

Toward a Better Estimate of Domestic Violence in America

Methodology

The analysis, entitled, *Toward a Better Estimate of Domestic Violence in America*, presents a new method to estimate sub-national domestic violence trends that uses a set of normalized data from the National Crime Victimization Survey (NCVS) to up-adjust law enforcement agency data reported to the Federal Bureau of Investigation (FBI) through the National Incident Based Reporting System (NIBRS).

This fills a gap in the current data eco-system; the NCVS provides domestic violence rates for the entire nation, but it is not possible to drill down into more specific geographical areas or jurisdictions. The methodology outlined here allows for the consideration of under-reporting, but for smaller geographics. Given that law enforcement agencies can report NIBRS data in a timelier fashion than the annual NCVS survey publication, this approach also provides an opportunity to establish domestic violence trends closer to real-time.

DEFINITION AND MEASUREMENT OF DOMESTIC VIOLENCE

Measuring domestic violence depends on how domestic violence is defined as well as the sources of incidence and prevalence estimates that are used (clinical reports to medical professionals, official reports made to law enforcement, or self-reporting of incidents by victims/survivors). Unfortunately, consensus among researchers, practitioners, and policymakers as to what constitutes domestic violence has not been reached. Some stakeholders seek to focus the definition solely on physical or sexual violence between intimate partners or immediate family members, while others wish to include emotional and psychological abuse.

There is also debate over how severity is measured and quantified. Some stakeholders focus on women as victims/survivors and men as perpetrators, while others explore violence that occurs in same-sex relationships or involves men as victims/survivors and women as perpetrators. Some reporting systems do not define domestic violence and instead simply list the term, while others rely on how a law enforcement codes a domestic violence (e.g., use of a separate offense code or inclusion of domestic violence within an aggravated assault code).

https://journals.sagepub.com/doi/abs/10.1177/1077801200006007005

¹ Gelles, R. J. (2000). Estimating the incidence and prevalence of violence against women: National data systems and sources. *Violence Against Women*, *6*(7), 784-804.



How the FBI Defines Domestic Violence in NIBRS

Since 1930, law enforcement agencies have voluntarily provided crime statistics through the Uniform Crime Reporting (UCR) Program to the FBI. Known as the Summary Reporting System (SRS), the crime data collection captures basic information on the number of crimes and arrests for eight "part one" offenses (murder/non-negligent manslaughter, robbery, forcible rape, aggravated assault, burglary, larceny-theft, motor vehicle theft, and arson) and a larger number of "part two" offenses (e.g., simple assault, driving under the influence, disorderly conduct). The problem with these larger categories is that they only consider the most serious offense within an overall incident (where there could have been multiple offenses) and they contain limited information about the victim, the offender, and situational characteristics.

To address the limitations of reporting data only on the most serious crime that occurs in an incident and on a limited number of crime types, the FBI sunsetted the SRS and began transitioning reporting to NIBRS in 2021.² NIBRS reporting includes all offenses that were part of an incident and also includes information about the victim, offender, the property involved, and any arrests made. Not all agencies have made the transition, however, and a decision was made to temporarily allow reporting through both the SRS and NIBRS to expand coverage of the data.

The FBI began collecting data about "domestic and family violence" through the SRS and NIBRS in 2019. Domestic and family violence is defined as:

"The use, attempted use, or threatened use of physical force of a weapon; or the use of coercion or intimidation; or committing a crime against property by a current or former spouse, parent, or guardian of the victim; a person with whom the victim shares a child in common; a person who is or has been in a social relationship of a romantic or intimate nature with the victim; a person who is cohabiting with or has cohabited with the victim as a spouse, parent, or guardian; or by a person who is or has been similarly situated to a spouse, parent, or guardian of the victim."

NIBRS was updated to replace the data value of "lover's quarrel" with domestic and family violence as a circumstance for murder and aggravated assault offenses. In addition, a value for "ex-relationship" was added. To be sure, even with this definition, it is difficult for law enforcement to distinguish domestic violence between intimate partners from that which occurs between co-habituating relatives. It is also unclear whether child abuse could be coded/considered as a form of domestic and family violence.

² Bureau of Justice Statistics. (2022). *National incident-based reporting system* (NIBRS). https://bjs.ojp.gov/national-incident-based-reporting-system-nibrs

³ Federal Bureau of Investigation. (2019). *NIBRS offense definitions*. https://ucr.fbi.gov/nibrs/2019/resource-pages/nibrs_offense_definitions-2019.pdf



How Domestic Violence is Defined in the NCVS

The NCVS defines domestic violence as attacks, threatened attack, and/or unwanted sexual activity by someone known to the victim. Specific questions within the NCVS cover aggravated assault and assault as well as rape/sexual assault.⁴

- Assaults may be classified as aggravated or simple, and the severity of the assault ranges from minor threats to near fatal incidents. Aggravated assaults include an attack or attempted attack with a weapon, regardless of whether the victim was injured, or an attack without a weapon when serious injury resulted. Simple assaults include the threat, attempt, or intentional infliction of bodily injury. Both aggravated and simple assaults exclude rape, attempted rape, sexual assault, robbery, and attempted robbery.
- Rape includes unlawful penetration of a person against the will of the victim, with use or threatened use of psychological coercion or force, or attempting such an act. Forced sexual intercourse includes vaginal, anal, or oral penetration by the offender and also includes incidents where penetration is from a foreign object, such as a bottle. These incidents can be experienced by male or female victims/survivors in a heterosexual or same-sex context. Attempted rape includes verbal threats of rape.
- Sexual assault encompasses a wide range of victimizations, separate from rape and attempted rape. These incidents include attacks or attempted attacks generally involving unwanted sexual contact between the victim/survivor and offender, with or without the use of force. Behaviors may include grabbing, fondling, or verbal threats.
- Rape and sexual assault are combined into one victimization measure. The NCVS has administered stalking supplements but has not done so recently.

ESTIMATES OF DOMESTIC VIOLENCE FROM THE NCVS

NCVS data for 2022⁵ indicate that there were an estimated 1,370,440 domestic violence incidents (violent victimization committed by current or former intimate partners or family members) – a rate of 4.9 per 1,000 households. Additionally, there were an estimated 951,930 intimate partner violence incidents (violent victimizations committed by current or former spouses, boyfriends, or girlfriends) – a rate of 3.4 per 1,000 households. Both the count and rate of domestic violence and intimate partner violence

⁴ Bureau of Justice Statistics. (n.d.). *NCVS dashboard* (N-DASH): *Terms and definitions*. https://ncvs.bjs.ojp.gov/terms#terms

⁵ Thompson, A., & Tapp, S. N. (2023). *Criminal victimization*, 2022 (NCJ 307089). Bureau of Justice Statistics. https://bjs.ojp.gov/document/cv22.pdf



incidents in 2022 were the highest recorded in the five-year period from 2018 to 2022, although the 2022 rates were not statistically different from those recorded in 2018.⁶ About 54% of domestic violence victimizations and 52% of intimate partner violence victimizations were reported to law enforcement in 2022, slightly higher than the share reported to law enforcement in 2021.⁷ This means that nearly half of domestic violence and intimate partner violence victimizations are not reported to law enforcement and therefore are not recorded in official law enforcement statistics.⁸ Consequently, these incidents are not included in annual estimates of domestic and intimate partner violence published annually by the FBI.⁹

DATA USED FOR THE CURRENT ANALYSIS

Three different data sources were used for this report.

1. NCVS: The first source is the concatenated file of the NCVS data from 1992 through 2022, available currently at ICSPR study number 38604. 10 The analysis is limited to domestic violence assaults, using the same methodology and variable definitions as Powers and Bleeker (2023). 11 Note that NCVS only surveys individuals who are at least 12 years old. After filtering the data to domestic violence aggravated assaults, there remained a total of 1,527 reported incidents over the 21-year sample. Recall that the NCVS measures self-reported victimization from roughly 240,000 individuals in about 150,000 households.

⁶ See Table 1: Thompson, A., & Tapp, S. N. (2023). *Criminal victimization*, 2022 (NCJ 307089). Bureau of Justice Statistics. https://bjs.oip.gov/document/cv22.pdf

⁷ See Table 4: Thompson, A., & Tapp, S. N. (2023). *Criminal victimization*, 2022 (NCJ 307089). Bureau of Justice Statistics. https://bjs.oip.gov/document/cv22.pdf

⁸ When converted to rates, the Bureau of Justice Statistics reports that 2.6 and 1.7 domestic violence and intimate partner violence victimizations per 1,000 persons, respectively, were reported to law enforcement in 2022. See Table 6: Thompson, A., & Tapp, S. N. (2023). *Criminal victimization*, 2022 (NCJ 307089). Bureau of Justice Statistics. https://bjs.ojp.gov/document/cv22.pdf

⁹ During Piquero's term as Director of the Bureau of Justice Statistics, a team of statisticians provided members of the National Plan to End Gender-Based Violence with specific estimates of domestic violence over time. The report states, "An analysis of NCVS data over the past three decades indicates significant declines in incidences of rape, sexual assault, and intimate partner violence. Between 1993 and 2019, the NCVS reflects a 74% decline in intimate partner violence crimes and a 60% decline in rapes and sexual assaults, which tracks a similar (and indeed, even more substantial) decline in other criminal victimizations over the same period." See page 18: The White House. (2023). *U.S. national plan to end gender-based violence: Strategies for action*. https://www.whitehouse.gov/wp-content/uploads/2023/05/National-Planto-End-GBV.pdf

¹⁰ Bureau of Justice Statistics. (2023). *National crime victimization survey, concatenated file,* [United States], 1992-2022. Inter-university Consortium for Political and Social Research [distributor]. https://doi.org/10.3886/ICPSR38604.v1

¹¹ Powers, R. A., & Bleeker, K. (2023). Self-defense and police reporting of intimate partner violent victimization: A comparison of White, Black, and Hispanic women victims. *Journal of Interpersonal Violence*, 38(3-4), 4189-4214. https://doi.org/10.1177/08862605221114304



2. **NIBRS:** The second source is the concatenated files provided by Kaplan (2024). For these data, incidents were filtered to include those reported as aggravated assaults (via the victimization aggravated assault question, not the specific NIBRS crime category). Specifically, we focused on the aggravated assault circumstance variable that had a specified category of domestic violence. Since the NCVS only includes those who are at least 12 years old, NIBRS events for those under 12 were eliminated. Agency-years with only partial reporting were also removed; included agencies had reported crime incidents in all 12 months. For the NIBRS data, imputations were needed for the age, Hispanic status, and race of the victim for a small number of cases. A regression approach was performed, using the other variables available, to impute the age for each separate year of the NIBRS data. For Hispanic status, not-Hispanic was imputed, and for race multi-racial was imputed.

The methodology to review the open-source computer code to replicate is available at https://github.com/apwheele/dvtrends

3. The last data source are mappings of reported population-served estimates, downloaded from the FBI's Crime Data Explorer. These are derived from the Law Enforcement Officers Killed in Action data series. Agencies are represented in NIBRS using an originating agency identifier. When an agency-year does not have a reported population estimate, the missing data are imputed as having a population of the under 50,000 population category, as jurisdictions with a missing population estimate tend to be small or non-city law enforcement agencies.

MODELING APPROACH

The regression equation predicting the probability of reporting the domestic violence assault to law enforcement is a logistic regression equation as follows:

$$g(\mathbb{P}[\mathsf{Report}]) = \beta_0 + \beta_1 \cdot \mathsf{Female} + \beta_2 \cdot \mathsf{Hispanic} + \Sigma \beta_k s(\mathsf{Year}_k) + \Sigma \beta_l s(\mathsf{Age}_l) + \Sigma \beta_d d(\mathsf{Race}_q) + \Sigma \beta_h d(\mathsf{Region}_h) + \Sigma \beta_i d(\mathsf{PopGroup}_i)$$

The *probability* of reporting the assault to law enforcement is a function of the *victim's/survivor's* sex, Hispanic status, racial identity [Asian/Pacific Islander, Black, Native American, Two or more races, White (reference)], and geographic region (Northeast, Midwest, South, West). For the NCVS, earlier years did not include the region, and so for

¹² Kaplan, J. (2024). *Jacob Kaplan's concatenated files: National incident-based reporting system (NIBRS) data*, 1991-2022. https://www.openicpsr.org/openicpsr/project/118281/version/V9/view

¹³ Federal Bureau of Investigation (n.d.). *Crime data explorer*. https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/home



these years we used the missing region as the reference category in the regression. For population groups, we included variables for cities of 50,000 to 250,000, another category for over 250,000, and the reference group of cities under 50,000 population.

The model also includes non-linear restricted cubic spline terms for the victim's age (with knots at 25, 40, and 65), and year spline variables (with knots at 1999, 2007, 2015). Restricted cubic splines allow for the modeling of non-linear terms. ¹⁴ These variables were intentionally chosen, as it is necessary to have a consistent set of variables across both the NCVS and NIBRS to apply the methodology. Even if other characteristics that predict reporting in the NCVS are known, they are only useful in this methodology if they are regularly captured in NIBRS. The model does not include sampling weights in its estimates. Those are typically not included in regression modelling, and are commonly used only for estimating national level rates.

Regression Model Results

The model used to generate local estimates uses several variables found in both the NCVS and NIBRS. These include the demographic characteristics of the victim (gender, race and ethnicity), the regional characteristics (U.S. region where the report occurred, as well as the population of the jurisdiction), and the year of the report. Table 1 displays the regression model results for the logistic model, including the linear coefficient estimates.

¹⁴ Harrell, F. E. (2001). Regression modeling strategies: with applications to linear models, logistic regression, and survival analysis. New York: Springer.



Table 1: Logistic Regression Model Coefficients

В	SE	p-value	
-78.61	42.92	0.07	
0.04	0.02	0.07	
-0.04	0.02	0.13	
0.03	0.01	< 0.01	*
-0.05	0.02	0.01	*
0.15	0.12	0.22	
-0.23	0.42	0.59	
0.14	0.16	0.37	
0.09	0.36	0.81	
-1.19	0.29	< 0.01	*
0.57	0.19	< 0.01	*
-0.10	0.26	0.70	
-0.20	0.24	0.41	
-0.10	0.23	0.66	
-0.24	0.24	0.32	
0.18	0.15	0.23	
0.21	0.16	0.19	
	-78.61 0.04 -0.04 0.03 -0.05 0.15 -0.23 0.14 0.09 -1.19 0.57 -0.10 -0.20 -0.10 -0.24	-78.61 42.92 0.04 0.02 -0.04 0.02 0.03 0.01 -0.05 0.02 0.15 0.12 -0.23 0.42 0.14 0.16 0.09 0.36 -1.19 0.29 0.57 0.19 -0.10 0.26 -0.20 0.24 -0.10 0.23 -0.24 0.24 0.18 0.15	-78.61 42.92 0.07 0.04 0.02 0.07 -0.04 0.02 0.13 0.03 0.01 < 0.01

p < .05

The coefficients are not of much direct interest. For this model, what matters is the accuracy of the predicted probability. The fact that many coefficients are not statistically significant is immaterial to whether our estimates are accurate or not.

To illustrate how underreporting is affected by two factors—the age of the victim and the year during which the victimization occurred—Figure 1 shows the predicted probability of reporting aggravated assault domestic violence to law enforcement based on the age of the victim recorded in the NCVS. As victims age, their rate of reporting victimization increases. However, this reporting rate peaks in the early 40s with a reporting rate of 73%.



Figure 1: Marginal Age Effects of Aggravated Domestic Violence Reporting Rates in the NCVS

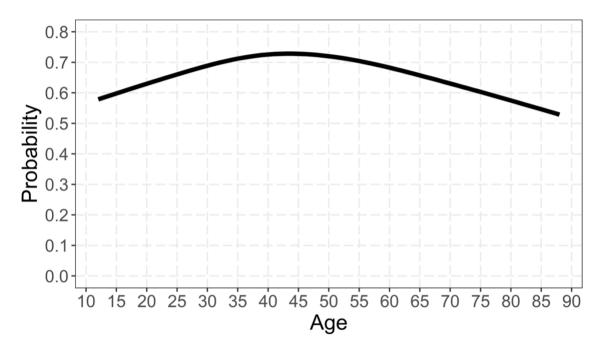
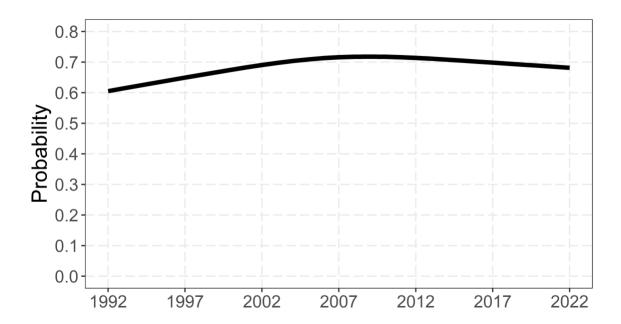


Figure 2 shows a similar pattern across years. There is an increase in aggravated assault domestic violence reporting through 2008, peaking at 72% of victims stating that they reported their victimization to police. Reporting rates for domestic violence have been declining since about 2011, and in 2022, 68% of domestic violence victimization was reported to law enforcement. Both figures highlight that not only is domestic violence underreported to the police, but the reporting rates notably vary across characteristics. For example, although it is difficult to estimate statistically, vulnerable populations such as youth, elder adults, people who identify as LGBTQ+, or immigrants may have lower rates of reporting than those who do not hold these characteristics.



Figure 2: Marginal Year Effects of Aggravated Domestic Violence Reporting Rates in the NCVS



To establish the validity of the model, the model's predicted calibration is shown. Table 2 takes the predicted probability values for the slightly more than 1,500 NCVS reports, and separates them into deciles, and shows the model's predicted total reported events versus those predicted. Table 2 demonstrates that the model is well calibrated (e.g., observed and predicted reports very similar to one another), and thus is likely valid for use in up-adjusting reported NIBRS data.

Table 2: Calibration of Model

Decile	Observed Reports	Predicted Reports
1	74	75.4
2	95	89.8
3	91	96.1
4	104	101.7
5	95	101.6
6	109	106.1
7	116	108.0
8	105	111.7
9	122	117.2
10	118	121.4



NIBRS Estimates

With the model to generate each individual up-weight for the NIBRS reported incidents, particular agencies can be examined. It is difficult to estimate specific geographic areas that are larger than a single agency, because an estimate of total reporting in the area would be necessary. There is no simple way to estimate at the county level with the NIBRS data.¹⁵

NIBRS reporting is voluntary; not all jurisdictions report crime data to NIBRS. For example, Chicago, Los Angeles, New York City, Phoenix, San Francisco and several other major cities were not reporting to NIBRS in 2022. The jurisdictions identified as the top 20 cities for aggravated domestic violence were identified as cities with more than 250,000 population that reported to NIBRS in 2022. The 20 cities with the highest rate of aggravated domestic violence in 2022 were included. Table 3 shows the years of available NIBRS data for each of the top 20 cities.

Table 3. Years of Available NIBRS Data

CITY	YEARS OF AVAILABLE NIBRS DATA
ALBUQUERQUE, NM	2018 - 2022
ANAHEIM, CA	2022
ATLANTA, GA	2021, 2022
AURORA, CA	1997 - 2022
BALTIMORE, MD	2022
BOSTON, MA	2020 - 2022
BUFFALO, NY	2021, 2022
CHESAPEAKE CITY, VA	2002 - 2022
DENVER, CO	2005 - 2022
FORT WORTH, TX	2006 - 2022
LAS VEGAS, NV	2020 - 2022
LUBBOCK, TX	2018 - 2022
MEMPHIS, TN	2001 - 2022
MINNEAPOLIS, MN	2019 - 2022
OKLAHOMA CITY, OK	2020 - 2022
PHILADELPHIA, PA	2022
PORTLAND, OR	2016 - 2022
SAN ANTONIO, TX	2021, 2022
ST. PAUL, MN	2020 - 2022
TULSA, OK	2021, 2022

¹⁵ See: Kaplan, J. (2024). Uniform Crime Reporting (UCR) Program Data: An opinionated guide to FBI data. https://ucrbook.com/

¹⁶ Wichita, KS was excluded because the number of aggravated domestic violence incidents reported in 2022 was nearly 10 times higher than the number of incidents reported in each of the previous 20 years, resulting from a change in 2022 to how the circumstances of aggravated assaults were identified in NIBRS.



Table 4 presents the number of aggravated domestic violence incidents reported by each of the top 20 cities to NIBRS since 2018 (when data were available) and the percent change in the number of incidents reported between 2021 and 2022. The number of reported aggravated domestic violence incidents increased for five cities, decreased for 10 cities, and remained the same for one city (Lubbock, TX).

Table 4. Aggravated Domestic Violence Incidence Counts by City, 2018-2022

CITY	2018	2019	2020	2021	2022	% CHANGE 2021-2022
ALBUQUERQUE, NM	832	1,308	1,550	1,329	1,035	- 22%
ANAHEIM, CA					634	
ATLANTA, GA				432	370	- 14%
AURORA, CA	61	126	192	277	342	+ 23%
BALTIMORE, MD					980	
BOSTON, MA			833	795	753	- 5%
BUFFALO, NY				539	325	- 40%
CHESAPEAKE CITY, VA	75	213	235	260	194	- 25%
DENVER, CO	509	573	737	800	948	+ 18%
FORT WORTH, TX	170	491	999	962	711	- 26%
LAS VEGAS, NV			464	1,343	1,437	+ 7%
LUBBOCK, TX	86	291	625	631	631	0%
MEMPHIS, TN	398	785	921	947	967	+ 2%
MINNEAPOLIS, MN		708	687	581	664	+ 14%
OKLAHOMA CITY, OK			875	774	748	- 3%
PHILADELPHIA, PA					1,202	
PORTLAND, OR	285	429	551	807	686	- 15%
SAN ANTONIO, TX				1,122	1,380	+ 23%
ST. PAUL, MN			143	399	378	- 5%
TULSA, OK				943	660	- 30%

Table 5 shows the low and high range estimates of underreported aggravated domestic violence for the top 20 cities in 2022. Only the low estimates are presented in the main report. The size of the up-adjusted correction ranged from 29% to 53% and varied based on the demographic and geographic factors included in the model.

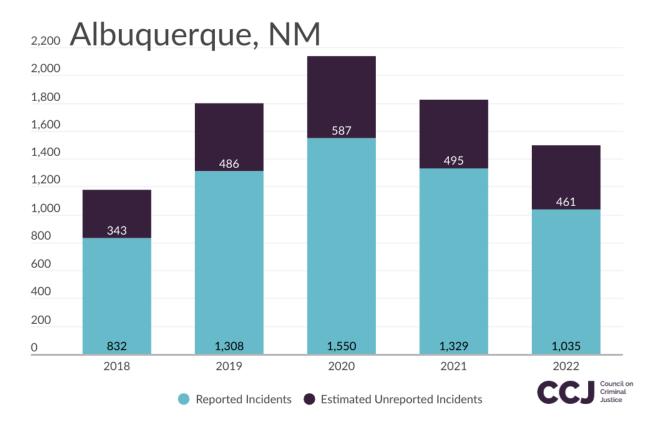


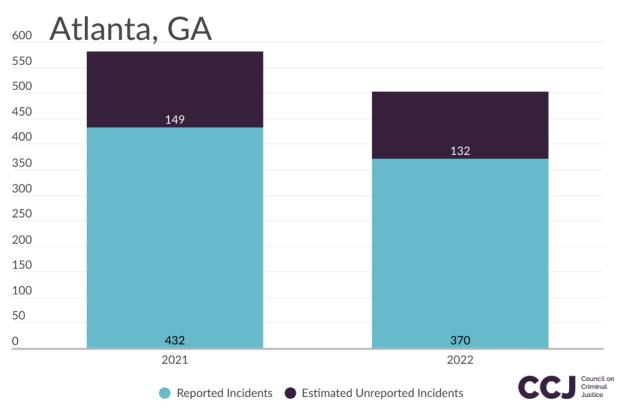
Table 5. Reported, Underreported, and Total Estimated Aggravated Domestic Violence Incidents, 2022

CITY	REPORTED INCIDENTS IN NIBRS	ESTIMATED UNDERREPORTED INCIDENTS (LOW, HIGH)	TOTAL ESTIMATED INCIDENTS (LOW, HIGH)	SIZE OF ADJUSTMENT (LOW, HIGH)
ALBUQUERQUE, NM	1,035	461, 527	1,496, 1,562	45%, 51%
ANAHEIM, CA	634	251, 275	885, 909	40%, 43%
ATLANTA, GA	370	132, 143	502, 513	36%, 39%
AURORA, CA	342	125, 137	467, 479	37%, 40%
BALTIMORE, MD	980	360, 379	1,340, 1,359	37%, 39%
BOSTON, MA	753	352, 392	1,105, 1,145	47%, 52%
BUFFALO, NY	325	109, 118	434, 443	33%, 36%
CHESAPEAKE CITY, VA	194	69, 76	263, 270	36%, 39%
DENVER, CO	948	373, 396	1,321, 1,344	39%, 42%
FORT WORTH, TX	711	236, 248	947, 959	33%, 35%
LAS VEGAS, NV	1,437	564, 587	2,001, 2,024	39%, 41%
LUBBOCK, TX	631	186, 195	817, 826	29%, 31%
MEMPHIS, TN	967	340, 353	1,307, 1,320	35%, 37%
MINNEAPOLIS, MN	664	300, 322	964, 986	45%, 49%
OKLAHOMA CITY, OK	748	288, 307	1,036, 1,055	39%, 41%
PHILADELPHIA, PA	1,202	409, 429	1,611, 1,631	34%, 36%
PORTLAND, OR	686	297, 320	983, 1,006	43%, 47%
SAN ANTONIO, TX	1,380	426, 449	1,806, 1,829	31%, 33%
ST. PAUL, MN	378	181, 202	559, 580	48%, 53%
TULSA, OK	660	262, 280	922, 940	40%, 42%

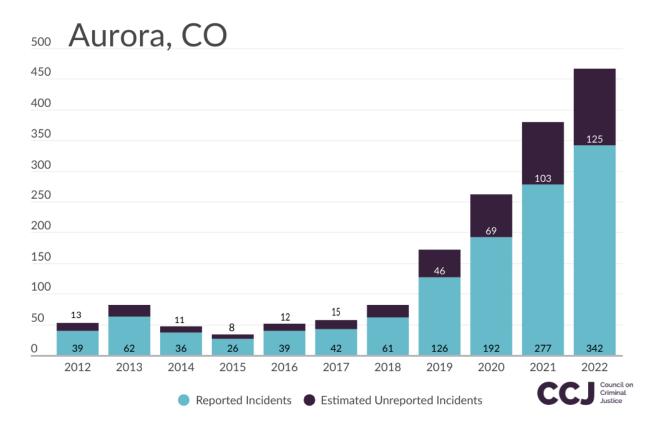
Below, the reported number of aggravated domestic violence incidents and the estimated number of underreported incidents are presented for the top 20 cities featured in the report, in alphabetical order. All available data from 2012 to 2022 are presented, although the agencies included began reporting to NIBRS in different years. Note that Anaheim, CA, Baltimore, MD, and Philadelphia, PA are excluded as they began reporting to NIBRS in 2022 (these data can be found in Figure 2 of the main report). It is important to note that the methodology can be applied to any NIBRS reporting agency or jurisdiction, regardless of population size or incident count.





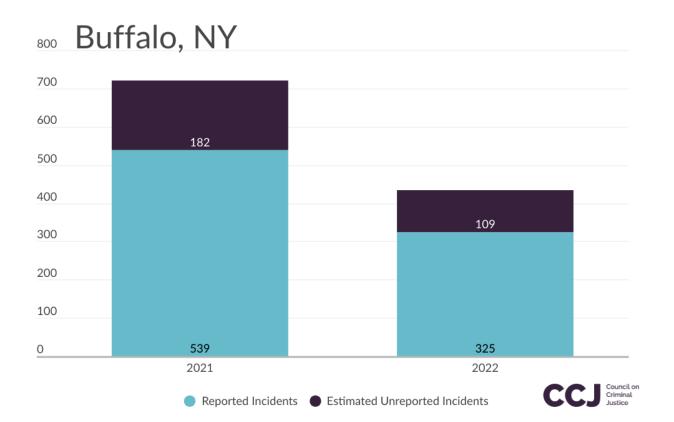


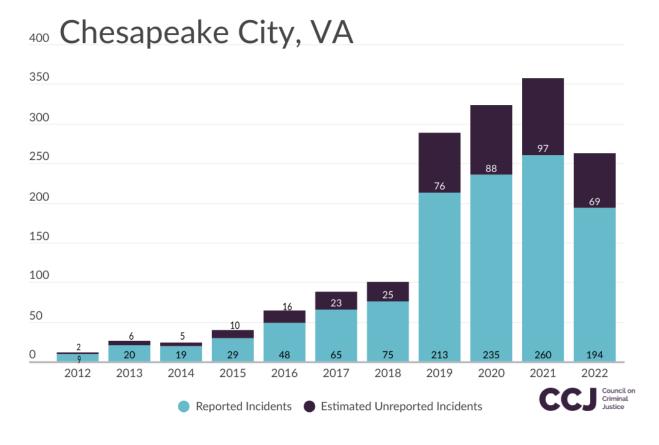






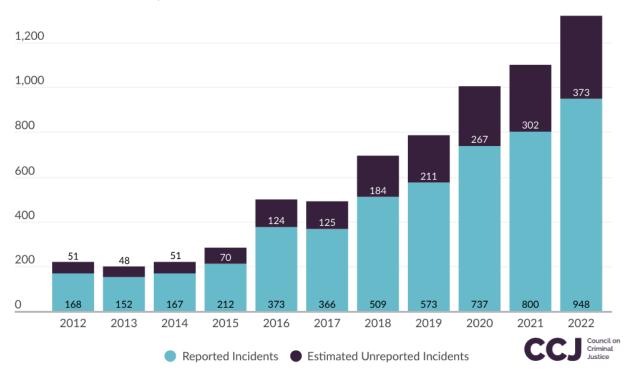




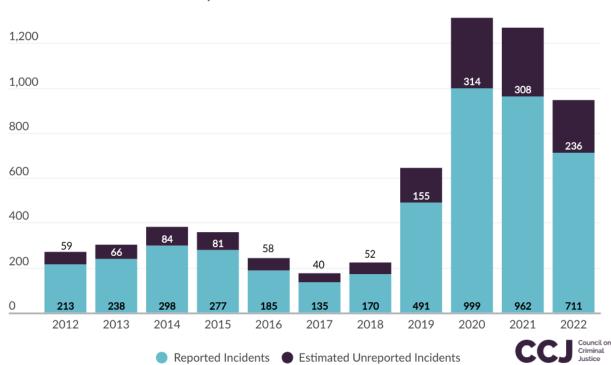




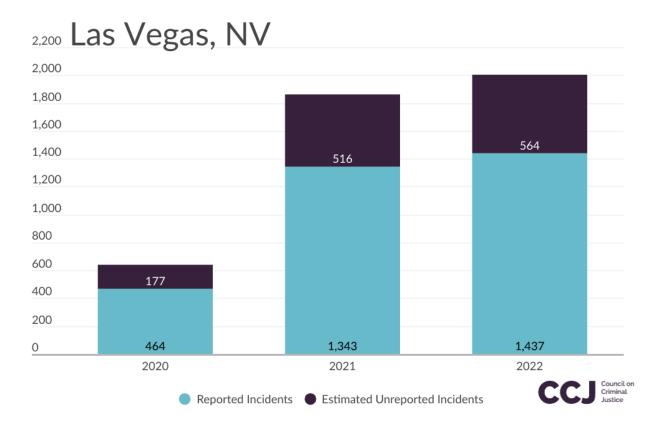
_{1,400} Denver, CO

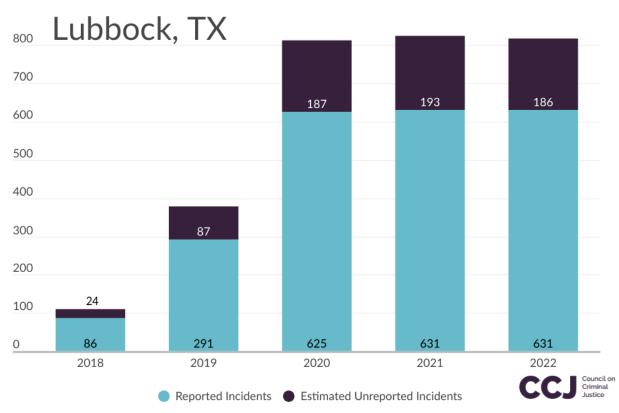






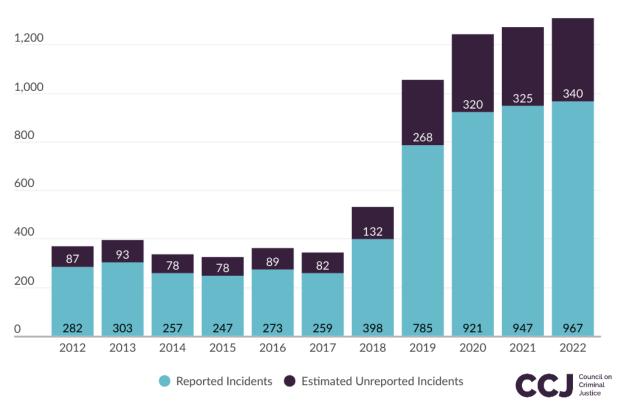


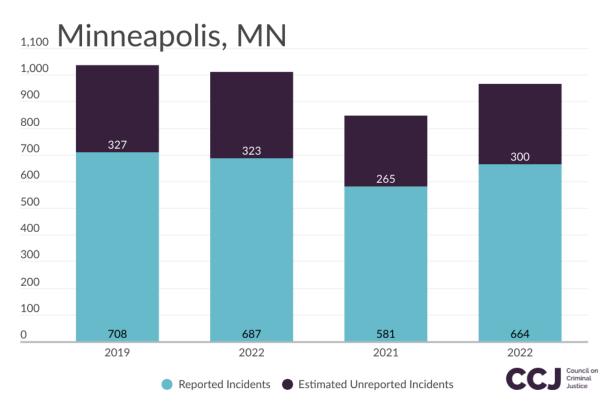






1,400 Memphis, TN







Oklahoma City, OK

