### WASHINGTON STATE HEALTH SERVICES RESEARCH PROJECT

# **Violent Crime Trends and Geographic Variations**

Research Brief No. 079 October 2016 By Joe Campo, MPH OFM Health Care Research Center

The Office of Financial Management's Health Care Research Center and its criminal justice Statistical Analysis Center have begun collaborating on the development of an online geographic information system. Once completed, that system will allow users to map various measures using both criminal justice and health-related data.

In this research brief we use data compiled for that system to focus on violent crimes in Washington state. These data allow us to identify trends seen nationally, statewide and by county; to assess variations in violent crime rates seen among the counties; and, by in-depth examination of health-related data, to better understand the variation in the severity of injury among those violent crimes.

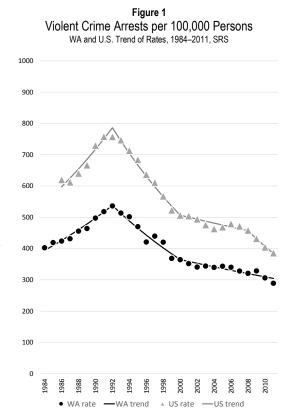
For this brief, arrest data from the Federal Bureau of Investigation's Uniform Crime Reporting Program's Summary Reporting System (SRS) are used as the primary source of crime data. Vital statistics death data are used in comparing murder arrests and deaths, and inpatient and observation unit stays are used in comparing aggravated assault arrests and hospital stays. Joinpoint<sup>1</sup> is used in identifying trends and, unless otherwise noted, 95 percent confidence intervals are used in determining if differences seen are statistically significant.

#### **Trends**

The rate of violent crime arrests, which includes murder and manslaughter, forcible rape, robbery and aggravated assault, reached a high point in the United States (US) and in Washington in the early 1990s. In 1992, the peak year in Washington, there were 536 violent crime arrests per 100,000 persons; in the US, there were 758.

In both the US and Washington, rates began to trend downward after 1992. For the US, three distinct trend lines are seen after 1992: from 1992 to 2000, the rates dropped on average by 5 percent per year; from 2000 to 2008, by 1 percent per year; and from 2008 to 2011, by 6 percent per year. For Washington, there are just two trend lines after 1992: from 1992 to 2000, when the rates dropped on average by 5 percent per year, the same as the US, and from 2000 to 2011, when they dropped by slightly less than 2 percent per year.

In 1991, the difference between the state rate, 518, and the US rate, 758, was 240 violent crime arrests per 100,000 persons; in 2011, that gap narrowed to 97 violent crime arrests per 100,000. Most of that narrowing occurred because of the sharp decline seen nationally between 2006 and 2011.



In Appendix A, trends in violent crime arrests in each of our 39 counties are shown for 1984 to 2011. However, among those counties, five have rates that are persistently higher than the state or are high now and trending upwards; these are discussed here.

<sup>&</sup>lt;sup>1</sup> Joinpoint Regression Program, Version 4.1.1.5. February 2015; Statistical Research and Applications Branch, National Cancer Institute.

As shown in Figure 2, four counties—Kitsap, Pierce, Spokane and Yakima—have had violent crime arrest rates that are generally higher than the statewide trend. In Kitsap County, those rates had been lower than the state's prior to the late 1990s. However, from 1999 and later, they have been essentially flat, with no significant upward or downward trend, while the state's rates have been trending downward. It may be worth noting that in 2011, the rate in Kitsap is appreciably lower than the previous 10 years, and perhaps this is a harbinger—or simply an anomaly.

In Pierce County, the violent crime arrest rates are persistently higher than the statewide rates. Those rates reached a peak in 1991, when there were 951 violent crime arrests per 100,000 persons—a rate higher than the nation's. However, from 1992 to 2002, the arrest rates fell by nearly 6 percent per year; thereafter, there are no significant trends, although 2010 and 2011 show a decline.

Since 1994, when the rates in Spokane County reached their high of 554 violent crime arrests per 100,000 persons, there has been a significant downward trend of 2 percent per year. Nonetheless, the rates and the trend line in that county remain higher than the state's rates.

For Yakima County, the peak violent crime arrest rate also occurred in 1991, with 668 violent crime arrests per 100,000 persons. No significant trend was seen in those rates until 1995, when they fell by 17 percent per year from 1995 to 1999. However, since 1999, those arrest rates have been trending upwards at 2 percent per year and, as of 2008, have begun to once again exceed the state rate.

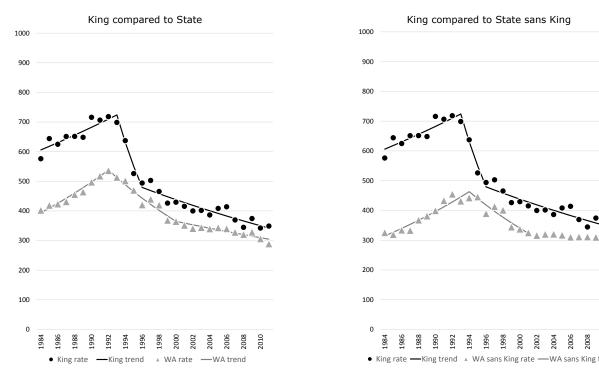
Figure 2

Violent Crime Arrests per 100,000 Persons in Kitsap, Pierce, Spokane and Yakima Counties 1984-2011, SRS Kitsap Pierce 1996 1998 2000 1996 1998 Yakima Spokane 1990 1992 1996 1998 1998 2000 2000 2006 2008 2008 1992 1998 1998 2000 2002 2006 2008 2008

The fifth county with violent crime arrest rates higher than the state's is King. In Figure 3, the rates in King are compared to the rates for the state as a whole and to the rates for the state minus King, since that county composes nearly one-third of the state's population.

Figure 3
Violent Crime Arrests per 100,000 Persons in King County compared to the State and to the State minus King County

1984–2011, SRS



Within King County, violent crime arrest rates reached their highest point in 1992, at 718 per 100,000 persons, and then markedly decreased by 13 percent per year from 1993 to 1996; from 1996 to 2011, those rates have been declining by 2 percent per year.

Excluding King County from the statewide rates affects the inflection points seen in the trends: For the state as a whole, the peak in the trend occurs in 1992; by excluding King County from the statewide rates, the peak in the trend occurs in 1994. Similarly, with King included in the state rates, there is a

significant downward trend seen from 2000 to 2011; in excluding King, there is no significant trend in the remainder of the state after 2000.

### **Comparisons with Health Data**

By definition, three of the four types of offenses categorized as violent crimes — murder, rape and aggravated assault—involve actual bodily harm, while the fourth, robbery, may involve just threatened harm.

Although constituting only 1 percent of the violent crime arrests, murders are readily identifiable in the health-related vital statistics death data. Conversely, robberies, which constitute 29 percent of violent crime arrests, are not readily identifiable in any current health or health-related data sets.

Figure 4
Violent Crime Arrests by Type
2009-11 combined, SRS

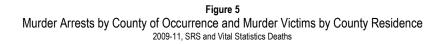
murder
1%
12%

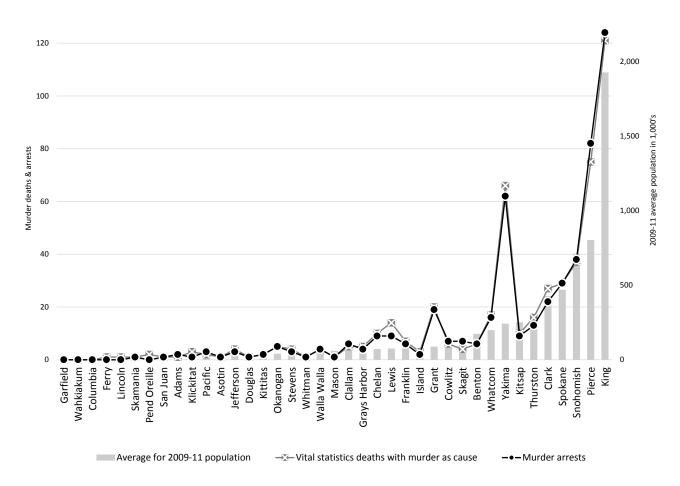
aggravated assault
58%

robbery
29%

In between are aggravated assaults and rapes, both of which likely involve some encounter with the health care system, be it a clinic, emergency department or hospital.

In Figure 5, counties are shown in rank order according to their population size, with the corresponding number of murder arrests and victims.





As may be readily evident, there appears to be a close match between the number of arrests and the number of victims. Perhaps equally readily evident, certain counties appear to have disproportionately higher numbers of murders and arrests than would be expected given their population size, e.g., Grant, Lewis and Yakima.

Using the age-specific mortality rates for the state as a whole, we estimated the expected number of murders for each county by applying those statewide rates to each of the counties' age-specific populations. We then compared those expected number of murders to the actual or observed number of deaths and, by applying a 90 percent confidence interval standard with a Poisson distribution, determined if the observed number of deaths differed significantly from the expected. This approach was chosen since most counties have too few cases to calculate age-specific rates.

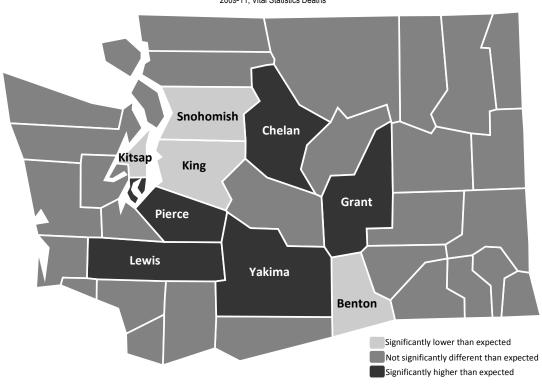


Figure 6
Observed to Expected Comparisons of Murder Victims by County Residence
2009-11, Vital Statistics Deaths

Figure 6 shows those counties with higher-than-expected numbers of murders, those with lower-than-expected numbers and those not significantly different from the expected. As can be seen, five

counties—Chelan, Grant, Lewis, Pierce and Yakima—had higher-than-expected numbers of murders, while four other counties—Benton, King, Kitsap and Snohomish—had fewer than expected.

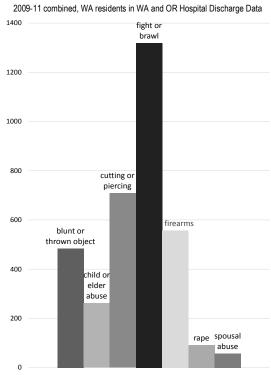
Using Washington and Oregon hospital discharge data for inpatient and observation unit stays, we sought to similarly identify Washington residents who had been hospitalized as a result of violent crimes.

Looking at the first nine diagnosis fields as well as the injury code (see Appendix B for listing), we found relatively small numbers of hospitalizations related to rape (92), child or elder abuse (262) or spousal abuse (57) for 2009—11.

However, during that same time period, injuries associated with aggravated assault arrests — including those incurred from blunt or thrown objects (484), cutting or piercing instruments (709), fights or brawls (1,319) and firearms (557)—were of sufficient magnitude to allow for comparisons among counties.

Moreover, because these injuries were severe enough to require a hospital stay, they arguably correspond to the most egregious aggravated assaults.

Figure 7
Inpatient or Observation Unit Stays Potentially Related to Violent Crimes



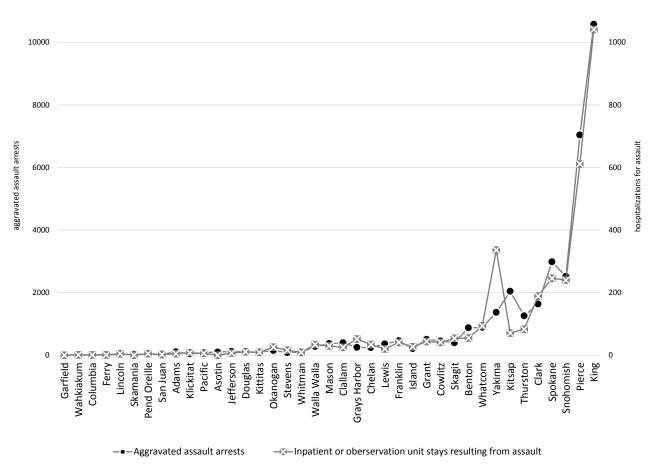


Figure 8
Aggravated Assault Arrests by County of Occurrence and Assault-related Hospitalizations by County Residence
2009-11, SRS and WA and OR Hospital Discharge Data

Maintaining the same rank order of counties by population size, in Figure 8, the number of aggravated assault arrests occurring in a county are compared to the number of hospital stays experienced by residents of those counties that were due to injuries likely associated with assaults. Although the scale for the arrests is 10 times the scale for hospitalizations, there appears to be a general degree of concordance with, however, some readily evident exceptions, e.g., Kitsap and Yakima counties.

In Figure 9, counties whose crude rates for aggravated assault arrests were significantly higher, lower or no different from the state's are shown. Per those arrest data, 27 of the 39 counties had arrest rates significantly lower than the state's rate, while five counties—Franklin, Kitsap, Mason, Pierce and Spokane—had rates that were higher.

In Figure 10, an observed-to-expected assessment was done using the age-specific statewide hospitalization rates to compute the expected number of assault-related hospitalizations among the residents in each county. These, too, were categorized as being significantly lower than expected, higher than expected or no different than expected. For both the arrest rates and observed-to-expected assessment, 90 percent confidence intervals were used.

There is only a limited degree of concordance between the findings of these two data sets, and some contradictory findings, too. For instance, per the arrest data, Kitsap's arrest rate is high, but per the hospitalization data, its observed number of hospitalizations is low. Similarly, per the arrest data, Grays Harbor's arrest rate is low, but per the hospitalization data, its observed number of hospitalizations is high.

Figure 9
Aggravated Assault Arrest Rates by County of Occurrence that are Higher, Lower or No Different than the State Rate
Per 100,000 persons using 90% confidence interval, 2009-11, SRS

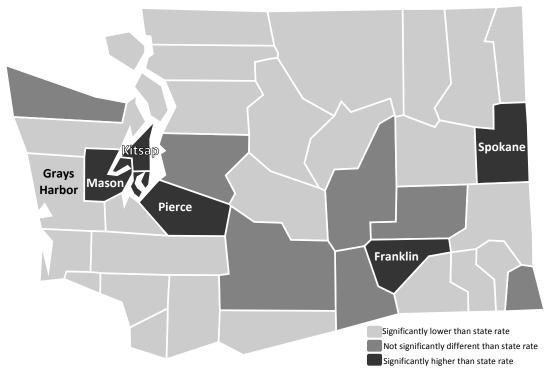
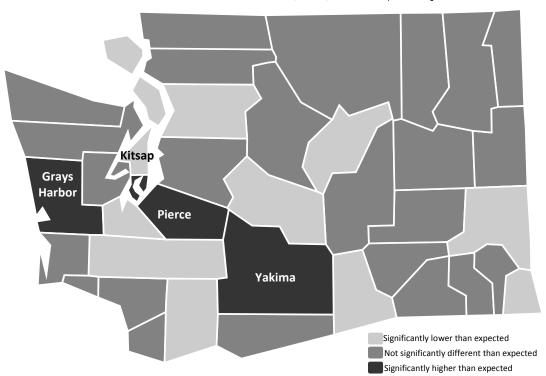


Figure 10
Assault-related Hospitalizations by County of Residence that are Higher, Lower or No Different than the Expected
Based on Poisson Distribution with 90% confidence interval, 2009-11, WA and OR Hospital Discharge Data

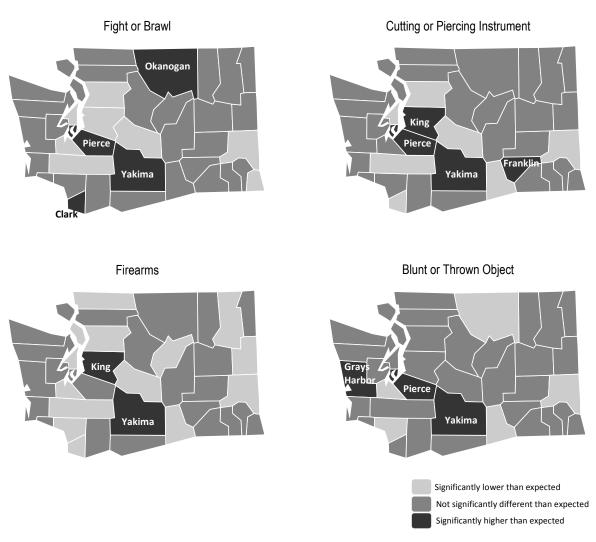


In fact, only one county—Pierce—had both a high arrest rate for aggravated assault and a high hospitalization rate for injuries associated with assaults. A Pearson correlation of the arrests and hospitalization rates for all counties resulted in an R<sup>2</sup> of 0.17 with p<0.01, suggesting that arrests rates account for only about 17 percent of the variance in hospitalization rates, and that the remaining 83 percent is attributable to other factors.

Figure 11

Types of Assault-related Hospitalizations by County of Residence that are Higher, Lower or No Different than the Expected

Based on Poisson Distribution with 90% confidence interval, 2009-11, WA and OR Hospital Discharge Data



In Figure 11, the counties with higher-than-expected hospitalization rates are shown for each of the causes associated with an aggravated assault. Only Yakima County has higher-than-expected rates for all four causes: fight or brawls, cutting or piercing instruments, firearms, and blunt or thrown objects. Pierce is high for three—fight or brawls, cutting or piercing instruments, and blunt or thrown objects. Yakima and Pierce were also high in murder arrests and deaths (see Figure 6).

#### **Summary and Discussion**

Violent crime arrest rates have been trending downward in both Washington and in the nation as a whole. Although the rate in Washington is lower than the nation's, the downward trend seen here is not as steep as seen in the United States, thereby narrowing the gap between the two.

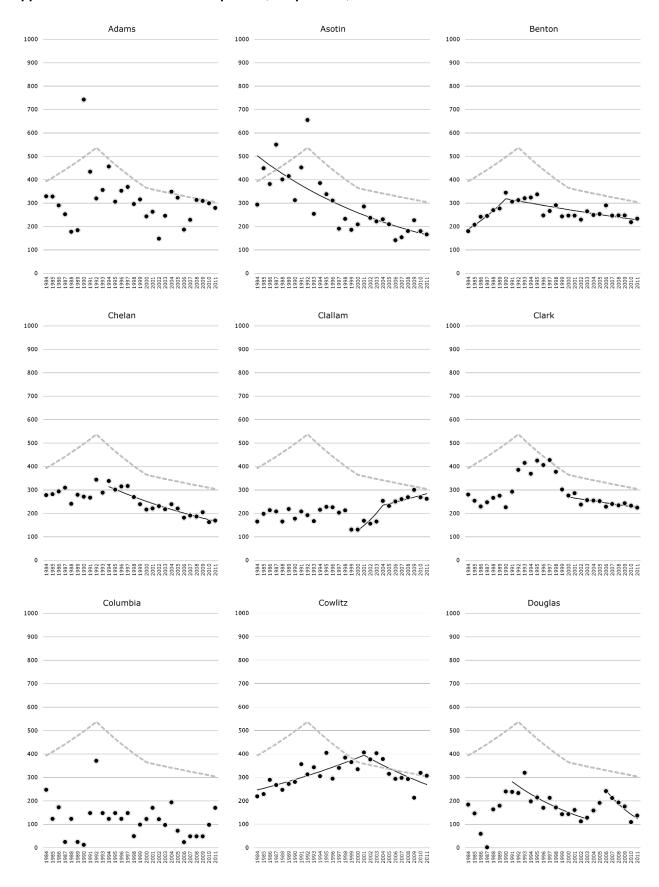
Within Washington, there is marked variation among the counties' trends. Four counties—King, Kitsap, Pierce and Spokane—have generally had arrest rates higher than the state's, but those counties are either trending downward or have remained essentially flat. A fifth county—Yakima—had had rates that were higher and lower than the state's over time; however, for more recent years, its arrest rates have been trending upward.

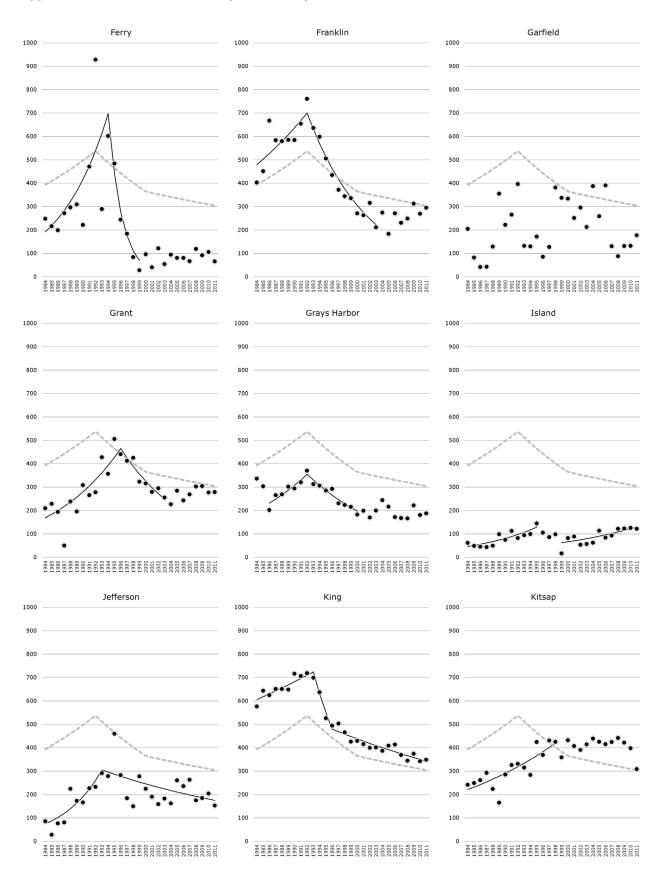
County murder rates, derived from vital statistics death data, and the county murder arrest rates appear to be highly concordant, and five counties—Chelan, Grant, Lewis, Pierce and Yakima—have higher-than-expected rates.

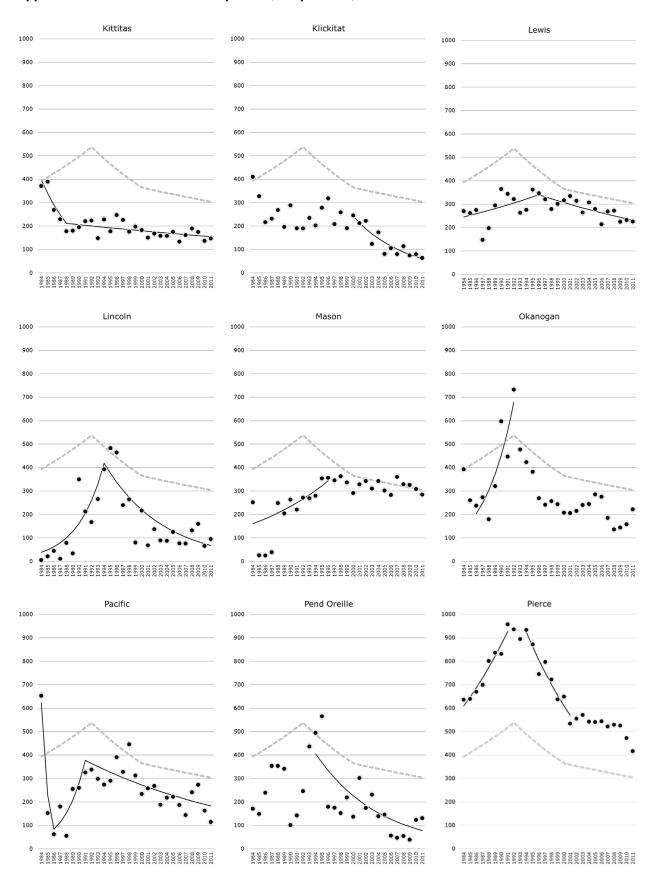
Aggravated assault arrest rates and hospitalization rates for injuries associated with fights and brawls, cutting or piercing instruments, firearms, and blunt or thrown objects, do not, however, match up well when looking at the counties. This was true when looking at all assault-related hospitalizations combined and when looking at each cause of hospitalization separately.

These differences may reflect variations in enforcement policies or in hospital admission practices or both. They may, however, also point to unmet needs in law enforcement capabilities and infrastructure, and suggest that some counties may have greater needs in addressing the most severe cases of assault.

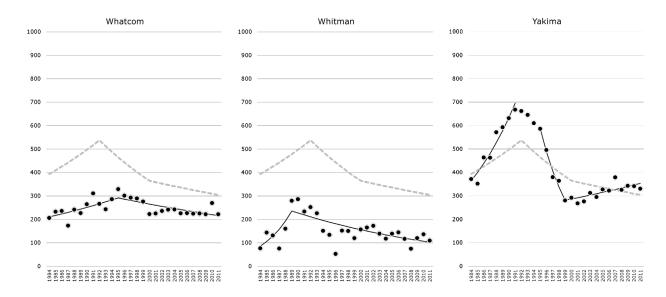
Finally, this brief presents a study of the potential value in expanding the types of data used in assessing our state's law enforcement and criminal justice impacts and needs.











# Appendix B: ICD-9 CM Codes Associated with Assault

Assault-Related Injury and Diagnosis Codes		
	Ecode	Diagnosis code
Fight or Brawl	E9600	n/a
Rape	E9601	995.83, V715
Firearm	E9650	n/a
Cutting or Piercing	E966	n/a
Child or Elder Abuse	E967.0-E967.9 excluding E967.3	n/a
Spousal Abuse	E967.3	n/a
Blunt or Thrown Object	E968.2	n/a