

Homicide Rates: Contributing Factors

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Introduction

In 2003 Gary Ridgeway entered a plea of guilty to 48 separate incidents of first degree murder committed over a period of approximately 3 years in the early 1980's, effectively making him the most 'prolific' murderer in U.S. history. An examination of Ridgeway's life reveals him to be a man of below average income who was frequently unemployed, alcoholic, and substantially below average in intelligence. Which, if any of these factors would we consider to be primary in producing Ridgeway's motivation to commit homicide? Was he under considerable economic stress; was his alcoholism to blame, or perhaps his low IQ and poor education? Most likely, it was a combination of these factors as well as additional factors not seen in his profile. In general, what factors do we find typically associated with areas where homicide rates are highest? In this report, we take an exploratory look at the relationship between homicide rates and several factors commonly associated with homicide rates, both confirming and challenging common intuitions regarding these factors. The main questions addressed in the report are as follows:

- How are economic factors and homicide rates related? In particular, how do homicide rates change in states with higher or lower *poverty rates*, *welfare recipient rates*, and *unemployment rates*?
- Is substance abuse prevalence related to homicide rates and if so, how? For this question, we consider two factors, *alcohol use* and *illicit drug use*, and their relationship to homicide rates.
- Are youth trends related to homicide rates? More to the point, do *high school drop-out rates* and *teenage pregnancy rates* appear to be related to the number of homicides that occur in a region?
- Is a state's approach to law enforcement related to its homicide rate? In particular, is the *percentage of the annual budget spent on law enforcement* higher or lower in states with high homicide rates, and how does the presence of the *death penalty* affect homicide rates?

Before we present our findings, we offer some background and context for both the data set used and the variables under consideration.

The Data

The data set used in this report was compiled by the group using numerous primary sources including the U.S. Census Bureau, the Federal Bureau of Investigation, and the National Center for Educational Statistics, among others. The data set includes the factors listed above for all fifty states and is *most recent* data (the data under consideration in this report was collected during the 2004-2006 interval). The set was constructed, cleaned, and the graphics were produced using the *R* statistical environment.

The Statistics

Throughout the report we use state level homicide rates taken from the Federal Bureau of Investigation, and given as the number of homicides per 1,000,000 persons.

Economic Factors: We first consider three critical economic factors: Unemployment Rates, Welfare Recipients, and Poverty Rates. The unemployment rate data is taken from The Bureau of Labor Statistics

and is given as a percentage of the total population that is currently considered unemployed. The welfare recipients data was taken from The Administration of Children and Families and is displayed in our data set as total recipients per 1,000 individuals. The poverty rate data used was obtained from the American Community Survey of 2004. The poverty rate is given as a percentage of the population living below the official poverty level within the last 12 months. The official poverty level differs according to the number of individuals in a family. For example, a family of 3 living in the contiguous 48 states is considered impoverished if their gross income is less than approximately \$18,300, while a family of 4 living in the contiguous 48 states is impoverished if their gross income is less than approximately \$22,000.

Substance Abuse Factors: We next consider two substance abuse factors: Alcohol Use and Illicit Drug Use. Alcohol use data was taken from the Office of Applied Studies and is given as a percentage of the population reporting having consumed an alcoholic beverage within the past month, and illicit drug use data was taken from the March of Dimes and is given as the percentage of the population over the age of 12 reporting having used one or more illegal drugs (marijuana, cocaine, heroin, etc...) in their lifetime.

Youth Factors: In addition to the above factors, we selected high school drop-out rates and teenage pregnancy rates to compare with homicide rates. The high school drop-out rate data was taken from the U.S. Census Bureau and is presented in the data set as the percentage of the population over the age of 25 that do not have a high school diploma. The teenage pregnancy rate is taken from StateHealthFacts.org and is given as the total number of teenage births per 1,000 people.

Law Enforcement Factors: For the two law enforcement factors, we consider first the percentage of a state's budget that is spent on law enforcement. This data was collected from the U.S Census Bureau and is presented as a percentage of the total annual budget in the data set. Whether or not a state has the death penalty is one of two categorical variables used and the statuses (yes/no) were collected from deathpenaltyinfo.org.

In addition to the above factors, our data set contains a categorical variable, which places each state in a particular U.S. geographic region. In **Figure 1**, we have a breakdown of the regions and the states included in each region. Additionally, we have ranked the regions (highest to lowest) by their average homicide rates.

1	2	3	4	5	6
South	Southwest	Mid-Atlantic	Midwest	West	New England
AL, AR, FL, GA	AZ, NM, OK, TX	DE, MD, NJ	IL, IN, IA, KS	AK, CA, CO, HI	CT, ME, MA
KY, LA, MS, MO		NY, PA	MI, MN, NE, ND	ID, MT, NV, OR	NH, RI, VT
NC, SC, TN, VA			OH, SD, WI	UT, WA, WY	

Figure 1: U.S. Regions, The regions are ordered left to right by increasing homicide rates

Questions & Findings

This report is organized according to the topics laid out in the introduction followed by a summary section which consolidates the findings and offers additional areas for discussion.

How are economic factors and homicide rates related?

We begin our findings section with an examination of the apparent relationship between three economic factors and state homicide rates. One would likely conjecture that poverty and homicide are positively related in that poorer neighborhoods and regions are more prone to crime, including violent crimes such as homicide. We find that the variables *unemployment rate* and *poverty rate* are positively related to the homicide rate. Our data indicates that as these two rates increase, there is a corresponding increase in homicides, with the latter relationship (poverty rate and homicide) being the stronger of the two. The third variable, welfare recipients appears to have little or no effect on the variability that we observe in homicide rates from state to state. Judging poverty and homicide to be the strongest relationship, we examine poverty levels by region and find that the two highest homicide regions have substantially higher poverty rates.

Unemployment Rates & Homicide

In **Figure 2** we have a plot of homicide rates by unemployment rates. We observe an apparent positive trend in that as poverty rates increase, homicide rates also appear to increase.

There are a number of possible y-outliers (seen in the upper left-hand corner), which may have a substantial effect on the overall 'fit' of the regression line. These potential outliers are identified as Louisiana (South) and Maryland (New England), and appear as outliers because they have the highest homicide rates of any state in the country and at the same time average or below average unemployment rates. As seen in Figure 1, the southern region takes the lead in homicide rates, while, interestingly, the New England region has the lowest average homicide rate. In addition, we see that there are a number of possible x-outliers. These potential outliers are identified as Mississippi (South), Alaska (West), Michigan (Mid-West), South Carolina (South), and Kentucky (South), and are x-outliers because they're unemployment rate far exceeds the, then, national average of approximately 4%. As stated the exclusion of these outlying observations may have a substantial effect on the appearance of the linear model.

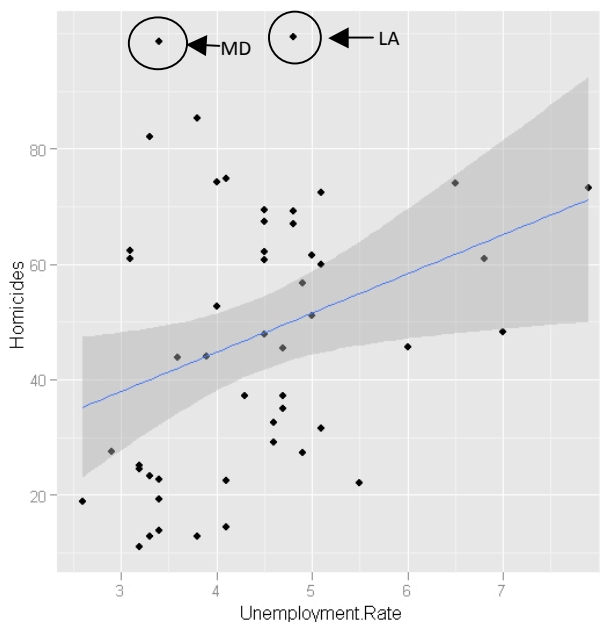


Figure 2: Homicide Rate by Unemployment Rate, The plot shows that as unemployment rates increase, homicide rates also tend to increase. Potential outliers are identified as states within high homicide regions.

Poverty Rates & Homicide

As with the unemployment rate, we see in **Figure 3** that the number of people living below the poverty level is positively related to the homicide rate. In Figure 3, we see that this increase in homicides per increase in poverty rate is more dramatic and the fit of the linear model appears to be stronger as well.

We see that the above two states, Louisiana and Maryland (identified as potential y-outliers above), are spread across the poverty rate axis (x-axis) in Figure 3, where they were not in the previous graphic (Figure 2). In particular, we see that Louisiana and Maryland are quite different with respect to their poverty rates, but quite similar to one another with respect to their homicide rates. That is, Maryland has one of the lowest poverty rates and Louisiana has one of the highest poverty rates though both have nearly identical homicide rates, and these rates are extremely high. Maryland in particular is an interesting outlier in that it has the second highest homicide rate in the country yet resides in the New England region, which has the lowest average homicide rate in the country.

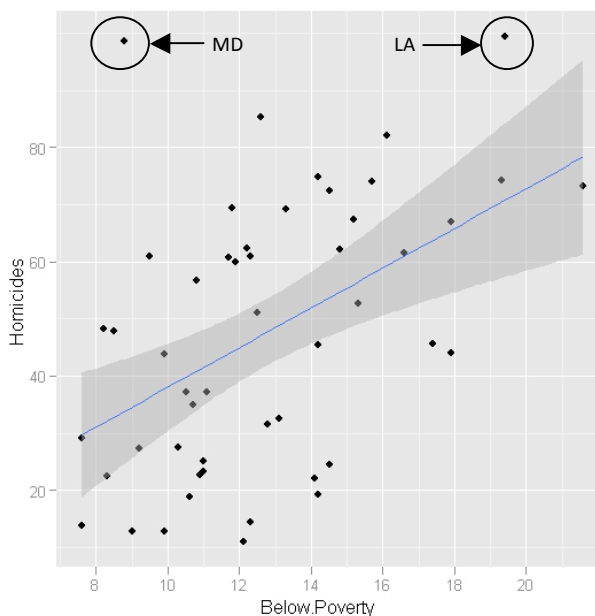


Figure 3: Homicide Rate by Poverty Rate, As poverty levels increase, homicide rates also increase. Potential outliers identified as having nearly identical homicide rates but vastly different poverty rates.

Welfare Recipients & Homicide

When we look at welfare recipients and homicide rates, we do not see the same relationship as with the other economic factors. In **Figure 4**, we see that, according to our data, the variability in homicide rates has little or nothing to do with the number of welfare recipients in a state. This is counterintuitive when we consider the previous two results. That is, the number of welfare recipients in a state would seem to be a fairly strong indicator of the poverty level and we should expect to see a similar relationship between this variable and the homicide rate.

However, there is substantial debate amongst policymakers as to the actual effects of the *War on Poverty*. That is, many contend that public assistance expansion has decreased poverty levels by raising the incomes of the poor. Others claim that welfare has a disincentive effect in

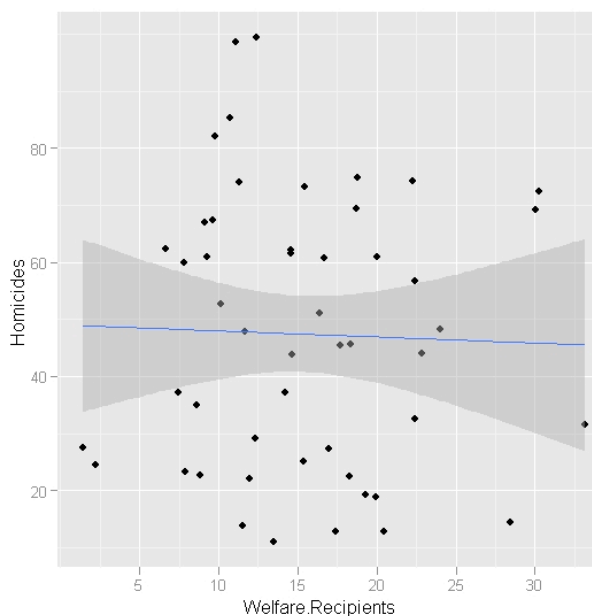


Figure 4: Homicide Rate by Welfare Recipients, No apparent linear relationship seems to exist between welfare recipients and homicide rates.

that it discourages the poor from seeking work, or seeking higher paying forms of work and thus increases poverty. It is probable that the confused relationship observed in Figure 4 is due to the confused relationship between poverty and welfare which is highlighted in the debate.

Poverty Rates by Region

Finally, judging homicide rates by poverty rates as the most significant relationship, we plot homicide rates by region alongside poverty rates by region (**Figure 5**) in order to see whether or not there exists a substantial difference in poverty levels across different regions, and whether or not that difference is

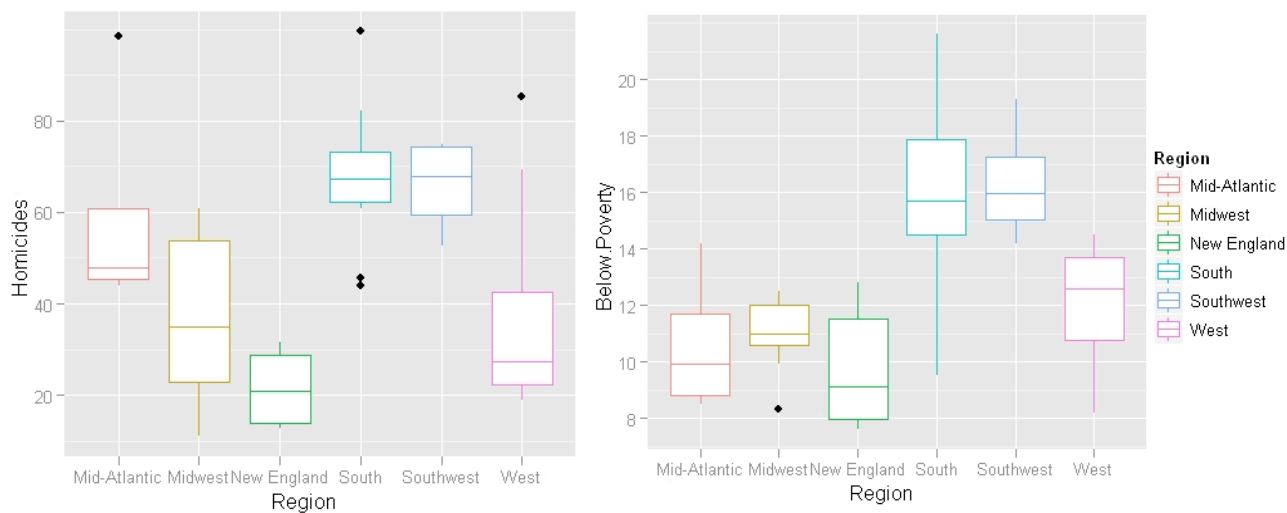


Figure 5: Homicide Rates by Region (left), Poverty Rates by Region (Right), High homicide regions (South, Southwest) are shown to have substantially higher poverty levels, while lower homicide regions (New England, Midwest, West) are seen to have substantially lower poverty levels.

what we would anticipate given the relationship observed in Figure 3. We can clearly see in Figure 5 that states in the South and Southwest regions have markedly higher poverty rates than states in the other regions. These two regions lead the nation in terms of their average homicide rates. Thus, the fact that we see substantially higher poverty levels in high homicide regions further confirms our finding that there may be a significant relationship between poverty rates and homicide rates.

Is substance abuse prevalence related to homicide rates and if so, how?

As with the economic factors under discussion in the previous section, one would expect that homicide rates and substance abuse prevalence would be positively related to one another. We would expect that increased drug and alcohol abuse would lead to increases in crime, including violent forms of crime. Despite our intuition, we find evidence in the data set that both alcohol use and drug use are negatively related to homicide rates. Our data shows that as substance abuse prevalence increases there is a corresponding decrease in the homicide rates. Additionally, we find that high homicide regions are substantially below average in terms of alcohol and illicit drug use rates.

In **Figure 6** we have created box plots of both alcohol use (top) and illicit drug use (bottom) by regions in order to determine whether or not there are observable differences in the placement of the data across regions.

We can see that with regards to alcohol use, New England, Midwestern, and Western regions have the highest rates, and with respect to illicit drug use New England, Western, and Southwestern regions are the highest. With regards to both, then, New England and Western regions lead the nation in alcohol and drug use.

In Figure 5, we saw that these two regions have the lowest homicide rates, thus we should immediately hypothesize that if we were to plot these two variables by homicide, we should discover that there exists a negative relationship.

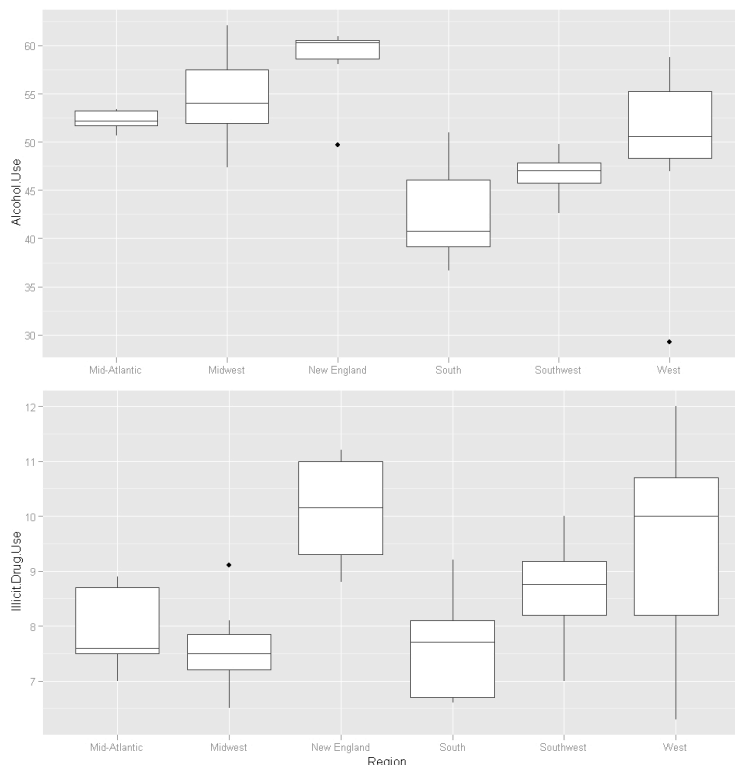


Figure 6: Alcohol Use by Region (top); Drug Use by Region (bottom), Low homicide rate regions (New England, West) are seen to be consistently above average with respect to alcohol and illicit drug use.

Indeed, when we plot alcohol use and homicide (**Figure 7**), we do observe indication of a negative relationship between the two variables.

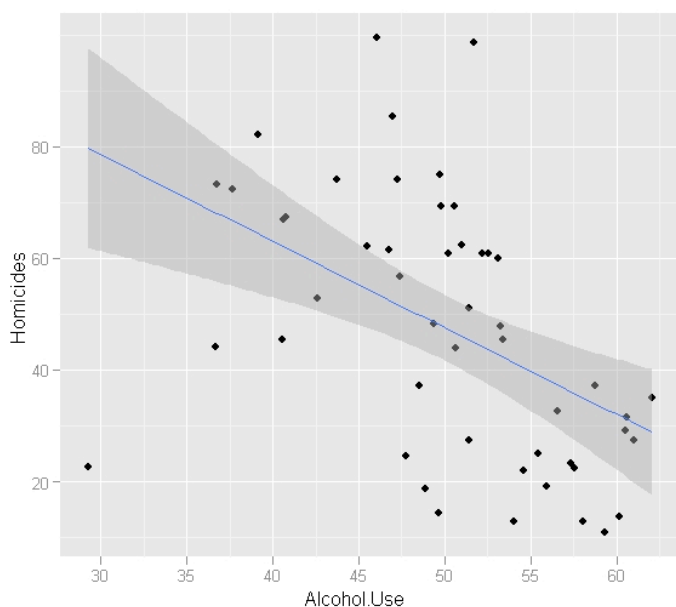


Figure 7: Homicide Rate by Alcohol Use, As alcohol use increases, there is a corresponding decrease in homicide rates.

We see that as alcohol use increases, there appears to be a reduction in the homicide rate, in general. The relationship does not appear to be as strong as those we've seen previously, as there is a substantial amount of variability in the response that is not explained by the alcohol use variable.

Though we do not present the plot, illicit drug use by homicide exhibited a similar relationship.

To further explore the relationship between these variables, we have produced maps (**Figure 8**), colored by alcohol use levels (top) and homicide levels (bottom). In the upper portion of Figure 8, we have a map depicting alcohol use intensity levels. There, the states colored in blue represent lower alcohol use levels and the states colored in red represent

higher alcohol use levels. The same coloring holds for the lower portion of Figure 8, but with respect to homicide rates rather than alcohol use levels.

Interestingly, we can see that there is strong evidence of the mentioned negative relationship in that the regions that are predominantly red in the upper map are predominantly blue in the lower map. This relationship is particularly strong in the Midwestern and New England regions of the United States. Indeed, we saw in Figure 6 that New England was the highest ranked region in terms of its alcohol use and the lowest ranked region in terms of its homicide rate.

We also saw that the Midwestern region is a leading region with regards to alcohol use and at the same time is one of the regions with the fewest homicides (ranked 4 of 6). Thus, the maps support the relationship between the two variables, which was reported in Figures 6 and 7.

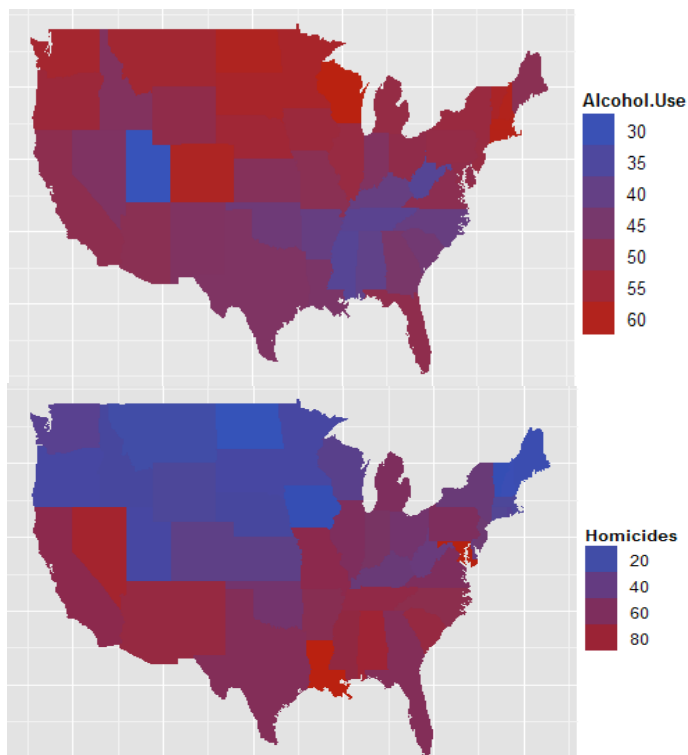


Figure 8: Alcohol Use (top), Homicide Rates (bottom). High homicide regions correspond to low alcohol use regions and low homicide regions correspond to high alcohol use regions.

Are youth trends related to homicide rates?

We next explore the relationship between homicide rates, teenage pregnancy, and high school drop-out rates. Upon initial consideration, neither teenage pregnancy nor high school drop-out rates would seem to have an obvious relationship to homicide rates. We may speculate that high school drop-out rates and crime may be related, but it is not immediately obvious that homicide should be one of the particular crimes impacted greatly by high school drop-out rates. We would, however, intuitively believe that high school drop-out rates and teenage pregnancy would be related.

The data shows that both variables are positively related to homicide and that the relationship between teenage pregnancy and homicide, in particular, may be quite strong. We conjecture that this relationship (teenage pregnancy and homicide) is primarily due to the relationship between teenage pregnancy and high school drop-out rates via the relationship between high school drop-out rates and poverty. That is, we anticipate that high teenage pregnancy regions also have high drop-out rates and high drop-out rates correspond positively to higher poverty rates. Thus given high teenage pregnancy rates, we should see higher poverty rates and therefore higher homicide rates.

To begin, we confirm that the relationship between high school drop-out rates and teenage pregnancy is strongly positive (graphic and details not included in report). This relationship is intuitive and redundant studies have been conducted regarding the socioeconomic impact of teenage pregnancy. Among these studies, education level is consistently mentioned as one of the outcomes most heavily affected. The

relationship will be used later in conjunction with poverty rates to justify the observed relationship between teenage pregnancy and homicide rates.

High School Drop Out Rates & Homicide

We begin by plotting homicide rates by high school drop-out rates in **Figure 9**. In Figure 9, we see that as high school drop-out rates increase, homicide rates tend to also increase. This relationship is reasonably strong by the appearance of the plot.

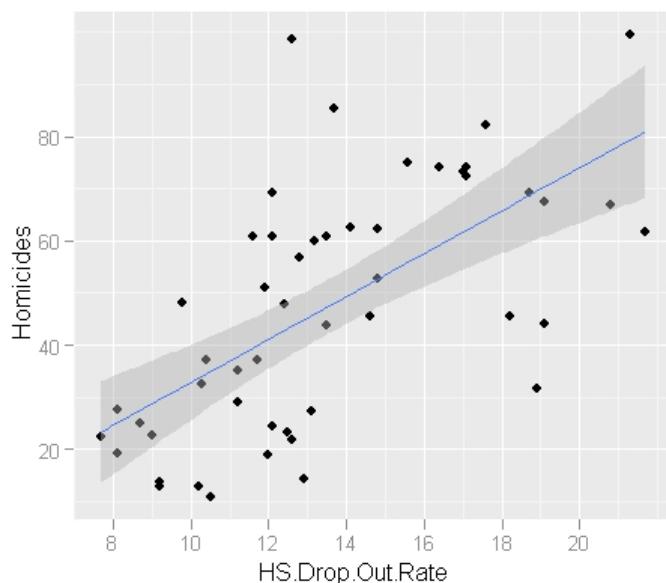


Figure 9: Homicide Rate by High School Drop-Out Rate, As the high school drop-out rate increases, there is a corresponding increase in the homicide rate.

We know from the first section of the present report (Figure 3) that poverty rates and homicide rates are positively related and it is natural to assume that income level and education level are positively related (we confirmed this, but have not included the graphic). That is, as education level increases so personal income also increases, and naturally, we should assume that as education increases, the poverty level diminishes. Thus, given this and because high school drop-outs would generally fall into lower income brackets, the relationship should not be surprising. As high school drop-out levels increase, poverty levels also increase which corresponds to the observed increase in homicide rates.

Teenage Pregnancy & Homicide

Given the relationship mentioned earlier between high school drop-out rates and teenage pregnancy, coupled with the relationship observed in Figure 9, we should not be at all surprised by the relationship found in **Figure 10**. There we have plotted homicide rates by teenage pregnancy rates and we see that there is a reasonably strong positive correlation. As teenage pregnancy increases, there is a corresponding increase in the homicide rate.

The 'fit' of the regression line in Figure 10 almost appears better than that in Figure 9, which is a bit surprising because we would probably prefer, intuitively, to name high

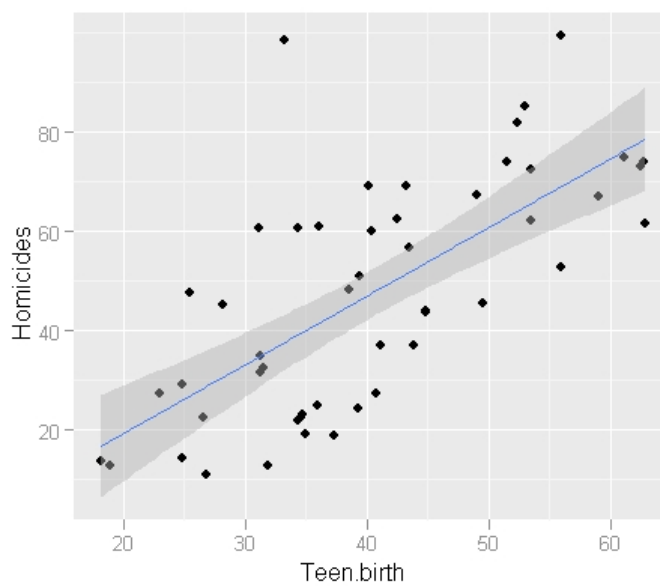


Figure 10: Homicides by Teenage Pregnancy, As teenage pregnancy increases, there is a corresponding increase in the homicide rate.

school drop-out rate as the stronger factor in judging changes in crime rates, as pregnant teens are not the only teens dropping out of high school. Additionally, we do not typically imagine that pregnant teens contribute a substantial portion to the homicide committing demographic. We fall back on the rationale used in the section summary to explain the correlation.

Is a state's approach to law enforcement related to its homicide rate?

The law enforcement factors considered in this report are the percentage of a state's annual budget which is spent on law enforcement and whether or not a state's justice system makes use of the death penalty. Attempting to interpret the issue of capital punishment is a matter of continuous debate, with policy makers generally split over the issue. As of 2008, approximately 60% of Americans supported the death penalty in homicide convictions and 35 of the 50 states utilized the death penalty.

Our data indicates that there is no particularly clear trend with regards to the amount of money spent on law enforcement across regions. We find that within both high and low homicide regions there is significant spread in the overall percentage of the annual budget being spent on law enforcement. We do however discover that there is likely to be a significant difference in the mean percentage of the annual budget being spent on law enforcement across capital punishment groups. That is, states *with* the death penalty typically spend a larger percentage of their budget on law enforcement than states without. We also see that within the majority of regions, states without the death penalty have lower homicide rates than states with the death penalty, and even further, homicide rates have actually increased since the installation of the death penalty among the 35 states which currently utilize capital punishment. We offer some interpretation of these results.

Law Enforcement Budget & Homicide

To begin, we plot the percent of the annual budget spent on law enforcement (**Figure 11**) by region. There we see that the spread in the budget variable is highest for the southern region, which leads the nation in terms of its homicide rate. We may hypothesize that some states are spending too little on police protection and this may be the reason they have such high homicide rates. In particular, we



Figure 11: Percent of Annual Budget Spent on Law Enforcement, The region with the most variability in percentage of annual budget spent on law enforcement is the southern region, which is the leading homicide rate region. All regions span the calculated mean percentage of annual budget spent on law enforcement of 3.9%

identify West Virginia and Alabama as the two states in the country spending the least (in terms percentage of their annual budget) on law enforcement and both of them are in the southern region. When we look at their homicide rates however, we are only able to tentatively confirm this hypothesis for Alabama. We see that West Virginia's homicide rate is only 44 in 1,000,000 people, a below average

figure, while Alabama’s homicide rate is 82 in 1,000,000 (double that of West Virginia), a well above average value. Additionally, we can see that the state spending the most on law enforcement is Virginia, which has a homicide rate of approximately 60 in 1,000,000 a moderately high value.

We next calculate the mean percentage of a state’s annual budget spent on law enforcement as approximately 3.9% and observe that for all regions, there are states in the above average spending range as well as the below average spending range. From these observations, we may begin to conjecture that the relationship between homicide rates and the percent of the annual budget spent on law enforcement will be mixed.

In **Figure 12** we have plotted homicides by the percent of the annual budget spent on law enforcement. While we do see some evidence that there exists a positive relationship between the two variables, the amount of change in the response which is not explained by the budget variable is likely to be great as there is a vast amount of observable variability.

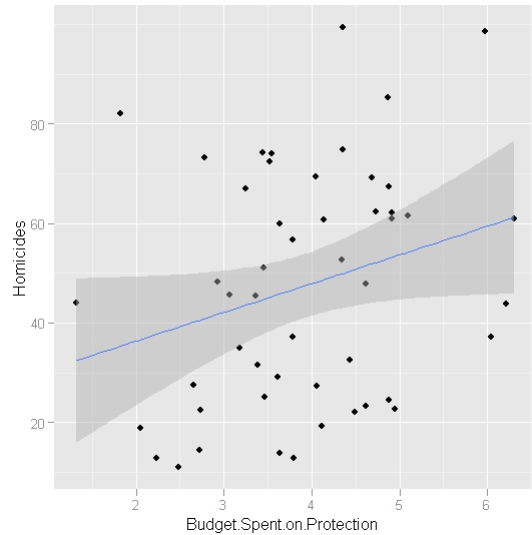


Figure 12: Homicide by Percentage of Budget Spent on Law Enforcement, The plot shows that there is some evidence that as budget increases, homicide rates also increase.

The relationship we do observe in the plot may seem counterintuitive in that as budget percentages increase, homicide rates increase. This indicates that states spending a larger percentage of their budget on law enforcement actually have higher homicide rates. Of course, one way to explain this is to say that the higher percentages are being spent *in response to* higher homicide rates. That is, states are spending more money in an attempt to reduce their homicide rates.

Death Penalty & Homicide

To further explore the relationship between budget and homicide, we facet the information found in Figure 11 by the categorical variable *death penalty* (**Figure 13**). In the graphic, we see that states spending a higher percentage of their annual budgets on law enforcement are typically states which implement the death penalty. We may interpret this observation in several ways.

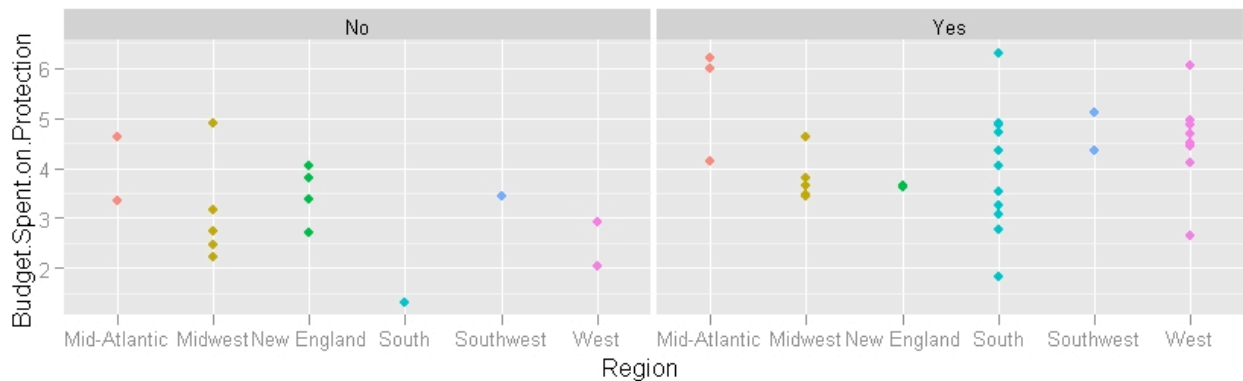


Figure 13: Percent of Annual Budget Spent on Law Enforcement by Region and Death Penalty, States which utilize the death penalty (Yes) appear to spend more on law enforcement than states which do not utilize the death penalty (no).

First, there is substantial evidence that the costs incurred by systems utilizing the death penalty far outweigh the costs incurred by systems utilizing a maximum life sentence penalty. These costs are often calculated as the sum of costs in the correction system, law enforcement system, and justice system. Thus, Figure 13 could indicate that the observable increases in law enforcement costs for states with the death penalty versus states without the death penalty is due to the increased costs of the death penalty system over the maximum life sentence penalty system. Second, we could utilize the rationale used alongside Figure 12. There we said that the increased costs were incurred by the state as a response to the higher homicide rates. We could maintain this and add that states implement the death penalty as a *further* response to their high homicide rates. That is, states not only increase law enforcement expenditures in their attempt to reduce homicide rates, but they also utilize the death penalty as a deterrent in order to decrease their homicide rates. Of course, there is substantial debate over whether or not the death penalty actually is an effective deterrent.

To briefly explore the question of deterrence, we begin by conjecturing that if the death penalty is effective at deterring crime and most particularly homicide, then we may expect to find substantially lower homicide rates in states with the death penalty. In **Figure 14**, we have produced a histogram of homicide rates by region and whether or not the death penalty is used. We see that for four of the six regions, the homicide rate is lower in states *without* the death penalty, and of the remaining two, New

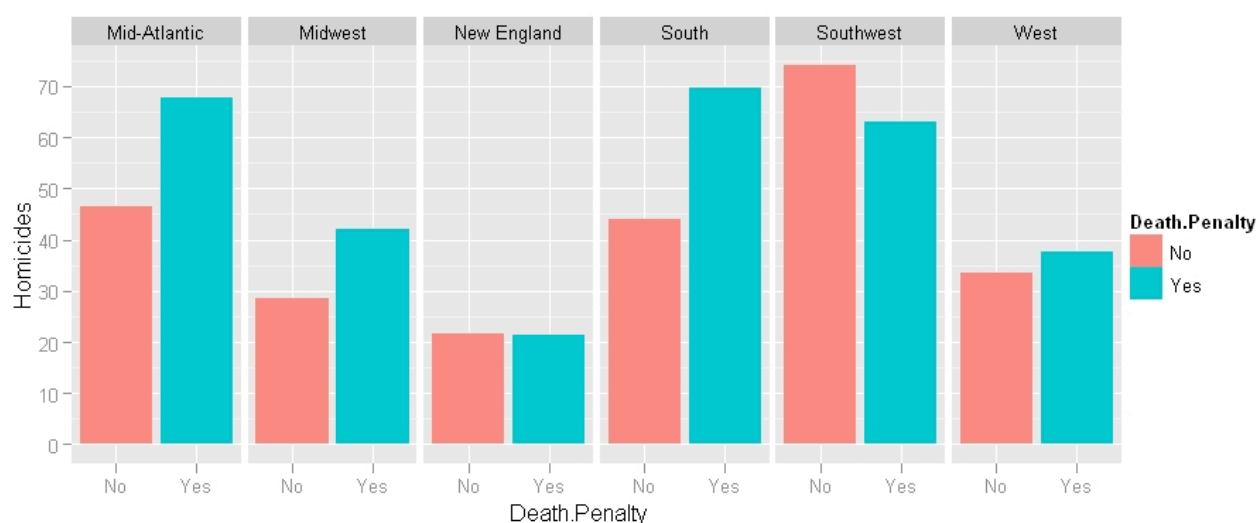


Figure 14: Homicide Rates by Region and Death Penalty, Four of the six regions have higher homicide rates in states which utilize the death penalty than in states which do not utilize the death penalty.

England has homicide rates equal in both categories. The relationship observed in these five regions certainly seems to contradict our conjecture and would seem to indicate the non-effectiveness of the death penalty as a deterrent. However, the claim may be made once again that the death penalty is being utilized in response to high homicide rates, which Figure 14 may also support. That is, states with high homicide rates may implement the death penalty in order to reduce their homicide rates (owing to its deterrent effect). However, when we consider that the death penalty has been in effect for the vast majority of the 35 states which utilize it since the 1970's (32 of the 35 states reenacted the death penalty in the 1970's), and our homicide rates are from 2005, this explanation seems thin. We would expect to see average or below average homicide rates in states with 25 years of death penalty deterrence. However, we observe the reverse.

Additionally, the relationship observed in Figure 14 when considered in conjunction with the previous graphic (Figure 13) also helps to explain the confusing result observed in Figure 12. There we saw that as law enforcement spending increased, homicide rates also increased. Since high expenditure states more often utilized the death penalty and since death penalty states are seen to have higher homicide rates, the positive relationship observed in Figure 12 between state expenditures and homicide rates is very likely due, at least in part, to the increased costs associated with the death penalty.

In our final graphic (**Figure 15**), we plot before and after mean homicide rates aggregated across all 35 states which currently utilize the death penalty. In this graphic we can see that the average homicide rate across these states has actually increased since the death penalty has been put in place. The increase is small, but this result in connection with Figure 14 may prompt us to question the value of the death penalty as a deterrent, in general.

To accurately study the value of capital punishment as a deterrent, we would need to examine changes in a state's homicide rate over time as well as consider the copious additional factors which certainly play a role.

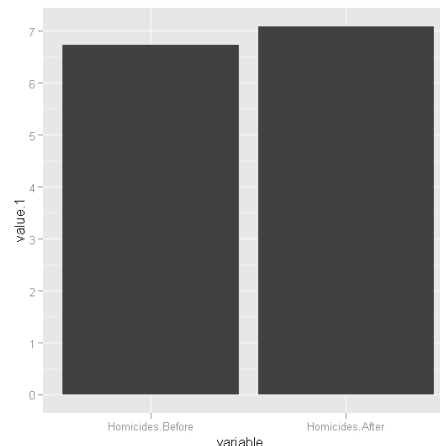


Figure 15: Before (left) and after (right) mean homicide rates for states which have the death penalty. The graphic shows that homicide rates have actually increased in states which utilize the death penalty.

Conclusion

Findings Summary

When we explored the relationship between economic factors and homicide rates, we were able to partially confirm our expectations. We saw that state poverty rates and unemployment rates were positively correlated with state homicide rates, which we would expect. However, we saw no evidence of a linear relationship between homicide rates and the welfare recipients variable. This latter result highlighted an ongoing debate over the effectiveness of the war on poverty initiative. Opinions regarding the effects of increased public assistance on poverty are split between those claiming it decreases poverty and those claiming it increases poverty. We conjectured that the reason the observed relationship between homicide rates and unemployment/poverty rates did not hold in the case of homicide rates and welfare recipients was due to the confused relationship between welfare and poverty, poverty being primary among the three variables.

The relationship between poverty and homicide appeared to be statistically significant and therefore, when we observed later that high school drop-out rates were positively related to homicides, we suggested that this relationship was due to the positive relationship between education and income level (i.e. higher education implies higher income, which implies lower homicide rates). The further question of the relationship between teenage pregnancy and homicide rates (positive relationship) was explained similarly as being due to the strong positive relationship between teenage pregnancy and high school drop-out rates.

Examination of the relationship between substance abuse prevalence and homicide rates yielded surprising (and confusing) results. We saw that in states with higher rates of alcohol and illicit drug use the homicide rate was typically lower. This unexpected result was confirmed by several graphics.

Finally, when we examined law enforcement factors and homicide rates, we saw that states spending more on law enforcement typically had higher homicide rates. When we later observed that states spending a larger percentage of their annual budget on law enforcement were also states with the death penalty and further that states with the death penalty were typically states with higher homicide rates, we reasoned that this positive relationship between budget expenditures and homicide rates was, in part, due to the increased cost of the death penalty over maximum life sentences.

Though nothing conclusive regarding deterrence can be gleaned from the data, we did find that states with the death penalty have higher homicide rates, which may support the abolitionist's point of view that the death penalty is not an effective deterrent. Because the death penalty was enacted in the 1970's by the vast majority of the 35 states which currently use it, we would expect to see homicide rates in these states reduce over the past 20-25 years to an average value rather than remaining as high as they are if capital punishment was as effective a deterrent as it is made out to be by its supporters. Additionally, we saw that the average homicide rates among the 35 states which currently use the death penalty is actually higher today than it was prior to the installment of the death penalty. The combination of these results may bring the value of the death penalty as a deterrent into question.

Further Considerations: Data

The data set includes the categorical variable region, and particular regions are shown to have substantially different homicide rates. We would like to incorporate demographic data (ethnicity breakdown, lifestyles trends, marital trends, population densities, etc...) on the regions so that we may begin to understand why we see such distinctions.

We would also like to include time series data on homicide rates (though perhaps this would significantly alter the structure of our dataset). As is, our data set includes current homicide rates for all states and homicide rates for death penalty states prior to the installment of the death penalty. Our data showed that homicide rates have increased in the death penalty states, despite the use of the death penalty. A time series of homicide rates may be able to further support or confute this finding.

Finally, we would like to collect homicide rate data on the largest city in each state. This would allow us to further explore the homicide rates variable and particularly the effect that population density has on homicide rates. This data could also help to explain the distinct homicide rates we find in different regions as well as why we find surprisingly different percentages of annual budgets being spent on law enforcement despite having similar homicide rate statistics.

Further Considerations: Additional Questions

Our data yielded an unexpected result in that both alcohol use and illicit drug use were seen to be negatively related to homicide rates. We were unable to explain this relationship within the report and would like to follow up on it. We were able to find studies which claimed that increased membership in

organizations like Alcoholics Anonymous and Narcotics Anonymous have a suppressing effect on crime rates and would like to follow up by examining this relationship in conjunction with our findings.

The relationship between teenage pregnancy and homicide appears to be stronger than the relationship between high school drop-out rates and homicide. This is a bit odd when we consider that it is not pregnant teens alone that are dropping out of high school. We would expect the relationship between teenage pregnancy and homicide to be weaker than the relationship between high school drop-out rates and homicide if our rationale (i.e. drop-out rates are positively related to poverty rates, which is positively related to homicide) given in that section of the report holds. We would like to try and make sense of this with a follow-up investigation, possibly including a further examination of the socioeconomic and criminal effects of teenage pregnancy.

Our analysis showed that regions spending a larger percentage of their annual budgets on law enforcement did not necessarily have higher homicide rates. We would like to further explore this by looking at rates of additional crime types. If we find that high crime rates, in general, are not the main factor in determining the percentage of the budget being spent on law enforcement, we would like to examine additional factors such as population demographics data in order to make some determination as to which factors may indeed be primary.

Finally, we would like to examine the death penalty as a deterrent using a time series of homicide rates in the hopes that we could further understand the deterrent (or non-deterrent) effect of capital punishment on the homicide rate.