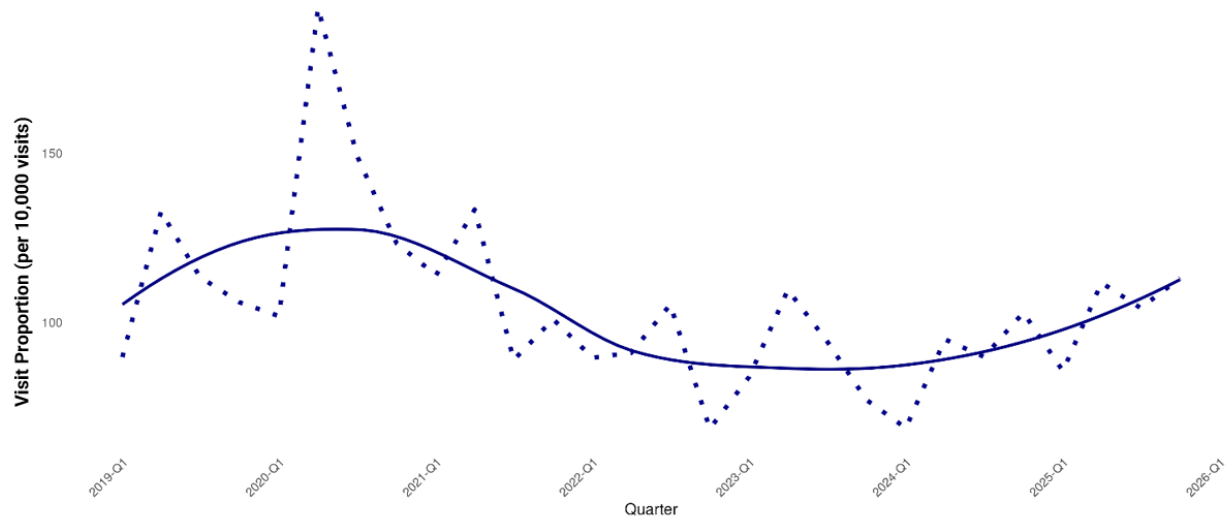


Table 3.4 Visit Proportions and Visit Ratios for Youth Violence-Related Emergency Department Visits at the University of Mississippi Medical Center, 2019-2025

Characteristic	Total Count	Visit Proportion (per 10,000 visits)	Visit Ratio	95% CI Lower	95% CI Upper
Overall	1,770	101.95			
Sex					
Female	850	88.40	Ref		
Male	920	118.80	1.34	1.23	1.48
Age Group					
11-14	218	46.90	Ref		
15-24	1,552	121.90	2.60	2.25	2.99
Race/Ethnicity					
Non-Hispanic Black	1,379	128.30	1.06	0.93	1.21

Table 3.4 Visit Proportions and Visit Ratios for Youth Violence-Related Emergency Department Visits at the University of Mississippi Medical Center, 2019-2025

Characteristic	Total Count	Visit Proportion (per 10,000 visits)	Visit Ratio	95% CI Lower	95% CI Upper
Hispanic	35	515.50	4.28	3.01	6.08
Multiracial/Other/Unknown	85	393.50	3.26	2.56	4.16
non-Hispanic White	271	120.60	Ref		

Conclusions

The analysis of firearm-related and youth violence-related emergency department (ED) visits in Mississippi and at the UMMC from January 2019 to December 2025 identified differential risk across sex, age, and race/ethnicity. Males consistently exhibited higher visit proportions compared to females for both firearm-related and youth violence-related injuries. The highest visit proportions were observed among individuals aged 15-24 years, highlighting a critical age group for targeted interventions. Non-Hispanic Black individuals had the highest visit proportions among racial and ethnic groups in both Mississippi and UMMC data, underscoring the need for focused public health efforts to address these differences in risk. Additionally, Hispanic individuals at UMMC experienced high visit proportions for youth violence-related injuries. While firearm-related injuries decreased over the study period, youth violence-related injuries remained relatively stable. Findings may be impacted by age missingness as age data were not always available for ED visits. These findings emphasize the importance of timely and targeted public health strategies to reduce firearm-related injuries and youth violence, particularly among high-risk groups.

4. Emergency Medical Services (EMS) data

Background

This section focuses on summarizing location of injury data from Emergency Medical Services (EMS) data through a hotspot analysis to visualize locations of firearm violence-related injuries.

EMS data includes data on EMS responses, patient demographics, treatment details, outcomes, and geographic location of injury. This data can have up to a 60-day reporting delay and combines response data from multiple providers.

Methods

EMS data from Jackson, MS between 2019 and 2025 was extracted and filtered for dispatch reason 'Assault' or 'Stab/Gunshot/Penetrating Trauma.' This dataset included street address, zip code, city, state and GPS coordinates of the location of injury, the disposition destination name, the sex and age of the person injured, the incident date and time of the injury.

Because EMS data includes data from multiple providers, data were deduplicated on incident-time and street address which essentially provided a dataset on incidents rather than injuries. As a result of de-identification there was no way to discern whether multiple records with the same incident-time and street address were injuries from multiple individuals, or whether they were the same injury but reported by multiple providers.

Street addresses were cleaned and standardized prior to geocoding, including uppercasing, trimming whitespace, removing punctuation and standardizing common street suffixes (e.g., STREET→ST, ROAD→RD) and directionals (e.g., NORTH→N). Longitude and latitude pairs were often missing or incorrect, and therefore extrapolated from street address, city and state either from existing longitude/latitude pairs of matching addresses or using SAS. City and state values were normalized (e.g., "City of Jackson" → "Jackson"; "Mississippi" → "MS"), and invalid ZIP codes (i.e. 0) were set to missing. Interstate formatting was standardized (e.g., "I 55" → "I-55") to align with TIGER street conventions. Street-level geocoding was then performed in SAS 9.4 using the 2024 TIGER street lookup data.

SAS assigns a score to its geocoding match from 0 to 100. The following algorithm was used for final longitude/latitude coordinate pairs:

- If SAS score was ≥ 75 , SAS coordinates were used.
- If SAS score was < 75 :
 - o If the EMS extract included coordinates, these raw coordinates were used.
 - o If the EMS extract did not include coordinates, but the EMS extract street address matched the SAS extrapolated street address, SAS coordinates were used.

- If the EMS extract did not include coordinates, but the street address was a cross-street that matched the SAS extrapolation, SAS coordinates were used.
- In all other cases, the street addresses and coordinates were reviewed and hardcoded in.

GPS coordinates were used to overlay EMS data on a map of Jackson in R.⁵ The map of Jackson was divided by census tract. Locations of injury were aggregated by census tract and visualized through a choropleth map. Locations of injury were also visualized as a hotspot map overlaid on a street map of Jackson. These maps show the number of incidents through intensity and color of hotspots. They were either shown as absolute (e.g., filtering a dataset for year of injury to show the absolute intensity of a cluster), or they were stratified by factors (e.g., cause of injury, day of week, time of day) to show the intensity of incidents relative to the other factors. Maps showing absolute intensity are useful to compare locations of clusters, whereas stratified maps showing relative intensity are useful to compare intensity across the different factors.

Results

Altogether between 2019 and 2025, EMS records showed that there were 10,856 incidents related to assault. Census tract 27, located in the central eastern part of Jackson, had the highest number of incidents during this period with 668 incidents related to assault.

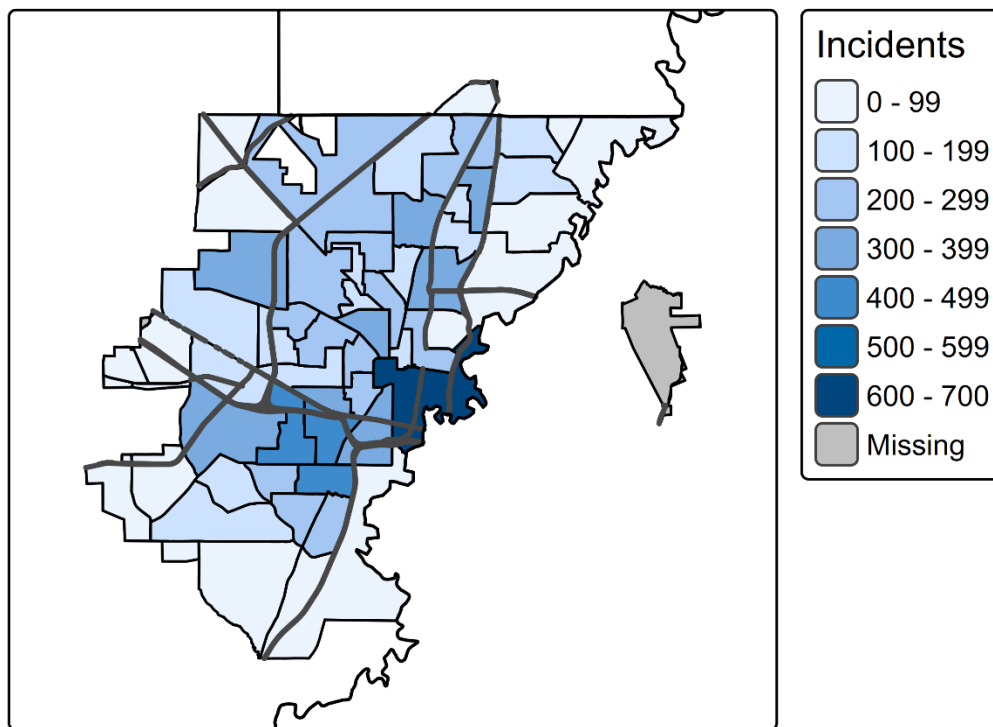


Figure 4.1. Choropleth map showing EMS locations of assault incidents in Jackson between 2019 and 2025 aggregated by census tracts. Dark grey lines indicate primary and secondary roads and

highways in Jackson. The disconnected shape on the right represents Jackson-Medgar Wiley Evers International Airport, which is also a part of the city of Jackson.

Figure 4.2 shows the EMS locations of assault incidents overall between 2019 and 2025. Table 4.1 shows the number of assault incidents by year, which have been declining since 2020. It is important to note that these numbers represent incidents and not individual injuries. An incident could have resulted in multiple injuries which would not be captured in the data presented here. Possible reasons for the decline could be incomplete data for more recent years, fewer EMS agencies reporting, or other artifacts of data reporting which state partners will have a better view on. Figures 4.3, 4.4, and 4.5 show the EMS locations of assault incidents stratified by year, day of the week, and time of incident respectively. Yearly stratification shows that assault incidents reported by EMS have decreased over time since 2020, as the hotspots have lightened and shrunk in size. Saturday and Sundays are the most frequent days of the week in which incidents were reported to EMS, and 6 to 9pm the most frequent time of day.

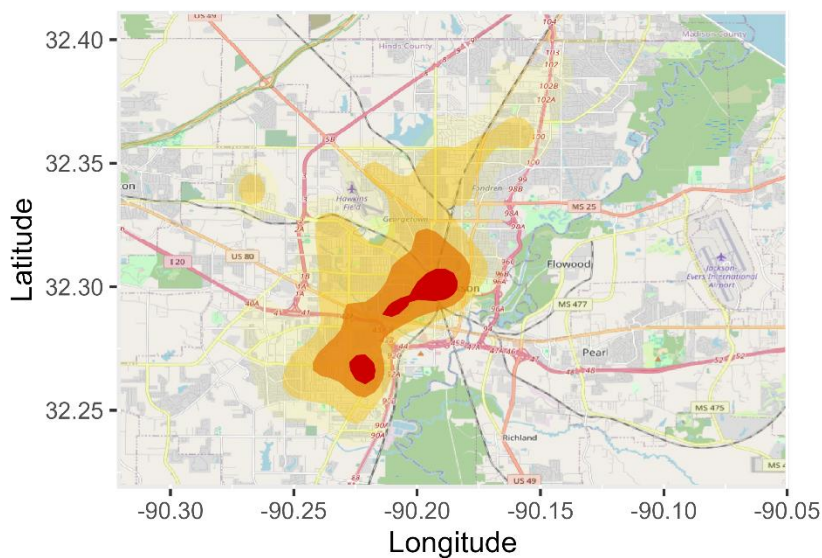


Figure 4.2 Map showing hotspots of all EMS locations of assault incidents in Jackson between 2019 and 2025.

Table 4.1 Number of assault incidents in Jackson reported to EMS by year

Year	Number of incidents
2019	1771
2020	2134
2021	1995
2022	1529

2023	1287
2024	1169
2025	970

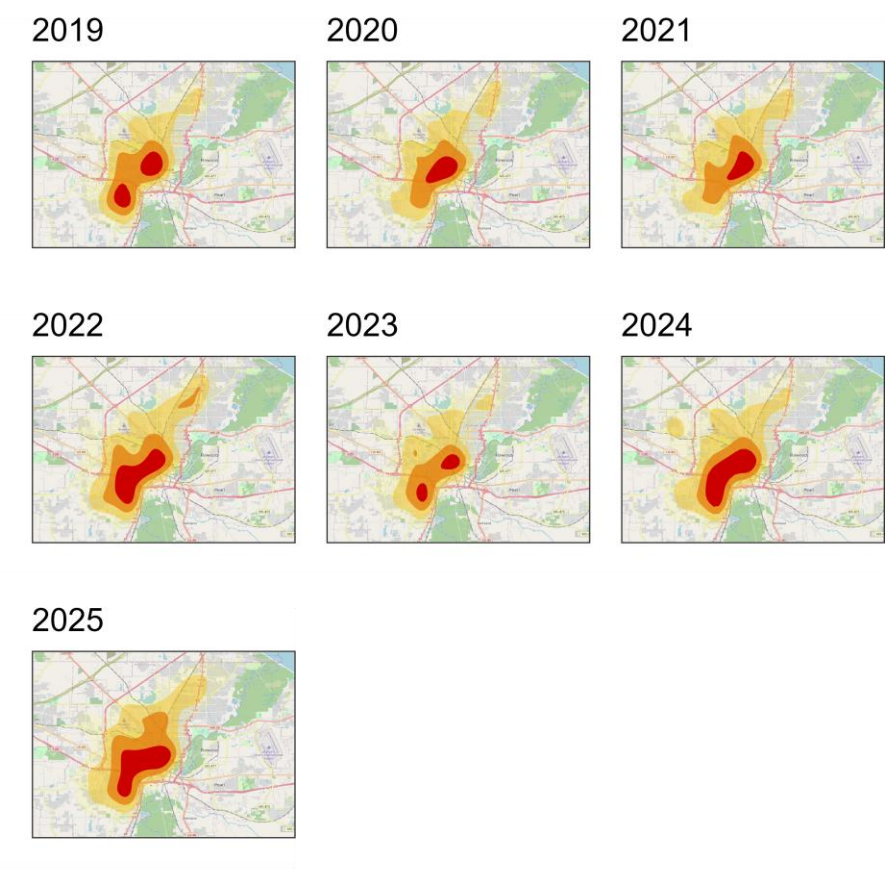


Figure 4.3 Map showing absolute hotspots of EMS locations of assault incidents in Jackson between 2019 and 2025, stratified by year of incident.

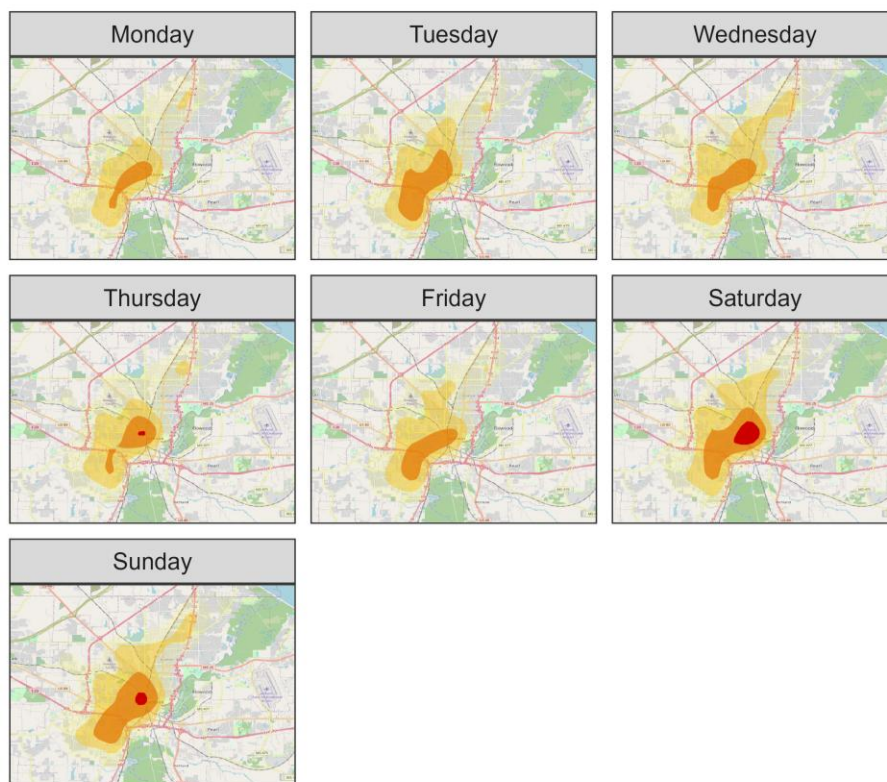


Figure 4.4 Map showing relative hotspots of EMS locations of assault incidents in Jackson between 2019 and 2025, stratified by day of incident.

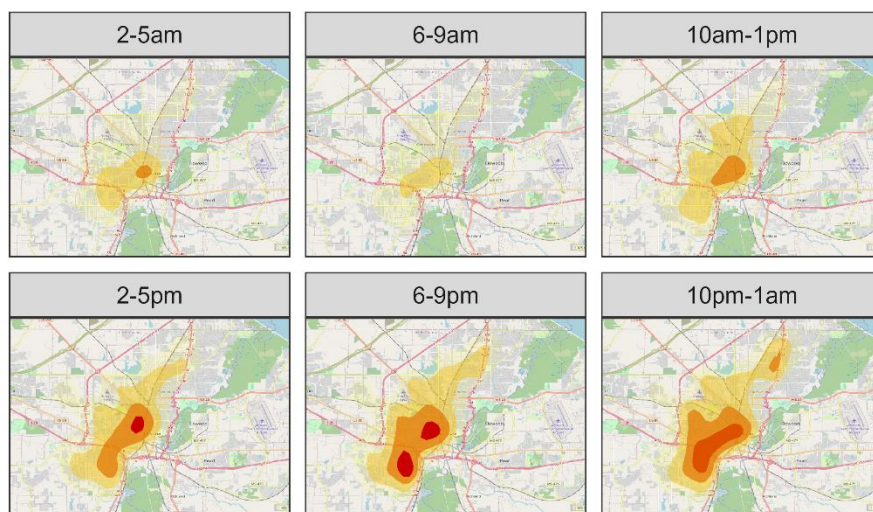


Figure 4.5 Map showing relative hotspots of EMS locations of assault incidents in Jackson between 2019 and 2025, stratified by time of incident.

72% of EMS records either had an unknown cause of injury or had cause of injury listed as ‘other’ non-specified injury type. Figure 4.6 shows the EMS locations of assault incidents stratified by the cause of injury listed in the record, after removing the unknown or non-specified injuries. After the unknown and non-specified injury causes, injuries involving firearms was the next most prevalent cause of injury type (17.3%). The hotspots for the incidents involving firearms are localized to north and south of the I-20 highway, between interstates I-220 and I-55.



Figure 4.6 Map showing relative hotspots of EMS locations of assault incidents in Jackson between 2019 and 2025, stratified by cause of injury listed.

Filtering to only firearm injuries, Saturday night through Sunday early morning and Sunday night have the highest intensity of hotspots and are consistent in the locations of those hotspots.

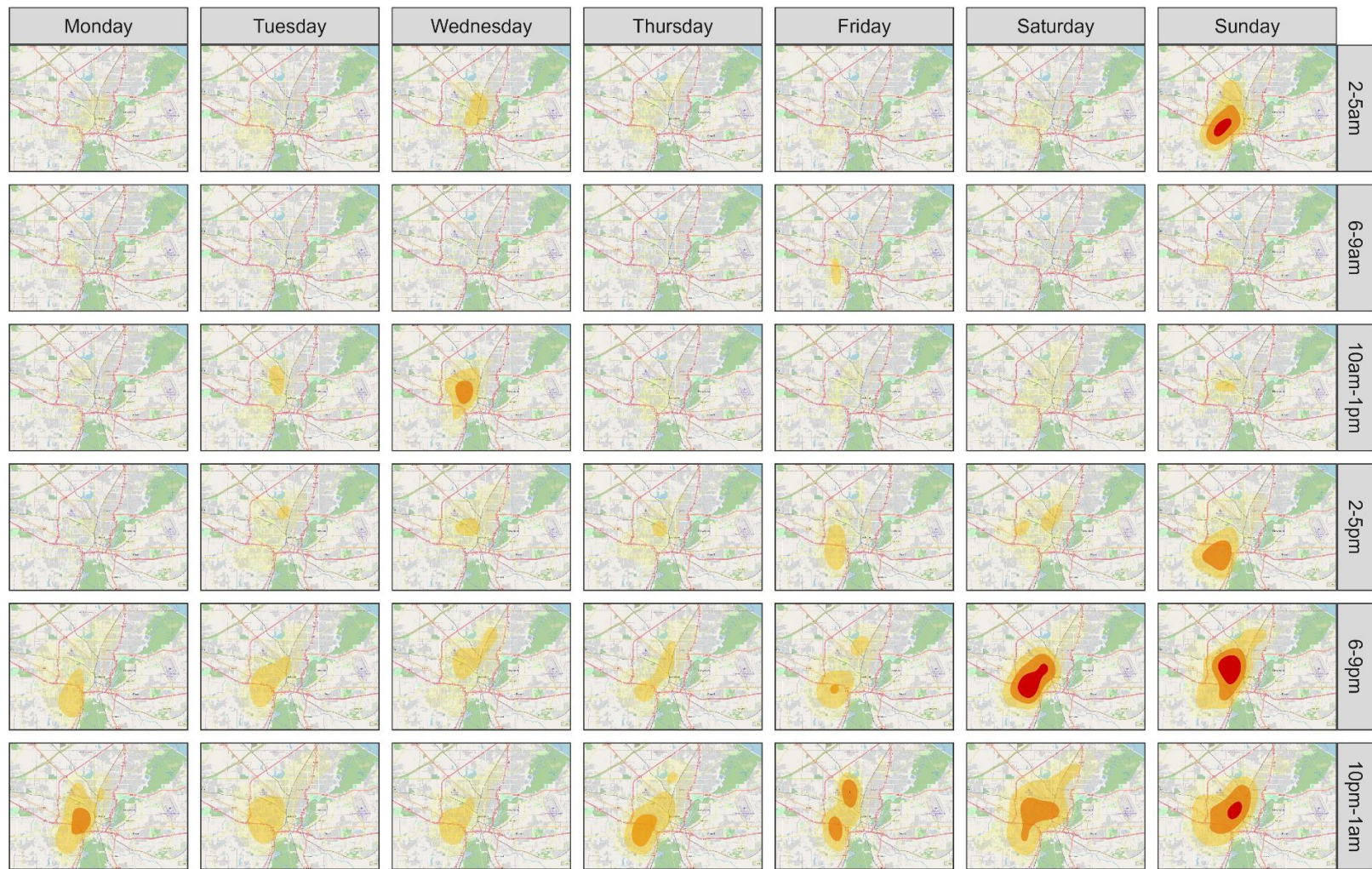


Figure 4.7 Relative hotspot map of EMS locations of firearm incidents in Jackson between 2019 and 2025, stratified by day of the week and time of day.

Conclusions

Maps of EMS data showed that most assault incidents between 2019 and 2025 were reported by EMS north or south of interstate I-20 between I-220 and I-55. Temporal data showed that Saturday and Sunday were the most frequent days, and 6-9pm was the most common time of day of the incident calls. The hotspots of the records listing firearms as a cause of injury were consistent with the hotspots from other causes of injuries, with most incidents occurring either Saturday night into Sunday early morning or Sunday night.

A limitation of this analysis is that 72% of the records did not specify the type of injury cause. Additionally, because the data was deidentified, there was no way to deduplicate on the person-injury and therefore the analysis focused on incidents. More information on the person and injury type could provide behavioral context for injury causes and support community-based organizations and law enforcement in violence prevention efforts addressing root causes of injuries. Another limitation is that there is likely to be underreporting in the EMS data as some individuals are injured but may not seek medical care due to various potential reasons including financial limitations, fear of retribution, or avoidance of law enforcement follow-up.

5. Youth Risk Behavior Surveillance System data

Background

The Youth Risk Behavior Surveillance System (YRBSS) monitors health-related behaviors that contribute to the leading causes of death and disability among youth and adults. This section focuses on an analysis of select variables from the 2023 YRBSS data to examine behaviors among youth in Mississippi compared to the national averages.

Methods

Data source

We used data from the YRBSS, a national school-based survey conducted by the Centers for Disease Control and Prevention (CDC). The YRBSS collects data from high school students in grades 9-12 across the United States, including state-specific data for Mississippi. The data used in this study were accessed from the YRBSS Explorer website (<https://yrbs-explorer.services.cdc.gov/#/>).

Definitions

The variables analyzed include self-reported behaviors related to weapon carrying, physical fights, bullying, and sexual violence. The variables of interest include:

- Carried a weapon on school property
- Carried a gun
- Were threatened or injured with a weapon on school property
- Were in a physical fight
- Were in a physical fight on school property
- Ever saw someone get physically attacked, beaten, stabbed, or shot in their neighborhood
- Were electronically bullied
- Were bullied on school property
- Did not go to school because they felt unsafe at school or on their way to or from school
- Were ever physically forced to have sexual intercourse
- Experienced sexual violence by anyone

Data analysis

Descriptive statistics were used to summarize the prevalence of each behavior/experience for Mississippi and the United States. Comparisons between Mississippi and national data were made using the 95% CIs to determine if the differences were statistically significant. All analyses were conducted using the data available from the YRBSS Explorer website.

Results

We identified several differences between Mississippi and the United States in terms of youth risk behaviors (Table 5.1). In Mississippi, the prevalence of carrying a weapon on school property was 6.2% (95% CI: 4.6, 8.4), higher than the national prevalence of 3.1% (95% CI: 2.5, 3.8). Similarly, the prevalence of youth carrying a gun was 10.5% (95% CI: 8.6, 12.7) in Mississippi, compared to 3.5% (95% CI: 2.8, 4.4) nationally. Mississippi students also reported higher rates of being threatened or injured with a weapon on school property (9.5%, 95% CI: 7.6, 12.0) compared to the national average (6.6%, 95% CI: 5.9, 7.4).

Physical fights were more common among Mississippi students, with 25.6% (95% CI: 23.2, 28.1) reporting being in a physical fight, compared to 18.3% (95% CI: 16.2, 20.7) nationally. Additionally, 26.6% (95% CI: 23.3, 30.2) of Mississippi students reported ever seeing someone get physically attacked, beaten, stabbed, or shot in their neighborhood, compared to 19.9% (95% CI: 17.3, 22.7) nationally.

Bullying behaviors showed mixed results, with 14.6% (95% CI: 12.5, 17.1) of Mississippi students reporting being electronically bullied, compared to the national prevalence of 15.9% (95% CI: 15.0, 16.8). The prevalence of being bullied on school property was similar between Mississippi (15.5%, 95% CI: 13.6, 17.7) and the United States (15.0%, 95% CI: 14.1, 15.8). In Mississippi, 15.1% (95% CI: 11.3, 19.9) of students reported that they did not go to school because they felt unsafe, significantly higher than the national prevalence of 8.6% (95% CI: 7.6, 9.7).

Sexual violence indicators also showed concerning trends, with 11.9% (95% CI: 10.3, 13.6) of Mississippi students reporting being physically forced to have sexual intercourse, compared to 8.5% (95% CI: 7.6, 9.4) nationally.

Table 5.1 Select Youth Risk Behavior Surveillance System Variables, Mississippi and United States, 2023*		
Variable	Mississippi Prevalence (95% CI)	United States Prevalence (95% CI)
Carried a weapon on school property	6.2 (4.6, 8.4)	3.1 (2.5, 3.8)
Carried a gun	10.5 (8.6, 12.7)	3.5 (2.8, 4.4)
Were threatened or injured with a weapon on school property	9.5 (7.6, 12.0)	6.6 (5.9, 7.4)
Were in a physical fight	25.6 (23.2, 28.1)	18.3 (16.2, 20.7)
Were in a physical fight on school property	7.5 (6.0, 9.3)	5.8 (4.4, 7.5)
Ever saw someone get physically attacked, beaten, stabbed, or shot in their neighborhood	26.6 (23.3, 30.2)	19.9 (17.3, 22.7)
Were electronically bullied	14.6 (12.5, 17.1)	15.9 (15.0, 16.8)
Were bullied on school property	15.5 (13.6, 17.7)	15.0 (14.1, 15.8)
Did not go to school because they felt unsafe at school or on their way to or from school	15.1 (11.3, 19.9)	8.6 (7.6, 9.7)
Were ever physically forced to have sexual intercourse	11.9 (10.3, 13.6)	8.5 (7.6, 9.4)
Experienced sexual violence by anyone	12.3 (10.8, 13.9)	11.0 (10.1, 12.0)

Conclusions

The 2023 YRBSS data highlighted differences in youth risk behaviors between Mississippi and the United States. Mississippi students reported higher rates of weapon carrying, physical fights, witnessing violence, being physically forced to have sexual intercourse, and feeling unsafe at school compared to their national peers. These findings underscore the need for targeted interventions and programs to address these risk behaviors and improve the safety and well-being of youth in Mississippi. Efforts could focus on reducing violence and bullying, enhancing school safety, and providing support for students who have experienced sexual violence. By addressing these critical issues, public health officials and educators can work towards creating a safer and healthier environment for all students.

Objective #2

Background

To enhance the utility of the data for public health action related to violence prevention activities, the Epi-Aid team assessed current data sources that captured fatal and non-fatal assaults impacting the Jackson community through data user interviews. The interviews included questions related to data quality, completeness, and timeliness, as well as questions pertaining to possible improvements, linkages, and enhancements across fatal and nonfatal data systems.

Methods

We conducted interviews with 6 individuals representing 9 data systems to examine current violence data collection and processes and data sharing practices. Appendix 3 contains the data user interview guide. Initial informants were identified by MSDH and UMMC, with a snowball sampling strategy in which each informant from both Objective #2 and Objective #3 was asked to recommend other data user informants. Of the interviews, 4 of 6 were conducted virtually, and the 2 conducted in-person were conducted at the person's place of work. One EIS officer led the interviews, and another EIS officer assisted with follow-up questions and taking notes. Interviews were recorded and transcribed using Microsoft Teams after informants gave their verbal consent. Information from the data users was supplemented by information relating to data from key informants of Objective #3.

Interviews were analyzed thematically using a framework analysis to assess and summarize data systems and to describe key patterns within and across different organizational sectors.⁶ A thematic analysis was also conducted to identify the strengths, weaknesses, opportunities, and threats (SWOT) of the violence data landscape in Jackson, MS, to support recommendations related to enhancing the utility of data for public health action.

Results

Table 6.1 shows a summary of the data systems used for violence prevention efforts in Jackson, MS.

Briefly, the data systems reviewed by the interviewed data users were the NVDRS (MSVDRS), AVERT, EMS, Mississippi's Trauma Registry, UMMC's hospitalization electronic health records (EHRs), law enforcement, and community-based organization (CBO) data.

Mississippi has been submitting violent death data for NVDRS since 2019 but only became a statewide contributor in 2021. AVERT includes statewide emergency department data, including UMMC's emergency department data. EMS data is also statewide, and there are multiple EMS providers serving the Jackson population. The Mississippi Trauma Registry describes hospital-reported injuries that fit the trauma criteria for registry. UMMC's EHRs are patient records for the management of treatment and diagnosis.

Law enforcement data from both Capitol Police and Jackson Police Department (JPD) were described by data users. As the state capital, Jackson's law enforcement is overseen both by JPD and the Capitol Police force. The Capitol Police force previously only guarded State buildings, but its authority was expanded in 2021 to supplement JPD, which was experiencing staff shortages, as a response to rising crime in Jackson. It is responsible

for policing the Capitol Complex Improvement District (CCID), which includes the capitol building, downtown Jackson, Fondren, UMMC, and Jackson State University.

Finally, data users from two CBOs, Operation Good and People's Advocacy Institute were interviewed on the data held by each respective organization on their programmatic operations.

Table 6.1. Summary of data systems used for violence prevention efforts.

	Description	Years covered	Data users	Population coverage	Data collection	Timeliness	Current linkage
Mississippi Violence Death Reporting System (MSVDRS)	Mississippi data extracted from the National Violence Death Reporting System (NVDRS). Mississippi violent death reporting system including records of individual deaths, demographics, cause and manner of death, and circumstances.	2019-2025	Mississippi Department of Health (MSDH) (owner)	Statewide	Data compiled from vital statistics, coroner and medical examiner, and law enforcement	18-month delay	None
Advancing Violence Epidemiology in Real-Time (AVERT)	Emergency department syndromic data including demographics and diagnoses	2019-2025	MSDH (owner)	Statewide	Data submitted by hospitals	Within 24 hours	None, but some of the University of Mississippi Medical Center's (UMMC) electronic health records are included in AVERT
Emergency Medical Service (EMS)	Records of EMS responses, patient demographics, treatment details, outcomes, and geographic location data	2019-2025	MSDH (owner)	Statewide	Data submitted by EMS providers	60-day delay	None

UMMC Hospitalizations	Hospital admissions and discharge records, including patient demographics, treatment and diagnoses	From founding year	UMMC (owner)	All admissions to hospital. Hospital is the only Level I Trauma Center in the state and therefore admissions include outside of Jackson, MS.	Self-collected	Immediate	None, but some of these electronic health records are in AVERT
Operation Good's Crime statistics	Calls for service and crime incidents	From founding year	Operation Good (owner)	Most of Jackson except northeast Jackson area	Self-collected manually through phone calls and in-person form filling	Within 1-2 day	None
Office of Violence Prevention & Trauma Recovery data	Calls for service and crime incidents		People's Advocacy Institute (PAI) (owner)	Jackson, MS	Self-collected manually through phone calls	Immediate	None
Jackson Police Department data	Calls for service and crime incidents	Pre-2019 to present	Jackson Police Department (owner)	Most of Jackson except Capitol Complex Improvement District (CCID)	Self-collected	Within 24 hours	Linked to social determinants data from CDC. Weekly reports are shared with the Federal Bureau of Investigation (FBI), US Justice Department's Alcoholic, Tobacco, Firearms, and Explosives

							(ATF), US Attorney General, Secret service
Capitol Police Department data	Calls for service and crime incidents	2021 to present	Capitol Police Department	Capitol Complex Improvement District (CCID)	Self-collected	Within 24 hours	None but aggregate data uploaded to NIBRS which is publicly available
Mississippi Trauma Registry	Intentional and unintentional injuries that fit trauma criteria for registry		MSDH (owner)	Statewide	Data submitted by hospitals	Within 60 days	None but data shared through public requests, with national trauma bank, and with American College of Surgeons

Table 6.2 shows a summary of the strengths, weaknesses, opportunities and threats reported by the participants.

Strengths

The main strength of each data source assessed was that all sources were deemed useful and fit for purpose.

As frontline responders to violence in Jackson, community-based organizations, hospital, and law enforcement data are exemplary at data to action. These organizations hold personally identifiable information on victims of firearm violence, including contact information and location of incidents. This data informs locations for organizations to send more staff or resources. For example, JPD uses their data to determine where to place patrols or cameras. CBOs will allocate staff and resources to specific neighborhoods according to the locations of violence that they collect. UMMC examines and takes action based on EHR data that is directly useful for treatment and diagnosis of patients.

Beyond the data being useful for action, it has also been useful to provide evidence of successful violence prevention initiatives. Some CBOs have more recently been able to use their data as evidence that their programs are working. This has given credence to their work, and staff mentioned that external partners have been more willing to share data after this.

In the case of UMMC, the data they collect from a research perspective also includes information on reasons for presentation to the emergency department, hospital-based mortality, and length of stay, all of which can inform clinical management. Data from UMMC's clinical research trial, Mississippi Violence Injury Prevention Program (MS-VIP) has been useful in evaluating different community-focused interventions and will be eventually used for measuring interventions' impact. UMMC's EHRs also gives access to individual patient records.

Another example of data to action from MSDH is through their state trauma registry, which collects data on injuries from hospitals across the state. Data are reviewed periodically to determine the focus of quarterly meetings, which can then inform public health action. For instance, MSDH had previously found that a significant number of deaths could have been prevented from applying tourniquets which led to a statewide campaign to provide tourniquets to law enforcement and tourniquet training for every officer. As a result, they have seen fewer deaths and this campaign is being rolled out to schools as well. At the end of 2020, they found an increase in assault and gunshot incidents, and this began their research into these fatal and non-fatal assaults around the end of 2022 or beginning 2023, ultimately leading to this Epi-Aid.

NVDRS and AVERT data are used for reporting trends by MSDH. Monthly reports from these are shared with MSDH's Department of Mental Health, in partnership with UMMC. EMS data is another rich source of individual-level injury location data held by MSDH. MSDH are examining how they can use the data to inform programs. EMS and NVDRS data are considered complete in terms of reporting, as all deaths and emergency medical calls respectively are included in those datasets.

Data sources from frontline responders (CBOs, law enforcement, and UMMC) are also timely, having an almost immediate turnaround from data collection to input into a database. One CBO mentioned an incident where their organization was called, and they arrived at the scene before the coroner.

Weaknesses

Expanding usefulness

While syndromic surveillance ED data (AVERT) is effective at reflecting trends, it lacks individual-level data on risk factors, such as history of crime or substance use, that could be incorporated in models to guide prevention strategies. NVDRS, on the other hand, does include this individual-level data but currently only covers 3 years of data, which is insufficient for developing analyses or models on trends. On the other hand, CBOs that own datasets including this level of granular data do not have the resources, staff, or capacity to produce such models.

Integration with other data sources

Currently, the data systems exist in isolated infrastructures and while there is some data sharing between organizations, none are currently linked. One of the challenges is the lack of a unique identifier variable to link datasets. For example, AVERT includes a medical record number (MRN), but individuals are unable to be tracked across different medical systems. JPD data is hosted in a platform that enables exporting of data but is not conducive to linking multiple external data sources.

The main barriers to data linkage and sharing were the need for ongoing institutional relationship building and strict organizational data governance policies. For example, CBOs cited the difficulty in obtaining law enforcement data due to hesitancy from law enforcement. Law enforcement cited hesitancy in sharing data in the event that a case being investigated is compromised. These data linkage issues also create a lack of cohesion between data sources, especially as there is no way to ascertain duplicate records across datasets. Ultimately, this also highlights a degree of uncertainty in key measures from these datasets as they can represent the same, similar, or overlapping populations. In the AVERT dataset, it is not possible to estimate the number of unique patients who visit EDs because of the MRN issue mentioned above. CBOs may record the same incident in separate datasets that do not link.

Lack of standardization across datasets

In addition, there is limited standardization of data collection or variable definitions because goals differ among partners. For example, JPD typically operates according to their precinct and patrol zones, whereas MSDH reviews data by census tracts. CBOs, in turn, divide areas of operation by neighborhoods, and some UMMC MS-VIP resources are only available by zip code. Organizations have bespoke data collection tools that are not aligned in what or how data is collected, further complicating future data linkage efforts. Most CBOs for example conduct informal and manual data collection, where they are informed of incidents by community members and record details by hand, to be entered electronically at a later time. UMMC EHR data on the other hand is, as mentioned before, focused on documentation of in-hospital clinical operations and information documented is generally determined by clinical and billing requirements.

Representativeness and data coverage

Both ad-hoc data collection process and the aforementioned degree of uncertainty from the inability to link or deduplicate datasets, highlight a gap in understanding population coverage. Although AVERT, EHR and EMS data are “complete” in terms of reporting, they represent imperfect coverage in reality. AVERT only covers 85% of EDs nationally, and while EMS covers all services, there is the possibility that some victims do not seek medical care after injury. Relatedly, accurate assessment of injury intent is dependent on patient disclosure to providers.

Another limitation of the data are the age groupings. NIBRS and Capitol Police data group juveniles less than 18 together; the ability to further disaggregate among younger and older adolescents in analyses is a need.

Reporting issues

Another weakness is reporting issues, including delays in reporting. For example, MSVDRS has an 18-month delay due to the time it takes to collect, process, and clean the data. Because funding for data collection was only started in 2019, and 2021 was the first year to include all counties, this dataset currently only has 3 years of statewide data, which is not sufficient for temporal analyses. AVERT on the other hand has a 24-hour reporting delay but a 6-month delay in data verification and the release of officially produced reports. The Mississippi Trauma Registry, which previously contained 30 years of data, has been affected by vendor changes, but is typically delayed by 60 days due to reporting requirements.

While Capitol Police and JPD both report into the Federal Bureau of Investigation's (FBI) National Incident-Based Reporting System (NIBRS) at least once a month, the publicly available data is likely incomplete, as it shows almost no crime prior to 2025.

Threats

Multiple data users and key informants mentioned that funding was a key issue for continuity and program success. They expressed that more staffing was needed to support data linkage efforts. These could advance data utility for public health action. For example, current funding levels for MSVDRS were perceived as insufficient for data collection, and this could limit jurisdictions' ability to pursue data to action projects. Plans to develop an MSVDRS dashboard that would have increased visibility and possibly collaboration were halted due to staff turnover. In some organizations, there was no dedicated data person. In others, there was a dedicated data person that managed multiple datasets. This can make it challenging to know what violence data exists and where it sits without a central repository. Additionally, when there are new data user agreements, there can be a significant start-up cost in terms of time and staff needed to set up data sharing. In the case of the Mississippi Trauma Registry, issues with the data platform vendor resulted in significant data gaps and delays, as MSDH had to change contracts. This required additional staff time to convert historical data into a format that was useable and to conduct data quality assurance on the historical data, while also maintaining the registry.

Opportunities

One key recommendation from the data user interviews was the call for training to improve data literacy. This could create a better long-term return on investment from capacity-building that would increase data security measures as well as help users align on key data features (such as methods of collection, variables, and definitions) and create opportunities for data sharing. This would also allow the expansion of methods to evaluate data, thereby providing opportunity to further leverage data for public health action. CBOs have not created public reports with systematic evaluation of their efforts and increasing their ability to do so might help increase their perceived legitimacy and ability to attain resources.

There is an opportunity and a demand for creating a shared data repository or a dashboard where aggregate data or trends could be viewed. More specifically, there are several opportunities for specific linkages that would be beneficial:

- AVERT (hosted by MSDH Public Health Statistics) and mental health data (hosted by the Department of Mental Health) to understand risk and protective factors
- Law enforcement and CBO data to collaborate on neighborhood-specific incident response
- AVERT and hospital data to link an individual to their hospital stay
- EMS and emergency department data to link patient data to an individual's injury location and time, or a screening questionnaire at the emergency department to understand injury and patient context
- MSVDRS and death certificate details not already included in MSVDRS? to gain further information on fatal assaults

More generally, if it were possible to link all the existing datasets, one could have insight into individuals' broader experience with violence— from their risk factors that led to violence, their resulting injuries, their clinical treatment, to finally the outreach and support they've received for recovery and ultimately for violence prevention. A brief Mississippi Data Linkage Toolkit is provided in Appendix 5. Successful examples of other cities in the US combining data from multiple public services or city departments have shown the benefits of leveraging a city-wide lens to addressing population needs holistically.⁷ Doing this requires trust in other organizations and an understanding of the work being done by others. One of the CBOs mentioned that once evidence was provided that their programs were working, people warmed to sharing data with them. Data could inform prevention. A critical next step is to identify institutional and governance barriers that prevent the data from being shared, and to involve data users in ongoing violence prevention collaborations so that they may provide evidence to support these activities.

Currently, each partner holds one piece of the puzzle that together would form a more complete picture of individual and community risk and protective factors. Data provides evidence highlighting the reach and effectiveness of programs, helping to sustain and advance violence prevention initiatives.

Table 6.2: Strengths, weaknesses, opportunities, and threats (SWOT) table of Jackson’s violence data landscape Strengths • Data are useful and fit for purpose	Weaknesses • Data systems have limited integration given strict governance policies and need expanded institutional partnerships • Less visible nonfatal violence data • Inconsistent public reporting hinders coordination • Most CBOs rely on informal or manual data collection and management
Opportunities • Develop shared data infrastructure, such as a centralized data hub and a dashboard • Support data literacy efforts to expand methods of evaluation • Standardize data collection and definitions to align partners and help future data linkage • Link data sources to follow-up individuals for prevention and recovery strategies • Identify institutional and governance barriers to data sharing and set up data sharing agreements	Threats • Unstable funding and staffing issues • Need for more routine communication opportunities, including defining roles, between partners to build trust for data sharing

Conclusions and Recommendations

While there are several rich data sources representing occurrences of violence in Jackson, these currently represent disjointed efforts and remain unlinked across and within organizations which limit the usefulness of the data in violence prevention activities, particularly as it creates a risk of an unknown amount of duplication to be present across datasets.

Community-based organizations’ reliance on self-collected manual data hinders their programmatic activities, whereas institutional data safeguarded by state and hospital partners is limited in its usefulness towards programmatic activities. While law enforcement data is exemplary as ‘data to action’, the lack of integration of this data system and its separation from other violence prevention data and activities, particularly that of CBOs, presents an opportunity for further understanding the violence prevention landscape.

Taken altogether, the recommendations were the following:

1. Create and maintain a central data repository

- a. Aggregate data for trends and statistics
 - b. De-identify location-specific data for coordinated action by law enforcement and CBOs, supporting CBO programmatic activities in violence prevention and trauma recovery
- 2. Standardize data for future data linkage efforts
 - a. Clarify purpose of data linkage
 - b. Align on definitions
 - c. Standardize data collection
- 3. Identify institutional and governance barriers to data sharing
 - a. Support efforts to pseudonymize data by implementing unique identifiers in data that allows individuals to be followed through systems to understand their journey through violence prevention, occurrence, and recovery.
 - b. Involve data users in ongoing collaborations to embed data objectives and align data outputs for the purpose of enhancing violence prevention activities

Objective #3

Background

To inform public health action related to violence prevention in Jackson, Mississippi, the Epi-Aid team conducted key informant interviews to assess ongoing and planned activities and efforts. Interviews explored existing strategies, programs, and collaborations addressing fatal and nonfatal assaults, as well as perceived gaps and challenges at both the community level and within participants' own work. Respondents described the current state of violence in Jackson; successful prevention strategies; perceived barriers to implementing and sustaining violence prevention efforts overall; challenges encountered in their programs; community engagement approaches; facilitators of program success; data systems used to inform activities; partnerships and information-sharing practices; and recommendations for strengthening violence prevention efforts.

Methods

A semi-structured interview guide was used to elicit views on the current state of violence, prevention strategies, challenges at both the community and programmatic levels, partnerships and collaborations, data use, and recommendations for strengthening prevention efforts (Appendix 4). Key informants represented multiple sectors, including academia, criminal justice systems, healthcare, law enforcement, non-governmental and community-based organizations (NGO/CBOs), public health agencies, and public safety (Appendix 6).

A total of 23 interviews were completed, including three group interviews with two to four participants each, resulting in 29 respondents overall. All scheduled interviews were completed as planned, with no incomplete or rejected interviews. Some interviews were conducted virtually due to inclement winter weather. Interviews were conducted by trained interviewers, lasted approximately one hour, and included detailed written field notes for all interviews. Interviews were audio-recorded with participant consent, and recordings were transcribed using a HIPAA-compliant AI transcription application. Field notes were organized by interview questions to support rapid qualitative analysis. Interviewers conducted debriefs at the end of each day or immediately following interviews to discuss observations, emerging issues, and cross-cutting themes.

Interview field notes were imported into NVivo 15 qualitative analysis software, where each interview was represented as an analytic case. A rapid qualitative analysis approach was employed. Interview questions served as the primary coding framework, with field note content first coded to corresponding question-based nodes, followed by application of a focused set of thematic codes to capture key concepts emerging across interviews. Findings were synthesized

to identify common themes, perceived gaps, and opportunities to strengthen violence prevention efforts.

Participation was voluntary, and verbal consent for audio recording and transcription was obtained from all participants. All data were de-identified prior to analysis, and findings are reported in aggregate, with quotes attributed using non-identifying descriptors.

Results

A total of 29 respondents were interviewed across 23 interviews, of which 3 interviews were group interviews with two, three, and four respondents, respectively. A majority of the interviews were conducted in-person (n=22). Participants generally served in multiple sectors of violence prevention. Most respondents served populations of either the whole state of Mississippi (n=17), or the city of Jackson (n=10) (Table 3.1.)

Table 3.1. Interview format, service sector, and service target population of interviewed participants

Characteristics	n
Interview Format	
In-person	22
Virtual	7
Violence Prevention Sector*	
Community-based organizations	8
Academia	7
Criminal Justice System	5
State-based non-governmental organizations	5
Public Safety	4
Public Health Agency	3
Healthcare	3
Law Enforcement	3
Regional target population for service	
City	10
County	2
State	17

* Categories are not mutually exclusive.

Analysis of interview data yielded six key findings areas: the current violence landscape in Jackson; effective violence prevention strategies and conditions for success; barriers to implementation and sustainability; community engagement, partnerships, and information flow; data systems, data gaps, and coordination opportunities; and recommendations and priority opportunities. Together, these findings describe both progress and persistent challenges in violence prevention efforts and highlight how health systems and public health agencies are positioned to use this information. The results are presented with attention to the distinct and

complementary roles of MSDH and UMMC, as well as opportunities for shared action across systems and community partners.

Current violence landscape in Jackson

Participants described a complex and evolving violence landscape in Jackson. Most noted that homicide rates have declined in recent years, with several stakeholders reporting levels approaching or returning to pre-COVID baselines. Despite these improvements, violence, particularly firearm-related violence, remains a central concern, especially for youth and young adults. Respondents emphasized that even as fatal violence decreases, the persistence of gun exposure, retaliatory violence, and youth involvement continues to generate fear and instability in affected communities.

At the same time, participants highlighted substantial gaps in understanding nonfatal violence trends, including aggravated assaults and robberies. Limited data availability, inconsistent reporting, and reduced public transparency were described as barriers to accurately characterizing the full scope of violence. Several respondents noted that perceptions of violence are shaped not only by lived experience but also by media coverage and uneven data dissemination, which can amplify fear even as some indicators improve. Overall, the findings suggest that while progress has been made in reducing homicides, violence in Jackson remains unevenly distributed and insufficiently captured by current data systems, complicating prevention and response efforts.

What works in Jackson's violence prevention and why

Participants consistently identified community-based violence intervention approaches as central to effective violence prevention efforts. Programs using credible messengers, violence interrupters, and trusted community members were described as particularly effective in de-escalating conflicts, interrupting cycles of retaliation, and engaging individuals at highest risk. Respondents emphasized that these approaches are most successful when implemented directly in the neighborhoods where violence occurs and when staff have lived experience that fosters trust and legitimacy.

Importantly, participants noted that violence prevention strategies are most effective when paired with economic and social support. Job training, workforce development, education re-engagement, and assistance with basic needs were frequently cited as essential complements to violence interruption. Early engagement with youth and families, consistency over time, and strong relationships with community stakeholders were described as key facilitators of success. Across interviews, respondents stressed that trust, local tailoring, and sustained investment are necessary conditions for violence prevention strategies to achieve and maintain impact.

Barriers to implementation and sustainability

Participants described a range of interrelated barriers that limit the implementation and sustainability of violence prevention initiatives in Jackson. Funding instability emerged as a dominant challenge, with most programs reliant on short-term or competitive grants that restrict staffing, continuity, and the ability to plan for long-term impact. Respondents noted that insufficient resources contribute to staff burnout, limited program reach, and difficulty sustaining engagement with participants over time. Competition for funding and visibility was also described as a barrier, with organizations sometimes operating in silos or duplicating services rather than coordinating efforts.

In addition to resource constraints, participants highlighted challenges related to institutional, political, and relational dynamics. Trust and collaboration with law enforcement were described as uneven, with some programs experiencing skepticism or resistance at the frontline level despite stated leadership support. Political considerations, jurisdictional complexity, and administrative processes were reported to slow implementation or create uncertainty. Participants also emphasized that broader structural conditions, including poverty, housing insecurity, limited access to behavioral health services, and historical disinvestment, increase the demand for prevention services beyond current system capacity. Together, these barriers constrain the ability of violence prevention efforts to scale, sustain impact, and fully meet community needs.

Community engagement, partnerships and information flow

Participants described community engagement and partnership development as highly relationship-driven processes rooted in visibility, trust, and consistent presence. Engagement most often occurs through community events, neighborhood outreach, and direct interaction with residents. Trusted CBOs were frequently described as central hubs that connect residents to services, provide support during crises, and facilitate participation in violence prevention efforts. Respondents emphasized that engagement is strongest when organizations demonstrate care, responsiveness, and long-term commitment to the communities they serve.

Partnerships across community organizations, healthcare systems, public agencies, and law enforcement were sustained through routine communication, shared work, and mutual support. Participants highlighted the importance of showing up, maintaining relationships outside of formal funding cycles, and recognizing partner contributions. Information and resources were shared through a mix of formal and informal channels, including meetings, newsletters, social media, websites, media coverage, and word of mouth. However, respondents noted that coordination challenges, limited staffing, and uneven communication infrastructure constrain the reach and consistency of engagement and information sharing. Together, these

findings suggest that while strong relational networks exist, greater coordination and capacity are needed to support scalable and sustained community engagement.

Recommendations and priority opportunities

Participants offered a range of recommendations aimed at strengthening violence prevention efforts and partnerships in Jackson. The central theme was the need for sustained and intentional investment in community-based violence intervention and prevention programs, particularly those led by trusted local organizations. Respondents emphasized that effective programs exist but are constrained by short-term funding, limited staffing, and insufficient infrastructure to support long-term impact. Most noted that stable funding would allow organizations to retain qualified staff, expand into high-risk areas, and maintain consistent engagement with clients.

In addition to funding, participants highlighted opportunities to improve coordination, data use, and cross-sector collaboration. Recommendations included developing shared platforms for information and resource coordination, improving data collection and transparency to demonstrate program impact, and strengthening data literacy across organizations. Respondents also emphasized the importance of addressing root causes through economic opportunities, education, youth engagement, and behavioral health supports. Finally, participants called for more intentional collaboration among community organizations, health systems, and law enforcement, with a focus on prevention, trust-building, and shared responsibility for reducing violence.

Data systems, gaps, and coordination opportunities

Participants described the use of multiple data systems to inform violence prevention work, including law enforcement data, court records, hospital discharge data, vital statistics, school data, and program-level tracking. Homicide data were generally viewed as the most accessible and routinely analyzed, while data on nonfatal violence, such as aggravated assaults and robberies, were described as less available, delayed, or inconsistently reported. Several respondents noted that this imbalance limits the ability to fully understand violence trends and to target prevention efforts beyond fatal incidents.

Across interviews, respondents emphasized that data systems remain fragmented, with limited integration and inconsistent sharing across agencies and organizations. Differences in reporting standards, jurisdictional boundaries, and data governance were described as barriers to coordination. CBOs frequently rely on informal or manual data collection methods due to resource constraints, which further complicates aggregation and analysis. Participants expressed interest in shared data infrastructure, clearer data sharing agreements, and improved

data literacy to support more coordinated, timely, and prevention-focused decision-making across the trauma care and public health systems.

Using these findings: Practical opportunities for MSDH and UMMC

The findings summarized above reflect perspectives from partners who are actively working to prevent violence in Jackson under complex, resource-constrained conditions. The opportunities outlined below are not recommendations in isolation, but illustrative ways in which MSDH and UMMC could use these findings to strengthen, align, and sustain existing efforts. They are grounded in what participants described as working, where challenges persist, and where institutional roles are complementary.

Opportunities for MSDH

Based on the findings, MSDH is well positioned to support violence prevention through its statewide role in data stewardship, coordination, and funding alignment. Participants consistently identified fragmentation across systems as a challenge, particularly for nonfatal violence data and prevention outcomes. MSDH could use its convening role to support shared definitions, reporting expectations, and data sharing approaches across public health, healthcare, law enforcement, and community partners. Findings also suggest opportunities to use MSDH's funding and policy levers to support longer funding horizons for effective community-based prevention approaches, as well as to invest in evaluation and data literacy support that does not add burden to frontline organizations. Finally, MSDH could use these findings to help align state-level initiatives with local prevention priorities and to serve as a neutral bridge across sectors.

Opportunities for UMMC

As the state's Level I trauma center and a central community partner, UMMC plays a unique role at the intersection of injury care, prevention, and data. Findings highlight opportunities to strengthen hospital-based intervention programming by considering hospital-based interventions which serve youth, extending follow-up and improving handoffs to trusted community partners. Participants also highlighted the potential for UMMC to leverage trauma registry, discharge, and clinical data, in coordination with public health partners, to better understand nonfatal violence patterns. In addition, findings suggest that continued attention to trust, visibility, and community-centered engagement could help address perceptions of UMMC as institution-focused rather than community-embedded. Aligning research and evaluation processes more closely with service delivery and prevention goals may further support these efforts.

Shared opportunities for MSDH and UMMC

Most opportunities identified through interviews are best addressed jointly. Participants described strong interest in shared data infrastructure, coordinated funding strategies, and unified prevention messaging. MSDH and UMMC could use these findings to co-develop shared dashboards or reporting tools, establish joint data governance approaches, and stabilize partnerships with trusted community organizations. Coordinated communication that frames violence prevention as a health-centered, community-led effort may also improve public understanding and trust. Finally, the findings point to opportunities for jointly supported demonstration projects that integrate trauma care, community-based violence intervention, and youth or economic supports.

Conclusions

These findings underscore that violence prevention in Jackson is shaped by a combination of community-led strengths, system-level constraints, and opportunities for improved alignment across health, public safety, and community sectors. While effective strategies and committed partnerships are already in place, sustained impact will depend on continued coordination, stable resources, and improved data infrastructure. Together, the findings offer a shared foundation for MSDH, UMMC, and their partners to strengthen existing efforts and inform future prevention and response activities.

Overall Conclusions

Despite recent declines in some violence types, Jackson continues to experience some of the highest homicide and firearm injury rates in the nation, with Hinds County consistently outpacing both state and national averages. NVSS and NVDRS data show that most homicides are firearm-related, concentrated among Black males ages 15–34, and frequently occur in homes or on streets; intimate partner violence remains a dominant driver for female victims. Similarly, syndromic surveillance (AVERT) and UMMC emergency department data show some groups are at greater risk: males, youth ages 15–24, and Black residents have the highest firearm and youth-violence visit rates. While firearm-related ED visits have declined since 2022, youth-violence visits remain flat, and EMS hotspot maps highlight recurring corridors of higher levels of violence just north and just south of I-20, with peaks on weekend evenings. In the YRBSS, we saw that Mississippi high-school students report higher weapon carrying, physical fights, feeling unsafe, and forced sex than national peers, signaling upstream risk. Despite the availability of multiple rich data systems—NVSS, NVDRS, AVERT, EMS, hospital records, and community-level tracking—these sources remain siloed, inconsistently standardized, and largely unlinked, limiting their usefulness for coordinated prevention. Community-based violence intervention programs, credible messengers, and hospital-based initiatives are demonstrating promise, but they operate with unstable funding, limited staffing, and uneven collaboration with law enforcement and public agencies. Together, these findings underscore the need for sustained investment, shared infrastructure, and cross-sector alignment to reduce violence and support recovery.

Recommendations

In addition to the recommendations outlined at the beginning of the report, CDC’s *Community Violence Prevention Resource for Action* provides a framework that aligns closely with Jackson’s needs, based on key informant interviews.⁸ Recommended strategies include: (1) **Strengthen Economic Security** by expanding job training and employment programs for youth and returning citizens; (2) **Provide Quality Education** such as through early childhood education and programs that keep youth in school; (3) **Create Protective Environments** by using environmental design (e.g., remediating vacant lots, improving lighting and visibility, and Safe Passage) in EMS hotspot corridors; (4) **Promote Healthy Family Relationships** via parenting and family-strengthening programs to address intimate partner violence and household conflict; (5) **Strengthen Youths’ and Young Adults’ Skills** with school-based curricula, conflict-resolution training, and peer mediation; (6) **Connect Young People to Caring Adults and Activities** by investing in mentoring, after-school, and summer programs in hotspot neighborhoods; and

(7) Intervene to Lessen Harms and Prevent Future Risk by expanding UMMC's hospital-based services to include a youth focused hospital-based intervention program, formalizing referrals to trusted CBOs, and sustaining street outreach models that pair violence interruption with wraparound supports. Operationally, we recommend establishing a shared data infrastructure that houses aggregate trends and de-identified, location-specific feeds; standardizing core variables; and piloting pseudonymized unique identifiers to follow individuals through prevention, care, and recovery. MSDH and UMMC could provide data literacy and evaluation support for CBOs, map institutional barriers, and develop common data-use agreements so partners can share information securely. Stabilizing multi-year funding for community-based violence intervention, pairing credible messengers with employment, education, behavioral health, and basic-needs services, and improving transparency on nonfatal violence trends will strengthen frontline capacity. Finally, MSDH and UMMC can use their joint convening power to align funding timelines, co-develop dashboards, hold routine cross-sector coordination meetings, and launch demonstration projects that integrate trauma care, community outreach, and prevention.

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Appendices

1. Firearm violence syndrome definition
2. Youth Violence syndrome definition
3. Data user interview questions
4. Key informant interview questions
5. Mississippi data linkage toolkit
6. Organizations interviewed

Appendix 1. Firearm Violence Syndrome Definition

CDC Firearm Injury v2 Definition Factsheet & Technical Brief

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Definition Description: The aim of this syndrome definition is to assist with rapid detection of potential initial visits for a firearm injury. The following injury intents due to firearms are included in this definition: unintentional, intentional self-directed, assault, undetermined intent, legal intervention, and terrorism. The definition aims to capture only initial encounters for a firearm injury and negate subsequent encounters or sequelae.

New or Revised Definition: Revision of CDC Firearm Injury v1

Date Added to ESSENCE: October 2020

Use-Cases for Definition:

Case-finding: Not Intended as Use Case

Trend monitoring: Primary

Early outbreak detection: Not Intended as Use Case

Emergent Condition: Not Intended as Use Case

Justification: Created and revised by partners in the CDC's National Center for Injury Prevention and Control (NCIPC) to support national, state, and jurisdiction-level querying of emergency department (ED) visits captured by the National Syndromic Surveillance Program to identify those visits related to an initial encounter of a firearm injury, including the following types: unintentional, intentional self-directed, assault, legal intervention, terrorism, and undetermined intent.

In this updated definition, Firearm Injury V2 has 1) updated ICD-9 and ICD-10 diagnosis codes (with and without decimals); 2) updated SNOMED diagnosis codes; and 3) added more free text terms (e.g. struck or hit). This definition was developed in part to support CDC's Firearm Injury Surveillance Through Emergency Rooms (FASTER) program, which encompasses two funding initiatives:

- The FASTER initiative was funded in 2020 and collected near real-time ED data on firearm injuries in 10 states and was funded 9/1/2020 – 8/31/2023.
- The FASTER: Advancing Violence Epidemiology in Real-Time (FASTER: AVERT) initiative was funded in 2023 to collect near real-time ED data on firearm injuries, other violence-related injuries, and mental health conditions in 12 states for 5 years from 9/1/2023 – 8/31/2028.

Data Source During Development: CDC staff utilized emergency room data included in the Chief Complaint Query Validation (CCQV) datasource to evaluate individual chief complaint text terms in the CCQV dataset.

Validation Methods: The query for this syndrome definition was developed in an iterative manner by CDC staff with backgrounds in violence and injury surveillance. Previous versions of the definition were developed in collaboration with local and state health departments who conducted manual visit-level reviews, and CDC also conducted systematic text mining and implemented machine learning approaches to identify inclusion and exclusion terms to query chief complaint text.

Limitations: This definition captures firearm injuries of all intents and does not differentiate firearm injuries by intent type. The definition might underestimate or overestimate ED visits related to firearm injuries because of the variation in coding, reporting, and availability of visit-level data between facilities or over time.

Definition Fields and Structure: Both discharge diagnosis codes (ICD-9-CM, ICD-10-CM, and SNOMED codes) and chief complaint free text with exclusions are used in the definition. If discharge diagnosis codes indicate a firearm injury in the diagnosis field, the ED visit is automatically included in the query result. When discharge diagnosis code information is not available, the ED visit is only included if the chief complaint text has a firearm injury-related term. In addition, the exclusions are only applied to the chief complaint text when a discharge diagnosis code is not present.

Detailed Definition Components

Table 1. Inclusion and exclusion terms included in the CDC Firearm Injury v1 definition.

Terms	Description
<i>Inclusion</i>	
International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)	
E922.0	Accident caused by handgun
E922.1	Accident caused by shotgun (automatic)
E922.2	Accident caused by hunting rifle
E922.3	Accident caused by military firearms
E922.8	Accident caused by other specified firearm missile
E922.9	Accident caused by unspecified firearm missile
E955.0	Suicide and self-inflicted injury by handgun
E955.1	Suicide and self-inflicted injury by shotgun
E955.2	Suicide and self-inflicted injury by hunting rifle
E955.3	Suicide and self-inflicted injury by military firearms
E955.4	Suicide and self-inflicted injury by other and unspecified firearm
E955.9	Suicide and self-inflicted injury by firearms and explosives, unspecified
E965.0	Assault by handgun
E965.1	Assault by shotgun
E965.2	Assault by hunting rifle
E965.3	Assault by military firearms
E965.4	Assault by other and unspecified firearm
E970	Injury due to legal intervention by firearms
E979.4	Terrorism involving firearms
E985.0	Injury by handgun, undetermined whether accidentally or purposely inflicted
E985.1	Injury by shotgun, undetermined whether accidentally or purposely inflicted
E985.2	Injury by hunting rifle, undetermined whether accidentally or purposely inflicted
E985.3	Injury by military firearms, undetermined whether accidentally or purposely inflicted
E985.4	Injury by other and unspecified firearm, undetermined whether accidentally or purposely inflicted
International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)	

W32	Accidental handgun discharge and malfunction
W32.0	Accidental handgun discharge
W32.1	Accidental handgun malfunction
W33	Accidental rifle, shotgun and larger firearm discharge and malfunction
W33.0	Accidental rifle, shotgun and larger firearm discharge
W33.00	Accidental discharge of unspecified larger firearm
W33.01	Accidental discharge of shotgun
W33.02	Accidental discharge of hunting rifle
W33.03	Accidental discharge of machine gun
W33.09	Accidental discharge of other larger firearm
W33.1	Accidental rifle, shotgun and larger firearm malfunction
W33.10	Accidental malfunction of unspecified larger firearm
W33.11	Accidental malfunction of shotgun
W33.12	Accidental malfunction of hunting rifle
W33.13	Accidental malfunction of machine gun
W33.19	Accidental malfunction of other larger firearm
W34	Accidental discharge and malfunction from other and unspecified firearms and guns
W34.0	Accidental discharge from other and unspecified firearms and guns
W34.00	Accidental discharge from unspecified firearms or gun
W34.09	Accidental discharge from other specified firearms
W34.1	Accidental malfunction from other and unspecified firearms and guns
W34.10	Accidental malfunction from unspecified firearms or gun
W34.19	Accidental malfunction from other specified firearms
X72	Intentional self-harm by handgun discharge
X73	Intentional self-harm by rifle, shotgun and larger firearm discharge
X73.0	Intentional self-harm by shotgun discharge
X73.1	Intentional self-harm by hunting rifle discharge
X73.2	Intentional self-harm by machine gun discharge
X73.8	Intentional self-harm by other larger firearm discharge
X73.9	Intentional self-harm by unspecified larger firearm discharge
X74	Intentional self-harm by other and unspecified firearm and gun discharge
X74.8	Intentional self-harm by other firearm discharge
X74.9	Intentional self-harm by unspecified firearm discharge
X93	Assault by handgun discharge
X94	Assault by rifle, shotgun and larger firearm discharge
X94.0	Assault by shotgun
X94.1	Assault by hunting rifle
X94.2	Assault by machine gun
X94.8	Assault by other larger firearm discharge
X94.9	Assault by unspecified larger firearm discharge
X95	Assault by other and unspecified firearm and gun discharge
X95.8	Assault by other firearm discharge
X95.9	Assault by unspecified firearm discharge
Y22	Handgun discharge, undetermined intent
Y23	Rifle, shotgun and larger firearm discharge, undetermined intent
Y23.0	Shotgun discharge, undetermined intent
Y23.1	Hunting rifle discharge, undetermined intent
Y23.2	Military firearm discharge, undetermined intent
Y23.3	Machine gun discharge, undetermined intent

Y23.8	Other larger firearm discharge, undetermined intent
Y23.9	Unspecified larger firearm discharge, undetermined intent
Y24	Other and unspecified firearm discharge, undetermined intent
Y24.8	Other firearm discharge, undetermined intent
Y24.9	Unspecified firearm discharge, undetermined intent
Y35.0	Legal intervention involving firearm discharge
Y35.00	Legal intervention involving unspecified firearm discharge
Y35.001	Legal intervention involving unspecified firearm discharge, law enforcement official injured
Y35.002	Legal intervention involving unspecified firearm discharge, bystander injured
Y35.003	Legal intervention involving unspecified firearm discharge, suspect injured
Y35.01	Legal intervention involving injury by machine gun
Y35.011	Legal intervention involving injury by machine gun, law enforcement official injured
Y35.012	Legal intervention involving injury by machine gun, bystander injured
Y35.013	Legal intervention involving injury by machine gun, suspect injured
Y35.02	Legal intervention involving injury by handgun
Y35.021	Legal intervention involving injury by handgun, law enforcement official injured
Y35.022	Legal intervention involving injury by handgun, bystander injured
Y35.023	Legal intervention involving injury by handgun, suspect injured
Y35.09	Legal intervention involving other firearm discharge
Y35.091	Legal intervention involving other firearm discharge, law enforcement official injured
Y35.092	Legal intervention involving other firearm discharge, bystander injured
Y35.093	Legal intervention involving other firearm discharge, suspect injured
Y38.4	Terrorism involving firearms
Y38.4X	Terrorism involving firearms
Y38.4X1	Terrorism involving firearms, public safety official injured
Y38.4X2	Terrorism involving firearms, civilian injured
Y38.4X3	Terrorism involving firearms, terrorist injured

SNOMED Concepts	
41430008	Shotgun slug, device
56768003	Blunt instrument, device
63409001	Large caliber firearm, device
69861004	Cutlass, device
77301004	Machine gun, device
86122002	Ballistic missile, device
111050005	Spinal manipulation, procedure
219257002	Burns, second degree, disorder
283545005	Rapid eye movement sleep abnormal, finding
218081007	Firearm discharge, finding
218086002	Firearm wound, finding
218082000	Intentional firearm discharge, finding
218087006	Self-inflicted firearm wound, finding
218088001	Accidental firearm wound, finding
269796009	Firearm-related death, finding
242869008	Small firearm, device
219199009	Assault by blunt instrument, event
219200007	Firearm wound, finding

219201006	Firearm wound, intentional self-harm, finding
219204003	Firearm wound, accidental, finding
219205002	Firearm wound, undetermined intent, finding
219203009	Firearm wound, discharge, finding
219198001	Firearm wound, discharge, finding
219142001	Shooting with firearm, event
219143006	Homicide by firearm, event
219144000	Attempted homicide by firearm, event
219145004	Suicide by firearm, event
219146003	Attempted suicide by firearm, event
287184008	Gunshot wound of head, disorder
287193009	Gunshot wound of chest, disorder
Chief Complaint	
GSW	
Gunshot (and common spellings and misspellings)	
Buckshot	
Revolver	
Rifle	
Shotgun	
Firearm	
Pistol	
Handgun	
Been shot	
I was shot	
I got shot	
Combination of hit, ricochet, graze with bullet	
Gun and wound	

<i>Exclusion</i>	
International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)	
Z51.89	Encounter for other specified after care
Chief Complaint	
No gun	
Remove gun	
Heard or hearing gun	
Hit head	
Kickback	
Water gun	
Pellet	
BB gun (and common spellings and misspellings)	
Rubber bullet	
Paint ball gun	
Nerf gun	
Air gun	
Spring gun	

Pistol whip
Nail gun
Staple gun
Stun, laser, or Taser gun
Struck or hit with, in combination with gun or pistol
Bloodshot
Scope
Fake
Allergy shot
Injection
Follow up
Chronic
Wound check, care, recheck, or infection
Drainage
Gswel or Gswol
GSW, gunshot, or bullet and history, ago, past, prior, previous, or old

Table 2. ESSENCE syntax, CDC Firearm Injury v2.

```
(,^[/ ]W3[23]^,andnot,(^[/ ]W3[23]___[DS]^,or,^[/ ]W3[23].___[DS]^),),or,(,^[/ ]W34[01][09]^,or,^[/ ]W34.[01][09]^),andnot,(^[/ ]W34[01][09]___[DS]^,or,^[/ ]W34.[01][09]___[DS]^),),or,(,^[/ ]X7[23]^,andnot,(^[/ ]X7[23]___[DS]^,or,^[/ ]X7[23].___[DS]^),),or,(,^[/ ]X74[89]^,or,^[/ ]X74.[89]^),andnot,(^[/ ]X74[89]___[DS]^,or,^[/ ]X74.[89]___[DS]^),),or,(,^[/ ]X9[34]^,andnot,(^[/ ]X9[34]___[DS]^,or,^[/ ]X9[34].___[DS]^),),or,(,^[/ ]X95[89]^,or,^[/ ]X95.[89]^),andnot,(^[/ ]X95[89]___[DS]^,or,^[/ ]X95.[89]___[DS]^),),or,(,^[/ ]Y2[2-3]^,andnot,(^[/ ]Y2[2-3]___[DS]^,or,^[/ ]Y2[2-3].___[DS]^),),or,(,^[/ ]Y24[89]^,or,^[/ ]Y24.[89]^),andnot,(^[/ ]Y24[89]___[DS]^,or,^[/ ]Y24.[89]___[DS]^),),or,(,^[/ ]Y350[0129]^,andnot,(^[/ ]Y350[0129]___[DS]^,or,^[/ ]Y35.0[0129]^,andnot,(^[/ ]Y35.0[0129]___[DS]^),),or,(,^[/ ]Y38.4^,andnot,(^[/ ]Y38.4___[DS]^),),or,(,^[/ ]Y384^,andnot,(^[/ ]Y384___[DS]^),),or,^[/ ]E922.[012389]^,or,^[/ ]E955.[012349]^,or,^[/ ]E955[012349]^,or,^[/ ]E965.[01234]^,or,^[/ ]E965[01234]^,or,^[/ ]E970^,or,^[/ ]E979.4^,or,^[/ ]E9794^,or,^[/ ]E985.[01234]^,or,^[/ ]E985[01234]^,or,^[/ ]41430008^,or,^[/ ]56768003^,or,^[/ ]63409001^,or,^[/ ]69861004^,or,^[/ ]77301004^,or,^[/ ]86122002^,or,^[/ ]111050005^,or,^[/ ]219257002^,or,^[/ ]283545005^,or,^[/ ]218081007^,or,^[/ ]218086002^,or,^[/ ]218082000^,or,^[/ ]218087006^,or,^[/ ]218088001^,or,^[/ ]269796009^,or,^[/ ]242869008^,or,^[/ ]219199009^,or,^[/ ]219200007^,or,^[/ ]219201006^,or,^[/ ]219204003^,or,^[/ ]219205002^,or,^[/ ]219203009^,or,^[/ ]219198001^,or,^[/ ]219142001^,or,^[/ ]219143006^,or,^[/ ]219144000^,or,^[/ ]219145004^,or,^[/ ]219146003^,or,^[/ ]287184008^,or,^[/ ]287193009^),),or,(,!gsw!,or,^gunshot^,or,^gun shot^,or,^gunshout^,or,^gunshoot^,or,^buckshot^,or,^buck shot^,or,^revolver^,or,^rifle^,or,^rifle^,or,^shotgun^,or,^shot gun^,or,^firearm^,or,^fire arm^,or,^pistol^,or,^handgun^,or,^hand gun^,or,^been shot^,or,^I was shot^,or,^I got shot^,or,(,^hit^,or,^ricochet^,or,^graze^),),and,(^bullet^),),or,(^gun^,and,^wound^),),andnot,(^no gun^,or,^remove gun^,or,^heard gun^,or,^hearing gun^,or,^hit head^,or,^hit my head^,or,^kickback^,or,^kick back^,or,^kicked back^,or,^water gun^,or,^watergun^,or,^pelle^,or,^pellt^,or,^bb ^,or,^bebe gun^,or,^bb gun^,or,^bbgun^,or,^b b gun^,or,^bibi gun^,or,^bi bi gun^,or,^bb pellet^,or,^bee bee^,or,^beebe^,or,^rubber bullet^,or,^paint^,or,^nerf^,or,^nurf^,or,^airgun^,or,^air gun^,or,^airsoft^,or,^air soft^,or,^spring^,or,^pistol whip
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^,or,^pistol whipped^,or,^pistol whipping^,or,(,^nail^,andnot,^damage to nail^,),or,^nailgun^,or,^nail
gun^,or,^staplegun^,or,^staple gun^,or,^stun^,or,^ta[sz]er^,or,^la[sz]er^,or,(,^struck^,or,^hit
with^,),and,(,^gun^,or,^pistol^,),or,^bloodshot^,or,^blood shot^,or,^scope^,or,^fake^,or,^allergy
shot^,or,^injection^,or,^follow-up^,or,^follow
up^,or,^followup^,or,^chronic^,or,(,^wound^,and,(,^check^,or,^care^,or,^recheck^,or,^infection^,or,^infecte
d^,),),o r,^drainage^,or,^gswel^,or,^gswol^,or,(,(!gsw!,or,^gunshot^,or,^gun
shot^,or,^bullet^,),and,(,^hx^,or,^history^,or,^history of^,or,(,^ago^,andnot,^minutes
ago^,),or,^past^,or,^prior^,or,^previous^,or,^old^,),),or,^[; /]Z51.89^,or,^[/]Z5189^,),)

Appendix 2. Youth Violence Syndrome Definition

CDC Youth Violence v1 **Definition Factsheet & Technical Brief**

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Definition Purpose: [Youth violence](#) is the intentional use of physical force or power to threaten or harm others by young people ages 10-24.¹ It typically involves young people hurting peers who are unrelated to them and who they may or may not know well.² It includes fighting, bullying, threats with weapons, and gang-related violence. A young person can be involved with youth violence as a victim, offender, or witness. The syndromic definition for Youth violence does not include sexual violence, intimate partner violence, emotional abuse, family violence, or child abuse/neglect by a parent or family member (definitions to capture these types of violence can be found in ESSENCE). The goal of this syndrome definition is to assist state, local, tribal, territorial, and federal public health practitioners in standardizing, identifying, and monitoring youth violence-related emergency department (ED) visits using syndromic surveillance data. The syndrome definition can improve states and communities’ understanding of trends in youth violence-related ED visits, which can inform timely prevention and response efforts.

Use-Cases for Definition:

- ☐ Case-finding
- ☒ Trend monitoring
- ☐ Early outbreak detection

New or Revised Definition: New

Added to ESSENCE: February 2024

Justification: Violence is a leading cause of death and nonfatal injuries among youth ages 10-24.² Several data sources report on violence victimization in various settings for youth. For example, the National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP), which includes data from a nationally representative probability sample of hospitals in the U.S., reported an estimated 306,538 individuals (rate

of 475 per 100,000 persons) ages 10-24 visited the ED for intentional assault-related injuries in 2021.¹ However, more timely data is needed to help public health practitioners track and understand trends in youth violence treated in EDs in near realtime.

Development Methods: The definition's authors, including subject matter experts from the CDC's Division of Violence Prevention, worked with four jurisdictions (Arizona, Alaska, Kentucky, and New Mexico) to test and validate it using visit data from January to December 2022.

1. The team evaluated diagnosis codes (International Classification of Diseases, 10th Revision (ICD-10-CM) and Systematized Nomenclature of Medicine (SNOMED)) from other violence-related syndrome definitions, assessing whether codes were necessary for identifying a youth-violence related injury, sufficient, or could be removed or recategorized from inclusion to exclusion (or vice versa).
2. The team assessed the chief complaint terms in other violence-related syndrome definitions for inclusion/exclusion in the definition.
3. The team added additional diagnosis codes and chief complaint terms related to violence not included in other violence-related definitions.
4. Participating jurisdictions computed the sensitivity of the definition using case-based surveillance data. Multiple sub-versions of the definition were iteratively analyzed and refined until the current definition (described in detail below) was finalized.

Definition Fields and Structure: The Chief Complaint Discharge Diagnosis (CCDD) field is used to query both the discharge diagnosis codes and chief complaint free text with exclusions (as necessary) to develop the syndrome definition.

It is important to note that youth violence occurs in individuals ages 10-24. As such, this specific age range could be entered into the query, or the NCHS Age Grouping preset categories could be used (select both 11-14 AND 15-24).

When running this definition, the following existing definitions in ESSENCE must be excluded:

- Sexual Violence v1
- Sexual Violence v2
- CDC Sexual Violence v3
- CDC Suspected Child Abuse and Neglect v1
- Intimate Partner Violence v1
- CDC Intimate Partner Violence v2
- CDC Suicide Attempt v1
- CDC Suicidal Ideation v1

This may be done by adding the following to "CCDD category free text" field:

```
ISNULL,or,^,ANDNOT,(,^Sexual Violence v[123]^,or,^;CDC Suspected Child Abuse and Neglect v1;^,or,^;Intimate Partner Violence v1;^,or,^;CDC Intimate Partner violence v2;^,or,^;CDC Suicide Attempt v1;^,or,^CDC Suicidal Ideation v1;^,)
```

Visits are classified as youth violence-related if:

1. The discharge diagnosis field includes an "included" code, even if the chief complaint is not specific to youth violence
For example, if a discharge diagnosis code is violence-related (e.g., ICD-10-CM Y04, assault by bodily force) but the chief complaint does not include violence-related terms (e.g., shortness of breath)

OR

2. The chief complaint includes a term specific to youth violence, but the discharge diagnosis field does not contain an included code
For example, if a chief complaint includes “patient was assaulted,” but there is not a discharge diagnosis code indicating a violence-related injury OR
3. There is agreement in both the discharge diagnosis field and the chief complaint field that a visit is youth violence-related
For example, if a chief complaint includes “patient was at the gas station and robbed and then hit on the top of the head with an unknown object,” and there is a corresponding violencerelated discharge diagnosis code (e.g., Y09, assault by unspecified means)

Validation Results: The positive predictive value (PPV) across the jurisdictions ranged from 72-99%.

Limitations: This definition has some limitations, including the inability to detect youth violence-related injuries if the specified chief complaint terms or discharge diagnosis codes are not included in the patient visit. Additionally, most patient visits do not provide enough information to determine whether the patient was the perpetrator or the victim of youth violence. Additional violence related chief complaint terms (e.g. hit, cut, kicked) were validated but not included in the definition due to numerous other injuries that are not related to violence. Although true positives are determined based on chief complaints and discharge diagnoses, several states used supplementary fields in ESSENCE, such as triage notes or clinical impressions, to note false positives. This resulted in lower PPVs than classification based only on CCDD data.

Detailed Definition Components

Table 1. *Inclusion and exclusion terms based on a case definition using violence/assault discharge diagnosis codes, CDC Youth Violence definition*

Variable Type	Terms	Description (Diagnosis Codes Only)
<i>Inclusions</i>		
Chief Complaint Terms	Assault	
	Beat/ing [up]	
	Beat/ing him/her/them	
	Catch/caught hands	
	Threw hands	
	Caught a fade	
	Fight/fought	
	Altercation	
	I/he/she/patient was attacked	
	Attacked by	
	Brawl	
	Violence	
	Violent	
	Robbed/robbing/robbery	
	Mugged/mugging/mugger	

	Was/they/got jumped	
	GSW	
	Gunshot	
	Gun wound	
	Revolver	
	Rifle	
	Shotgun	
	Firearm	
	Pistol	
	Handgun	
	Been shot	
	I was/got shot	
	Bullet	
	Hit	
	Ricochet	
	Graze	
	Buckshot	
	Pistol whip	
	Struck or hit with gun (or pistol)	
Discharge Diagnosis: ICD-9-CM	E96[0-9]	Assault codes
	E979	Terrorism codes
	E999.1	Injury due to terrorism

Discharge Diagnosis: ICD-10-CM	X92	Assault by drowning and submersion
	X93	Assault by handgun discharge
	X94	Assault by rifle, shotgun and larger firearm discharge
	X95	Assault by other and unspecified firearm and gun discharge
	X96	Assault by explosive material
	X97	Assault by smoke, fire and flames
	X98	Assault by steam, hot vapors and hot objects
	X99	Assault by sharp object
	Y00	Assault by blunt object
	Y01	Assault by pushing from high place
	Y02	Assault by pushing or placing victim in front of moving object
	Y03	Assault by crashing of motor vehicle
	Y04	Assault by bodily force
	Y07	Perpetrator of assault, maltreatment and neglect
	Y08	Assault by other specified means
	Y09	Assault by unspecified means
	T54.1X3	Toxic effect of other corrosive organic compounds, assault

SNOMED Concepts	T54.2X3	Toxic effect of corrosive acids and acid-like substances, assault
	T54.3X3	Toxic effect of corrosive alkalis and alkali-like substances, assault
	T71.XX3	Asphyxiation assault
	242869008	Assault by firearms
	219199009	Assault by handgun
	219200007	Assault by pistol
	219201006	Assault by revolver
	219204003	Assault by hunting rifle
	219205002	Assault by military firearm
	219203009	Assault by shotgun
	219198001	Assault by firearms and explosives
	11385001	Assault and battery
	219218005	Assault by cutting and stabbing instruments
	52684005	Exposure to attack by other person (event)
	269732008	Assault by corrosive substance, except poisoning (event)
	219182008	Assault by acid
	242856009	Assault by ammonia
	242857000	Assault by caustic alkalies
	219184009	Assault by caustic substance (event)
	219181001	Assault by corrosive or caustic substance, except poisoning
	219240001	Assault by criminal neglect (event)
	219241002	Abandonment of child with intent to injure or kill (event)
	242872001	Assault by cutting (event)
	242878002	Assault by cutting with axe
	242873006	Assault by cutting with knife
	242874000	Assault by cutting with craft knife (event)
	242876003	Assault with broken glass or bottle
	242875004	Assault with razor
	242886002	Assault by puncture wound
	242888001	Assault with stiletto (event)
	242887006	Assault with used injection needle (event)

	219197006	Assault by drowning
	274954001	Assault by explosive device
	219207005	Assault by antipersonnel bomb
	219213001	Assault by bomb in house
	242870009	Assault by booby trap bomb (event)
	219212006	Assault by car bomb (event)
	219214007	Assault by dynamite
	219208000	Assault by gasoline bomb (event)
	242871008	Assault by land-mine (event)
	219209008	Assault by letter bomb (event)
	219231000	Assault by fire and burning
	219232007	Assault by arson (event)
	242921009	Assault by branding

242920005	Assault by cigarette burn
219239003	Assault by hot liquid (event)
219191007	Assault by hanging and strangulation
219192000	Assault by garrotting or ligature
219193005	Assault by hanging (event)
269734009	Assault by manual strangulation (event)
219194004	Assault by strangulation (event)
219195003	Assault by suffocation (event)
242868000	Assault by high intensity noise
429626008	Assault by friend (event)
429580005	Assault by legal official
428498002	Assault by stranger
428500001	Assault by unrelated caregiver
428200002	Assault by person
242930001	Assault by physical restraint (event)
242931002	Assault by binding
242934005	Assault by physical restraint with adhesive tape (event)
242933004	Assault by physical restraint with handcuffs
242932009	Assault by physical restraint with rope or cord (event)
242936007	Assault by blindfolding
242935006	Assault by gagging (event)
219186006	Assault by poisoning
219187002	Assault by poisoning by drugs or medicines
269733003	Assault by poisoning by gas or vapor (event)
302986003	Assault by poisoning by non-pharmaceutical substances (event)
242858005	Assault by poisoning with local irritant (event)
242859002	Assault by poisoning with ammonia
242861006	Assault by poisoning with bleach
242864003	Assault by poisoning with mace spray (event)
242860007	Assault by poisoning with pepper dust
242863009	Assault by poisoning with perfume spray (event)
219234008	Assault by pushing from high place
219235009	Assault by striking by blunt or thrown object (event)
219236005	Assault by striking with blunt object (event)
242908002	Assault with baseball bat
242913003	Assault with club (event)
242910000	Assault with hammer (event)
242914009	Assault with held brick
242911001	Assault with poker
242907007	Assault with stick (event)
242912008	Assault with truncheon (event)
242909005	Assault with walking stick (event)

242919004	Assault by striking with thrown stone (event)
219237001	Assault by striking with thrown object (event)
242924001	Assault by pushing from moving vehicle
242926004	Assault by pushing from moving motor vehicle (event)
242925000	Assault by pushing from moving train

242927008	Assault by pushing into path of moving vehicle
242929006	Assault by pushing into path of moving motor vehicle
242928003	Assault by pushing into path of train
242923007	Assault by striking with motor vehicle (event)
242922002	Assault involving moving vehicles
242889009	Assault with body part (event)
242903006	Assault by human bite (event)
242896006	Blow with elbow
242897002	Blown with knee (event)
242895005	Head butt
242898007	Held by assailant (event)
242901008	Grasped and twisted by assailant (event)
242900009	Grasped with arm (event)
242899004	Grasped with hand (event)
242902001	Sat on by assailant
242894009	Intentional tripped
242892008	Kick with foot
242893003	Kick with shod foot (event)
242905004	Pinched
242890000	Punch with fist (event)
242904000	Scratched with fingernails
242891001	Slap with open hand (event)
242865002	Assault with electrical device (event)
242866001	Assault by torture with electric current
242867005	Assault with electric antipersonnel device
242915005	Assault with flexible instrument (event)
242916006	Assault with cane (event)
242918007	Assault with strap
242917002	Assault with whip
219222000	Cut in fight (event)
274229005	Fight – assault
219223005	Stabbed in fight (event)
50084004	Battery

Exclusions

Chief Complaint Terms	Heart beat; hrt beat	
	Heart is beat; beath	
	Heart skips	
	Difficulty beat	
	Premature beats	
	Extra beats	
	Feels beat	
	Verbal altercation	
	Acting	
	Play	
	Threat	
	Feel[is]	

No injury	
Followup	
Chronic	
Wound check	

Wound care	
Wound recheck	
Wound infection	
Wound infected	
Drainage	
Gswel/Gswol	
No gun	
Remove gun	
Heard gun	
Hearing gun	
Hit [my] head	
Kickback	
Water gun	
Pellet	
BB gun	
Bebe/bibi/beebe gun	
BB pellet	
Rubber bullet	
Paint	
Nerf	
Airgun	
Airsoft	
Spring	
Nail gun	
Damage to nail	
Staplegun	
Stun	
Ta[sz]er	
Bloodshot	
Scope	
Fake	
Allergy shot	
Injection	
Self inflicted	
Self caus	
Accident	

	Unintent	
	Ideation	
	Attacked or assaulted by sister	
	Attacked or assaulted by brother	
	Attacked or assaulted by sibling	
	Attacked or assaulted by cousin	
	Attacked or assaulted by caretaker	
	Attacked or assaulted by relative	
	Attacked or assaulted by son	
	Attacked or assaulted by daughter	
	Attacked or assaulted by mother/mom	
	Attacked or assaulted by father/dad	
	Attacked or assaulted by nurse	
	Attacked or assaulted by animal	
	Attacked or assaulted by dog	
	Panic attack	
	Anxiety attack	
	Asthma attack	
	Psychiatric	
	Psych eval	
	Mental health eval	
Discharge Diagnosis: ICD-10-CM	Z13.3	Encounter for screening examination for mental health and behavioral disorders
	Z51.89	Encounter for other specified aftercare
	X7[1-9]-X8[0-3]	Intentional self-harm codes

Table 2. CCDD Parsed, *ESSENCE* syntax, *CDC Youth Violence Definition V1*

(, (, (^ass[au]lt^, OR, ^ass[au][au]lt^, OR, ^beat^, ANDNOT, (^heartbeat^, OR, ^heart beat^, OR, ^heart is beat^, OR, ^difficulty beat^, OR, ^beath^, OR, ^hrt beat^, OR, ^feels beat^, OR, ^heart skips^, OR, ^extra beats^, OR, ^premature beats^,), OR, ^beat up^, OR, ^beating up^, OR, ^beat him^, OR, ^beat her^, OR, ^beat them^, OR, ^beating him^, OR, ^beating her^, OR, ^beating them^, OR, ^catch hands^, OR, ^caught hands^, OR, ^caught those hands^, OR, ^caught a fade^, OR, ^threw hands^, OR, (^fight^, ANDNOT, ^play^,), OR, ^fought^, OR, (^altercation^, ANDNOT, ^verbal altercation^,), OR, ^I was attacked^, OR, ^he was attacked^, OR, ^she was attacked^, OR, ^patient was attacked^, OR, ^attacked by^, OR, ^brawl^, OR, ^pistol whip ^, OR, ^pistol whipped^, OR, ^pistol whipping^, OR, (^violence^, OR, ^violent^,), ANDNOT, (^acting^, OR, ^threat^, OR, ^feel[is]^,), OR, (^robbed^, OR, ^robbery^, OR, ^robbing^, OR, ^robber^, OR, ^mugging^, OR, ^mugged^, OR, ^mugger^, OR, ^was jumped^, OR, ^they jumped^, OR, ^got jumped^,), ANDNOT, (^no injury^,),), OR, (^ass[au]lt^,), AND, (^!gsw!, OR, ^gunshot^, OR, ^gun shot^, OR, ^gunshout^, OR, ^gunshoot^, OR, ^buckshot^, OR, ^buck shot^, OR, ^revolver^, OR, ^rifle^, OR, ^rifle^, OR, ^shotgun^, OR, ^shot gun^, OR, ^firearm^, OR, ^fire

arm^,OR,^pistol^,OR,^handgun^,OR,^hand gun^,OR,^been shot^,OR,^I was shot^,OR,^I got
shot^,OR,(,^struck^,OR,^hit
with^,),AND,(,^gun^,OR,^pistol^,),OR,(,^hit^,OR,^ricochet^,OR,^graze^,),AND,(,^bullet^,),),OR,(,^gun^,A
ND,^w ound^,),),ANDNOT,(,^no gun^,OR,^remove gun^,OR,^heard gun^,OR,^hearing gun^,OR,^hit
head^,OR,^hit my head^,OR,^kickback^,OR,^kick back^,OR,^kicked back^,OR,^water
gun^,OR,^watergun^,OR,^pelle^,OR,^pellit^,OR,^ bb ^,OR,^bebe gun^,OR,^bb gun^,OR,^bbgun^,OR,^b
b gun^,OR,^bibi gun^,OR,^bi bi gun^,OR,^bb pellet^,OR,^bee bee^,OR,^beebe^,OR,^rubber
bullet^,OR,^paint^,OR,^nerf^,OR,^nurf^,OR,^airgun^,OR,^air gun^,OR,^airsoft^,OR,^air
soft^,OR,^spring^,OR,(,^nail^,ANDNOT,^damage to nail^,),OR,^nailgun^,OR,^nail
gun^,OR,^staplegun^,OR,^staple
gun^,OR,^stun^,OR,^ta[sz]er^,OR,^la[sz]er^,OR,^bloodshot^,OR,^blood
shot^,OR,^scope^,OR,^fake^,OR,^allergy shot^,OR,^injection^,OR,^follow-up^,OR,^follow
up^,OR,^followup^,OR,^chronic^,OR,(,^wound^,AND,(,^check^,OR,^care^,OR,^recheck^,OR,^infection^,
OR,^inf
ected^,)),OR,^drainage^,OR,^gswel^,OR,^gswol^,OR,^;Z5189^,)),ANDNOT,(,^selfinflicted^,OR,^self
inflicted^,OR,^self caus^,OR,^self
harm^,OR,^accident^,OR,^unintent^,OR,^threat^,OR,^ideation^,OR,^;X7[1-
9]^,OR,^;X8[0-3]^,)),ANDNOT,(,^attacked^,OR,^assaulted by^,OR,^assaulted
by^,),AND,(,^sister^,OR,^brother^,OR,^sibling^,OR,^cousin^,OR,^caretaker^,OR,^relative^,OR,^son^,OR,
^daugh
ter^,OR,^mother^,OR,^mom^,OR,^father^,OR,^dad^,OR,^nurse^,OR,^friend^,OR,^animal^,OR,^dog^,)),
OR,^;X9
[2-9]^,OR,^Y0[0-9]^,OR,^;T54[123]X3^,OR,^;T71XX3^,OR,^;E96[0-
9]^,OR,^;E979^,OR,^;E9991^,OR,^;242869008;^,OR,^;219199009;^,OR,^;219200007;^,OR,^;219201006
;^,OR,^
;219204003;^,OR,^;219205002;^,OR,^;219203009;^,OR,^;219198001;^,OR,^;11385001;^,OR,^;2192180
05;^,OR
;^;52684005;^,OR,^;269732008;^,OR,^;219182008;^,OR,^;242856009;^,OR,^;242857000;^,OR,^;219184
009;^,O
R,^;219181001;^,OR,^;219240001;^,OR,^;219241002;^,OR,^;242872001;^,OR,^;242878002;^,OR,^;242
873006;
^,OR,^;242874000;^,OR,^;242876003;^,OR,^;242875004;^,OR,^;242886002;^,OR,^;242888001;^,OR,^;2
428870
06;^,OR,^;219197006;^,OR,^;274954001;^,OR,^;219207005;^,OR,^;219213001;^,OR,^;242870009;^,OR,
^;2192
12006;^,OR,^;219214007;^,OR,^;219208000;^,OR,^;242871008;^,OR,^;219209008;^,OR,^;219231000;^,
OR,^;2
19232007;^,OR,^;242921009;^,OR,^;242920005;^,OR,^;219239003;^,OR,^;219191007;^,OR,^;21919200
0;^,OR,
^;219193005;^,OR,^;269734009;^,OR,^;219194004;^,OR,^;219195003;^,OR,^;242868000;^,OR,^;42962
6008;^,
OR,^;429580005;^,OR,^;428498002;^,OR,^;428500001;^,OR,^;428200002;^,OR,^;242930001;^,OR,^;24
293100
2;^,OR,^;242934005;^,OR,^;242933004;^,OR,^;242932009;^,OR,^;242936007;^,OR,^;242935006;^,OR,^
;21918
6006;^,OR,^;219187002;^,OR,^;269733003;^,OR,^;302986003;^,OR,^;242858005;^,OR,^;242859002;^,
OR,^;24
2861006;^,OR,^;242864003;^,OR,^;242860007;^,OR,^;242863009;^,OR,^;219234008;^,OR,^;219235009
;^,OR,^
;219236005;^,OR,^;242908002;^,OR,^;242913003;^,OR,^;242910000;^,OR,^;242914009;^,OR,^;242911
001;^,O
R,^;242907007;^,OR,^;242912008;^,OR,^;242909005;^,OR,^;242919004;^,OR,^;219237001;^,OR,^;242
924001;

^,OR,^;242926004;^,OR,^;242925000;^,OR,^;242927008;^,OR,^;242929006;^,OR,^;242928003;^,OR,^;242923007;^,OR,^;242922002;^,OR,^;242889009;^,OR,^;242903006;^,OR,^;242896006;^,OR,^;242897002;^,OR,^;242895005;^,OR,^;242898007;^,OR,^;242901008;^,OR,^;242900009;^,OR,^;242899004;^,OR,^;242902001;^,OR,^;242894009;^,OR,^;242892008;^,OR,^;242893003;^,OR,^;242905004;^,OR,^;242890000;^,OR,^;242904000;^,OR,^;242891001;^,OR,^;242865002;^,OR,^;242866001;^,OR,^;242867005;^,OR,^;242915005;^,OR,^;242916006;^,OR,^;242918007;^,OR,^;242917002;^,OR,^;219222000;^,OR,^;274229005;^,OR,^;219223005;^,OR,^;50084004;^,ANDNOT, (^panic attack^,OR,^anxiety attack^,OR,^asthma attack^,OR,^psychiatric^,OR,^psych eval^,OR,^mental health eval^,OR,^;Z133^,)

Appendix 3. Data User Interview Guide

To be completed by the interviewer at the beginning of the interview:		
Interview ID <i>DU + [2 digit month] + [2 digit day] + [first initial of interviewer's first name] + [first initial of interviewer's last name] + [# of interview overall]. E.g., DU1117NV01</i>		
Service Provider ID <i>MS2025 + SP + [sequential number – 001, 002], e.g.: MS2025SP001</i>		
Date of interview		
Site of interview		
Lead Interviewer name		
Notetaker name		
Start Time		
Stop Time		
Agreed to the interview?	Yes No (underline) Witness Initials:	
Agreed to the audio recording?	Yes No (underline) Witness Initials:	
Interviewee information	Occupation Specialty	Years worked in specialty
Participant #1		
Participant #2 (if applicable)		
Participant #3 (if applicable)		

Hello, [name/names]. Thank you for taking the time to speak with me today. My name is [insert name]. I am/we are here with the Centers for Disease Control and Prevention (CDC), working

with the Mississippi State Department of Health (MSDH) and the University of Mississippi Medical Center (UMMC).

The purpose of this interview is to gain a deeper understanding of the data being utilized for violence prevention efforts, including the types of data captured and the data quality. We also seek to map the current data sources to identify any gaps in data collection across different partners, including how data is collected and linked across different systems, and how it is used. Insights from participants will be instrumental in understanding how data can be leveraged to support an evidence-based approach to violence prevention through data sharing.

The interview will take approximately 60 minutes. We are interested in your thoughts and perspectives, so there are no right or wrong answers. This interview is voluntary, and you can stop at any time or skip any questions you do not want to answer. The information you share will be combined with information from other interviews. Neither you nor your organization will be personally identified in any reports or publications. Quotes from this interview may be used to accurately convey your perspective; however, nothing will be shared or published that can identify you or your organization.

We would like to audio record this interview and take detailed written notes. The purpose of recording is to ensure that we are accurately capturing your thoughts, experiences, and perspectives. If you do decide to stop the interview, we will delete the recording, and the information provided during your interview will not be included in our analysis. These audio recordings will be transcribed using a HIPAA compliant AI transcription application. The recording will be destroyed after we are able to complete our analysis or after six months, whichever occurs first. Are there any questions about the recording?

[If the participant refuses recording]. Ok, instead my colleague [insert name] will take detailed notes.

Any questions before we start? We will begin recording now.

Questions for Stakeholders

Tell us a little about yourself and your role:

Now we'll discuss the data logistics and data flow. .

1. What type of violence are you monitoring/collecting?
 1. Probe: How do you use that data for violence prevention?

2. Can you walk us through how you obtain and process the violence-related data you have? (in other words, your data flow)
 1. Probe: What are the variables you use to link data sources?
 2. Probe: What organizations do you share data with?
 3. Probe: What data do you share?

Now we will switch gears and discuss the challenges and strengths of the data being monitored or collected.

4. What challenges do you face in collecting violence-related data?
5. What challenges do you face in sharing or accessing violence-related data?
6. How timely and complete do you consider the available data on violence?
7. What population is represented in your data?
 1. Probe: What population is missed from your data?

Now that we have discussed some issues and strengths, let's discuss how the data could be improved.

8. What improvements would make the data more useful for your violence prevention efforts?
 1. Probe: How do you think the data you have supports or hinders your violence prevention efforts?
9. What are some opportunities for better data sharing or linkage with other organizations?
 1. Probe: If you could add more data elements to the data you have in-house, what would you add?
10. What barriers exist to ongoing sharing and collaboration around violence surveillance data?

Before we wrap-up this insightful discussion...

11. Are there any others we should speak to regarding violence data?
12. Is there anything else that we need to understand that we didn't touch on today?
 1. Probe: Is there anything else you'd like to add to our discussion before we end?

Conclusion

Thank you for taking the time to share your experience with us today. Those are all the questions I have for you. I'm going to [end our recording/stop taking notes] now [*End recording and note-taking*].

[*Share any additional information about dissemination of results/products*]

Appendix 4. Key Informant Interview Guide

To be completed by the interviewer at the beginning of the interview:		
Interview ID <i>KI + [2 digit month] + [2 digit day] + [first initial of interviewer's first name] + [first initial of interviewer's last name] + [# of interview overall].</i> <i>E.g., KI1117NV01</i>		
Date of interview		
Site of interview		
Lead Interviewer name		
Notetaker name		
Start Time		
Stop Time		
Agreed to the interview?	Yes No (underline) Witness Initials:	
Agreed to the audio recording?	Yes No (underline) Witness Initials:	
Interviewee information	Occupation Specialty	Years worked in specialty
Participant #1		
Participant #2 (if applicable)		
Participant #3 (if applicable)		
Participant #4 (if applicable)		
Participant #5 (if applicable)		

Hello, [name/names]. Thank you for taking the time to speak with me today. My name is [insert name]. I am/we are here with the Centers for Disease Control and Prevention (CDC), working with the Mississippi State Department of Health (MSDH) and the University of Mississippi Medical Center (UMMC).

The purpose of this key informant interview is to gain a deeper understanding of violence prevention efforts, including existing strategies, programs, and collaborations aimed at prevention within the city of Jackson, MS. We also seek to understand perspectives on the current state of violence and violence prevention in Jackson, MS. We anticipate the interviews to identify perceived gaps, challenges, and opportunities for improvement to inform future initiatives. Insights from participants will be instrumental in shaping a more comprehensive and effective approach to violence prevention in our community.

The interview will take approximately 1 hour. We are interested in your thoughts and perspectives, so there are no right or wrong answers. This interview is voluntary, and you can stop at any time or skip any questions you do not want to answer.

The information you share will be combined with information from other interviews. Neither you nor your organization will be personally identified in any reports or publications. Quotes from this interview may be used to accurately convey your perspective; however, nothing will be shared or published that can identify you or your organization.

We would like to audio record this interview and take detailed written notes. The purpose of recording is to ensure that we are accurately capturing your thoughts, experiences, and perspectives. If you do decide to stop the interview, we will delete the recording, and the information provided during your interview will not be included in our analysis. These audio recordings will be transcribed using a HIPAA compliant AI transcription application. The recording will be destroyed after we are able to complete our analysis or after six months, whichever occurs first. Are there any questions about the recording?

Just to reiterate, we're interested in your thoughts and perspectives and there are no right or wrong answers.

[If the participant refuses recording]. Ok, instead my colleague *[insert name]* will take detailed notes.

Any questions before we start? We will begin recording now.

Let's start by briefly getting to know each other. As I mentioned I am with the CDC and we are working with the MSDH and UMMC.

1. Can you tell me a bit about yourself and what you do for work?
 - a. Probes:
 - i. How long have you been in this role?

We will now talk about your ***perspective on violence and violence prevention*** in Jackson.

2. How would you describe the current state of violence in Jackson?
 - a. Probes:
 - i. What types of violence are most concerning in Jackson to you?
 - ii. How do you think violence has changed in Jackson?
 - iii. Since you lived here?
3. What violence prevention strategies or programs do you believe have been most effective?
 - a. Probes:
 - i. Based on types of violence reported earlier – why?
4. What challenges or barriers do you see in implementing or sustaining violence prevention initiatives?
 - a. Probes:
 - i. By types of violence reported earlier
5. How are community members engaged in violence prevention efforts?
 - a. Probes:
 - i. What would increase the likelihood of community member engagement?
 - ii. What do you think are barriers individuals face in accessing your programs or initiatives?

[Organization/Program domain]

6. From your perspective, what has helped facilitate your program's success?
7. What are some barriers you have encountered in implementing your program?
8. What data or data systems are used to inform your organization's violence prevention work?
 - a. Probes:
 - i. What gaps data management, data resources, or data coordination do you think need to be addressed?
9. What other organizations, agencies, or groups are you currently working with in violence prevention efforts?

- a. Probes:
 - i. How do you work with these organizations, agencies, or groups?
- ii. What steps did you take to establish and develop a partnership?
 - iii. What strategies did you use to maintain the partnership?
 - iv. Can you share any challenges you faced during this process and how you overcame them?
- 10. How are information and resources about violence and prevention efforts shared among community members and partners?
- 11. What recommendations do you have for improving violence prevention efforts and partnerships in Jackson?
 - a. What additional resources would strengthen violence prevention work in the city?

This has been an insightful discussion. As we **wrap-up** we wanted to know...

- 14. Is there anything else you would like to share about violence prevention or related needs in the community?

Conclusion

Thank you for taking the time to share your experience with us today. Those are all the questions I have for you. I'm going to [end our recording/stop taking notes] now [*End recording and note-taking*].

[*Share any additional information about dissemination of results/products*]

Appendix 5. Mississippi Data Linkage Toolkit

In the absence of data access to enable data linkage as requested by Mississippi's Department of Health for the Epi-Aid, CDC is providing a brief data linkage toolset to supplement CSTE's Injury Data Linkage Toolkit.⁹ The purpose of the linkage toolkit is to guide methods for those partaking in Mississippi violence prevention efforts.

Objectives of data linkage

Prior to any data linkage, the objectives and aims of the data linkage could be clearly stated and agreed upon and understood by all data owners.

Data governance and confidentiality

Working with sensitive personally identifiable information (PII), particular data that is not owned by your organization, will typically require certain governance standards in terms of who has access, how the data is being used and analyzed, how it is being stored, and how it will be discarded. Ensure that only the minimum number of users necessary have access to the data and consider deidentifying the data where possible by creating a unique identifier for each individual in the data after the linkage is done where possible. Ensure also that storage is held in the most appropriate location for governance purposes, and that there is clear documentation on how and when the data is discarded. Typically, organizations and data user agreements will outline what this is.

Software

Software for data cleaning, preparation and data linkage includes R, SAS, and Python. R and Python are free software, are well-equipped to deal with big data and probabilistic matching and are therefore recommended for data linkage work. R particularly is user-friendly and has excellent data visualization packages and free documentation. For more information on linking datasets using R, see Applied Epi's comprehensive The Epidemiologist R Handbook.¹⁰

Source dataset

A source dataset could be chosen based on the purpose of the linkage. As an example, if the purpose of the linkage is to see how many hospitalizations resulted in death, the source dataset

would be the hospitalizations onto which one would link the mortality dataset. The source dataset is the dataset that will retain all its rows.

Understanding data sources

Often, a dataset will be an extract from a database that includes the complete data. Understanding what the extract represents is crucial prior to linkage. Before linking datasets, it is crucial to understand whether all datasets being linked represent the same **time period** and **population**.

In our example above, if the hospitalizations dataset covers hospitalizations between 2019 and 2023 in all hospitals in Jackson, MS but the mortality dataset covers deaths occurring in Hinds County between 2018 and 2021, these datasets would not be appropriate to link because they cover different populations and time periods.

Data cleaning

Regardless of what linkage method is used, most data sources must be 'cleaned' to standardize variables for linkage. As an example, "*123 DRURY LN*" is the same address as "*123 Drury Ln*" in practice, or "*January 1, 2021*" the same as "*01/01/2021*" but programmatically these are not equivalent.

Another step in data cleaning is deduplicating records. This requires careful consideration into what the data is representing. For example, hospital records may show multiple records per individual. Deduplicating could involve either removing duplicate hospitalization records, or it could involve removing all but one hospitalization records for the individual if the analysis requires only the first hospital episode.

Data can be imputed where missing. If there are multiple records with missing values, some values can be inferred. For example, if all the data extracted is from a specific hospital in Mississippi but some records are missing the 'Zipcode', 'City' or 'State' field for the treatment address, these could be inferred and inserted from the hospital address. Data imputation can be done statistically, such as filling missing quantitative values with averages.

Missing data

It is unlikely that data from both or all sources will be complete and that records will match exactly. Using the previous example, some hospitalizations will not have resulted in deaths and

therefore will not have corresponding death records, resulting in blank mortality variables after the linkage. Others may have death records but that do not match the hospitalization records. For this reason, it is important to understand what type of linkage is appropriate according to the variables in the data.

Type of linkage

Ideally, you can link based on a common unique variable present in both datasets such as medical record number or social security number depending on the data available. If a common variable is not present, there are 2 types of linkage possible: deterministic or probabilistic.

A deterministic linkage links based on multiple non-unique variables like first name, last name and date of birth. Consider that deterministic linkage requires variables to be standardized across datasets. For example, first name or last name would be a string of characters and linkage is case-sensitive, and therefore *"FIRSTNAME"* is not equivalent to *"Firstname"* or *"firstname"*. Likewise, date formats could be standardized, preferably in the *YYYY-MM-DD* format. In this way, a deterministic linkage matches records exactly as they are based on multiple fields.

A probabilistic linkage is more complicated and relies on weighting. It requires thresholds for determining whether two records describe the same entity. For example, a probabilistic linkage would be useful in establishing whether *"John J. Doe"* of *"123 Drury Lane"* is the same entity as *"Johnny J Doe"* of *"123 Drury Ln"*. For more information, refer to CSTE's Injury Data Linkage Toolkit.⁹

Linkage variables examples

- First name and last name
- Date of birth
- Medical record number
- Social security number
- Date of death
- Address
- Date of incident

Linkage quality assessment

To evaluate the linkage quality, consider the following: How does the number of linked records compare to the number of linked records that was expected? How many unlinked records are there? What is the degree of missingness of key variables? Unlinked records can be reviewed separately and manually to understand why some records remain unmatched.

Probabilistic matching will typically have a weighted probability matching score indicating the degree of agreeability between matched records. For more information on this, please refer to CSTE's Injury Data Linkage Toolkit.

Considerations for data analysis

- What population is represented by the data and what population is missing? This could be included in any output report.
- If data is at all imputed, then consider the bias on any estimates derived from the data.
- Could unlinked records be included or discarded for the analysis?
- How does the missingness of each variable impact the analysis and output?
- What could be a reason for duplicate records in the data source?
- Reducing the dataset to only the variables/columns needed for the analysis can help with computationally expensive analysis. For example, consider removing names and date of births for the analysis and replacing them with a unique computer-generated identifier and age.

Appendix 6. Organizations Interviewed

Organization interviewed	Organization type
Operation Good	Community-based organization
Strong Arms	Community-based organization
Mississippi Department of Public Health (MSDH)	Public health agency
Peoples Advocacy Institute (PAI)	Community-based organization
Jackson Resource Center	Community-based organization
Living With Purpose	Community-based organization
Jackson Police Department (JPD)	Law enforcement
Mississippi Capitol Police Department	Law enforcement
Mississippi Office of Violence Prevention and Trauma Recovery	Community-based organization
Jackson State University (JSU)	Academic institution
University of Mississippi Medical Center (UMMC)	Academic institution; Healthcare
Youth court system	Judicial system
Jackson HEALS	Community-based organization
Department of Public Safety	Governmental agency
Office of Neighborhood Safety and Engagement	Governmental agency