

A collage of several photographs showing police officers at night. In the foreground, two officers stand near a dark sedan; one is gesturing while speaking. In the background, other cars are visible with their lights on. A yellow caution tape runs across the bottom left.

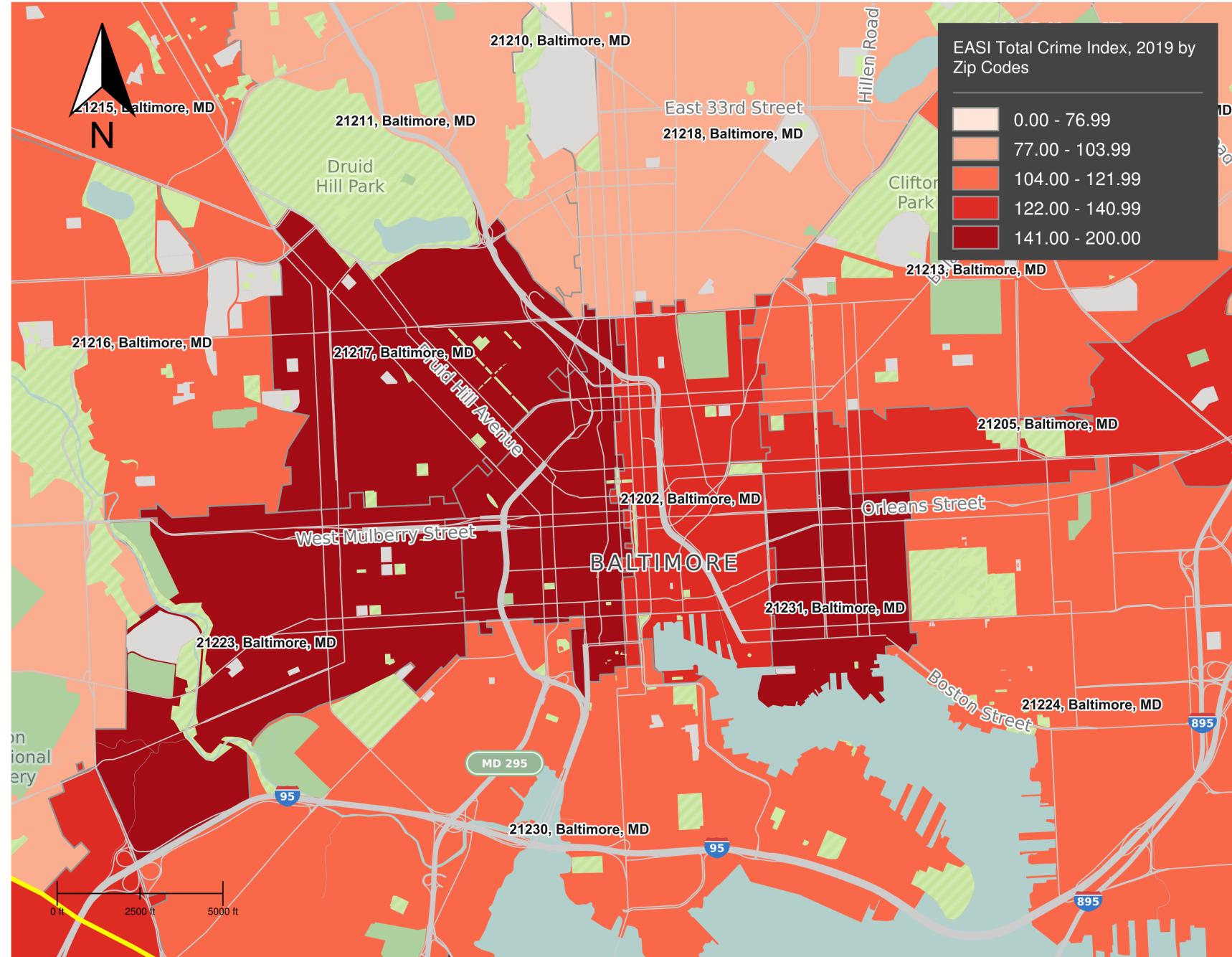
Discovering the driving
factors behind the high
crime rate in Baltimore

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“The city had the worst homicide rate among nation’s 50 largest cities last year, and the second-highest violent crime rate overall. ”

—Baltimore Sun

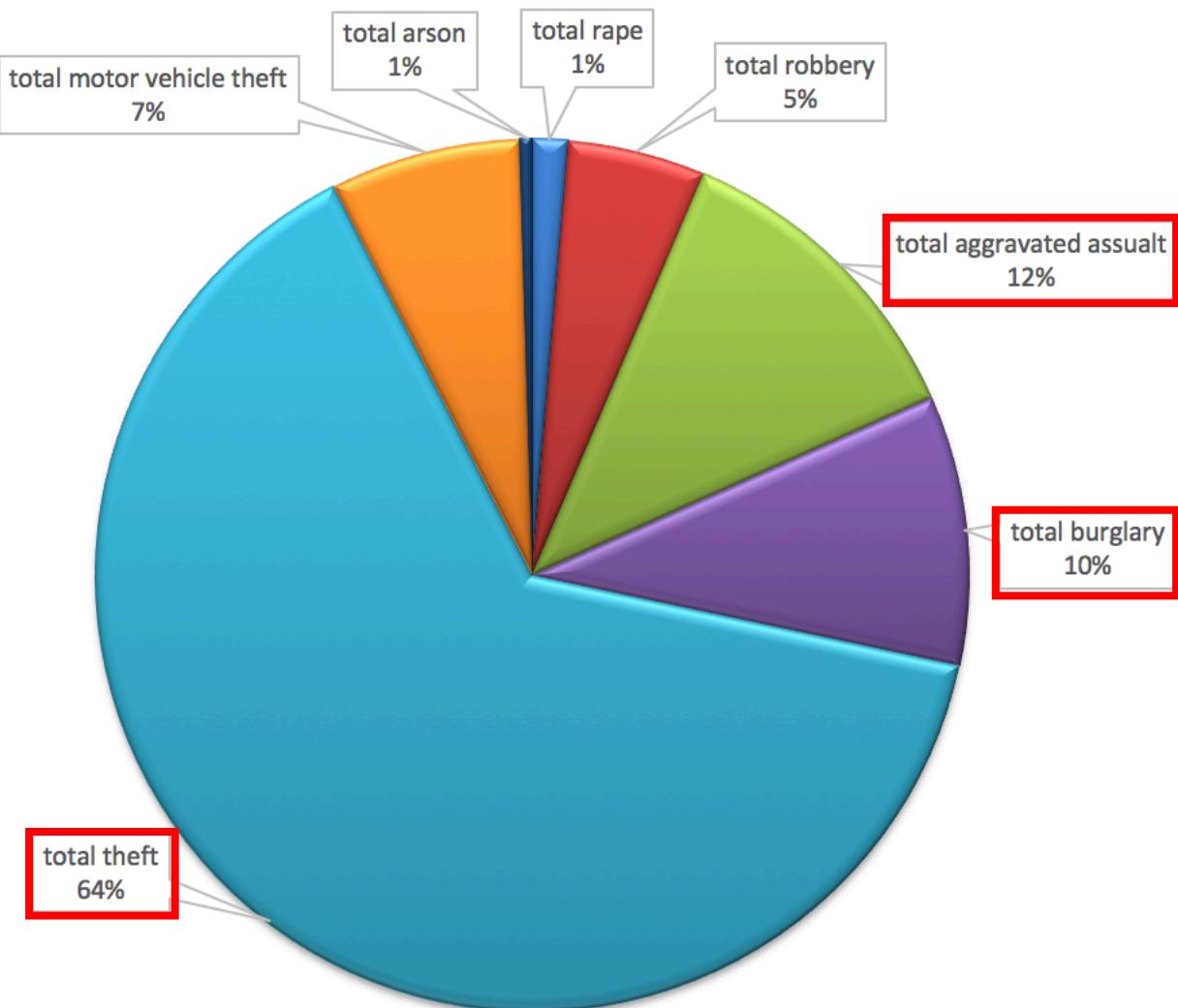




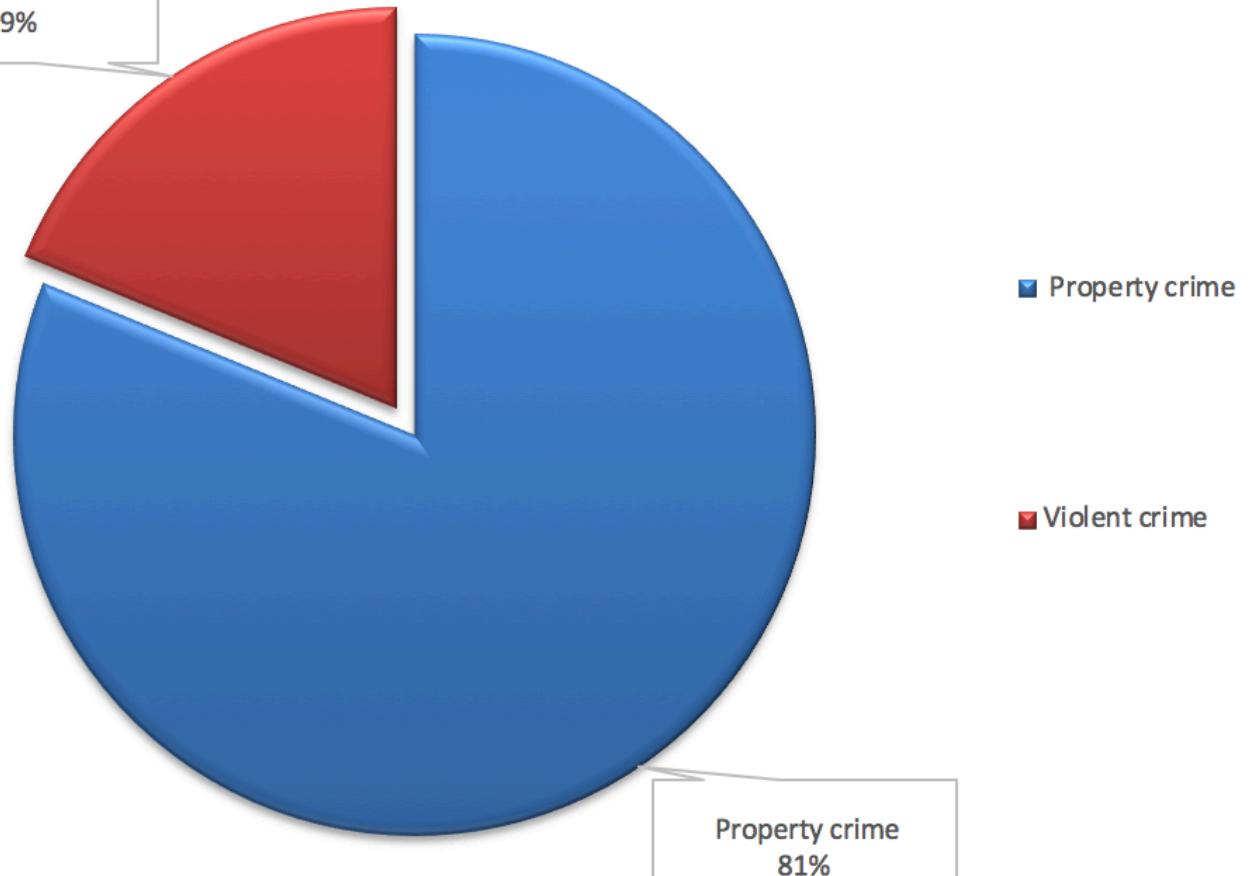
Heat map shows the crime occurrence with respect to location.

- Index of 100 is average crime level in US

2018 Crime Categories



- total rape
- total robbery
- total aggravated assault
- total burglary
- total theft
- total motor vehicle theft
- total arson



Initial hypothesis

Number of Crime

$$= \beta_0 + \beta_1 DO + \beta_2 IN + \beta_3 POV + \beta_4 POP + \beta_5 UNEM + \varepsilon$$

Where DO = Number of high school dropouts

IN = Median household income

POV = Total population in poverty

POP = Total Population

$UNEM$ = Unemployment

ε = Error of the model

Multiple Regression Analysis

Predictors

- Number of high school dropouts
- Median household income
- Total population in poverty
- Total Population
- Unemployment

Outcome

- Numbers of Crime

Multiple Regression Analysis - Property Crime

Regression Equation

Property Crime Count = $-62203 + 0.16131 \text{ Education: High School Dropouts}$
 $+ 0.3709 \text{ Median Household Income} + 0.00583 \text{ Total Population In Poverty}$
 $+ 0.09595 \text{ Population} + 0.01362 \text{ Unemployment}$

Coefficients

Term	Coef	SE Coef	95% CI	T-Value	P-Value
Constant	-62203	45903	(-189649, 65243)	-1.36	0.2469
Education: High School Dropouts	0.16131	0.07646	(-0.05097, 0.37360)	2.11	0.1025 ←
Median Household Income	0.3709	0.1743	(-0.1130, 0.8548)	2.13	0.1005 ←
Total Population In Poverty	0.00583	0.03188	(-0.08269, 0.09434)	0.18	0.8639
Population	0.09595	0.06229	(-0.07700, 0.26890)	1.54	0.1983 ←
Unemployment	0.01362	0.03468	(-0.08267, 0.10991)	0.39	0.7145

R-sq(adj)
23.33%

Multiple Regression Analysis

Regression Equation

Property Crime Count = $-57142 + 0.14080 \text{ Education: High School Dropouts}$
 $+ 0.3229 \text{ Median Household Income} + 0.09627 \text{ Population}$

Coefficients

Term	Coef	SE Coef	95% CI	T-Value	P-Value	
Constant	-57142	34901	(-142543, 28258)	-1.64	0.1527	
Education: High School Dropouts	0.14080	0.04703	(0.02573, 0.25588)	2.99	0.0242	←
Median Household Income	0.3229	0.1001	(0.0779, 0.5680)	3.22	0.0180	←
Population	0.09627	0.04690	(-0.01850, 0.21104)	2.05	0.0859	←

R-sq(adj)
46.75%

Multiple Regression Analysis – Violent Crime

Regression Equation

Violent Crime Count = 60903 + 0.07023 Education: High School Dropouts
+ 0.0227 Median Household Income – 0.01694 Total Population In Poverty
– 0.09107 Population + 0.01629 Unemployment

Coefficients

Term	Coef	SE Coef	95% CI	T-Value	P-Value
Constant	60903	33234	(-31369, 153175)	1.83	0.1408
Education: High School Dropouts	0.07023	0.05536	(-0.08346, 0.22393)	1.27	0.2733
Median Household Income	0.0227	0.1262	(-0.3277, 0.3731)	0.18	0.8660
Total Population In Poverty	-0.01694	0.02308	(-0.08103, 0.04714)	-0.73	0.5036
Population	-0.09107	0.04510	(-0.21628, 0.03415)	-2.02	0.1136
Unemployment	0.01629	0.02511	(-0.05342, 0.08601)	0.65	0.5518

$$\begin{array}{c} \text{R-sq(adj)} \\ \hline 57.86\% \end{array}$$

Multiple Regression Analysis

Regression Equation

Violent Crime Count = 61536 + 0.08172 Education: High School Dropouts – 0.09484 Population

Coefficients

Term	Coef	SE Coef	95% CI	T-Value	P-Value
Constant	61536	13813	(28873, 94200)	4.45	0.0030
Education: High School Dropouts	0.08172	0.02116	(0.03170, 0.13175)	3.86	0.0062
Population	-0.09484	0.02363	(-0.15072, -0.03896)	-4.01	0.0051

R-sq(adj)
67.29%

In summary

- In both models, the high school dropout rate and population are significant variables affecting crime rate in Baltimore.
- In the case of property crime, the median household income is the most significant factor, indicating that economic inequality may trigger crime occurrence. And the high population density offers more opportunities for property crimes, since the opportunity cost is relatively low.
- In the case of violent crime, it is interesting to find out that the high density can have a suppression effect on the crime rate.

Some Suggestions

For Government

- Shorten economic inequality between neighborhood areas

- Increase the average level of schooling

For YOU

- Go to places where there are lots of people around to avoid being attacked

- Not live in rich and highly-populated neighborhood to avoid property loss

References

- <https://nationalinterest.org/feature/why-police-cant-stop-crime-baltimore-34397>
- <http://myriammahiques.blogspot.com/2012/03/city-of-baltimore-is-dealing-with.html>
- <https://www.arcgis.com/apps/MapJournal/index.html?appid=9a4759b9343945a4b15facc98c22019>